Multimodal semiotics and collaborative design

a social semiotic approach to the co-production of virtual places and artifacts in Second Life

Gürsimsek, Remzi Ates

Publication date:
2012

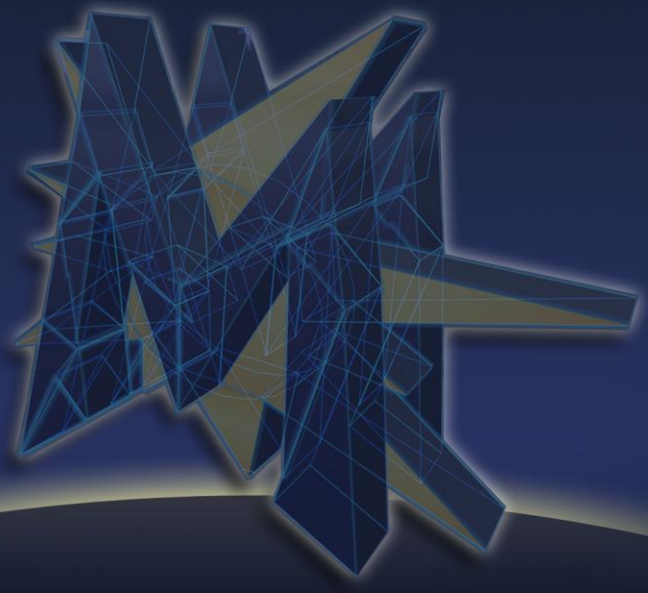
Document Version
Early version, also known as pre-print

Citation for published version (APA):
Gürsimsek, R. A. (2012). *Multimodal semiotics and collaborative design: a social semiotic approach to the co-production of virtual places and artifacts in Second Life*. Roskilde Universitetsforlag.

Multimodal Semiotics and Collaborative Design

A social semiotic approach to the co-production of virtual places and artifacts in Second Life

Remzi Ateş Gürşimşek



A dissertation submitted for the degree of Doctor of Philosophy
Department of Communication, Business and Information Technologies
Roskilde University, Denmark 2012

Prologue

'So it isn't the original building?' I had asked my Japanese guide.

'But yes, of course it is,' he insisted, rather surprised at my question.

'But it's been burnt down?'

'Yes.'

'Twice.'

'Many times.'

'And rebuilt.'

'Of course. It is an important and historic building.'

'With completely new materials.'

'But of course. It was burnt down.'

'So how can it be the same building?'

'It is always the same building.'

I had to admit to myself that this was in fact a perfectly rational point of view, it merely started from an unexpected premise. The idea of the building, the intention of it, its design, are all immutable and are the essence of the building. The intention of the original builders is what survives. The wood of which the design is constructed decays and is replaced when necessary. To be overly concerned with the original materials, which are merely sentimental souvenirs of the past, is to fail to see the living building itself."

Douglas Adams, 1990, Last Chance to See[1]

[1] (Adams and Carwardine 1990: 141)

Acknowledgements

I am very grateful to all my fellow colleagues at Roskilde University, who made me feel at home since my very first day in Roskilde. During my three years of intensive learning, teaching and research at RUC, Sisse Siggaard Jensen has not only been a wonderful supervisor and a wise mentor to me, but also she was a joyful travel companion, an ideal team-leader and a dear confidant with whom I will always be glad to be acquainted. I am also thankful to all members of the *Sense-making Strategies and User-driven Innovation in Virtual Worlds*[1] research project, among whom CarrieLynn Reinhard, Chris Olson, Lisbeth Frølunde, Ursula Plesner, Frank Wagner and Mette Wichmand has particularly supported my work with their valuable ideas, comments and efforts that made this dissertation come to life. Maren Hartmann from the University of the Arts Berlin has also contributed with her insightful comments and critiques. My research group, *Knowledge Production and Communication*, has provided an inspiring and lively environment to share and discuss my research perspective, and receive valuable feedback from colleagues. Among my fellow colleagues at RUC, I am especially grateful to Louise Phillips, Lisbeth Thorlacius and Dixi Louise Strand for their valuable input during a very critical stage of my analysis. Stanford University's Human-Sciences and Technologies Advanced Research Institute, particularly professors Keith Devlin, Michael Shanks and Jeremy Bailenson, as well as Innovation Center Denmark and the Danish Agency for Science, Technology and Innovation have helped me expand my vision, and engage in a new world of innovation. During this inspiring experience, my colleague and good friend Damon Hernandez provided much inspiration and motivation, for which he deserves a warm greeting and a nice bottle of wine. I would also like to thank all the participants in the case studies. I really appreciate the time and effort they have invested in helping me learn more about virtual worlds, and I hope the outcomes of this research could contribute to an understanding of their inspiring practices, and could help improving their experience.

My parents, Isik and Selcuk Gursimsek deserve thanks for not only for their always-supportive attitude but also for all the ideas, inspirations and confidence they have provided me.

Finally, last but definitely not least, my dear wife and companion Ödül Akyapi Gürsimsek deserves the warmest of all thanks. Ödül and I have been involved countless hours of brainstorming, arguing, co-writing, editing and deleting very important parts of this dissertation. Not even a sentence here could have been done without her..

[1] The research presented here is part of the Virtual Worlds Research Project and was partly funded by the Danish Strategic Research Council, KINO committee (grant no. 09-063261).

Multimodal Semiotics and Collaborative Design

A social semiotic approach to the co-production of virtual places and artifacts in Second Life

---

Detailed Table of Contents

List of Figures

List of Tables

List of Abbreviations

AR: Augmented Reality

CAD: Computer-Aided Design

CVE: Collaborative Virtual Environment

GUI: Graphical User Interface

GTM: Grounded Theory Methods

HCI: Human-Computer Interaction

MDA: Mediated Discourse Analysis

MMORPG: Massively Multiplayer Online Role-Playing Game

MUVE: Multi-User Virtual Environment

PAL: Pop Art Lab

SL: Second Life

RL: 'Real Life'

VE: Virtual Environment

VHIL: Virtual Human Interaction Lab (Stanford University)

VR: Virtual Reality

VW: Virtual World

1. Introduction

Virtual places and Second Life cases

Places are complex sign-systems. The construction of a place depends not only on the organization of objects and visual elements in physical space, but also on the semiotic potentials they present for meaningful human (inter-)action. When people interpret and respond to the discourses in places by participating in the social world, they also transform the social contexts in which spaces become semiotized. Therefore, the affordances and constraints of the socially available tools and resources for (co-)production and circulation of mediated discourses affect the characteristics of potential social actions that are enabled by certain places. Places not only represent particular affordances and constraints for various social actions, but also bear traces of the socio-cultural and the technological environments in which they come to being as useful and meaningful signs.

In this respect, virtual worlds (VWs) are also *places*. Virtual places represent, and in many ways simulate the three-dimensional spatial experiences and provide their users with various social affordances to use and co-produce these communicative environments. Previous research has shown that people often tend to interpret virtual places and artifacts in ways influenced by their physical counterparts, and they choose to behave in certain ways comparable to real-world[1] behavior[2]. On the other hand, VWs are not physical spaces in which human bodies and physical objects interact; but they are multimodal interactive representations of spatial phenomena that are appropriated into the virtual realm. Therefore, virtual places represent their makers' rhetorical intentions, and the ways in which they imagine the users to experience the places of a VW.

Second Life (SL) is a VW made of connected places that are aimed at avatar interaction and designed by processes of co-production. It is a digital platform that exemplifies how these so-called 'worlds' are co-produced by their users as interconnected virtual places and artifacts. Users of SL often form small-to-large groups of avatars to build virtual places for their collective purposes, to express their aesthetic talents, and to participate in collaborative projects which offer new mediated experiences to SL users. SL provides these content designers certain tools and resources to generate the places and artifacts, or to import certain assets from other digital platforms.

[1] I use the term 'real-world' cautiously, as I consider the interactions in SL as a part of the so-called *real* world. The fact that user actions are digitized and translated in VWs do not make them any less real than interacting with a computer, sitting on an actual chair, or forming wood to make a chair. In the following chapter on social semiotics and multimodality, I will further discuss my perspective on the real-virtual dichotomy.

[2] In the following chapters, I will discuss some of these works; for instance the notion of 'transformed social interaction' (i.e. Bailenson et al. 2004, Bailenson and Yee 2005, Bailenson et al. 2005, Bailenson and Beall 2006), place metaphors (Prasolova-Førland 2008), and the ways in which the design of virtual places can be affected by the metaphors of everyday life (i.e. Book 2004, Taylor 2009).

In this analysis, my central research question aims to investigate how these virtual places and artifacts are designed by the SL users as certain experiential, interpersonal and textual compositions of meaning; and through which channels these compositions communicate with the visiting avatars. The methodological aim here is to explore the ways in which these collaboratively designed and produced places can be framed and studied as multimodal semiotic phenomena in order to understand how the co-designers construct meaning and action potentials.

The analysis foregrounds the co-designers as social actors, and the processes through which they use the mediational means to co-produce experiential, interpersonal and textual potentials for avatar interaction. Therefore, the social VW of SL is the frame of reference for my study of collaborative design of virtual places and artifacts. I will present, analyze and discuss findings from three case-studies as part of the qualitative research project that I have conducted in SL from 2009 to 2011. I will also present the overall research question and subsequent operational research questions that have guided the analysis. In the following sections, I will frame the field of research by briefly discussing the relevant approaches to the study of virtual places; and the notions of co-design, co-production and user-generated content in digital media, in order to substantiate the research objectives and questions.

Co-production and user-generated content in digital media

As mentioned above, SL is a digital VW platform that provides its users with affordances for communicating in three-dimensional shared virtual places, using interactive artifacts, and various tools for collaboratively generating the VWs contents (i.e. Bruns 2008, Boellstorff 2008). Therefore, it can be considered a social media platform that is driven by social creativity and user-generated content. Research in media and cultural studies often emphasize the emerging role of the Internet as a social platform for communication, user-generated content, sharing and community building (i.e. Fuchs 2011b, Castells 2009). Digital communication scholars study the changing user-producer relations in online communities through the advent of 'social media' platforms, and explore the radical changes in the system architectures of digital media. Drawing on this perspective, the study of collaborative design and place-making in SL is a relevant and particularly rich field of observations, as the VW platform affords its users to generate the world's content, and form social groups for creative collaboration.

In fact, the spatial logic has been used by various researchers to explain the dynamic networks of online communication and collaboration. For instance, in 'The Rise of the Network Society' sociologist Manuel Castells (2010) defines an emerging *information technology revolution*. According to Castells (2009, 2010), space is a social product, and the new communication

technologies introduce new social ways of perceiving and producing spaces. The social practices that take place in these new social spaces are marked with a *nonlinear spatial logic*, the logic of *space of flows*, which describes the complex networks of co-production and social control (Castells 2009).

The advent of digital communication platforms gave way to not only new spatial practices and resources for place-making but also new methodological frameworks and research designs, the variety of which extends from the broad framework of internet research (Mann & Stewart 2000), to the so-called virtual methods (Hine 2005) or virtual ethnographies (Hine 2000) and to research in CVEs (Schroeder 2011). Particularly with the emergence of notions such as 'collective intelligence' (Lévy 1997), web 2.0. (O'reilly 2005) and 'convergence culture' (Jenkins 2006), research on co-production activities in digital media increasingly gained attention. O'Reilly's framing of the so-called 'web 2.0' emphasizes the role of collaborative content-generation and collective meaning-making as emerging global phenomena, and provides a theoretical backdrop for the study of online digital platforms and the cultures of collaborative social networks such as SL. The socio-cultural theories on networked societies and co-production of user-generated content often refer to the notion of 'collective intelligence', which was coined by French media scholar Pierre Lévy (1997). In his book, Lévy outlines a social history of space as: nomadic space, territorial space, industrialized spaces of commodities, and *knowledge space* that is made possible by sharing and co-production of knowledge through global information networks. Although Lévy's ideals may seem far-fetched and not realistically correspond to the institutional development of the commercial Web, his analysis of transformations of social space has influenced many contemporary theories. His concepts 'collective intelligence' and 'knowledge space' are important notions for the analysis of digital media. American media scholar Henry Jenkins' theory of 'Convergence Culture' (i.e. Jenkins 2006, Jenkins et al. 2009; also see Defilippi et al. 2006) is among the most popular interpretations of Lévy's ideas on a larger socio-cultural scale. In this, he focuses on issues such as the structures of participation and power relations between media users (as consumers) and media producers. In Jenkins' view, media users hold a certain amount of power through their selective behavior as consumers, while digital media technologies allow production and consumption to be democratized. On the other hand, critiques of Jenkins' convergence culture idea (i.e. Fuchs 2011a, 2011b) focus on the limitations of participatory culture and the challenges for participatory democracy. They emphasize issues of politics, *power, corporate domination* and *exploitation*. Fuchs (2011b) advocates the use of the notion 'prosumption' to explain the intricate relations of production, consumption and surveillance in Web 2.0 communities.

Media and cultural studies scholar Axel Bruns (2008) rejects the notion 'prosumption' and emphasizes the active participation and transformative agency of user activities in new media production. Bruns coins the term 'produsage' (Bruns 2008) in order to explore user-generated content in contemporary social media platforms including blogs, Wikipedia and SL. Communities of content creators can think and act collectively, and explore creative uses of tools and resources. Therefore, the structure of produsage communities is in constant flux. Although these notions in Bruns' perspective can be criticized with regard to the specific context of SL, his analysis of collaborative content creation activities in a wider spectrum social media is useful to understand the similarities and differences of these co-creation activities and the affordances and social conventions of platforms. The ideas and theories of media and communication scholars about the power relations, social control and exploitation in relation to online co-production activities affects my framing of media meanings and power relations in SL (i.e. Bonsu and Darmody 2008). On the other hand, several characteristics of SL distinguish it from conventional social media platforms, as it is a social VW with affordances for real-time interaction of avatars in three-dimensional shared places. Thus, the analysis focuses on such characteristics that create a *sense of place* in SL.

Research on virtual places

As I mentioned above, the analysis of SL emphasizes the framing of VWs as *places*, which accommodate both experiential and semiotic experiences of individuals in computer-mediated, multi-user, persistent virtual environments (Bartle 2004). In this perspective, digital platforms such as SL differentiate from both the places in physical world and the two-dimensional graphical environments of the World Wide Web, as they provide their users with a collaborative platform to experience both synchronous and asynchronous communication in a shared three-dimensional representation of space (Ondrejka 2005, Damer 2009). The spatial characteristics of interaction in SL provide specific affordances for verbal and non-verbal communication (Schroeder 2011) and the use of avatars as personal mediators (Jensen 2012). The experiential perspective to virtual places therefore considers the representational, metaphorical and performative aspects of virtual world-making (Jensen 2012) as constituents of a social semiotic analysis to uncover the meaning potentials in SL's places and artifacts.

Previous research studies on meaning and design in VWs have studied relevant issues such as the phenomenology of *sense of place* in digitally mediated communication (Maher and Simoff 2000), the underlying physical rules and their effects on user experience (Santos 2009), the relations between the design of VWs and architecture (Bridges and Charitos 1997), the semiotics of religious spaces in SL (Leone 2011), or the effects of real-world spatial metaphors on the construction of the virtual environments (i.e. Book 2004, Prasolova-Førland 2008, Taylor 2009). Design and

innovation studies researchers have also studied various VWs to explore their affordances and creative potentials for physically located but virtually co-located design processes (Gu et al. 2011), the ways of 'thinking together apart' in distributed design teams (Larsson 2003), the methods of object based collaboration (Wadley and Ducheneaut 2009), and avatar base innovation (Kohler et al 2009). From a design-oriented perspective, the collaborative design environments in VWs have also been defined as *virtual* or *distributed design* studios (Maher and Simoff 2000, Reffat et al. 2008, Weiley and Pisan 2008). All these interrelated research perspectives on the study of place-making and design in VWs emphasize the construction of meaningful user experience through the design of meaningful places; or, in other words, transforming the virtual space into 'inhabited place' (Weiley and Pisan 2008). Therefore, the framing of VWs as places and the emphasis on design as construction of meaningful environments invites a social semiotic approach, which provides a framework to study collaborative design of virtual places as a social practice of making multimodal meaning systems in particular contexts with socially available mediational means and semiotic resources.

In this analytical perspective, the social world of SL provides a necessary socio-technical backdrop for the proliferation of a design culture (or several design cultures) (Julier 2008) through the collaborative practices of SL users, and the ways in which they generate new meaning potentials. Place metaphors and the visual codes of the offline culture can provide the VW designers with certain clues and recognizable associations in design of virtual places; however, the co-designers' explorations of the semiotic potentials in SL can possibly surpass the conventional physical norms of place-making (Book 2004, Taylor 2009). It is the co-designers' task to turn their rhetorical intentions into 'semiotically shaped material' (Kress 2010) for the users to experience. On that note, the perspective of co-design and co-production takes the phenomenological aspects into account, as collaboratively designing and producing places and artifacts requires various discursive negotiations, as well as movements and collective actions in space and time. Although the research literature mentions certain relevant issues, such as the phenomenology of mediated action and transformed social interaction in virtual places or the affordances of SL for collaborative design, I believe the theoretical and empirical perspectives on the socio-cultural aspects of place-making and design with a multimodal semiotic perspective are still absent in the research field. Such a research perspective provides the potential to analyze the meaning resources in virtual places as design elements, and investigates the relations between affordances and particular design decisions about the construction of avatar interaction in three-dimensional places. Therefore, the analysis intends to contribute the research field by providing a model for the analysis of modes and meaning potentials in design of virtual places, and to support the multimodal perspective by the analysis of the co-designers, the design tools and the processes of collaboratively generating the VWs content.

The analysis emphasizes *affordances* and *constraints* as semiotic potentials; thus, it considers SL both as a VW for mediated social interaction and a digital platform for user-generated content.

Social semiotics and the multimodal approach to communication

In order to study the co-production of meaning potentials in SL, I use the multimodal social semiotic approach to communication, and a methodological blend of multimodal analysis with the methods borrowed from socio-cultural analysis of *mediated social action*. The social semiotic approach follows the systemic functional tradition introduced by critical socio-linguist Michael A.K. Halliday (1978, 2007). Social semiotics explores sign making in relation to the social contexts of communication and the semiotic resources that are socially available for generating meaning potentials. The systemic framework for the social semiotic analysis of language points to three fundamental (meta-)functional components as "ideational, interpersonal and textual meta-functions (Halliday 1978, 2007). In social semiotics, the dynamic relations of semiotic resources, and their *meaning potentials* of particular *contexts* are emphasized.

Other socio-cultural approaches have developed upon Halliday's socio-linguistic model, in particular the theories of multimodal discourse by Gunther Kress and Theo van Leeuwen (i.e. Kress and van Leeuwen 2001, van Leeuwen 2005, Kress 2010); phenomenological explorations of time, space and movement in mediated spaces by Jay Lemke (2002, 2005, 2009a, 2009b) and the mediated discourse analysis (MDA) approach to study social actions by Ron and Suzie W. Scollon (i.e. Scollon 2001, Scollon and Scollon 2003, 2004, Norris and Jones 2005) among others. The multimodal approach to social semiotics is central to my analysis, as I am interested in the dynamic interplay of various modes in design of virtual places –including, but not limited to image, text, sound and 3D objects – and how their meaning potentials are organized within the designs. For the multimodal analysis, I appropriate the three meta-functions as *experiential, interpersonal* and *textual*, by mainly following Michel O'Toole's (1994, 2004) systemic functional model on architecture. On the other hand, I revise O'Toole's model and produce a new conceptual matrix for analyzing the meta-functions and spatial ranks of scale in virtual place-making.

The rhetorical approach sees the social dimension of sign-making as a central element. Therefore, I borrow particular analytical concepts to explain the rhetorical dimension from the Mediated Discourse Analysis (MDA) (Norris and Jones 2005) stream of the theory, including Ron and Suzie Scollon's *nexus of practices* (Scollon 2001, Scollon and Scollon 2004). Therefore, my analysis includes the social actors, their practices, and their interpretations of the context of these practices as analytical objects. With this approach, not only are the textual qualities and internal semiotic organizations of resources within designed places and artifacts of analytical interest, but so are the

contextual factors of collaboratively designing in a virtual world such as SL. This understanding has a central role in the construction of my main research question, and the emphasis on socio-cultural dimensions of semiotic co-production. The nexus analysis section of the analysis provides possible answers to the research question in terms of its emphasis on the materiality of semiotic processes, and the investigation of the relations between meaning-making practices and mediated social interactions through digital means. This perspective also supports the framing of collaborative design processes as socially and technologically contextualized practices of semiotic production.

Analyzing design as construction of meaning and action potentials

The meaning-oriented perspective of social semiotics, and the experiential view of places that foregrounds the phenomenological perspective, invites the consideration of design as a central issue for the analysis. Within the survey of literature, I refer to the descriptions of the notion *design* proposed by various theorists in order to emphasize the prospective, dialogic and semiotic nature of the design activity and the solutions to design problems. In this view, designing can refer both to the construction of significations (Krippendorff 1998) or representations (Wisser 2006), and to a primitive human activity to shape, order and give meaning to the environment (Papanek 1984, Heskett 2002). In both cases, the role of design in the construction of meaningful human experience is related to its rhetorical and prospective character, which implies the initiation of change in the material world (Jones 2009 [1992]).

The analysis often refers to the notions of *affordances* and *constraints* as analytical foci, since these notions are found useful for explaining the relations between the designers' decisions and the users' interpretations about the meaning and action potentials in a social and material ecology of humans with useful objects (i.e. Gibson 1986, Norman 1988, 1998, 1999, 2008). The perspective of affordances and constraints is helpful in explaining the spatial practices, and the socio-technical environments in which people interact with spaces. The empirical perspective on affordances also provides an epistemological bridge between social semiotics and design theories, as these concepts are relevant for the study of multimodal meaning potentials in particular contexts. In addition, a socio-cultural perspective on virtual places and co-production requires that we consider the mediational means, or the media tools, and their affordances for certain communicative practices. As media and communication studies professor Klaus Bruhn Jensen (2010) advocates in his book on media convergence, the relationship between media meanings and media technologies depends on such communicative possibilities or improbabilities in our use of these as mediational means:

> Media technologies determine communication, but only in the first instance – in the negative sense of deciding which communicative practices are impossible or improbable, and in the positive sense of presenting affordances that constitute new windows of opportunity. Affordances are only actualized in steps and stages of social innovation and collaboration (Jensen 2010: 164).

Therefore, design is considered a social and communicative process, and affordances are the emergent semiotic potentials, through which designers organize the social environment of communication. The meaning-oriented design theories mention the unpredictability of design situations (Buchanan 1992) and the 'reflexive conversation' between the designers and the contexts (Cross 2007 [1990]), which often causes the design problems and the potential solutions to develop simultaneously (Wisser 2006). Especially in collaborative design cases, where the decisions on design solutions are based on the negotiations of co-designers, the social semiotic framework to meaning-making is relevant. Therefore, the analytical framework for the study of collaborative design in SL considers the dynamic social nature of the design projects, and the situations in which social relations of meaning and power are interweaved.

The research question

With this brief introduction, some of the central concepts in this study have been addressed. In the following chapters, the notions of virtual places, multimodality and semiotic potentials, and the collaborative design practices will be further examined. I use this interdisciplinary theoretical framework to anchor my analysis in existing research and to give grounds for the analytical approach and research question. The aim of my analysis is to study the collaborative design and co-production in SL as *social practices* in *situated contexts*. Therefore, I will ask questions about how different designers experience collaborative design processes in SL, and how they reflect on particular affordances and constraints of the platform within their individual and collaborative practices. In this approach, the overall research question is:

> How do the VW users co-produce multimodal meaning potentials in virtual places and artifacts through collaborative design, as exemplified by the social semiotic analysis of the three case studies in SL?

I suggest a multimodal sign-making oriented research study to analyze the co-design of places as cultural co-production of messages, where users transform their rhetorical intentions into experientially, interpersonally and textually semiotized virtual places. Collaborative design in SL is considered a communicative activity with unique characteristics, problems and solutions. Both the solutions and the problems of design are pre-conditioned by the socio-technical environments of

creative collaboration, and creative ideas can depend on either individual insight or collective processes (Hargadon and Becky 2006). Thus, SL is understood both as a cultural product and as a social context in which semiotic practices unfold. I will argue that for a complete and coherent social semiotic investigation of multimodal sign-making, it is necessary to amplify this nexus of actors, places and practices in the analysis. From a social semiotic perspective, places provide a rich foundation for functional and multimodal semiotic arrangements that are made possible by the interactions of various actors, practices and discourses in social contexts. In this respect, virtual places and artifacts are not much different in terms of their experiential, interpersonal and textual semiotic potentials that represent the historical situatedness of design contexts.

The analytical framework, which I am about to introduce in subsequent sections and chapters, aims to guide my observations and analysis of co-design activities in their actual social places and to also include factors of inworld interactions. I will explore the patterns of social relations and meaning-making structures of the social practices of collaboration and co-production. To do so, I focus on two operational questions. First, I ask how social actors, places and practices of co-production form context-bound nexuses of practice in order to engage with and give meaning to SL's affordances and constraints for collaborative content generation. The relevant sections of analysis, therefore, focus on the social actors, the mediational means, and the processes in and with SL. Consequently, I focus on how designed places and artifacts reflect the co-designers' rhetorical intentions through multimodal representations of socio-semiotic meta-functions. Here, the analysis mainly draws on the systemic functional framework, and discusses the ways in which virtual places and artifacts present experiential resources for movement and interaction, interpersonal resources for meaning-making and socialization, and textual resources to imply the intertextual relations between the internal and external components of the virtual place.

Three case-studies in Second Life

SL was selected as the field for observation and data production for two major reasons: the affordances of the user-interface for content creation and modification, and the participatory socio-technical infrastructure that underpins the proliferation of a unique 'design culture' in SL (Julier 2008). I build the analysis on a multiple case-study approach with the purpose of covering a wider range of contexts and experiences that contain collaborative design practices, and to be able to compare how certain socio-technical affordances affect the final products of designing.

Between 2009 and 2011, I conducted three case studies, in which I observed, worked together and interviewed virtual world designers with varying levels of expertise and experience in SL. I aimed to explore not only commonalities but also differences between and within cases. The collaborative

projects in each case of study show similarities in terms of their environments and tools for content-generation, but also differences in terms of the contexts and products of designing. The collaborative practice is an important criterion for the selection of cases. The three case studies are:

- ***Metrotopia***: participant observation of the multidisciplinary design process of a virtual laboratory (Metrotopia) and interviews with co-designers.
- ***Pop Art Lab*** (PAL): observations and in-depth interviews with the co-designers of a streaming music sim in SL funded by a Danish national cross-library organization
- ***Student workshop***: Communication and Design in VW: teaching, observations and focus group interviews with fifteen international students

The participants are often referred to as *designers*, *co-designers and builders* throughout the text. This difference in classification results from their context-bounded roles within the overall process of semiosis; in that, *designer* is used to describe a participant engaging in an individual content generation activity, whereas *co-designers* connote all direct contributors of collaborative projects whether they create objects or only ideas. *Builder* is the native term, which is used by content-generating residents of SL to connote builders of 3D objects. This term is often used in the interviews in order to communicate with appropriate terminologies.

A range of data collection methods has been used depending on the context and availability of observable participant practices and their experiences. The mixed methodological approach has provided an overall analytical mapping of how residents make sense of affordances for co-creating content. The mixed methods data collection has enabled me to observe instances of idea-generation, problem-solving and knowledge sharing while concurrently questioning how designers make sense of these processes with relation to their general virtual world experience. In-depth interviews have served this purpose.

Interventions and re-assessment of empirical categories, as well as methods of triangulation and participation are considered during different stages of the process. Follow-up interviews and long-term partnerships with some of the participants have allowed me to access cases during various 'moments' of collaboration. Furthermore, by participating in collaborative design and learning activities, it has been possible to gain first-hand experience with building, during simultaneous observations of SL builders and builder communities in their cultural contexts. Participant observation throughout the design process also enabled me to examine the changing roles of various actors during several inworld and offline stages of the process (Hine 2005, Deacon et al. 2007). Also, in-depth interviews with expert designers and novice users (or students) offered the chance to initiate discussions about the past experiences and reflections.

In a multimodal and multi-method approach to data production in social contexts, it is important to avoid forcing the findings into pre-conceived categories and to stay in touch with the socio-technical context in flux. Throughout the continuous analytical process, I have explored and analyzed the data for insights within each case study to then return to the field of study for more empirical observations thus to integrate new findings with the theoretical framework to fill the conceptual gaps among finding and previously established codes. Such epistemological and methodological explorations attempt to construct new frames for the understanding of the complex nexus of practices; thus, it provides an *informed point of view* to describe the fluctuating semiotics of social realities. The conclusions, which I will present at the end of this analysis aim to provide new topics for further discussions, critical evaluations and developments of the analytical model, which I will propose as my contributions to the field.

Outline of the thesis

As outlined throughout this chapter, the overall purpose of this analysis is to explore the socio-semiotic nature of co-production activities in virtual worlds and generate further discussions on the co-production of VWs by the co-design practices of their users. In order to do so, I will first discuss the theoretical framework of the thesis, particularly focusing on relations between the multimodal approach to social semiotic theory and the domain-specific knowledge of design research on construction of meaning in built environments. In fact, the dissertation can be categorized in four main sections: (1) the theoretical framework, (2) the analytical and methodological perspectives, (3) the presentation and analysis of findings from the three case-studies, and (4) conclusions, discussions and further directions for research.

The analysis aims to contribute to the VW research field by proposing a meaning-oriented multimodal framework to the analysis of co-design activities. Therefore, the discussions on the theoretical framework begins with a survey of VW research literature, and outlines the overall theoretical framing of VWs as *places* in which collaborative design practices are experienced by *physically remote but virtually co-located* designers (Gu et al. 2011).

Following these discussions, the third chapter focuses on social semiotics and multimodality, and includes discussions on a number of key analytical terms, including such central notions in the theory as *semiotic resources, meaning potentials* and *context of situation*. I argue that social semiotics offer a promising new epistemological ground for analyzing construction of meaningful discourses through design, mainly by the help of its poststructuralist critiques on co-construction of meaning potentials in particular social contexts. I discuss the notions of *sign* and *semiotization* by referring to key theorists of the *classical* semiotic approach, including *linguistic* theories of

Ferdinand de Saussure, the *triadic semiotic model* of Charles Sanders Peirce (1998 [1894]), and the relatively poststructuralist and multimodal *semiology* of Roland Barthes (1967, 1977). However, I build my arguments primarily on the social semiotic approach, which is marked by the systemic functional socio-linguistics of Halliday (1978), and its contemporary multimodal extensions theorized by Kress (2010) , van Leeuwen (2005a)[4] and Lemke (2009a, 2009b), among several others. In this chapter, I also revisit the theoretical debates on the notions 'space' and 'place' in relation to 'virtual place' and lay out an experiential semiotic framework to study places as social constructs. I exemplify my theoretical arguments by analyzing the various design strategies that are employed by the VW designers, and outline the systemic functional framework of experiential, interpersonal and textual *meta-functions* for multimodal analysis (O'Toole 1994).

In the fourth chapter, which is also the final section of the theoretical framework, I review *design research* literature to support my theoretical arguments on the socio-semiotic nature of co-production activities in VWs. In my review, the central terms that shape the analytical framework are *affordances* and *constraints*, and their relations to the socio-semiotic notion of *meaning potentials*. I refer to theories on and socio-cultural ecologies of design, design methods and product semiotics to discuss certain epistemological and methodological frameworks in design research in relation to the main research question. I argue that an in-depth understanding of certain '*designerly ways of knowing*' (Cross 2007) supports the social semiotic framework and allows the analysis to expand beyond the conceptual limitations of socio-linguistics. This chapter also includes the discussions on collaborative design processes, creative problem-solving with distributed stakeholders (Arias et al. 2000), and emergence of design solutions (Grossen 2008).

In the fifth and sixth chapters, I outline and discuss the analytical and methodological frameworks. My emphasis here is on the combination of multimodal analysis with a participatory ethnographic approach, and the poststructuralist framing of *design* as both context and content of multimodal discourses. In the analytical framework, I present and discuss the epistemological, ontological and methodological motivations for the construction of the social semiotic analysis, and I outline the particular ways in which I found it useful to support the multimodal approach with relevant social theories. Here, I outline two central methodological perspectives: *multimodal* (systemic-functional) *analysis* (i.e. Kress and van Leeuwen 2001, van Leeuwen 2005, Jewitt 2009, Kress 2010); in combination with *MDA* (i.e. Scollon 2001, Scollon and Scollon 2003, 2004, Norris and Jones 2005), which is not a separate field of study but an expansion of the social semiotic theses. In the Methodology chapter, I substantiate the discussions on the analytical framework, and present the multiple-case study approach, methods of data production and strategies for sampling the

[4] For Kress and van Leeuwen's perspectives on the analysis of multimodal discourse, also see Kress and van Leeuwen (1996, 2001).

three case studies. This chapter also includes the construction of the conceptual matrix that I have produced in order to categorize and theorize the findings from multimodal analysis. Finally, the chapter on methodologies presents my perspective on issues concerning reflexivity, limitations and the intended methodological contributions of this analysis.

In the following two chapters, which form the Analysis section, I present and analyze findings from the three case studies and focus on certain analytical categories to guide the overall discussions in the final chapter.

The seventh chapter presents findings on the *social contexts* of collaborative design projects. Here, I focus on three aspects: the *social actors* who participate in or contribute to the collaborative design projects, the *mediational means* that are utilized by the co-designers to contribute to their processes, and the *processes* by which virtual places and artifacts are materialized in SL. First, I outline the personal profiles of the co-designers, and my observations on the power relations in collaborative design teams. With reference to the analysis of the three cases, I exemplify my arguments by discussing how professional researchers and inworld[5] designers worked together in the building of a virtual laboratory, how students with no previous experience from virtual worlds learned how to use SL together, and how avatar-based anonymous friendships in SL turned into a team of builders working together for many years. The analysis of the mediational means deals with the perceived affordances and constraints of SL, and its socially available tools for collaborative design, to systematically analyze the ways in which they affect the collaborative design processes and the products of design. Here, I analyze the graphical user interfaces and the specific tools for content generation in SL, as well as the semiotic and material resources that are socially available. My purpose in including the role of tools and resources in the analysis is to employ the '*place semiotics*' perspective (Scollon and Scollon 2003) and review the meaning potentials in relation to the socio-technical contexts of their co-production. In the third sub-section of this chapter, the findings about the collaborative design processes are presented and analyzed. I present the social organizations of collaborative projects in all three case studies, and analyze the ways in which the co-designers chose to work together, by organizing their movements in time and space. I often refer to Jay Lemke's (2005, 2009a, 2009b) use of the notions '*chronotope*' and '*heterochrony*' to explain how collaborative practices are performed as movement between socially meaningful places and in heterogeneous time-scales. The empirical examples present the observations and interview-responses on several stages of the process, including the generation of

[5] Inworld is a term that is widely used in virtual worlds literature (and practice) to denote activities that takes place within the virtual worlds of SL. I often use this term to differentiate these activities from the online ones, which would include use of Web browsers or other software instead of SL's viewer GUI.

initial ideas, development of more tangible design concepts, production and testing of the designed objects, and various forms of problem-solving and decision-making throughout the processes.

The eight chapter is also the second analytical chapter, but nonetheless the central one. In this chapter, I engage in a systemic functional multimodal analysis of the collaboratively designed virtual places and artifacts. In this multimodal analysis, I apply an analytical matrix of three meta-functions (experiential, interpersonal and textual) in relation to the various levels of virtual constructions (virtual place, elevations/divisions, interaction spaces, artifacts, information surfaces). First, I analyze the design of virtual places and artifacts as experiential meaning potentials and present various ways used to signify the practical functionalities. Then, I focus on the textual organization of designs, and present the ways in which the co-designers appropriate the resources (i.e. prims, textures, organization of virtual space) into the co-produced environments. Multimodality is an important consideration at this stage; as various multimodal elements are brought together in order to produce messages. Finally, I focus on the construction of the interpersonal meta-function, and analyze the co-designers' choices of intertextual metaphors, and the representations or the affordances for social presence. This section ends with the co-designers' reflections on the dialogic nature of design activities, and how in particular situations they could not anticipate the user responses/behaviors. Although the proposed model presents the findings in a rank-scale format of various levels of construction (based on O'Toole's [2004] multimodal architectural model), I intend to synthesize my discussions and present a 'hypertext' of data in the final conclusions.

The final chapter presents an informed point of view in concluding the analysis; it discusses the potentials for further research, as well as some practical recommendations for designers and platform developers. The chapter begins with the synthesis of the findings and discussions, and then uses these discussions to reflect on the overall research framework and the overall question. This chapter will also proposes alternative further approaches to the study of emerging technologies and the user-driven co-design and co-production of virtual places and artifacts as multimodal digital phenomena.

2. Perspectives in virtual worlds research

Introduction

The multimodal meaning potentials of the virtual places and artifacts in SL, and the creative practices of the VW users, who co-design these places and artifacts, are the central foci of my analysis. My aim here is to frame the most relevant theoretical perspectives on the study of VWs and propose an operational description of SL as a *digital network* of *interconnected virtual places,* which are designed to accommodate various visual, auditory and spatial modes of digital communication. In the second part of this chapter, my focus will shift to the research literature on co-presence, collaboration and co-design in VWs, from which I will extract analytical concepts such as spatial cues and modes of collaborative design in an avatar-mediated world.

2.1. Defining and framing virtual worlds

There are several definitions of VWs that are coined and used by different disciplines and research fields in order to address certain issues related to interaction, communication and collaboration in digitally mediated spaces. Some of these definitions focus on how collaborative virtual places are constructed as two or three dimensional digital representations, whereas numerous others are concerned with how users interact with digital artifacts and/or with other users for various purposes. For VW veteran and researcher Bruce Damer (1998, 2009), VWs can be described as "shared graphical spaces on the Internet" (Damer 2009: 1), a wide variety of which are currently being used for various purposes including gaming, education, business, science and engineering. Although VWs combine aspects of earlier media such as the printed page, telegraph, telephone, film, radio, TV, and the World Wide Web, they also offer "a unique experience that grew up separate from the document-centric Web" (Damer 2009: 1). These three-dimensional graphical spaces allow their users to express themselves and interact in a virtual environment by the use of their *avatars* as their digital representations. Damer's description points out some important aspects of VWs as they are framed in my analysis, such as the design of shared, spatial, multimedia environments for 3D digital interaction[1]. However, there are certain other points that need to be elaborated for my analytical framework, which aim to emphasize the socio-semiotic characteristics of virtual place-making.

[1] It is possible to argue that early 2D graphic spaces (online games, visual chat spaces on the internet constitute a limited yet phenomenologically effective form of virtual worlds, while such graphical media interfaces are beyond the scope of this thesis.

Digitally-mediated virtual places such as SL have also been described as *multi-user virtual environments* (MUVEs) (Gordon 2008) or *collaborative virtual environments* (CVEs) (Prasolova-Førland 2008, Schroeder 2011). The former definition is often used to describe a wide variety of applications such as multi-player online games or multi-user VR environments, whereas studies that use the latter mostly focus on collaborative systems for digital interaction, problem-solving, content generation or various other purposes. In fact, a significant portion of the research literature on VWs is comprised by studies on *massively multiplayer online role-playing games* (MMORPGs) and the gamer experiences[2]. In his socio-economic analysis of online game spaces and gamer communities, professor of telecommunications Edward Castronova (2005) defines such spaces as "synthetic worlds", which he describes as "any computer-generated physical space, represented graphically in three dimensions, that can be experienced by many people at once" (Castronova 2005: 22). On the other hand, new media scholar Eric Gordon (2008) claims MUVEs such as SL are not essentially games, even if they might include game spaces. In this perspective, SL represents the *social VWs* "in which the primary purpose is the creation of meaning through the manipulation of the world and communication with others within the world" (Damer 2009: 2).

In his book on designing virtual worlds, the game designer and researcher Richard Bartle (2004) defines virtual worlds as *shared or multi-user, persistent virtual environments that are simulated/implemented by a computer (or a network of computers)*. While Bartle's analysis of VWs focuses mainly on design and user-interaction in MMORPGs, several fundamental characteristics are common for many online applications of 3D social worlds. In his view, major characteristics of virtual worlds are: underlying automated rules that enable players to effect changes to it, representation of players/users as inworld characters, and real-time interaction with a shared and (relatively) persistent world. Bartle's definition is useful in terms of putting the emphasis on VWs as places in which human communication take place. Evidently, the ways in which the field is described depends heavily on the purposes of the research framework. I emphasize the framing of VWs as *places* in order to stay consistent with the overall socio-semiotic framework on virtual place-making as co-production of multimodal sign systems.

Virtual worlds as places

As mentioned above, I consider the VW of SL a network of *virtual places*, which accommodate and afford the co-production of 3D virtual environments as multimodal semiotic processes of *place-*

[2] Unfortunately, it is not possible to discuss all the landmarks of MMORPG research and game studies here, in the limited space of this dissertation. However, in addition to Richard Bartle's (2004, 2008) contributions, I find digital communication scholar T.L. Taylor's "Play Between Worlds: Exploring Online Game Culture" (Taylor 2006) and game-designer Ralph Koster's "A Theory of Fun" (Koster 2005) as particularly helpful resources for exploring the relations between the design of gamer experience and the possible social arrays of digital interaction in online games.

making. In fact, it is possible to relate the concept of VWs to much earlier spatial technologies such as shadow puppetry or theater plays (Boellstorff 2008, Damer 2009), especially when we consider the representational, *metaphorical* and *performative* aspects of virtual world-making (Jensen 2012). On the other hand, the digital technology that is subjected to analysis here brings forth an important difference, or "a new twist" as Damer (2009) proclaims : computer-generated online worlds can host many virtual places which are inhabited and co-created by digitally mediated interactions of people from various physical locations. In other words, the affordances of computer-generated VW's provide *real-time* interaction in a *shared virtual place* where users are allowed to effect changes on the content (Bartle 2004).

As I have discussed earlier, the modalities of communication in SL include not only the verbal modes such as speech and text, but also non-verbal aspects such as avatar appearance, positions, gestures and performances in virtual space (Boellstorff 2008, Schroeder 2011). VWs afford heterochronous (synchronous and asynchronous) multimodal interaction and collaboration in shared virtual places, in contrast to the graphical interfaces of web-based interaction (Kohler et. al. 2009). Therefore in the context of virtual places, intersubjectivity and intertextuality have new domain-specific manifestations of social interactions. On the other hand, 3D virtual places share some of the limitations of 2D interfaces; in that, "[t]he scale is necessarily still fixed, so the time taken to travel to places and the need for content between those places are still issues" (Bartle 2008: 9). From this experiential perspective, Bartle argues that a virtual world's design should not only include software, but should consider maintaining a community, a service, and a *place*. He specifically emphasizes the importance of *place*-making in VW design as:

> Virtual worlds are places. They may simulate abstractions of reality; they may be operated as a service; creating them may be an art; people may visit them to play games. Ultimately, though, they're just a set of locations. Places. (Bartle 2004: 475)

VWs such as SL are formed by hyperlinked instances, which can be mapped in terms of a 2D graph or a world-grid. According to Bartle (2008), making a VW as interconnected virtual places, which is essentially a network of hyperlinked instances that construct the grid, is essentially building representations that are continuous at the visual level, while contiguous at a more conceptual level. Users' avatars travel among these instances and keep experiencing the world seamlessly via the software[3]. The designers of VWs shape the world's resources to be perceived and experienced by the users, as "the manner in which a virtual world is presented imposes limitations on its underlying representation, and this representation lies at the heart of what the virtual-world-as-

[3] Social semiotician Jay Lemke's (2002) use of the notion "hypermodality" can also be helpful to understand this concept. Lemke claims that multimodality and hypertextuality are integrated in hypermodal media environments, where users have the chance to define their own meaning-making patterns, or *traversals*.

place is" (Bartle 2008: 2). With a socio-cultural perspective on place-making to VWs, a "structured crowd in a designed space" suggests the presence of a "world-maker" (Damer 2009: 13); thus, it is possible to relate the design activity to co-creation of social places and the feeling of co-presence in VWs. Therefore, the place-centric perspective also makes an ethnographic approach more conceivable, as place-making denotes socio-cultural field-sites (Boellstorff 2008).

SL's affordances for 3D visual representation and mediated spatial interaction are also related to the social construction of feelings of *presence* and *co-presence* in virtual places. For ex-Linden Lab developer Cory Ondrejka (2005), online interaction differs from inworld interaction in SL because it is mostly asynchronous, lacks the spatial cognition and the virtual space it represents is *descriptive* rather than *experiental* (Ondrejka 2005). In this respect, virtual places are "*computer-mediated dynamic world models that create a sense of place" (*Maher and Simoff 2000: 1). This idea of *creating a sense of place* foregrounds the phenomenological and metaphorical aspects of virtual place-making, as it emphasizes the mediated spatial experiences. Communication professor Sisse Siggaard Jensen (2009, 2011, 2012) explores avatar-mediated social activities of co-production and user-driven innovation in various VW platforms, including game-worlds and SL, and concludes: "[t]he driving dynamics of visions and emotional engagement, cognitive efforts and learning as enacted do not only lead to adaptation to the worlds but also to transformative dialogues" (Jensen 2012: 402). Jensen (2012) emphasizes a *metaphorical* understanding of virtual world-making through an interpretive semiotic framework of avatars as personal mediators.

Architectural design in virtual worlds

In fact, Bartle's (2004, 2008) *place metaphor has* influenced a range of ideas and concepts that associated VWs with the physical built environment since the early conceptual formation of the research field (Gu et al. 2011). Following Bartle, when virtual worlds are defined as *places,* which accommodate human activities such as *navigation, interaction* and *communication*, it is reasonable to consider design of a virtual place as an *architectural problem* as well (Bridges and Charitos 1997*).* Architectural design scholars Alan Bridges and Dimitrios Charitos (1997) have observed virtual environments (VEs) through virtual reality technologies to ask how architectural design knowledge can contribute to the design of virtual environments. Bridges and Charitos refer to taxonomies of existential and urban spaces, and they categorize the elements that a VE includes as: *places* where particular activities are carried out; *paths*, which express a tendency towards mobility and expansion; *places* that relate to several directions; *system of paths* that divide environment into domains; *thresholds*, locus of interaction between any spatial elements, meeting points between two paths and openings; and *space establishing elements* which define the objects that constitute the VE. Although their work is rather dated with respect to the development pace of

virtual world technologies, it significantly points to some issues that are still relevant. By using their taxonomy of the elements of virtual environments, it is possible to analyze current virtual worlds and understand the role of these spatial characteristics to the nature of interaction. The architectural design perspective on virtual place-making is also important in its emphasis on architectural expertise and its knowledge on 'how to compose form in order to accommodate *function* and convey *meaning'* (i.e. how doors/windows are meaningful only when surrounding objects are designed to detect collision and not permit passage, how portals should be designed and integrated into the VE to prevent disorientation).

Physics and hyper-realism in Second Life

As I mentioned above, design of VWs depend on the world being persistent in some respects; especially in terms of its affordances to host and store the designed places even if their designers leave them to go offline. In a design-based perspective on virtual places, it is important to consider how the world's physical rules shape the ways in which avatars and objects interact to form the virtual experience. It is important for a virtual world designer to understand the underlying physical rules of how things behave in the VW, although these objects are essentially digital representations. For Bartle (2008), the designers of virtual worlds get to define the physics of their universe. The computer-simulation and physics scholar Renato dos Santos (2009) focuses on construction of physical realism within virtual worlds, and explains how it is maintained stable for a more immersive user experience. According to Santos, Second Life physics is neither the Galilean/Newtonian "idealized" physics nor a real world physics virtualization; but it "diverges from reality in such a way that it may be labeled *hyper-real" (Santos 2009: 11)*. He also outlines how this hyper-realism is maintained by describing how a *physics-engine* works. These physical rules are important for designers, as they define socially available semiotic resources and their meaning potentials. For instance, the design of virtual furniture should be properly scripted so that the avatar does not float on air, or design of interiors should consider the *in-avatar* and *in-camera* modes of viewing the world (Wadley and Ducheneaut 2009). All these structural components determine the socio-semiotic meaning potentials on both visual and experiential levels, as they shape the rules by which avatars and objects interact in virtual places. This issue is important for my analysis of virtual place-making because it is also relevant in the creation of what some SL designers have described as "SL-like"[4] in designed places and artifacts.

[4] Alternatively, "SL-ish".

SL and RL: Transferring domain-specific design knowledge

Transferring knowledge on place and experience from the so-called *real-world* domain to the virtual is a commonly scrutinized topic in the VW research field (i.e. Book 2004, Taylor 2009). For instance, information scientist Ekaterina Prasolova-Førland (2008) *focuses on place metaphors in CVEs in order to* characterize the functions of the *spatial dimensions*. Her analytical categories include: *outlook* (i.e. the degree of reality or abstraction, and to what extent it is a frontier), *structure* (i.e. mutual relationships between different parts of VE), *role* (i.e. meeting and work places, information spaces, virtual stage and exhibitions). As the VW designers' experience various co-design contexts, their knowledge about the platform'affordances and their possible impact on local creative communities expand. This is usually reflected in their designs, particularly in their use of visual metaphors to guide the users and make them "comfortable and provide an identifiable foundation from which to build experiences, relationships, and places" (Taylor 2009: 4).

For digital media scholar Pamela G. Taylor (Taylor 2009), VWs such as SL are *driven* by visual metaphors that are used to represent recognizable visual, conceptual and experiential phenomena. On the other hand, VWs offer designers a relatively flexible and open-ended virtual design space to explore possible creative aspirations and co-create innovative ideas by being unrestricted from physical constraints. The culturally rich and resourceful design knowledge on physical built spaces (i.e. architecture, urban design, interior design) may offer a starting point for designing VWs; but the new and authentic affordances of such design environments also provide virtual realms to explore and experiment with. The designers can either choose to replicate real-world environments and physics, or use the available tools and resources to innovate new methods, processes and environments, through which they expand the potential solution spaces. At this point, Taylor (2009) recommends another research perspective that is not based on RL metaphors but asks "What does the virtual help us do that we cannot do in RL?"

Modes and affordances for digital communication have shaped not only the ways in which designers appropriate metaphors and experiences but also their methods of working together. Stanford University media scholar Byron Reeves and physician/entrepreneur J. Leighton Read (Reeves and Read 2009) point to the emerging transformations in professional working models and the shaping effects of 3D online spaces, such as MMORPGs and other online games. In their view, this *gamification* of work culture is not only at the metaphorical level, but it progresses on material and practical contexts, which will inevitably change the rules of global collaboration and design for many corporations. Media and anthropology scholars Elizabeth Keating and Chiho Sunakawa (2010) analyze how the "new electronic spaces for human collaborative activity" influence communicative practices in order to understand how people "orient to, plan, and execute

collaborative actions that span quite different environments with quite different types of agency, possible acts, and consequences" (Keating and Sunakawa 2010: 331). Their findings show that *participation cues* in online games requires *new habits of spatial reasoning,* which are often fairly influenced by the cultural and social contexts in which participants collaborate.

> Being able to manipulate and interpret continually shifting participant roles and spatial configurations and being adaptable in the use of the modality of space is a significant part of interacting across real space and technologically mediated space, with new shared elements of social life (Keating and Sunakawa 2010: 353).

In terms of the social VWs such as SL, transfer of spatial codes from the so-called real-world has a central importance in the analysis of designer practices. As Betsy Book (2004) claims, user-generated social worlds tend to be 'more directly influenced and inspired by cultures of everyday offline life' as residents constantly draw from existing resources and conventions of entertainment media and pop culture. User-driven co-production activities in Second Life are often initiated by similar creative explorations of users with different motivations and individually meaningful contexts (Dennhardt and Kohler 2010, Kohler et. al. 2009, Ondrejka 2005). Therefore, the following section will continue to discuss issues such as co-presence, collaboration and co-design in SL. Before discussing these issues, I will briefly summarize the first part of the review and draw the main analytical points from the VW literature thus far.

Synthesis: Virtual place-making, architecture and design

In summary, various perspectives on virtual worlds focus on the spatial characteristics of avatar interaction in VWs, and emphasize the social dimension of place-making in terms of construction of the meaningful user experience. These perspectives contribute to the formulation of my research question, as my multimodal social semiotic framing of communication considers design as not only the construction of *visual characteristics* of places and artifacts, but also their social functions as meaningful *sign systems*, and their practical functions as *mediational means*. The question is how virtual places and artifacts in SL are co-designed and co-produced for *multimodal interaction*; therefore I often employ spatial categories of place-making in my analysis of virtual places that are comparable to these approaches. In the following section, my review continues with research studies on the social dimensions of being together and co-producing virtual objects in a VW.

2.2. Research on co-presence, co-production and co-design in virtual worlds

Although the development and study of virtual worlds are (relatively) recent phenomena, which originates from the early/mid-1990s and are mainly driven by the socio-technical developments of the era, researchers have been extensively investigating various aspects of online communication,

collaboration and co-production in CVEs (i.e. Steuer 1992, Schroeder 1995, Bridges and Charitos 1997, Damer 1998, Dev and Walker 1999). SL represents a specific socio-technical stream within this paradigm in which users still interact via mediation of digital technologies and graphical user interfaces, but they do so by navigating in, exploring and interacting with 3D representations in virtual places. The platform allows user-driven co-production of digital content. Furthermore, users are allowed to co-create the places and artifacts in SL, and share/distribute them among residents or open them for public/private use. However, virtual objects are usually created with support of external - online and/or offline - software, and SL definitely is not the only collaborative platform for user-generated content online. In SL, user-driven innovation proliferates through user-to-user interaction, knowledge and resource exchange in socio-cultural contexts (Ondrejka 2005). Similarly, in Axel Bruns' (2008) *produsage* theory, SL represents a multifaceted and multi-layered (*hybrid)* environment in which economies are built on emerging locally-specific collaborations. This is my starting point in the study of these co-production activities as part of a wider social media landscape, focusing on *pro-am* (Leadbeater and Miller 2004) media users, their practices, and traversals among various online platforms. Therefore, I consider collaborative design of virtual places and artifacts in SL an illustration of a larger socio-technical context, condensed within a particular technology which attracts a particular user group on the Internet.

While CVEs and immersive media spaces are getting more accessible, efficient and affordable, research findings on design and use contexts of these *third places* (Moore et al. 2009) continue to be ambiguous and dispersed among disciplinary borders. In his latest book, media and communication studies professor Ralph Schroeder (2011) presents a central research framework about collaborative virtual environments (CVEs) by focusing on the issues of co-presence and connected presence. Schroeder's (2011: 3) theoretical framework combines "research in HCI and social psychology of computer-mediated communication" with "the sociology of new technologies and their use as tools to carry out social research". By examining research uses of CVEs, Schroeder sets his aim to bring computer science and social sciences together, and reaching a multidisciplinary understanding of how people interact in VWs. He also emphasizes the potential of CVEs as laboratories for social research, where observations can be done in natural settings and by studying existing *natural* performances.

Co-presence: Being "there" together, in a virtual world

Schroeder's (1995, 2006, 2011) framework of "being there together" includes not only use of verbal and non-verbal communicative tools and their affordances but also ways of collaborative problem-solving and meaning-making in small and large groups. Here, the emphasis is not on the technology itself, but on how people interact by using these technologies and participate in

mediated social interaction with others through their avatars. He categorizes three dimensions of "*presence, co-presence and connected presence*" that constitute the mediated communication experience through the feelings of self-presence, presence of and with others, and awareness of the virtual environments in which social interactions take place. In fact, the concepts of *presence* and *co-presence a*re closely related to the notions of *avatars* and representation of bodies in virtual space. Schroeder also discusses the modalities of communication that are often included CVEs, including not only the verbal modes of communication such as speech and text, but also non-verbal aspects such as avatar appearance, gestures and performances in virtual space. Although he emphasizes the role of "nontechnical" aspects of interaction as more important than the "technical ones", theoretical arguments on how affordances can be defined and observed, how they are constructed by individual and social processes, and how their perception could change through learning and use are not discussed in detail. Nonetheless, by following Schroeder's analysis of context-specific affordances and limitations, it is possible to analyze possible contexts of use and affordances which enable co-designers to collaborate on their tasks. What makes Schroeder's (2011) analysis about avatars and virtual space significant is the emphasis on the importance of *visual landscape* or *built environment*, and the extent to which nonverbal communication and interaction can take place by the affordances (and limitations) provided by the VW (Gürsimsek 2012). In fact, this aspect of CVEs also places them at the center of my analytical framework, as certain affordances of SL make it useful for collaborating on spatial tasks. Following Schroeder, I emphasize particular affordances for users to navigate, communicate, co-create and modify virtual objects, and discuss the current research literature on affordances and constraints in design theory to support the analysis of the findings from the three case studies.

In the following section, I will illustrate some of the other significant theoretical perspectives and methodological strategies to reflect on the applied research methodology of my analysis. Although the overall framework is based on qualitative research, quantitative VW research literature is often found useful to strengthen the analysis, and provide a wider perspective of the subject matter for grounding theoretical statements derived from case studies (Eisenhardt 1989).

Quantitative VW research: Lab experiments and longitudinal studies

Two major tendencies in quantitative approaches underpin the perspectives on collaboration and co-production in virtual environments: (1) experimental studies that focus on certain aspects (or variables) of user interaction and theorize on the findings of an iterative observation process, and (2) longitudinal studies which observe long-term social practices in a larger scale and theorize mostly on statistical data. Experimental approaches usually define particular variables and conditions that are explicitly specified and manipulated, and they employ a (relatively) large

number of participants to perform tasks in virtual space to test their relations to the variables and context of interaction. They are often considered effective for measuring relationships between communication sources and their effects on behavior (Deacon et al. 2007). For instance, at Stanford University's Virtual Human Interaction Lab (VHIL), Jeremy Bailenson (2006) and his colleagues are focusing on social implications of being present in an immersive VR environment (Blascovich and Bailenson 2011). The projects that are conducted by Bailenson and his colleagues use quantitative analysis and on-site observations of 'transformed social interactions' in CVEs, where they investigate how designing user-tracking settings for virtual learning or collaborative building spaces employs the knowledge of social and non-linguistic codes, such as visual and behavioral realism, as well as characteristics of virtual agents/avatars, such as plasticity or attractiveness (Bailenson et al. 2004, Bailenson and Yee 2005, Bailenson et al. 2005, Bailenson and Beall 2006).

A second influential stream in quantitative virtual world studies often focus on longitudinal analyses of user activities, virtual economies and inworld transactions, and try to reveal the patterns that could explain how cultures of online worlds are co-created and practiced by communities. Research studies with such inclination often use statistical data on money exchanges, forms and practices of transactions, structures of virtual world economies, questions about how they could affect real world industries, or relations between MMORPG design and large-scale user behavior (Ip and Jacobs 2004). Edward Castronova's analyses of virtual economies and online game industries (Castronova 2005, 2007, Castronova et al. 2007, Castronova et al 2009) is among the most influential of this type of quantitative research.

Although my overall perspective on the VWs research field is enriched by the findings of such studies, my qualitative methodology grounds the analysis to a wider range of collaborative practices within the design process. Drawing on this, I combine the behavioral perspective with the textual analysis of multimodal designs in order to explain the *how* and *why* questions. My analytical framework aims to explore the co-design activities within their social environments to include as many environmental factors of the inworld interactions as possible. I analyze the co-designers' meaning-making processes in one-to-one and small-group interactions to emphasize the phenomenological experiences of time, space and movement in the construction of places and artifacts. This is why I rely on qualitative VW studies, particularly in research contexts where researchers are interested in understanding the nature of social interactions in VWs.

Qualitative VW Research: Social and cultural dimensions of virtual interaction

Qualitative VW studies use various VW platforms as subjects of analyses, and they occasionally use comparative methods to understand the developments in interactive technologies and theorize

their perceived effects on networked virtual communities, often by consulting ethno-methodological methods (i.e. Damer 1998, Boostrom 2008, Ostrander 2008, Boelstorff 2008). Anthropology professor Tom Boellstorff's (2008) detailed ethnographical analysis of SL's communities and their socio-cultural practices of communication, collaboration, and co-creation is among the most influential examples of such literature. Through his extensive fieldwork, Boellstorff claims that "virtual worlds are distinct domains of human being, deserving of study in their own right" (Boelstorff 2008: 238). Creativity and user-generated content is central in Boellstorff's framing of SL's digitally mediated culture, while the many forms of social interaction they provide can herald the transition from the "2D web" to the "3D web", or more specifically: from *network* to *place*.

Within Roskilde University's 'Sense-making strategies and user-driven innovation in VWs' research project, a wide trajectory of approaches have been used by co-researchers, including sense-making methodology (Reinhardt and Dervin 2010), participant ethnographies on collaborative user/gamer practices (Jensen 2008a, 2009, Frølunde 2009, 2012), co-production and participatory design (Jensen 2008b, 2012b;), and user-driven innovation (Jensen 2008c, 2011). Another visible stream in qualitative VW studies focuses on particular platforms and/or technologies, and attempt to analyze their affordances and limitations - potentials and pitfalls for specific use contexts - by focusing on user-interfaces, communication tools and virtual environments. Such studies have been focused on SL, as well as other collaborative platforms, such as Open Sim or Active Worlds (i.e. Schroeder et al. 2001, Corbit 2002, Dickey 2005, Moore et al. 2009). There is also a significant number of recent studies on collaborative content creation in CVEs that us SL as platform, a number of other studies also emphasize design practices in other platforms such as LambdaMOO, Activeworlds, Everquest, and processes of world-building where they actively participate in the design of new platforms (i.e. Rosenman et al. 2007, Wadley and Ducheneaut 2009, Kohler et al. 2009). Although such examples have similarities with my analytical framework, most of these studies have different analytical foci than social semiotics, and they are not necessarily interested in co-production of meaning potentials within multimodal sign systems.

For instance, scholars from distance education field Parvati Dev and Decker Walker (1999) study evolutionary design of a virtual learning environment in which design and use of virtual artifacts/worlds are parts of a curriculum. Through participatory observation and analysis of multimodal archives (i.e. images, conceptual figures) they conclude on the value of early design studies in the development of educational innovations. Science communication and education researcher Margaret Corbit (2002) analyzes building of a 3D multiuser virtual science museum with a particular focus on accommodating the needs of several interconnected user groups, and provides feedback for design improvement, factors that affect participation and collaboration.

Corbit's methodology includes participatory design analyzes and a pilot group of teenaged participants. Interactive media studies researcher Michele Dickey (2005) analyzes 2 exploratory case-studies on distance education using Active Worlds in order to explore unique affordances and potentials of AW for spatial distant learning. Dickey reports on her findings from participatory observation, formal and informal interviews with faculty, design team, students and staff, and she provides empirical evidence on specific affordances for distance learning. Rhetoric and communication researcher Scott Graham and graphic designer Brandon Whalen (2008) propose an ethnographic case study on professional practices of a new-media designer, which explores a range of issues in genre theory and how to coordinate with new-media design process. They define their methods as ethnography, in-depth interview, collaborative authoring, and their aims as proposing 'a theoretical model on hybridity of modes, meanings and genres in new media design'. However, their methodology includes monitoring a single designer's social practices, and it is limited in terms of inclusivity of various discourses, practices and perspectives on design. Jensen (2008) describes two cases of user-driven innovation, knowledge construction and communication forms, exemplified in a 'library-hangouts' projects and organization of an inworld talk-show. The question Jensen asks is 'how do creators of the projects deal with possible issues and bridge the gaps in the process of innovation?' Jensen uses participatory observation, in-depth and RL video interviews, and archival data to produce reflections on user-driven innovative practices and methods of co-design in SL. In a business-oriented study, Thomas Kohler et al. (2009) report eight case studies with commercial firms who want to interact with users for new product development. Their methodological aim is to explore the opportunities virtual worlds offer for real-world innovations. Through participant observation (world) and semi-structured interviews with managers and customers, they offer theoretical and practical implications for avatar-based innovation.

These examples illustrate the variety of approaches – in terms of research contexts, research questions, participants and methods of inference. What characterizes the above-exemplified cases is that each study includes one or several participants who are generating content in CVEs; whereas the different researchers produce their data to emphasize different aspects of user-designer-system interaction. It is also possible to categorize these studies in terms of their purposes, research contexts, and the nature of interaction between the observer and the observed. Nonetheless, the outcomes, and interpretations of the findings show considerable variations in relation to these epistemological and methodological factors. My analytical framework differs from the aforementioned studies in that; I am particularly interested in the multimodal meaning-making processes of designers through the socio-cultural and systemic-functional lenses of social semiotics. Although the knowledge on co-presence and collaborative practices provide a theoretical

backdrop for the understanding of user practices in mediated places, I specifically focus on co-production of meaning potentials through collaborative design.

Research on design collaboration in virtual worlds

The user-generated VWs afford a shared virtual environment for synchronous design collaboration, where "designers are physically remote but virtually co-located as avatars within their design representation in the form of a 3D model" (Gu et al. 2011: 270). Therefore, such 3D worlds are thought to facilitate higher levels of design communication and representation, mainly because of their multimodal communication cues that produce an awareness of the nearby designer(s) and their actions in three-dimensional space. The digital technology enables co-designers to perceive and use shared design representations through new interactions with the digital models (Gu et al. 2011). As mentioned above, such collaborative actions may require new ways of spatial thinking and behavior (i.e. use of avatars and navigating via interfaces), especially when designers have different preferences and responses to different modes of design representations (i.e. 2D sketching and 3D modeling).

Interaction design researchers Greg Wadley and Nicolas Ducheneaut (2009) focus on the mechanics of user collaboration via avatars in virtual space, and on how a group of virtual world users communicate and collaboratively create required geometries by given components. They classify the two levels of the sense presence in Second Life as 'in-avatar' and 'in-camera', which points to an important characteristic of the VW; and results in new challenges such as not being able to understand where your group member's camera is focused and not being able to communicate on specific objects/parts because of disorientation. Their work also reveals the role of the detachable camera in user experience and orientation in collaborative working. By providing designers with modular components of a pre-designed form to re-assemble, Wadley and Ducheneaut (2009) exclude the extensive use of the inventory, collection of resources from various platforms. While their findings are significant for showing how verbal and non-verbal references (i.e. visually marking positions, pointing with editing functions, marking places with avatars) are used for spatial functions such as navigation and orientation, they choose to single out a limited part of the design process, and do not involve the social aspects.

I intend to broaden the context of inquiry to include how users collaboratively generate content by involving the variety of socially available resources during the process. Unlike Wadley and Ducheneaut, my focus is not only on how user-designers perform given tasks, but how they collaboratively generate ideas, and produce virtual places and artifacts as emerging meaning systems. This perspective includes the mechanics of collaboration as an important element, for which Wadley and Ducheneaut's study is a valuable resource. On the other hand my main purpose

is to observe collaborative design practices in their authentic settings and social contexts of occurrence in SL, rather than formulating experimental procedures to test specified interactions (Koutsabasis et al 2012). I believe the socio-cultural and ethnographic perspectives can support the social semiotic analysis of these aspects.

Educational technology scholar David Thomas and urban/environmental planning scholar Justin Hollander (2010) focus on the pedagogical aspects of collaborative design, and they conduct a series of case studies of urban planning courses taught using Second Life, videogames, and game-like virtual worlds as a means to advance studio education pedagogy in design. They use participant observation and teaching, analyze student projects and processes in six urban planning studio courses, and discuss potentials and limits of emerging digital media for studio-based design education. In the "Communication and Design in VWs Workshop" case-study, I have analyzed 15 international students, who worked in groups to design artifacts in SL. Therefore, I consider the pedagogical perspective of Thomas and Hollander (2010), and of other educational VW researchers, resourceful for the analysis of case studies. However, a pedagogical perspective is not a central concept that bridges and unifies the three case-studies that I have conducted in SL. I am also interested in understanding the contextual differences between amateurs –or students- and experienced content creators.

The possible affordances and benefits of virtual technologies for RL professional designers is also a fairly well investigated area within VW research (i.e. Kohler et al. 2009, Koutsabasis et al. 2012). For instance, product and systems design researcher Panayiotis Koutsabasis and colleagues (Koutsabasis et al. 2012) investigate the value and applicability of VW technologies to architectural design, interior design and user interface design practices through a series of experimental collaborative cases. In their view, "VW can add value in the design review and evaluation phases of design activities, especially for cases and domains of design for which customer participation and feedback is critical" (Koutsabasis et al. 2012: 385). Their study also presents certain limitations that affect the inworld behaviors of co-designers, and shape the structure of collaborative design processes. Drawing specifically on their potentials for collaborative design, Koutsabasis et al. (2012) relate the main characteristics of VWs that may be beneficial to VW designers. These include the affordances for making 3D visualizations and simulations, experiencing real-time navigation, creating and manipulating objects, co-constructing solutions, feeling immersed and present through avatars, and being able to use several forms of verbal and non-verbal as well as synchronous and asynchronous communication.

Is also possible to come by various independent VW platforms and projects, which offer their users synchronous communication platforms that support collaborative 3D modeling and

multidisciplinary working (Gu et al 2007), such as the DesignWorld (Gül and Maher 2006, Maher et al. 2006, Rosenman et al. 2006). Gül and Maher (2006) combine a 3D modeling tool with a 2D sketch pad within DesignWorld in order to highlight the nature of the collaborative process, communication content and the development of design solutions. Their study shows that both 2D and 3D representations can benefit different stages of the process: 2D encourages idea-development while 3D affords collaborative modeling of design solutions. They claim that 3D representations are particularly helpful when "designers collaboratively refine the 3D model to visually analyze the design idea as they effectively develop realistic design representations" (Gül and Maher 2006: 471). By offering design-oriented platforms for virtual interaction, such platforms also provide test-beds for research on multidisciplinary collaboration, ownership systems and relationships between objects (Maher et al. 2006), or software agents for real-time multi-user collaboration and affordances of built-in design tools (Rosenman et al. 2006).

Similarly, architecture scholars Rabee Reffat and colleagues (Reffat et al. 2008) propose a real-time computational system for formation and computation of architectural designs in 3D VEs. Their modeling system (IAMVE[5]) includes a library of pre-fabricated architectural objects to be utilized and assembled by the user, geometrical and non-geometrical modification options, programmed interrelationships and constraint-based rules automated by the system. Their aim is to help utilize the *virtual architectural design studios* in education and professional practice, and particularly to support architecture at the conceptual design stage.

Drawing on the places of collaborative design practice in the real-world, the term *virtual design studio* (Reffat et al. 2008, Maher and Simoff 2000) can be used as a metaphor to describe the places for avatar-based collaborative design practices. The physical bodies of designers are replaced –and represented- by avatars, while interaction of representational bodies and objects take place in three-dimensional virtual space. In professional design processes, the affordances for spatial interaction allows not only the designers but also the clients and/or potential users to travel in virtual space, move around the virtual object(s) and monitor changes in real-time. In this sense, virtual design studios differentiate from traditional approaches to physical places of collaborative design (Maher and Simoff 2000). Such virtual places for creative collaboration can also be described as 'distributed design studios', the production of which needs to be founded on "informed consideration of the implicit interaction design choices being made" (Weiley and Pisan 2008: 343) during collaborative practices. Weiley and Pisan's (2008) formulation of a distributed virtual design studio affords reconfiguration by team members, mixing of realities, control of

5 Interactive Architectural Modeling in Virtual Environments

access, allow both synchronous and asynchronous working and transform space into 'inhabited place'.

Virtual worlds and Computer Aided Design (CAD)

When we compare avatar-based collaboration in virtual places with conventional CAD systems such as 3D Studio Max or AutoCAD, certain domain-specific affordances of these collaborative platforms become apparent. According to design and manufacturing systems scholars W.D. Li and colleagues (Li et al. 2005), computer-aided design (CAD) applications should support both distribution of information to geographically dispersed locations and collaborative co-operation of individual systems to shared design targets and objectives to support creative collaboration. In fact, the level of real-time multi-user interactivity and variety of modalities that are made available by the 3D VWs have not been equally met by the recent CAD systems; as most current design software hardly support collaborative designs (Reffat et al 2008)[6]. While conventional CAD software support individual content generation practices in visually segregated view-planes (usually as top, front, side and perspective views) and allow collaboration through file-sharing, 3D virtual places can support both synchronous and asynchronous collaboration on 3D models within a multi-user environment (Maher et al. 2005). For Koutsabasis et al. (2012), the *sense of presence*, or *psychological immersion*, while interacting with VWs make designers feel as being *in-the-world*, rather than being external observers of a 3D model, as in using CAD environments.

> In a VW, users communicate in real time while being in the designed space, being able to point to specific attributes, objects or places, being able to instantly communicate an idea, restructure a solution, evaluate a concept. It all happens in the same space, and therefore there is greater awareness and coordination of the collaborating design team. (Koutsabasis et al. 2012: 361-362)

Furthermore, the social affordances provided by the VW's places for mediated co-presence and social interaction provides a 'collaborative co-design environment' (Piller et al. 2005), where users can seek help from virtual communities and develop design ideas together (Phillips and Rodden 2001). In my analysis, SL is foregrounded precisely for this reason; as the VW platform affords the construction of such a virtual/distributed design studio environment and provides an empirical field for multimodal analysis of collaboratively produced designs.

[6] Here, it is important to note that there is a significant difference in terms of visual quality and the resolution between the screen images from SL and 3D-rendered images from a professional CAD software. However, here my main concern is the platforms' affordances and constraints for collaborative working. Thus, I continue my discussion with an emphasis on this aspect, while I will admit that the quality of the visual rendering may also have a significant effect on the designers' experiences.

Socio-cultural perspectives on co-design in virtual worlds

Drawing on the synthesis of the VW research literature thus far, I consider the user-driven co-design practices in SL examples of social creativity. Design researchers Gerhard Fischer and Elisa Giaccardi describe social creativity as:

> [T]he diverse and collective stock of scientific content and artistic or stylistic ideas that individuals and communities share, re-interpret, and use as a basis for new ideas and visions constitutes the vital source of invention and creativity (Fischer and Giaccardi 2007: 28).

In such creative social practices, individual and social creativity can (and should) complement each other, as creative output often results from interaction with tools and artifacts and from collaborating with other individuals (Fischer et al. 2005). The collaborative platforms are challenged in their attempts to provide socio-technical environments that would activate user communities and bring social creativity alive, not only because of individual and social differences, but also because of a variety of 'distances', which involve multiple dimensions. In Fischer and Giaccardi's *metadesign* approach to social creativity, these distances are conceptualized "(1) *spatially* (across physical distance), (2) *temporally* (across time), (3) *technologically* (across artifacts), and (4) *conceptually* (across individuals, communities, and cultures)" (Fischer and Giaccardi 2007: 28). In their view, collaborative platforms such as SL harness the potential synergy of many creative users by offering tools, resources, environments and communities of *metadesign*, and providing affordances for exploration of emerging opportunities. For Elisa Giaccardi (2005), *metadesign* represents a *constructive mode* of design, rather than simply a new model of design, in that it promotes "collaborative and transformational practices of design that can support new modes of human interaction and sustain an expansion of the creative process" (Giaccardi 2005: 15). To capture the complexity of social creativity –particularly in digital technologies-, the focus in *metadesign* is kept on design of general systems and processes rather than isolated content (objects), and the relational structures that allow the design environments to evolve through social interaction.

The emphasis on socio-cultural characteristics and social histories of collaboratively produced design cultures in VWs is apparent in game designer and researcher Celia Pearce's (2006) study on 'productive play', where Pearce traces the virtual artifacts designed by the *Uru* gamer community in VWs including SL and There. Pearce argues that boundaries between play and production, work and leisure, and between media consumption and media production are increasingly blurring in places such as SL. She describes VWs as *dynamic, two-way mediums* where the *audience* has as much power to create as the *producer*; and suggests user-*generated* content as a new business model, with new business opportunities. Although Pearce is interested in affordances for general

participation in such communities rather than specific design activities, the questions she asks in her conclusion have contributed to my overall research perspective. I also aim to investigate how user creativity and productivity can be enhanced by observing collaborative user-driven practices and to analyze the factors that affect content co-production. Affordances for user-generated content in virtual worlds such as SL, *There* or *ActiveWorlds*[7] presents emerging cultural forms of production, and allows users to interact as active participants rather than passive users. In this respect, Pearce's work is noteworthy, as it investigates creative user communities that share a similar background (gaming) with a specific storyline, genre and social conventions. These aspects will later be discussed in relation to the empirical analysis, particularly when I analyze how experiential and interpersonal meaning potentials are constructed by collaborative design of places and artifacts in the Metrotopia and PAL cases.

Critical perspectives on co-production and the power relations

From a critical point of view, it is possible to view such co-production activities differently, especially when the aforementioned theoretical insights are reflected on a wider socio-cultural scale and include a poststructuralist understanding of power relations in social practices. When issues such as copyright rules, permissions and limitations, sharing and remixing of digital content are considered, the importance of the critical perspective becomes apparent. In this view, three aspects of designerly interactions are important in co-production: interactions and relations between (1) content-generators (designers) and Linden Lab as creator and moderator of the platform, (2) designers and other designers, with whom they collaborative build places, and (3) designers and (prospective) users, who are expected to interpret the meaning potentials organized by the designer(s).

Marketing scholars Bonsu and Darmody (2008) interpret user involvement in content creation in community-authored virtual environments as a type of commercial exploitation by corporations. As "co-creation involves pursuit of mutually beneficial relationships between marketers and customers by empowering customers to be creative collaborators in the production process" (Bonsu and Darmody 2008: 356), they claim that this relationship is *empowering consumers to cooperate* on the one hand, while allowing companies to *commodify the consumers' creative output* on the other. They observe at least two ideological fundamentalist groups in SL: *creative* (use SL as platform for testing alternative forms of sociality) and *corporates* (whose SL presence is more about capital than personal experience, such as RL brands). Bonsu and Darmody's (2008) present a critique of capitalist information economy through a neo-marxist interpretation of the new forms of productive cooperation. My understanding of user-generated content and user-driven

[7] Former *AlphaWorld* (Damer 1998, 2009)

innovation differs from Bonsu and Darmody's in that; I understand content generation in SL not only as the outcome of a leisure activity, but also as a range of (structured or unstructured) creative collaborations in virtual worlds; including artistic experimentations, research projects (such as Metrotopia), design of educational environments, museums, events, etc. In doing so, I focus on digital content generation activities in terms of *co-production* of the VW's places, rather than merely the *use* of an interface or the *consumption* of a product. On the other hand, Bonsu and Darmody's statements are also accurate for describing certain aspects of the current VW economies in general, which point to a distributed commercial market environment that lacks interoperability between VWs (Philips and Rodden 2001) and run by several private corporations.

One important aspect of the increasing interest in co-production activities in VWs is the issues of ownership and intellectual property; which affect the development and use of the inworld virtual economy. There are several ongoing debates on the properties and legal conditions of 'information artifacts', one main property of which is being available for infinite actions of copying, modification and reproduction. For Ondrejka (2005), digital items carry the properties of physical properties in many ways (i.e. utility, added value and investment of creators); therefore, they should have the same legal rights as 'property rights'. On the other hand, von Hippel and Krogh (2003) compare '*private investment*' and '*collaborative action*' models through user-driven innovation activities in their study of open-source content developers; and, offer a new model for user collaboration on digital items. In their 'Private-Collective' innovation model, digital items created by users are not entirely public and have private aspects of the use and dissemination of the creations, which gives the creator control over certain aspects of the design even after it is shared freely (von Hippel and Krogh 2003)[8]. In SL, the current ownership model provides content-generators certain privileges on deciding how their designs will be used and shared, while the platform essentially keeps all rights to the inworld productions.

Finally, it is important to mention the balance between the creative potentials and the limitations for ownership, sharing and use of collaboratively generated objects, in reference to the development of co-production practices in VWs. As mentioned above, SL provides certain options to the creator of objects, among which the ability to limit copies, changes and/or modifications is a central issue. In his book "The making of Second Life", media journalist Bruce Wagner Au (2008) mentions "Nexus Prime", a virtual city that was co-created and co-designed by its inhabitants who had equal building and modifications rights on the place. Au's ethnographic analysis quite accurately describes the possible social and cultural implications of working with virtual design

[8] Another popular and influential example of contemporary copyright models in "Creative Commons", which provides the content creators with a flexible set of rights to be reserved, such as limiting the distribution to non-commercial channels or allowing partial attributes to the original work.

teams –including differences in working habits and task organizations, mediation of co-creation practices involving many creative personalities– as he describes the co-production of Nexus Prime "emergence within emergence" (Au 2008: 47). The challenging issue is to create the social bonds that keep the avatars together and to determine common design principles in order to keep a relative level of persistence within the co-designed places. A similar approach to Nexus Prime was also tried by Jensen's (2008) study, in which Jensen and her colleagues attempted to launch a virtual library in SL with an open co-design vision, which encouraged avatars to join in and configure the place. However, the vision of the project was not realized as it resulted in poor designer interaction, and limitations of creative privileges (Jensen 2008). Such examples show that it is not only the technical and structural aspects of the world's interfaces' design that affects the development of co-design practices, but also the social and cultural norms about communicating, collaborating and co-creating in virtual places with avatars.

2.3. Conclusion: Framing the co-design of virtual places as social semiotic practice

By the place-centric framing of VWs, I intend to emphasize not only the visual qualities and the dimensions of three-dimensional space, but also the spatial practices and place-making experiences of the user-designers of SL. For this purpose, I have analyzed VW research literature and drew concepts to guide the analytical framework in this chapter. Evidently, the most central of the analytical concepts I use is *virtual place*. Here, I am interested in how the visual metaphors of place-making are constructed through transformative dialogues between designers and users of the VW, and how the semiotic, as well as structural, associations to the places of the physical world are built. VW designers combine visual metaphors and functional aspects in ways that can be compared to conventional practices of architectural design, whereas there are also considerable differences between the two domains. The technical and aesthetic knowledge transferred from real-world designs can still be applied in different contexts. Often times, the design of virtual places and artifacts resemble the ways in which architectural spaces are organized in the physical world, and a sense-of-place is represented within them. On the other hand, the hyper-real physics of the VW and its specific affordances provide the designers with freedom and flexibility to experiment with designing experiences that may not be possible in the physical world. The effects of knowledge transfer between the two domains are not limited by the visual characteristics of designed forms, but they also include the ways in which designers organize their social practices by using the VWs affordances. These two points are important for my analysis: both the semiotic characteristics of virtual places and artifacts, and the ways in which they are co-created as meaningful signs point to multimodal discursive relationships to their so-called real-world counterparts.

In a place-centric socio-semiotic view of design in VWs, issues such as co-presence, collaboration and co-production are important for the analytical framework. The social and cultural dimensions of avatar-mediated collaboration in virtual places point to the spatial modes of communicating in SL. The social component of SL as *place* manifests itself as inworld design processes unfold in time and through collaborative experience. Research on co-presence and collaborative practices in VWs shows that the organization of such experiences depends on both the affordances of the platform and the social factors that arise from the mediation of social interaction. I consider the notions of co-presence and co-design closely related to social practices in a socio-cultural view to place-making in SL. Therefore, I will not only focus on mechanics of collaborative design or certain affordances of the platform but also observe co-design as a socially and culturally situated *nexus*[9] of sign-making practices.

The understanding of a VW as a place in which creative individuals collaboratively design things also refers to the notion of *virtual design studio*, where both experiential networks of practices and metaphorical sign systems interact to accommodate creative collaborations. Furthermore, SL as *virtual design studio* provides a place where designers can experience co-presence via their avatars, and practice co-design in real-time from distant physical locations. On the other hand, I find this term helpful in explaining the distant collaborations of pro-am designers in their inworld projects, rather that professional real-world designers who prototype their RL projects. This is a central motivation for me to use SL as the platform for studying collaborative design rather than a conventional CAD software. Thus, both the individual meaning-makings and collective creative practices that lead to co-production of virtual places contribute to my analysis. At this point, it is also possible to suggest an ethnographic approach to the study of the meaning potentials of places within the mediated cultures of SL.

I aim to integrate the theoretical insights on *co-presence, collaboration* and *co-design* from VWs research with the systemic-functional framework of social semiotics and design research to understand how meaning potentials in virtual places are co-constructed. For the sake of forthcoming analytical framework, it is also important to note that SL as place affords a *multimodal shared virtual space* for avatars to interact in *real-time* and *apply changes* to the content.. On that note, the affordances for inworld (avatar) interaction and social networking in SL result in the proliferation of local *design cultures* (Julier 2008) within the VW. In terms of the collaborative design process, the semiotic system of meaning potentials of collaborative design in SL result in new transformed social interactions. My aim is to make a qualitative exploration of

[9] The 'nexus analysis' (Scollon 2001) perspective will be detailed in the following chapter.

designers and their meaning-making practices through the use of multimodal semiotic resources that are provided by SL and other media in naturally occurring (authentic) social settings.

As a final point, I consider the socio-semiotic optic as a critical lens to evaluate the effects of social relations of *hierarchy* and *power* on co-production of virtual places. In my analytical framework, I consider the socio-semiotic power relations among designers, users and platform developers as a constituent of the analytical matrix. I use the findings of the aforementioned research studies on collaboration, content-generation and design in VWs to analyze potentialities and niches in the field, while consulting their methodological and epistemological premises to frame my research properly within the existing literature. I consider the various perspectives on the socio-cultural dimensions of co-production helpful guidelines to keep the critical analytical stance towards the subject, and consider not only the affordances but also perceived constraints and limitations within the analytical foci. In fact, I relate the issues of ownership and co-creation of user-generated content closely with the theoretical framing of multimodal discourse production. In the following chapter on social semiotic theory, I will argue the role of these issues in my analysis with reference to the notions of semiotic resources, and co-creation of meaning potentials within the nexus of practices. In terms of design theory, these issues will be further scrutinized in relation to affordances and constraints as channels of communication between designers and users.

Theoretical Categories	Concepts and references	Analytical Implications
Defining and framing virtual worlds	• Shared graphical spaces on the Internet (Damer 2009) • Multi-user virtual environments (MUVEs) (Gordon 2008) • Collaborative virtual environments (CVEs) (Prasolova-Førland 2008, Schroeder 2011). • Synthetic worlds and massively multiplayer online role-playing games (MMORPGs) (Castronova 2005) • Social worlds (Gordon 2008, Damer 2009) • Shared or multi-user, persistent virtual environments that are simulated/implemented by computers (Bartle 2004)	Various definitions focus on different aspects of VWs. Place-centric view requires emphasis on the three-dimensional shared places that afford real-time interaction between people's avatars in virtual space.
Virtual worlds as places	• Online interaction vs. inworld interaction in SL (Ondrejka 2005) • Spatial technologies of representation and performance (Boellstorff 2008, Damer 2009) • *Real-time* interaction in a *shared virtual place* where users are allowed to effect changes on the content (Bartle 2004, Damer 2009) • Verbal and non-verbal modes (Boellstorff 2008, Schroeder 2011) • Places that are continuous at the visual level, and contiguous at a more conceptual level. (Bartle 2004) • Computer-mediated dynamic world models create a sense of place (Maher and Simoff 2000) • *Semiotic* view of virtual world-making and avatars as personal mediators (Jensen 2012) • Design of a virtual place as an *architectural problem* (Bridges and Charitos 1997*)*	VW-as-place implies not only visual qualities, but also experiential and semiotic aspects. Design of virtual places can be compared to physical built spaces, since the aim is to understand how the *sense of place* is constructed through the organization of design elements.
Transferring knowledge from RL places	• *Hyper-real* physics in SL *(Santos 2009)* • *Place metaphors in CVEs* (Prasolova-Førland 2008) • User-generated social worlds and the influence of cultures of everyday offline life' (Book 2004) • Visual metaphors are used to represent recognizable visual, conceptual and experiential phenomena - "What does the virtual help us do that we cannot do in RL?" (Taylor 2009)	The physics of the world also frames its affordances. Knowledge of RL places are transferred as semiotic references. Designers can either replicate RL metaphors, or design new concepts. Focus is on place metaphors and participation cues in spatial practices.
Co-presence and co-production in VWs	• User-driven innovation, user-to-user interaction, knowledge and resource exchange (Ondrejka 2005) • A multi-layered (*hybrid)* environment in which economies are built on emerging locally-specific collaborations (Bruns 2008) • *Focus on pro-am users* (Leadbeater and Miller 2004) • Transition from the "2D web" to the "3D web", or more specifically: from *network* to *place* (Boelstorff 2008) • Presence, co-presence and connected presence (Schroeder 1995, 2006, 2011)	Co-presence precedes co-production in avatar-mediated places. Verbal and non-verbal modes co-construct the multimodal experience. Users with different backgrounds can collaborate via their avatars. Co-presence is related to both technical and non-technical issues.

Collaboration and co-design in VWs	• physically remote but virtually co-located as avatars within the design representation (Gu et al. 2011) • focus on the mechanics of user collaboration in virtual space (Wadley and Ducheneaut 2009) • focus on the pedagogical aspects of collaborative design (Thomas and Hollander 2010) • value and applicability of VW technologies to architectural design, interior design and user interface design (Koutsabasis et al. 2012) • DesignWorld - 2D encourages idea-development while 3D affords collaborative modeling of design solutions (Gül and Maher 2006, Maher et al. 2006, Rosenman et al. 2006) • Virtual architectural design studios: real-time computational systems for formation and computation of architectural designs in 3D VEs (Reffat et al. 2008) • Virtual design studios differentiate from traditional approaches to physical places of collaborative design (Maher and Simoff 2000). • Distributed virtual design studio affords reconfiguration by team members, mixing of realities, control of access, allow both synchronous and asynchronous working and transform space into 'inhabited place' (Weiley and Pisan 2008)	RL design knowledge can support the practices of virtual teams. But real-time avatar-mediation has implications for distant collaboration. The presence of 2D and 3D design affordances affect design methods. SL is considered a virtual design studio and a social environment for collaborative design. Methodologically, the focus is not only on the mechanics of interaction, but also on the social contexts and semiotic resources.
Socio-cultural and critical perspectives on co-production	• Social creativity and metadesign – overcoming spatial, temporal, technological and conceptual distances (Fischer and Giaccardi 2007: 28) • VWs as *dynamic, two-way mediums* where the *audience* has as much power to create as the *producer* (Pearce 2006) • Critique of co-production as corporate exploitation (Bonsu and Darmody 2008) • Ownership models: 'property rights' (Ondrejka 2005) - 'Private-Collective' innovation model (von Hippel and Krogh 2003) • Creative potential and the limitations for ownership, sharing and use of collaboratively generated objects (Au 2008, Jensen 2008)	The structure of participation and rules of ownership affects the design practices Meaning potentials are generated as dialogues. A critical perspective on the developer-designer-user relations is necessary.. Semiotic analysis can benefit from the consideration of power relations among these actors.

Table 2. 1 Theories and concepts in VW research that are relevant to the analysis of collaborative place-making in SL

3. Social semiotics, multimodality and the rhetorical approach to co-design of virtual places

Introduction

In the previous chapter, I outlined and discussed several research perspectives on VWs and the digitally mediated social practices in three-dimensional virtual places. As I have argued, theoretical descriptions in the field vary according to their general research purposes and questions that researchers aim to explore. My focus on studying virtual place-making leads me to analyze the semiotic aspects of multimodal meaning generation in the social world of SL through collaborative design of three-dimensional virtual places. In this chapter, I present an outline of the theoretical framework for the study of virtual place-making as collaborative practices of digital content generation. Here, I discuss the particular social semiotic framing of communication in relation to the overall research question:

> *How do the VW users co-produce multimodal meaning potentials in virtual places and artifacts through collaborative design, as exemplified by the social semiotic analysis of the three case studies in SL?*

The theoretical framework is drawn on the *multimodal social semiotic approach to* communication in order to study co-production of meaning potentials through collaborative design experiences. The general social semiotic approach was inspired by the critical sociolinguistic theories of Michael A.K. Halliday (1978, 2007); Robert Hodge and Gunther Kress (1988); and theories of multimodal discourse by Kress and Theo van Leeuwen (Kress 2010, Kress & van Leeuwen 2001, van Leeuwen 2005a); and phenomenological explorations of virtual experience in space, time and movement by Jay Lemke (2002, 2005, 2009a, 2009b) among others. Social semiotics as a social scientific field of inquiry originates from the linguistic tradition, and explores sign and meaning making in relation to the social environment of communication. Social semioticians study the construction and use of semiotic resources to generate sign systems, and *meaning potentials* of sign systems in a particular *context of situation*. I consider the participants of the collaborative design projects as socially situated sign-makers, the rhetorical intentions and social interactions of who collectively shape the multimodal orchestration of virtual places and artifacts.

I often use the terms *meaning potentials* and sign systems, rather than signs and meanings, in order to emphasize the indirect socio-semiotic links between designers and users of semiotic entities. I draw analytical insights from Halliday's arguments on the *social functions of language* to

discuss the semiotic functions of various design elements, both as a multimodal entity and as a continuously transformative process. However, I also argue that a critical re-interpretation of the socio-linguistic framework - particularly its meta-functional framing of linguistic expression in relation to other modes of communication - is necessary to understand the semiotic complexity of collaborative place-making in the social domain. The perspective of *multimodality* provides an indispensable frame for the study of design in VWs; in that the multimodal perspective aims to understand how different forms of semiotic expression are collectively used to construct sign systems, and how the division of semiotic labor is hyper-textually organized in making of meaning potentials. In this respect, I find Michael O'Toole's (1994, 2004) theorization of the systemic functional framework for architecture and spatially-displayed art particularly useful, and appropriate his multimodal rank-scale model for analyzing the virtual places and artifacts in SL.

I also refer to the poststructuralist discussions on meaning, discourse and social action (i.e. Poynton 1993, Poster 2007 [1994]) in order to emphasize the dynamic contexts, in which collaborative design activities take place. A major contribution of poststructuralism to the general field of semiotics – as well as particularly to social semiotics – results from its emphasis on the socio-cultural dimensions of *semiotic resources in use*, rather than merely having *the text* as analytical unit. For Kress and van Leeuwen (1996, 2001), modes are shaped through social interactions in specific contexts. O'Halloran (2004, in press) and O'Toole (1994, 2004) follow Halliday's (1978) emphasis on *choices* among possible *semiotic resources*, and describe these resources as systems of meaning at people's disposal (Jewitt 2009). On the other hand, interaction analysts (i.e. Jones and Norris 2005) focus on social action, and try to explain the *situated interplay* between modes in given contexts at a given moment (Jewitt 2009). In the analytical framework, I adopt the complex context-specific notion of 'nexus of practices' from the field of mediated discourse analysis (MDA) (Scollon 2001, Scollon and Scollon 2004, Norris and Jones 2005) in order to theorize the production of texts through a systematic analysis of various discourses that contribute to its making. I also use Ron and Suzie Wong Scollon's (2003) notion of 'place semiotics' to conceptualize the social contexts in which collaborative design activities take place, as their *geosemiotic* approach helps to determine the social actors, places, interaction orders and multimodal semiotics of signs. In sum, my purpose in this chapter is to construct the central theoretical framework for the analysis of co-design practices in SL through the multimodal social semiotic optic and emphasize the overall perspective on social functions of virtual places and artifacts as semiotic entities. I intentionally keep certain important aspects of the theoretical framework, including theories on co-*design* and *affordances*, in reserve for the following chapter, where I discuss these issues in relation to the domain-specific perspectives derived from *design research*.

3.1. The social semiotic approach to communication

The epistemological and methodological perspectives of social semiotics have been mainly shaped by two theoretical approaches. First in the field of semiotics, as the primary predecessor, paradigmatic formulations of Ferdinand de Saussure's structuralist linguistic theory and Charles Sanders Peirce's (1998 [1894]) triadic model of signs (object, sign vehicle and interpretant, and their symbolic, iconic and indexical relations) provided the interpretive semiotic foundation. On the other hand, the semiotic discourse on the meanings and roles of signs in understanding human cultures is also a much dismantled field; mainly with the influence of the poststructuralist critique on the socio-cultural production of meaning, and *reading* as one of its key constituents. While 'mainstream semiotics' focuses on systems as products, it was argued that semiotic systems cannot be understood in isolation, or independent from their social uses and functions. The second major influence was instigated by such critiques, and a necessary reconsideration of the social dimension of meaning-making. The importance of the social dimension in making of signs and meanings is emphasized in Halliday's (1978, 2007) functional linguistic analysis of language as a set of social semiotic meaning potentials (Lemke 2009b). Within this socio-cultural critique of traditional semiotics, socio-linguistics emerged as a bridge between the text-based pragmatic analysis of semiotics and social scientific methods for systemic analysis of *discourse as social process*.

> Social semiotics treats all semiotic acts and processes as social acts and processes. What is at issue always in social processes is the definition of social participants, relations, structures, processes, in terms of solidarity or in terms of power (Hodge and Kress 1988: 122).

Kress also describes social semiotics as "a theory that deals with meaning in all its appearances, in all social occasions, and on all cultural sites" (Kress 2010: 2). He deconstructs the overall term *social semiotics*, where the *social* perspective refers to the social relations (actions, interactions and processes), while the *semiotic* emphasizes the texts, genres and the social environments in which messages are organized. The *rhetorical approach* of social semiotics is thought to "attribute(s) power to meaning, instead of meaning to power" (Hodge and Kress 1988: 2) by emphasizing the role of social and political thought in making of signs and meanings. In terms of analysis, this requires particular attention to the social actors and the power relations with a phenomenologically-guided social semiotic approach to virtual place-making, which incorporates individual perspectives of sign-makers (*co-designers* in three case studies) on how social roles are enacted and experienced throughout the collaborative design process. My purpose in doing so is to include the social interaction among the co-designers as a major constituent of analysis, and to investigate how these power relations are reflected in construction of experiential (ideational), interpersonal and textual characteristics of co-designed places and artifacts.

Classical models of sign and the social dimension of sign-making

Here, my aim is to theorize virtual places and artifacts as multimodal sign systems produced to communicate particular social functions through potential affordances and constraints for social action. In order to do so, we must first consider how signs are defined by the mainstream semiotic traditions, and what social characteristics they represent within the socio-semiotic terminology.

The traditional characterization of the sign is formulated as "something that stands for something else in some respect" (Nöth 1990: 84), which means "a portion of the syntagmatic plane that is treated as a unity" for social semioticians Hodge and Kress (1988: 262). The meaning potentials of signs are derived from the possibility of *choice on both paradigmatic and syntagmatic dimensions,* which shape the composition of messages by the communicators' use of available resources for sign-making (Jewitt 2009). In order to explain the nature of signification, Ferdinand de Saussure's dyadic model focuses on *grammars* and *mental references ('sound images')*, and theorizes the relation between *signifier* and *signified* on *arbitrariness*. For Saussure, the direct relationship between signifier and signified results from the linguistic system of *differences* and *oppositions,* which define the meaning of a sign by not only in reference *to* what its signified is, but also what it is *not (Chandler 2007).* On the other hand, Charles S. Peirce's (1998 [1894]) triadic conception of the sign considers meaning as fundamentally a dialogic process, and not a material entity or characteristics of the object. Peirce's triadic model expands the scope of Saussurean semiotics by introducing three structural variables (*object*, *sign vehicle* and *interpretant*) and their *symbolic*, *indexical* and *iconic* relations[1] (Chandler 2007). Peirce's model emphasizes contextual *motivations* and *semiotic potentials*. Although Saussure's diachronic perspective on semiotic relations and his interest in studying the internal systematization of language was also influential, Peirce's abductive logic on the dynamic, internal and social, relations between signs and their interpreters had a more seminal effect on social semiotics. In fact, Hodge and Kress' (1988) socio-linguistic theory takes Saussure as an "*anti-guide"* (1988: 20), through which they invert the prohibitions of (so-called 'mainstream') structuralist semiotics and propose and alternative semiotics which incorporates cultures, societies and politics into the study of meanings and signs[2]. However, Hodge and Kress' (1988) social semiotic approach also criticizes Peirce's triadic model for being too much internalized, personalized and isolated from social situations. For Hodge and Kress, the weakness of this model was its presentation as a sole psychological fact, without explicitly discussing its roots in social processes. Social semiotics attempts to resolve the ambiguities due to the psychological classification of semiosis by exploring the underlying social

[1] Peirce's three interconnected components of a sign system were: sign vehicle, object and interpretant
[2] Although Saussure's theory also acknowledges the existence of social factors, they are not considered as fundamental components of sign making but more as supplementary aspects to understand relations between sign-complexes as grammatical entities (an apt metaphor would be that of a dictionary, instead of a hypertext in use).

structures and analyzing the context of situation in relation to habitus and social roles of sign-makers.

A synthesis of Saussure's and Peirce's perspectives were developed and elaborated into a frame of 'second-order signification' by Roland Barthes, who also illustrates the socio-cultural turn of semiotics in the second half the 20th century. Barthes' earlier structural analyses of particular cultural sign systems (i.e. products, places, advertising images) in terms of *metalanguages* (Barthes 1967) and *myths* (Barthes 2009 [1957]) and his ideas on the role of *jouissance*[3] and multiplicity of voices (Barthes 1977) are also important in terms of marking the socio-cultural dimensions of multimodal sign making (Lemke 2009a). Another significant influence is the critical linguistic approach of Mikhail M. Bakhtin (1981, 1986)[4], a Russian philosopher and literary theorist who was also influential in later formulation of theories on dialogic approaches to communication, proposed important theoretical concepts, including '*actively responsive understanding'*. Through this way of engagement with semiotic systems, social actors are both respondents (interpreters) and makers of social meanings. Bakhtin's critique of Saussure, and later structuralist social scientists, also lies in his emphasis on the importance of extreme heterogeneity of speech genres and the difficulty of determining the complete nature of any utterance.

While traditional semiotics may provide the theoretical foundation to deconstruct various meanings potentials through an interpretative *reading* of signs and sign-systems, it lacks "an adequate explanation of why certain meanings get attached to certain symbols at certain historical times" (Griffin 2009: 337). For van Leeuwen (2005a), the problem with Peirce's formulation of motivated signs (icons and indices) is that in structuralist semiotics meaning was still formulated as 'objectively existing' within the sign system, rather than being constructed in the 'act of sign production and interpretation'. Social semiotics aims to close this gap by focusing on the sign-maker's perspective with a rhetorical approach to communication.

Social semiotics formulates communication in terms of semiotic resources and meaning potentials in particular contexts, rather than signs and their corresponding meanings. The sociolinguistic roots of social semiotics are specifically apparent in Halliday's functionalist approach, which aims to critically discuss the structuralist models on semiotic texts. According to Halliday, the object of social semiotic inquiry is not *structures* of particular signs, but *sign systems*:

> With the notion of system we can represent language as a resource, in terms of the choices that are available, the interconnection of these choices, and the conditions affecting their

[3] Loosely translated as 'pleasure of the text'
[4] The so-called 'Bakhtin group' includes the Marxist (early-) poststructuralist critique of Voloshinov (1929), who describes Saussurean structuralism as a form on 'abstract objectivism'.

> access. (…) The data are the observed facts of 'text-in-situation': what people say in real life, not discounting what they think they might say and what they think they ought to say. (Or rather, what they *mean*, since saying is only one way of meaning.) (Halliday 1978: 192)

In terms of the design process, choices refer to basic units of semiotic action, where sign-makers assess the social world of resources and potentialities. To study the social histories of choices made by participants of communicative activities, it is necessary to understand their worlds of referents and significations, as specific social tasks require specific types of social behavior (Hodge and Kress 1988: 58). Kress (2010) also lays emphasis on the importance of *choice* in construction of meaning through *style*, which is inherently a political process. While theoretical debates on communication and social interaction are often foregrounded by the framework of ideology (*class* versus *lifestyle)*, Kress claims that a more apt metaphor for theories of representation and communication would be *life-worlds* – a term he borrows from Schütz and Luckmann (1984) -, which point to 'clusterings of social and cultural factors and resources' such as education, gender, ethnicity, age and regionality. Within the social semiotic perspective, effects and potentials of technologies for production and communication ought to be considered within this context. Ideology rests in the social relations within the semiotic process, in what Hodge and Kress calls the "semiosic plane[5]" (1988: 65).

> The makers of signs 'stamp' present social conditions into the signs they make and make the signs into the bearers of social histories (Kress 2010: 69).

To conclude, the analytical strength of social semiotic understanding of the social world results from not only its pragmatic view on sign systems and their transformations, but also from its emphasis on the rhetorical dimension of sign-making, which puts the social actors and their interpretations of the context of situation, and of culture, under the microscope. While the social semiotic analysis acknowledges the role and importance of diachronic code structures on representation and signification in societies, I argue that these relations are also constantly reproduced, negotiated and transformed by collaborative design activities in particular situations. Social functions and affordances of each semiotic mode determine the shaping of meaning potentials of sign systems, but only in cooperation with affordances of social environment within the *context of situation* and the *context of culture*. I argue that for a complete and coherent social semiotic analysis of place-making as multimodal discourse, it is necessary to amplify this complex network of contexts, narratives and meaning potentials to uncover how the *social* aspect of semiosis is constructed through interaction. In this perspective, co-design and co-production of virtual places and artifacts include construction of multiple sign systems, which are based on co-

[5] The semiosic plane refers to semiotic events between producers and receivers in a relationship of. Semiosic processes are actions that take place within the plane of semiosis. According to Hodge and Kress (1988: 262, 265), semiosic transformations (in relation to mimetic transformations) refer to social relationships of participants, social meanings and forces that are producing them.

designers' purposeful orchestration of socially available material and semiotic resources to communicate indirectly with their users. Each sign system (place and/or artifact) represents several choices, as they are composed of smaller multimodal compositions (i.e. textures, scripts, 3D objects), and each multimodal composition contributes to the overall rhetorical intention, that is to communicate intended experiential, interpersonal and textual meaning potentials.

Contexts and meaning potentials in semiotic systems

As explained earlier, the systemic functionalist perspective of social semiotics focuses on sign systems and semiotic resources in particular contexts of situation, through which they present various *semiotic potentials* for social interaction (Hodge & Kress 1988, van Leeuwen 2005). With this rather constructivist framework, the aim of social semiotics is to re-frame the interpretative semiotic analysis by emphasizing social processes, relations and potentialities through which meaning is generated. Therefore, the social and cultural contexts in which semiotic action takes place bears significant importance for analytical purposes. Hodge and Kress (1988) focus on the semiotic dimensions and meaning potentials of the context of communication. *T*hey argue the theoretical breaking point of social semiotics from its structuralist roots by using Voloshinov's (1929) description of *the 'utterance* as a *social phenomenon'*. Every semiotic act (verbal or non-verbal) is placed within a place and a context of social relations (Scollon and Scollon 2003). For the social semiotic framework, these places connote not only the immediate contexts of use, but also the diachronic contexts in which meaning potentials are actualized.

Halliday defines the 'meaning potential' as "the paradigmatic range of semantic choice that is present in the system, and to which the members of a culture have access" (1978: 109). Halliday's functionalist view is interested in what a sign system *can do*, or rather what the social actors are able to do with it by assessing its internal organization and the social functions that it had *evolved to serve*. In doing so, Halliday adopts a sociolinguistic perspective, and regards language as "encoding of a 'behavior potential' into a 'meaning potential'; that is, as a means of expressing what the human organisms 'can do', in interaction with other human organisms, by turning it into what they 'can mean' (Halliday 1978: 21). Halliday's theory of social semiotics considers language as one of possible socially contextualized meaning resources, the potentials of which are inherently related to the context of use. The sociocultural view of communication in systemic functional framework is based on the approach's emphasis on the *context of situation* in communication.

Context is related to "the environment in which a text unfolds" by Halliday and Hasan (1985). According to their sociolinguistic view of language, notions of context and text have their theoretical roots in various sources, including Malinowski's (1923, 1935) ethno-methodological

view on the nature of *con-text* as sentences before and after a particular sentence, and British linguist J.R. Firth's (1935) framing of participants, action, features and effects of social situations. The context of culture is closely related with how societies organize their activities within cultures. Kress (2010) focuses on the notions *society* and *culture* by emphasizing that they are characterized by different aspects of human interaction. While *society* emphasizes "human action in social groups", and is "characterized by (differences in) power", *culture* is defined as "the name for the resources which have been made, produced, remade, 'transformed', as the result of social work." Following this logic, Kress claims that "it is 'the social' which generates 'the cultural' and, in that, 'the semiotic'" (Kress 2010: 14).

> In a social semiotic theory the assumption is that the cultural technologies of representation, production and dissemination and the affordances and facilities that they offer are used within the frame of what is socially possible at one time (Kress 2010: 19).

At this point, it is important to distinguish between what is meant by *text* and *context*. Halliday defines text as "the primary channel of the transmission of culture; and it is this aspect – text as the semantic process of social dynamics – that more than anything else has shaped the semantic system" (1978: 141). A *text* can be seen both as a *product, that is* a social construct that can be systematically studied; and as a *process, that is* a continuous process of semiotic choices and movements within a network of potentials (Halliday and Hasan 1985). The role of context and content in determining the flow of communication depends on their mutually transformative relationships, as Halliday expresses:

> The context plays a part in determining what we say; and what we say plays a part in determining the context. As we learn how to mean, we learn to predict each from the other (Halliday 1978: 3).

The *context of situation* is described by the nature of the activity (*field*), the social-interpersonal relationships of participants of the communication act (*tenor*), and affordances and limitations of the channels that are socially available for communication (*mode*) (Halliday 1978, Lemke 2009b). In other words, for the social semiotic framing of meaning-making, context of any text depends on its relation to the social environment and other texts within the environment upon which the (framing of) situation is constructed. In accordance with the multimodal social semiotic framework, I refer to text as not only the content of a linguistic sign but also a semiotic entity that is constructed for multimodal communication, including various compositions in images, texts, sounds, 3D artifacts and places.

A situation is described as "the environment in which the text comes to life" (Halliday 2007: 180). The *social* dimension of the theory requires the consideration of the environment of

communication as an essential semiotic resource through which modes are assembled and formed into messages. The sociocultural definition of situation takes three major elements in consideration in order to describe a circumstance as a particular *situation*: (a) the object or focus of attention, (b) resources to be mobilized by participants, and (c) constraints of the context in which communication takes place (Taylor et al. 2007 [2000]). A situation is constructed within the constant transformative relationships between these factors in social contexts, and transforms the context in which it takes place. In other words, our view of reality is thought to be produced, maintained and transformed by the trajectory of modes we use to communicate, the primarily effective of which is language we use to refer to co-construct our own social worlds (Griffin 2009). As discussed above, my use of social semiotics as primary theoretical framework results from the theory's *rhetorical* approach the *social* contexts of semiosis, and its predisposition to consider the sign-maker's perspective in analyzing communication. Consideration of *semiotic resources* and *meaning potentials* as a fundamental constituent of the social semiotic approach has significantly affected my analytical framework. Semiotization of meaning potentials in collaborative design activities, and individual interpretations of the co-designers about the affordances and limitations of SL in reference to their personal life-worlds were among the central topics of inquiry within all three case studies.

3.2. The multimodal approach to communication

Although the sociolinguistic view of texts consists primarily of verbal expressions in written and/or speech forms, contemporary theories on multimodal social semiotics consider a wide range of semiotic resources as potential texts (i.e. Iedema 2003, Kress and van Leeuwen 2001, van Leeuwen 2005, Kress 2010, Lemke 2002, 2005, 2009a, 2009b, O'Halloran 2004, O'Toole 2004). This view includes language as a semiotic resource, but expands the focus to relations and orchestrations of a plurality of modes in construction of meaningful sign systems (Jewitt 2009), such as the virtual places. Designers of virtual places and artifacts in SL often need to assemble various forms images, text, music, as well as interactive and animated 3D objects in making of mediated places for meaningful avatar experiences. Therefore, I consider multimodality as a central element of the theoretical framework in order to describe the organization and use of various design elements as multimodal compositions form, function and structure.

In this view, modes represent 'cultural technologies' for transcription and inscription of semiotic texts, which have different affordances and limitations depending on the context. For Kress, "mode is a socially shaped and culturally given semiotic resource for making meaning" (Kress 2010: 80). Kress frames his definition of *mode* by the communicative practices that develop in specific societies by the use of semiotic resources. The choices of what resources will be used as modes, and

how they will be appropriated to the social environment, would change from one culture to another; as "modes are the result of a social and historical shaping of materials chosen by a society for representation" (Kress 2010: 11).

Although epistemological foundations of the social semiotic framework originates from linguistics, the its systemic functional approach is extensively applied to other modes, often being modified to study the meaning potentials in images and text (Kress and van Leeuwen 2001, 2006 [1996), film (O'Halloran 2004), mediated and non-mediated spaces (i.e. Stenglin 2008, McIlvenny and Noy 2011, Lymer et at. 2011, Wang and Heath 2011; also see O'Toole [1980] for representation of spatial experience in narrative), or interactive digital software (i.e. Lemke 2005, van Leeuwen 2005, Wade 2008). The multimodal perspective bears a significant importance for my analytical purposes, as design of virtual places and artifacts inherently synthesize the meaning potentials of various modes as resources, including images, texts, sounds and music, and interactive 3D objects. Among this wide trajectory of multimodal approaches, I find O'Toole's (1994, 2004) model for systemic analysis of architecture and built spaces most helpful, particularly because of its potentials for adaptability to virtual places and artifacts in order to emphasize their spatial characteristics as semiotic meaning potentials.

For Hodge and Kress (1988: 124), "signs in the system of modality have their own history, which contributes to their meaning and effect." They acknowledge Halliday's recognition of modality within the domain of social relations, which bears traces from not only the context but also activities of social actors, their prior contestations and the state of representations. . In a social semiotic system, modality determines the respective positions (stances) of participants in the semiotic process by organizing and categorizing the social actors, places and sets of relations within the context of culture. In doing so, every semiotic entity would also always bear traces of modality, amplifying the various voices –embodied in semiotic resources- that contributed the making of the sign Modality, in this perspective, is not an internal characteristic of the objects themselves, but it is realized and practiced during the actual process of collaboratively making meanings.

Multimodal social semiotics theorizes meaning in 3 semiotic instances: (1) *semiosis* (communication as meaning complex), (2) *multimodality* (modes and their relations) and (3) *specific mode* (specificities, material affordances, historical and cultural origins of elements) (Kress 2010: 61).

I consider the process of making multimodal arrangements by using (including copy and pasting, remixing, etc.) semiotic resources as a form of *(bric-)collage (Kress 2010)* , where the resourcefulness and aptness of the modes are chosen according to the semiotic requirements of the context of situation. Multimodal arrangements are a form of syntagms. Designers frame the chosen

aspects of multimodal entities for representation, intended for their users/interpreters to perceive the design as a coherent semiotic whole. "The form and character of sub-textual units, the modules, are derived from their functions and uses within the text"(Kress 2010: 148). Arrangements are made as spatial and temporal ensembles in the social world. Through *orchestration* of modes and movement in time and space, multimodal arrangements offer their interpreters possible paths/routes for meaning-making (Jewitt 2009). Kress (2010) mentions division of semiotic labor in making of the ensembles of meaning, and their orchestrations. In the introduction to his edited handbook on multimodality, Carey Jewitt (2009) describes the two central scopes of the multimodal approach as description of *semiotic resources* and investigation of *intersemiotic relations* between modes. Van Leeuwen (2005) explains the unity of internal *orchestration* of signs as *multimodal cohesion,* which consists of simultaneous organizations of rhythm (time), composition (space/layout), information linking (cognition) and dialogue (communication). *Orchestration*, as an analytical keyword and a metaphor, has central importance for my purposes in understanding the social semiotics of collaborative design (in VWs), in two particular ways. First, the orchestration of modes and modal configurations (of semiotic resources) in composition of multimodal texts is implied. The second form or orchestration is a way of organizing and managing the social practices through which signs are co-produced.

In fact, all texts are considered as material artifacts, which are always already multimodal in terms of textual composition (Lemke 2009a, Kress 2010). In other words: "the world of meaning has always been multimodal" (Kress 2010: 174) Following this logic, I take the position proposed by the multimodal approach to social semiotics, and deem that "fundamentally, all semiosis is multimodal" (Lemke 2002: 302). I consider (written and/or spoken) language as only one of these communicative resources; while drawings, music, video, gestures, 3D artifacts and architectural constructions can also be used as modes in representation and communication. Each mode is used in specific contexts and affords certain social actors and constrains others. A particular message, information of emotion may be communicated with a particular mode may not be effective with others or it may need modal translation. Similarly, the indexicality of visual modes (such as images, movies and interactive graphics) can be used to enhance the affordances of the semiotic arrangements for communicating messages. For instance, in *Elements of Semiology,* Roland Barthes (1967: 26-27) mentions *clothes as written about*, *clothes as photographed*, and *clothes as worn* to emphasize the effects of modality as semiotic resource. Within the multimodal perspective, different ways of experiencing an architectural space (such as through actual physical presence, browsing images or watching videos of it, or navigating in an interactive virtual representation) would certainly affect the construction of spatial experiences. In terms of the design of virtual places, as any other spatial composition, syntagmatic relations within the layout of the overall

design can also operate as a semiotic resource. The virtual places and artifacts that are co-created in SL also bear particular modal affordances and constraints, as the co-designers organize the environment of communication to facilitate particular social actions while limit others. To sum up, modes are created, used and transformed according to the communicative and representational needs of societies, and semiotic requirements of the context of situation. As Kress (2010: 87) states: "What a community decides to use and regard as a mode is a mode." My particular aim in adopting the multimodal perspective is to inquire how SL's social world allows and/or hinders the emergence of particular modes in collaborative design.

Multimodality in Digital Media

Digital technology is considered as a "multimodal social semiotic technology", which provides "a common platform for semiotic resources to combine and unfold in new and innovative ways" (O'Halloran in press*:* 4). Media, on the other hand, is defined by Kress and van Leeuwen as "[the] material resources used in the production of semiotic products and events" (Kress and van Leeuwen 2001: 22), including both the materials and the tools used. For the systemic functional analysis of digital communication media, multimodality presents a methodological approach and an epistemological framework for understanding the affordances and constraints of digital media. The three features of contemporary media landscape characterize the social semiotic understanding of transformation in social practices within and between media: "(a) forms of knowledge production; (b) forms and principles of text-making composition; and (c) social and semiotic blurring: the dissolution, abolition, disappearance of frames and boundaries" (Kress 2010: 23).

For O'Halloran (in press), the systemic functional/multimodal approach to digital communication is innovative because it emphasizes the relations between semiosis, text and context in order to reveal the individual, social and cultural patterns for meaning-making. As the digital communication technologies develop, a growing multiplicity of modes and modal arrangements are becoming available for online communication, as well as new affordances for participation and collaboration. On the other hand, analyzing multimodal meaning resources for co-production of digital technologies also presents several limitations, including the complexity of analysis and dynamic nature of media texts. For Lemke (2009b), hyper-textual construction of the Web offers users with many possible sequences of interaction, the coherence of which depend on both thematic (presentational), structural and dialogic relations. By doing so, the hyper-text affords its users to "generate trajectories (…) which are themselves a new kind of multimodal syntagm" (Lemke 2009b: 291). Therefore, notions such as *production* and *authorship* must be re-explored and re-theorized to comply with the new forms of expression and social practices, such as the cut-

and-paste logic of online media, the horizontal power relations in participatory cultures and user-generated content (Kress 2010).On the other hand, the multimodal perspective needs new dimensions and further clarifications when the subject of inquiry is a VW.

Multimodality and the virtual worlds

As I emphasize throughout this dissertation, my research focuses on co-design of virtual places and artifacts in SL. SL has been defined as a 'virtual world' which is inhabited by many 'residents' via their 'avatars' by many of its users, its creator Linden Lab, and by several researchers,. None of these definitions are semiotically neutral; they are loaded with negotiations and discourses on the conditions of virtuality, spatiality and interactivity. But a fundamental question of what makes such a platform 'virtual' is yet to be answered, as the social interactions and co-production activities actually do take place in temporal and spatial dimensions. As I will explain in further detail in Chapters 7 and 8, the reflections of the co-designers on their semiotic associations with co-production of virtual places and artifacts rely substantively on their conceptualizations of the VW itself, and what makes SL so different than the so-called '*real-life* (RL)'. Therefore, in this section I will discuss the condition of being *virtual* (in contrast to real or actual). My aim here is to bridge the social semiotic framework to the following section on the notion of *place* as an experiential and a social context for semiotic events (in contrast to space as an abstract mathematical description).

Social definitions of the *real* versus the *virtual*, and social construction of their meanings, have always been of central importance to the semiotic understanding of space and place[6]. An important one of semiotic associations include *signs of realism*, and the necessary "semiotic navigational devices for the viewer" (Kress 2010: 106) to arrange multimodal clues in a meaningful experience. According to Hodge and Kress (1988: 121), "contending parties seek to impose their own definition of what will count as 'truth' and 'reality', as a decisive moment in the battle for social control." Making of signs both requires and transforms the semiotic resources of the culture in which communication takes place. Social semiotics consider these personal accounts of truth and reality as integral parts of the process of semiosis; as contesting discourses they represent conflict and negotiation in power relations.

While the domain of the virtual is concerned with representations, the actual refers to the ontological process of *becoming* rather than the text itself. In his introduction to the edited volume on Gilles Deleuze's views on science and philosophy, entitled 'The force of the virtual', Peter Gaffney (2010) describes a constructivist agenda for the definitions of the *actual* and *virtual* that is

[6] For detailed discussions of social construction of discourses on reality, see also Berger and Luckmann (1966) and Lakoff and Johnson's (1980) seminal work on cultural metaphors; as well as Iedema (2003) for reflection of the social constructivist frame on social semiotic theory.

tied to a process of actualization; and the relevant opposition is rather between 'the continuous actual-virtual system' and the 'already vanishing present'. In the Deleuzean sense, interpretation (mental image) of reality will essentially be: "(1) limited in scope by the time and place of the observer, (2) structured according to the modalities of sense, and (3) ontologically secondary to the thing it represents" (Gaffney 2010: 13). Similarly, Frédéric Keck (2005) claims that *the virtual, the symbolic, and the actual* are three intertwined degrees of experience, and they interact complex and productive ways. Here, the *symbolic* acts as an intermediary level between the *virtual* and the *actual*.

In technology-oriented cases of digital communication and virtual presence, signification and definition of reality becomes an even more complex epistemological problem. In cases such as multimedia production, where technology is the issue of semiotic analysis, articulation of potentials and new means of production is important, as "previously technically, materially and professionally distinct forms of production come together through and in the affordances of the new technology" (Kress and van Leeuwen 2001: 123). User performances in physical space are translated to the virtual environment by the mediation of digital technologies; thus, it is possible to imagine a conceptual relationship between physical actions and their counterparts in the virtual environment. Social psychologist Jim Blascovich and virtual reality researcher Jeremy Bailenson (2011) formulate the dichotomy between the real and the virtual by referring to social psychology, and prefer to discuss in terms of a *grounded reality* instead. For Blascovich and Bailenson, virtual behavior (social action in virtual environments) is in fact *real*, and people apply similar behavioral templates that they use in grounded reality into the digital realm. Digital communication scholar Jonathan Steuer (1992) claims that the definition of virtual reality is based on the experiential concepts of *presence* and *telepresence*. Steuer discusses the technological dimensions that contribute to the construction of these two experiential dimensions in relation to the analysis of several environmental factors, such as vividness and interactivity. All these interrelated issues on how the co-designers interpret and co-produce discourses on reality and virtuality in their designs are reflected in my methodology. The construction of the co-designers' meaning-makings on the design processes and the final products can depend on the ways in which they interpret the VW's affordances and constraints, and they think virtual places should be signified in a world where avatars are not bound by conventional RL physics.

3.3. Space, place and virtual place: The semiotic and experiential views

It is necessary to discuss psychological, phenomenological and social aspects of the semiotic transformation from *space* to *place* in order to understand social practices of multimodal sign-making through collaborative design of virtual places. The semiotic aspect of place-making results

from the meaning-making practices, in that the objects and bodies in spaces are transformed into places in people's minds as they learn about them through experience. Places are experiential and semiotic constructs. They are experiential, as they refer to particular locations where meaningful human interaction takes place. In fact, place is essential to human thought, as every action has to happen somewhere (Relph 2007). In this sense, *built spaces* (i.e. architectural spaces) are transformed into *places* through socio-cultural histories that are embedded in their designs, and the ways in which they are interpreted and/or experienced as sign systems.

Within a design-based perspective, "place is mixed with human values and principles, which transforms it as "a particular space which is covered with meanings and values by the users" (Najafi et al. 2011: 187). As a central agent of semiotic change, *design* shapes the environment of communication. Configurations of artifacts that constitute the place would, thus, transform the projections of the complex, inter-related social arrays in which places are constructed and experienced through everyday practices. My analysis emphasizes the spatial characteristics of virtual environments, and practices of place-making through co-production of meaningful signs. Therefore, I will exemplify and discuss various similarities between (so-called) virtual and real places. On the other hand, the virtual places that are subjected to analysis here have unique characteristics, through which they are experienced and designed differently than physical places.

According to social science scholar Edward Relph's (2007) analysis of *spirit of place* and *sense of place* in VEs, a phenomenological perspective on the study of place-making is helpful for analysis. He argues that there are at least three interwoven elements of place: its physical setting, the spatial activities within it, and the meanings that arise from experiences from interacting with it. Ontological and epistemological relationships between space, time and bodily experience are also among the central discussions in the phenomenological approach (Merleau-Ponty 2004 [1948], Stewart and Mickunas 1974).

> We can no longer draw an absolute distinction between space and the things which occupy it, nor indeed between the pure idea of space and the concrete spectacle it presents to our senses (Merleau-Ponty 2004 [1948]: 51).

In his book on 'concepts of Space', physics scholar Max Jammer (1970) distinguishes two particular tendencies to conceptualize space in modern European philosophical and natural sciences. The positivist concept of space is something that exists in itself, independently from human consciousness (i.e. we can talk about *space* without actually *being in* space). The opposing viewpoint, metaphysical (or dualist) concept of space has its roots in the theology of Leibniz, where 'place' denotes 'God'. Similarly, the Cartesian notion of space opposed the Aristotelian subjectivism

(Lefebvre 1991 [1974]). Phenomenological concept of space offers a third way, a concept of space understood via its appearances in conscious human experience (Qvortrup 2002).

Space and Place: The experiential and functionalist approaches

In his widely cited book on space and place, geography professor Yi-Fu Tuan (1977) proposes and experiential perspective on these two concepts, and explores how people feel and think about space and place through exploration of a variety of disciplines, including psychology, literature, anthropology and theology. In Tuan's phenomenological perspective on place-making, *experience* has a central role, as experience is framed by "the various modes through which a person knows and constructs a reality" (Tuan 1977: 8). We perceive and act in the world by processing kinesthetic, visual, haptic, auditory and other stimulants. For Tuan, "[T]he organization of human space is uniquely dependent on sight" and "other senses expand and enrich visual space" (Tuan 1977: 16). Although multimodal social semiotics –particularly in its postmodern expansions – refer to these modalities as various semiotic resources in a coherent semiotic arrangement, Tuan's experiential perspective has important similarities in terms of its multi-dimensional understanding as space and place as socially produced phenomena.

From the experiential perspective, space connotes a more abstract mathematically define phenomenon, while place refers to the multitude (and memory) of such multimodal experiences. Spaces are experienced as relative locations and spatial relations of objects or places within, thus it can be described by a *network of places*. On the other hand, Tuan describes place as "an organized world of meaning" (Tuan 1977: 179), which is essentially a fixed framing of lived experience[7].

Phenomenology considers place as a type of object, which defines space through organization of its (functional and representational) elements. On the other hand, space connotes an *abstract term* that describes a complex set of ideas and something that is measurable. Certain spatial relations and structures are closely tied to the construction of interpersonal relationships, which contributes to the construction of a sense of place. Similarly, phenomenology of architecture (and built spaces) "explores ontological character of humankind and considers 'being-in-the-world' as an indispensable part of continuation" (Najafi et al. 2011: 187); thus it emphasizes the spatial practices, interactions and experiences of people within the material and symbolic structures of architecture. In Tuan's terms, *spaciousness* and *crowding* are closely related to the making of such experiences. On the other hand, the phenomenological perspective is concerned with individual experiences and subjective interpretations of people instead of ultimately objective truths (Turner

[7] Similar to the example in Douglas Adams's prologue to this dissertation (Adams and Carwardine 1990), Tuan (1977) also mentions the consistently rebuilt Shinto temples Japan to exemplify how the experiences of space and place differ from culture to culture.

and Turner 2004). Social Informatics scholars Phil and Susan Turner's phenomenological approach claims that the prevalent 'place=space+meaning' formulation falls shorthanded, mainly because of the *elusive* and *evanescent* characteristics of *place* that make it larger than the sum of its parts. *Spatial ability* becomes *spatial knowledge* through movement and learning about the locations. This notion resembles Michel de Certau's (1984) conceptualization of *walking in the city or* drawing maps to represent space.

To theorize the social semiotic in computer mediated environments, I often refer to the phenomenological interpretations of space and place. Although phenomenology alone does not frame the fundamental constructivist perspective I employ in this research study, it is useful in supporting the understanding of *the social* through the inquiry of mediated experiences of *the (co-producing) individual*s. In his defense of the phenomenological approach to the study of virtual spaces, Lars Qvortrup (2002).distinguishes 3 fundamental characteristics of virtual space experiences. For Qvortrup, a virtual space is not a parallel world, nor is it a representation of reality. Virtual spaces are representations of space experience. Iconic function (reference), indexical function (support) and symbolic function (parallel world) can be observed in design of virtual spaces. Multimodal virtual reality represents the way in which we *perceive* space, the way in which *we are in* space, and the way in which we *practice* space. Qvortrup's semiotics-inspired phenomenological assessment of virtual spaces is important, in that it centers on multimodal meaning potentials of virtual environments, in which bodies, objects and interactions are digitally represented. The influence of the phenomenological approach is evident in Lemke's theory (Lemke 2005, 2009a and 2009b), mainly his analyses of traversals in time and space in transmedia environments such as interactive CD-ROM software and online computer games. Lemke (2009a) uses the phenomenological approach to guide his social semiotic analysis of virtual game-places, as he theorizes how socially meaningful actions are experienced in and through space and time:

> Meanings are made across time, space, in and through matter. Experience is experience in and through time, in place and across space, in a body and in interaction with other bodies (Lemke 2009a: 143).

Lemke claims the phenomenological perspective on time, embodiment and movement "necessarily complements a semiotic one", in that it "asks us to set aside categorizations which have become naturalized for us through history and culture and attempt to recoup the experiential feelings and nominally subjective (…) aspects of what it means to act and be in time and with the world" (Lemke 2009a: 141). In fact, physical relationships and interactions of bodies in space are among the fundamental dimensions of social semiotic contexts (Hodge and Kress 1988).

Architectural design and place-making

Design's role is central in the construction of these experiential potentials, as it organizes and represents the affordances for place-making. In their review of the seminal literature on the concept and sense of place, Mina Najafi and colleagues (2011) claim that "purpose of designing places not only is facilitating of everyday activities but providing symbolic and affective qualities [that] are very important to attract more people to places" (Najafi et al. 2011: 188). Here, the relevant dimension is the role of designers in forming and creating the necessary spatial organizations for place-making to occur; while the interaction that takes place within the (physical or virtual) place is what the visitors will experience.

> Houses and streets do not of themselves create a sense of place, but if they are distinctive this perceptual quality would greatly help the inhabitants to develop the larger place consciousness (Tuan 1977: 171).

Sense of place and the meanings that are associated to places are among the central considerations in built spaces, which are thought to be the result of various interrelated elements including the landscape, the location and personal attachment/involvement with the site (Najafi et al. 2011). For this reason, architects are advised to consider not only the meanings but also the physical attributes and affordances of the settings. According to Najafi et al.'s (2011) comprehensive literature review, the contributing factors to the construction of a sense of place in architecture are broadly divided into two groups: the *cognitive/perceptual factors* and *the physical characteristics*, which in part define not only the physical characteristics but also the associated meaning and action potentials. For instance, it has been suggested from an architectural point of view that built places of architecture do not only fulfill an aesthetic function, but it is some special type of *functional art* (Rasmussen 1959) which brings together form, function and structure as a social construct. For Danish Professor of Architecture Steen Eiler Rasmussen, who defines the task of architecture as "to bring order and relation into human surroundings" (Rasmussen 1959: 34), to see architecture is not enough to fully understand it but one has to experience it from within. It is in fact the aspect of *utility* that separates the work of architecture from the work of art (Rasmussen 1959). On the same token, the places of architecture are not generally meant to be built stand-alone without any urban or natural environment around it; which makes its textual relations with its surroundings an important aspect of place-making. In Tuan's (1977) phenomenological perspective, architectural space reflects the social and functional dimensions of human experience:

> Architecture continues the line of human effort to heighten awareness by creating a tangible world that articulates experiences, those deeply felt as well as those that can be verbalized, individual as well as collective (Tuan 1977: 100).

From this perspective, to build (and to live in) architectural spaces is a conscious effort to combine several types of experience and awareness. Tuan states that a builder first needs to know where to build and with what materials; then afflict physical effort to work. "A worker modifies his own body as well as external nature when he creates a world" (Tuan 1977: 102), including the social practices of people who use (or live in) it. Therefore, architecture both teaches and influences social roles and relations. Whether the design reflects a religious place in which subject and objects of practice are clearly defined or an interior decoration which emphasizes the distinction of *inside* and *outside,* architectural space defines, represents and constructs ways of experiencing the social and physical worlds. Architectural design articulates social order by impacting *senses* and *feeling,* through *experiential* and *symbolic* qualities. An architect learns and practices the *rhythms of culture*, and develops a tacit understanding of the ways to give it *symbolic form*[8].

Social semiotics, spatial practices and place-making

The semiotic organization of space and place cannot be understood separately from the organization and signification of social actions, through which relations of power and social control are also organized. Space frames experience not only in terms of movement in and/or between locations, but also in terms of co-production of socially meaningful actions and discourses in and about spaces. In this framework, Henri Lefebvre's (1991) neo-Marxist framing of the production of 'social space' has an influential role –as knowledge and action possibilities– in understanding the modes of production, allowing them to take place while transforming the social system in which co-producers interact. For Lefebvre, *space* is a theoretical entity, while *spatial practices* are empirically observable; and "the concepts of *production* and the *act of producing* do have a certain abstract universality[9]" (Lefebvre 1991 [1974]: 15). In this view, the terms of everyday discourse (i.e. room, house, shopping center, public space) describe and distinguish *social spaces* in which social actions take place.

The spatial dimension adds further considerations and choices for sign-makers: objects in space have many surfaces, other objects can now be *above* or *below* them, and they can be composed to form open or closed spaces to certain degrees (van Leeuwen 2005a). Another important consideration in multimodal organization of space is the position of the viewer in relation to the composition, while this is a dynamic relationship which can change through movement in time. Although in *Reading Images*, Kress and van Leeuwen (1996) limit their discussions of the notion of *framing* within the field of visual communication, van Leeuwen (2005a) expands the reach of the notion and theorizes *framing* as a *multimodal principle* by including built spaces in his theory. He

[8] Tuan describes architectural space as "frozen music", which refers to "spatialized time" (Tuan 1977: 118).
[9] Emphasis in italics by original author.

analyzes school and office buildings to explore the spatial types of framing, and how design operates in making of semiotic spaces. Van Leeuwen (2005a) outlines five categories (segregation, permenance, permeability, separation, rhyme) in which multimodal organization of spatial elements are considered as semiotic work: they are used either to connect or disconnect, to segregate or separate, or to create similarity and/or contrast. By critically reviewing Edward T. Hall's idea of *proxemics* (Hall 1966), Hodge and Kress prefer to use the term 'spatial codes' rather than 'proxemic codes', as it is thought to combine both the material and social dimensions of signifying systems.

> The spatial code and its transformations carry complex social meanings, and the decoding of the text reveals both general social categories and processes of negotiation in terms of them (Hodge and Kress 1988: 57).

Furthermore, Kress' and Lemke's social semiotic perspectives often include analyses of the relations between design, body, tools and objects in their transformations). Kress' emphasis on everyday practices reminds the ideas of Merleau-Ponty, who aimed at a description of experience through every day social action and perception, and of body and its interaction with the environment through a phenomenology of perception.

The organization of multimodal components into the space - whether physical or virtual space or graphical space of designed images – may orient and direct the interpreters (interactants) towards particular behaviors (Kress 2010). For Kress, "[a]ll communication is movement" (Kress 2010: 169), and different media have different affordances to facilitate movement, while each multimodal arrangement provides both 'curricula' and 'pedagogies' for interpreters to experience. For instance, he discusses 'screen' as a "spatially organized site of display" (Kress 2010: 170) with specific affordances for digital communication and image-dominated representation. Users (as interpreters and learners) experience a 'constant transformative engagement' through the use of graphical interfaces; and as a result, their 'capacities for acting in the world' may be enhanced.

As a final point, a specific stream in the social semiotic theory deals with issues that emerge with consideration of *places* as semiotic contexts. The discourse-analytical approach to the social semiotic framework is developed by numerous researchers, including the influential methodological perspective of mediated discourse analysis (MDA). The unit of analysis in MDA approach is *mediated action* –social action mediated through the use of cultural tools – that is realized by the meaning potentials - affordances and constraints- of *mediational means*, as users deploy them in their social worlds/situations (Jones and Norris 2005: 5). Ron and Suzie Wong Scollon's (2003) concept of 'geosemiotics' develops a four-themed framework to understand how

human action unfolds in 'three-dimensional' and 'multiply discursive' spaces, particularly in built environments, which consists of:

- **The social actor**, i.e. the habitus of individual humans.
- **The interaction order** in which the conduct their social lives,
- **Visual semiotics**, i.e. the discourses of images and texts which they encounter, and
- **The place semiotics** in which all of this happens including all the other sign equipment and their emplacement or location in time and space in the material world. (Scollon and Scollon 2003: 166)

The potentials meanings of signs are determined through a complex network of social and cultural relations, and the context of situation in which the sign is placed (produced and interpreted) would affect the overall semiosis. In terms of VWs, these contexts often unfold in a plurality of physical and virtual places. Scollon and Scolllon's formulation of place semiotics have been adapted to the study of visual semiotics in Lisbeth Frølunde's (2009) analysis of collaborative film-making, and to the field of virtual worlds in Maria Bortoluzzi and Piergiorgio Trevisan's (2009) conceptualization of SL as a 'non-place' for pedagogic practices[10]. Drawing from Scollon and Scollon's (2003) formulation of place semiotics, I propose four themes for the analytical matrix to understand how meaning potentials unfold in *three-dimensional* and *multiply discursive* virtual places. I analyze the social contexts of collaborative design, the mediational means and the orders of design processes in Chapter 7, and then present the multimodal analysis of virtual places and artifacts that are designed for avatar interaction[11].

Place-making in virtual worlds

Space "describes geometrical arrangements that might structure, constrain, and enable certain forms of movement and interaction" (Dourish 2006: 1). Unlike *space*, which is framed by *the three-dimensional environment in which objects and events occur in relative positions and directions*, *place* has metaphorical and emotional connotations attached to them. But how do we transfer these semiotic and phenomenological perspectives to the study of virtual places? How can we understand in what ways people experience, design and build these digital communicative environments in which human bodies are replaced with avatars, and physical objects with virtual artifacts? Which semiotic and material resources do these world-builders use in order to co-produce meaning and action potentials in the virtual places? And how do they pursue the collaborative design projects by using the tools that are provided by the platform?

[10] Another social semiotic approach to virtual places is Massimo Leone's (2011) semiotic analysis of religious space in SL. Leone focuses on aesthetics and phenomenology through a 6-month ethnography of worshipping communities.
[11] Analytical reflections derived from Scollon and Scollon's theory of *place semiotics* will be elaborated in the *Methodology* chapter, where I outline the general analytical matrix produced by an iterative process of coding.

With similar questions, Lemke (2009b) analyzes transmedia traversals in their relations with multimodal genres and political economy of signs. Lemke (2005, 2009a) directs the focus of his social semiotic inquiry to interactive digital media, particularly computer games ('game-worlds') in which users are represented with avatars in their mediated interactions in virtual places. Lemke's observations in game-worlds, and his formulations of semiotic movement as *chronotope*[12] and phenomenological experience of time as *heterochrony*, require particular attention for the study of collaborative design in VWs[13]. His analysis focuses on transmedia franchises and the 'branded content' of new media products –rather than user-generated content– with the aim of using social semiotics as a tool for critical multimedia analysis to grasp their social meanings.

In the early "new" media spaces, spatial metaphors were widely used (Messeter 2009) although the visual and structural design of media platforms had not yet reached the levels of *immediacy* and *hypermediacy* (Bolter and Gruisin 2000) compared to contemporary digital media, let alone to the 3D virtual places in VWs like SL. A good example is William Mitchell's (1996) theory of City of Bits, where Mitchell describes the emerging digital information networks as systems of virtual spaces and the connecting *information superhighways*. Mitchell also exemplifies his arguments on spatial metaphors in the early Web's social spaces by mentioning locations such as agoras or forums in early Web pages.

In their influential 1996 article on *the roles of place and space in collaborative systems*, Steve Harrison from Xerox Palo Alto Research Center and Paul Dourish from Apple Research laboratories argue that the focus on space and spatial models in computer supported collaboration is misplaced; whereas an operational clarification on space and place in new media design is necessary (Harrison and Dourish, 1996). Drawing on architecture and urban design theories, as well as on their own research findings, Harrison and Dourish claim that the relation between space and place is a social one, it is the *sense of place* which frames interactive behavior. Furthermore, their understanding *place* as "understood reality" also frames important aspects of collaborative systems, such as *connectedness* and *distinction (*Harrison and Dourish 1996: 67*)*. Meaning-making humans are *located in space*, while they *act in place.* Since it is relevant to speak of places rather than spaces in terms of semiotic co-production, it is also necessary to be aware of the intertwined distinctions between *sense of place*–which results from the user's interaction – and *spirit of place* (genius loci) –which is related to the relationship between the building and its physical and socio-cultural environment- (Relph 2007). Undeniably, both sense and spirit of place are dependent on the cultural context, but in different aspects. It is also possible to argue the application of the

[12] A term which Lemke borrows from Bakhtin (1981) to describe 'socially typical movement across meaningful spaces'
[13] Lemke uses chronotope and heterechrony to describe 'culturally typical movements' in time and space. These two terms will be explained in more detailed within the Methodology chapter, in which I will be discussing the analytical framework with respect to the 'meta-functions' and 'place semiotics/context of situation' matrix.

genius loci idea to virtual places, which may have unprecedented new types of relations with their (real and virtual) environments. Edward Relph argues that place-making in virtual reality environments –similar to the design of physical environments - fundamentally requires an act of *selection* and combination among the representative powers of the designer(s) and the imaginative capabilities of the user(s).

> The original author of a virtual place in some fashion has to anticipate how participation might occur and to provide suitable cues and possibilities for it, though in a fully interactive virtual place, as in a real place, the imaginative involvement of participants will lead to changes that can in no way be anticipated. (Relph 2007: 24).

As the role of digital technologies in everyday life has significantly evolved in the past decades, such technological transformations have also transformed social and cultural practices (Dourish 2006). Similar to the graphical Web interfaces, 3D VWs and CVEs also followed an evolutionary pattern, which included the additions of elements such as voice and video embedding. Although certain characteristics of the new electronic domain are affected by people's existing interactions with similar media, developing individual and communal expressions for new media is necessary for building what Relph (2007) calls a *sense of virtual place*. However, additions and improvements to the technological infrastructure also affect the ways in which media users behave and interact.

> [E]arly conceptions of place in interaction design in general have not accounted for the richness of social, cultural and material aspects of context to the same extent as have design disciplines such as architecture or urban planning. However, over the last few years there have been changes in the landscape of interaction design that warrant a renewed concern for how we relate interactive technology to place (Messeter 2009: 32).

The techno-social situations through which new technologies of place-making are introduced and the spatial practices through which they are used have a reciprocal effect. As these new mediated practices are emerging from within existing cultural practices, they also transform the spaces of everyday action (Dourish 2006). The electronic media is changing the ways in which we often think, feel and communicate in social situations; whereas our interactions with the media are constantly being reconstructed and our cultural environments transformed (Relph 2007). In this sense, social VWs such as SL create a stronger sense of place as they allow theirs users to co-create the world's content, meanwhile they enable the designer-communities to remix and share it.

Although my focus is particularly on 3D virtual places and artifacts in VWs, it is also important to note that interactive digital experiences can be designed in different ways by using different technologies that could afford various experiences, while limiting others. The changes that Messeter mentions can be exemplified by the emergence of three-dimensional multi-user virtual

environments, augmented reality, location-specific computing and the new forms of social practices that evolve through their use. Drawing on their 10-year-old analyses of place and place-making with digital technologies, Dourish (2006) also argues that growth in both the connectivity and processing powers of computers resulted in the emergence of immersive virtual environments in which avatar embodiments share the same graphical world, and design of location-specific technologies via mobile devices for specific places (Messeter 2009).

For Harrison and Dourish's (1996) CSCW[14]-oriented analysis, certain affordances of the so-called "real-world" can be applied to the virtual domain as spatial models, including *relational orientation* and *reciprocity*, *proximity* and *action*, *partitioning*, *presence and awareness*. In their understanding, "designers can exploit our familiarity with the spatial organization of our everyday physical environments [;] in particular, they wish to exploit the ways that space structures and organizes activity and interaction" (Harrison and Dourish 1996: 68). Harrison and Dourish's (1996) analysis is partly a result of the "spatial turn in computing" and the emergence of collaborative working systems for offices in 1990s (Messeter 2009), which provide a fruitful yet limited scope. It is possible to claim that such analyses from mid- and late 1990s would provide only limited insights, as they have been under critical scrutiny parallel to the evolution of technologies and socio-cultural practices. The place-oriented CSCW perspective of Harrison and Dourish (1996) has been criticized to rely too much on the distinction between the object and meaning, and the dichotomy of real and virtual worlds (Messeter 2009). However, their analyses of place in earlier collaborative working systems show remarkable similarities with the multimodal framework of my research, in which different modes such as image, sound and video are considered as interrelated parts of particular unifying semiotic functions.

> It's very easy to blindly talk about "audio and video" in media spaces as if they were equivalent media, performing the same sort of function. However, when we take the place-centric view—and as we have seen, it's the place-centric view which affects how people communicate and behave—then we can see that audio and video actually provide very different sorts of functions (Harrison and Dourish 1996: 73).

In fact, Harrison and Dourish's (1996) earlier analysis considers place generally as a *space with something added*, while Dourish's (2006) later analysis of the contemporary CSCW systems points to the limitations of this "layer-cake" model of understanding space and place and argues that space is as much socially constructed as place. As new technologies are introduced to societies, they do not only change the ways in which the users socialize but also their spatial practices, and the ways in which they understand and develop *spatialities*. Drawing on French cultural theorist

[14] Short for: Computer Supported Cooperative Work

Michael de Certeau's (1984) analysis of a *Walk in the City*, Dourish emhasizes the role of *spatial practices* in the making of the sense of place, and the importance of both space and place models in design of collaborative systems. De Certau argues that spatial practices are in fact social negotiations between "strategic" and "tactical" spatial practices, in which strategies of power and control conflicts the ways people individually and collectively use and produce spaces. In this respect, "de Certau's space is a practiced space" (Messeter 2009: 37). For de Certau, "to walk is to lack a place. It is the indefinite process of being absent and in search of a proper" (de Certau 1984:103)

Strategic practices can be considered as practices of design, whereas tactical practices are the practices of use (Dourish 2006). Similar to the nexus of practice perspective in MDA (Scollon 2001), Dourish (2006) emphasizes the multitude of personal and social experiences that constitute the feeling of place exist in the form of a network of many spatial systems. The focus on spatial practices brings de Certau's and Harrison and Dourish's ideas together with those of phenomenologists (i.e. Tuan1977, Lemke 2002, 2005, Turner and Turner 2004) and LeFebvre's (1991) Marxist framing of power relations and production of social spaces. In fact, both Harrison and Dourish (1996) and Dourish (2006) defend meaning as a collective product, and collective production of the meaningfulness of places and spaces as a social process.

My purpose is to develop the multimodal systemic-functional model of social semiotics to the analysis of virtual places and artifacts, and use the multimodal analysis of meaning potentials to explore the socio-technical contexts in which co-design and co-production practices take place. There are two main reasons why I believe such a socio-technical approach to the semiotic analysis is necessary to understand the complexity of multimodal semiotic potentials. The systemic functional analysis can help us analyze the experiential, interpersonal and textual meaning potentials that are embedded as multimodal discourses by negotiating actors, including the co-designers and visitors. Furthermore, the analysis of co-design practices and the means by which modes are organized to represent, orient and organize semiotic resources also help us understand the ways in which multimodal discourses are produced.

3.4. Systemic functional framework and multimodal sign systems

Multimodal analysis of semiotic entities is based on systemically outlining the potential social functions of objects in relation to their contexts of use, and the affordances of the environment in which communication takes place. The systemic functional approach to analyzing sign systems, and formulation of their meaning potentials as socio-semiotic meta-functions were developed primarily by linguists Michael A.K. Halliday (1978, 2007) and Ruqaiya Hasan (Halliday and Hasan

1985). In their view, functions of language are associated with not only the various ways of using the signs but also their role in the interpretation of the general linguistic system (Halliday 1978: 187). Through the use of language as sign system, the social world in which communication takes place is *actively symbolized* and *transformed*. The process of learning linguistic sign systems – similar to other socially constructed sign systems – is a social process in which "the construal of reality is inseparable from the construal of the semantic system in which the reality is encoded" (Halliday 1978: 1). For analyzing social systems of signs as semiotic resources, it is not only necessary to consider social rules as semiotic frames for human action, but also human beings as actively transformative actors.

> In some very basic sense the use or function of every media work is not just to link a producer and a user, but to link across the timescales of production, circulation, and use (Lemke 2009a: 143).

The systemic functional approach claims that the relations between the elements of a sign system (paradigmatic and syntagmatic relations between signifiers and signifieds) are not arbitrary; on the contrary, they are embedded with roles, options and syntactic functions that are realized in the context of situation. Halliday defines the framework for understanding the social functions of language under three fundamental (meta-)functional components:

1. *Ideational* Function (language expressing a content)
2. *Interpersonal* Function (language as expressing relations among participants in a situation)
3. *Textual* Function (structure of the message in relation to the total communication process) (Halliday 1978: 45, and 2007: 88)

Halliday also elaborates the first (ideational) function into two sub-categories: as *experiential* and *logical* meta-functions. In this formulation., the 'ideational' function represents 'the world around and inside the subjects', the 'interpersonal' function enacts 'social interactions as social relations', and the 'textual' function refers to "a world in which all the elements of the text cohere internally, and which itself coheres with its relevant environment" (Kress and van Leeuwen 2006 [1996]: 15). All of these semiotic components contribute to the making of signs in any given social situations. In terms of analysis, the order of meta-functions is not sequential or strictly grammatical, but it depends of the context of situation, intentions of social actors and organization of semiotic resources in the semiotic environment.

> Social semiotics is primarily concerned with human semiosis as an inherently social phenomenon in its sources, functions, contexts and effects. It is also concerned with the social meanings constructed through the full range of semiotic forms, through semiotic texts and

> semiotic practices, in all kinds of human society at all periods of human history (Hodge and Kress 1988: 261).

However, the systemic functional model for linguistic sign systems cannot be directly adopted and applied for the analysis of multimodal phenomena, such as audio-visual presentations, 3D artifacts and places. Although these entities often bear verbal signs in combination with other multisensory information in multimodal arrangements, the analysis requires consideration of the use of various modes to afford different types of interaction and contribute to the overall meaning by their situated meaning potentials. For instance, design of virtual places and artifacts in SL often include linguistic signs to inform visitors, draw attention to a particular theme or guide their movements to certain locations, while verbal information is placed within a 3D virtual environment where avatars, objects and surfaces (textures) are organized to facilitate spatial navigation. Within the multimodal paradigm, Kress (2010) focuses on the three functions by questioning the semiotic potentials of modes in communication and representation. For the ideational function, he asks if certain modes can represent meanings about the world of states, actions and events. The main question for the interpersonal function is to inquire how multimodal signs represent meanings about the social relations of those who are engaged in communication. Finally, the textual dimensions is concerned with how 'message-entities' which are internally coherent and which cohere with their environment are formed (Kress 2010: 88).

Lemke (2002, 2009) reconsiders Halliday's linguistic meta-functions in accordance with the multimodal conception of digitally mediated communication, and generates a new terminology to study social functions of multimodal texts. In the course of analyzing how these functions are realized within multimodal composition, Lemke also offers a comprehensive analysis of multimedia and virtual environments. In Lemke's formulation, the 'ideational' becomes the 'presentational function, which (re-)presents a state of affairs, or enacts an activity; the 'interpersonal' becomes the 'orientational' function, which addressed the (real or imagined) Other, constructing interpersonal relationships; and finally, the 'textual' becomes the 'organizational function' which constructs relationships of parts to wholes, and strands of continuity based on similarity within difference (Lemke 2002: 304).

As mentioned by Halliday, the context of situation and its structural elements have a relationship with the semiotic functions and their transformations on the semiosic plane[15]. His functional sociolinguistic approach to meaning considers not only the semiotic functions (*ideational, interpersonal* and *textual*) as contextual elements in making of signs but also takes the structural

[15] The influence of Polish-born British anthropologist Bronisław Malinowski on social semiotic theory is evident in Halliday's (1978) theorization of 'context of situation' and 'context of culture'.

elements of the situation (*field, tenor* and *mode*) into account. The role of semiotic relationships is embedded into the ideational meanings, role relationships into the interpersonal meanings, and (multi-)modal configurations of resources into the textual meanings. All of these structural components (of a semiotic situation) contribute to the making of meanings, therefore should be taken into account in a social semiotic analysis.

The three perspectives above represent various attempts to theorize the social semiotic functions of sign as in the social domain. On the other hand, virtual places and artifacts present original affordances and constraints for user interaction, therefore a critical point of view to the linguistic meta-functions should also be argued for the analysis of virtual place-making as a complex social phenomenon. Halliday's view is strictly a linguistic one, focusing on the particular cases of language learning and use in social contexts. Whereas Kress (2010) and Lemke (2002, 2009) theorize multimodal phenomena by focusing also on relations between different modes as semiotic resources. In terms of the central analytical foci, the multimodal theories above are not very different from Halliday's initial theory, in that they both focus on the semiotic, social and structural/organizational aspects of semiotic processes, and consider sign production (design) as both a product and a process. On the other hand, virtual places and artifacts are designed to be *experienced* both spatially and temporally, rather than merely being *read* or *viewed* on a graphic plane. The spatial characteristics of avatar-mediated presence and navigation in virtual space thus affect the potentials for construction of meaning through interaction. In my view, design of these specific types of digital environments can be explained with the help of spatial perspectives on the systemic functional framework, particularly by notions borrowed from architecture and built spaces. Therefore, I use Michael O'Toole's (1994, 2004) conceptualization of the social semiotic perspective to study buildings of architectural design as multimodal sign systems, expressed in the experiential, interpersonal and textual meta-functions. For O'Toole (1994), the main characteristics of buildings that differentiate them from the works of contemplative visual arts (such as paintings or sculptures) are their practical use values, or the *signification of their functions in use* to be precise. This aspect refers to their *experiential* functions. In this view, the *interpersonal* function is described by how the building addresses the individuals through its expressive style and visual language, including the building as a whole and its individual parts in detailed ranks of scale. Finally, the *textual* function explains how composition of each spatial element coheres to each other and the environment in which the building is constructed. In O'Toole's (2004) view the three meta-functions present a dynamic and interrelated form of semiosis, the interpretation of which should follow a hypertextual logic rather than a linear one. As I have explained, I consider the multimodal compositions of functional elements in design of virtual places and artifacts as a spatial task, where virtual buildings and their internal parts (interaction spaces, objects and surfaces)

follow similar considerations of experiential, interpersonal and textual characteristics to physical buildings. On the other hand, the aforementioned characteristics also show domain-specific affordances and constraints, mainly because of digital mediation of bodily and spatial experiences. Therefore, in my analytical framework, I use O'Toole's model to describe the three meta-functions, while the design elements in virtual constructions and their structural ranks of scale show differences in my model. I use ' (a) virtual places (sims or parcels), (b) their divisions and elevations in virtual space, (c) interaction spaces, and (d) elements (artifacts and surfaces)' as the four categories to explain the ranks of scale in construction, rather than O'Toole's (2004) 'building, floor, room, element' scale. My aim is to contribute to the theory by proposing an analytical model for these computer-mediated social environments through the multimodal analysis of their socio-semiotic functions, and how the co-designers intend to communicate their rhetorical intentions in orchestration of experiential, interpersonal and textual meaning potentials.

Relations of design, genre and mode in multimodal discourses

The systemic functional framework provides the essential analytical model for the study of socially constructed discourses, which are built on the many possible semiotic code systems. Drawing from Michel Foucault (1982), Kress (2010: 110) describes discourse as "meaning resources available in a society to make sense of the world, social and natural, at a larger level." For social semiotic theory, discourses are socially constructed means of knowing particular aspects of reality (Kress and van Leeuwen 2001). Kress and van Leeuwen (2001) study multimodal discourses in images, and social factors that shape their production, by referring to *provenance* and *experiential meaning potential* as two fundamental principles. In their perspective of multimodal discourse, experiential meaning potentials are based on "the idea that signifiers have a meaning potential deriving from what it is *we do* when we produce them, and from our ability to turn action into knowledge" (Kress and van Leeuwen 2001: 10).

> Discourse affects choice of design, but choice of design in turn affects design" (Kress and van Leeuwen 2001: 128)

Discourse constitutes the ideological component of sign-making and it includes the assessment of rhetorical intentions and semiotic resources of the environment. *Discourse* shapes the world of knowledge by organizing meanings as potentials to be used/realized. *Genre*, on the other hand, constrains discourse by contextualizing, locating and situating meaning in social spaces. *Discourse* works within the level of potentials and possibilities to make the meaning, while genre refers to standards and conventions to frame the meaning for representation. Therefore, while *discourse* operates primarily on the level of the *social*, *genre* is tightly bound to (and limited by) the context

of *culture*. Finally, *mode* provides 'means for realizing/materializing meanings' with resources that are appropriated within societies.

Design is considered as a mediating level of practice between content and expression, and defined by Kress and van Leeuwen (2001: 5) as "(uses of) semiotic semiotic resources, in all semiotic modes and combinations of semiotic modes." Design focuses on individuals' realization of their interests in participating in the social world in a prospective way. The prospective nature of *design* results from its capacity to translate rhetor's intentions into 'semiotically shaped material', and transform the available resources into "means for action in the designer's interest" (Kress 2010: 22)..

> The political and social interests of the rhetor are the generative origin and shaping influence for the semiotic arrangements of the designer (Kress 2010: 50).

The process of the rhetor refers to the social dimension and politics of communication, which is ideally present at all stages of sign-making including the initial idea/concept generation to policy making and overall shaping of the designed messages (Kress, 2010: 43). Kress' definition of design "foregrounds a move away from anchoring communication in *convention* as social regulation." (Kress 2010: 6) Semiotic resources connote *potentials*, while *competences* refer to grammars, and thus, constraints. In co-production of virtual places and artifacts, meaning generation through design is closely related to the co-designers' choices to represent certain genre characteristics, or create new visual syntaxes to emphasize their rhetorical intentions[16]. These differences and similarities in the use of *modes* and *genres* as *semiotic resources* are particularly of interest for my analytical framework.

3.5. Shortcomings of social semiotics and the socio-cultural perspective

It is important to note that the systemic functional framework is an epistemological construct, similar to the notion of multimodality, which is produced to systematically frame and analyze certain aspects of reality, while it also has limitations. Although Halliday unequivocally admits the impossibility to capture cultural and situational contexts in their whole semiotic entirety, he claims that focusing on the context of situation makes the phenomenon "more describable" (1978: 109). The multimodal perspective and the overall theoretical perspective of social semiotics has also been criticized, particularly because of its limitations for giving voice to a multiplicity of voices, and for considering the complexity of human cognition with relation to sensory information. Multimodal analyses often tend to be predominated by audio-visual perception rather than exploring the possible trajectories of human perception (including, but not limited to, touch and smell). By

[16] For instance, the design of places and artifacts in the Metrotopia case-study followed particular intertextual discourses (and visual styles) on superheroes and comic books. On the other hand, the co-designers of PAL explain their initial purpose as creating a "SL-like" visual style.

comparatively analyzing the multimodal perspective with the anthropologically informed ethnographic methodologies, Sarah Pink (2011) argues the tensions and challenges of combining these two approaches. According to Pink, the main difference between anthropological and multimodal approaches results from ”their understandings of both the relationships between the senses and the way a ‘sensory’ approach might be mobilized as a methodology” (Pink 2011: 262). Pink’s *phenomenological anthropology* describes ‘affordances’ in relation to perceptual processes rather than understanding of culture as a set of rules and representations that can be categorized and differentiated through distinct sensory channels (of sensory information). Taking Pink’s (2011) comments on the challenges of doing an ethnographically guided social semiotic analysis of multimodality, I focus on modes as interrelated (and mutually supportive) ways of representing the rhetorical intentions of sign-maker(s). In doing so, I emphasize the interconnectedness of modes as representational tools (Ivarsson et al. 2009), and focus on not only the direct sensory channels of information (such as audio-visual texts) but also social practices in designed places (such as movement, orientation, spatiality and interactivity). My analytical perspective of what modes *can do,* or what designers can do with them, also bears traces of the phenomenological approach; in that I am also interested in how individuals experience affordances and limitations in their social semiotic experiences in multi-sensory (and multimodal) environments.

I consider social semiotics as and epistemological bridge between the structuralist roots of traditional semiotics and the critical socio-cultural perspective on production of sign systems and their social functions. The sociocultural tradition in communication research considers communication as a dynamic process in which meanings, identities and social structures are co-produced by the participants of communicative social processes (Craig and Muller 2007, Griffin 2009). The symbolic interactionist perspective focuses on the meanings that arise out of social interaction, through which humans act towards other people or things (Griffin 2009). For social-psychologist George Herbert Mead (2007 [1934]), it is the *social process* that gives birth to thought and communication, as mutually empathetic responses to the message of communication; and *social control* operates as a reference to ‘organized social processes of experience and behavior’ through awareness of *the other*. In this framing, resources for communicating cannot be taken separately from their possible *social uses,* and discourses of various actors use them. Therefore, defining a tool essentially requires construction of a complex nexus of co-production practices. One can associate Mead’s sociocultural perspective with the notion of *affordances*, as the trajectory of affordances and constraints are also determined by the potential for meaningful action through use of objects (Gibson 1986, Norman 1988).

As a prominent constructivist perspective to classical sociology, Bruno Latour’s (2005) Actor-Network Theory (ANT) approach also questions the notion of *social*, and puts forth an intricate

framework to re-trace the dynamic *connections* that form –and continuously re-form – the collective actions of people. For Latour, "'social' is not some glue that could fix everything (…); it is *what* is glued together by many *other* types of connectors" (Latour 2005: 5); as "a type of momentary association which is characterized by the way it gathers together into new shapes" (Latour 2005: 65). Latour advices *social* scientists to free themselves from the boundaries of such sturdy conceptual frames, and trace the unstable and shifting frames of reference by following the actors and the formation of networks. This perspective provides not only epistemological but also methodological issues to take into consideration when the topic of research is a 'social' phenomenon.

As sign-systems traverse among time and space, sociocultural differences in construction of different contexts are reflected in the variety of meaning potentials. Systems of power and social control affect the ways in which discourses are co-produced, while interpretations of signs can quite possible resist the dominant rhetorical intentions of sign-makers Therefore, the social contexts in which consumption and co-production activities take place bears particular importance for a socio-cultural approach to the social semiotic framework. However, the interpretative framing allows the deconstruction of possible meaning potentials to an extent that is limited by the researcher's ability to capture these relations, thus may result in subjective overstatements about certain rhetorical elements. Language and education scholar Cate Poynton (1993) criticizes the text-oriented framing of meaning in social semiotics through a comprehensive review of systemic-functional linguistics in relation to feminist and poststructuralist critical theories. For Poynton, the functionalist linguistic framework should be supported with poststructuralist techniques of analysis that emphasize the production and circulation of discourses within the "poststructuralist power/knowledge nexus" (Poynton 1993: 7). One problem with the structuralist formulation for Poynton (1993) is the requirement that lexicogrammatical units (field, tenor and mode) should be 'kept apart' rather than being considered as 'simultaneously being constructed and negotiated'. By focusing merely on 'text' as the analytical unit, and distinguishing between elements of discourses, the systemic functional model lacks the analytical depth on mobilization of these discourses, the effects of language in use' and the roles of individual within certain institutional contexts.

> This apparatus can only describe what is, within the boundaries of text. In order to begin to delineate discourses, however, one needs to take account of what is *not,* what is absent within a particular discursive site (…) In other words, what might have been said but was not—or, given the institutional context and the position occupied by the speaker, could not be said (Poynton 1993: 9).

Here, the relevant question for poststructuralist social semiotics is not about whether distinctly organized modes have individual meaning potentials or not, but rather if *meta-functions are really as distinct as is claimed*. The focus of analysis should exceed text as the basic unit, and "one needs to be able to move beyond text, beyond language, beyond linguistics, into ethnography, history, etc" (Poynton 1993: 9) in order to understand the social conditions in which meta-functional components interact and construct representations of emergent discourses. In sum, Poynton (1993) criticizes the systemic functional framework to rely too much on the 'text' as analytical unit, unnecessarily distinguishing the categories and modes of communication in making of discourses, and offering "singular readings, readings which are naturalised as 'the meaning' of the text in question" (Poynton 1993: 14)[17].

Language and communication researcher Odysseas Constantinous (2005) reviews systemic functional analysis of multimodal objects in combination with (critical) discourse analytical approaches to multimodal semiosis in her extensive review article on media, modes and technologies. For Constantinous, the two approaches do not contest but rather complement each other, since "each aims towards the same broad objective of studying the phenomenon of multi-semiotic meaning making" (2005: 604). The crucial concepts that concern both approaches are *medium* and *mode*. Constantinous (2005) argues that modality is not an objective reality or a thing) that is out there, but it is an "analytic construct built to (…) explore a wider range of phenomena than just the linguistic and verbal semiotic systems" (Constantinous 2005: 607). While socio-linguistic frameworks of mode and modality (in terms of truth value and representation of reality) have been adopted and applied in *Reading Images* by Kress and van Leeuwen (1996), the distinguishing characteristics of each mode (i.e. image, text, sound, interactivity) prevents a completely accurate modal translation.

Film and media studies professor Mark Poster (2007 [1994]) proposes another framework to study modes and meanings of electronic media environments with a socio-cultural perspective. Poster links his theories to the symbolic communication framework of Jean Baudrillard (2005 [1996]), who –for Poster - "broke with the realist paradigms of social science at first by combining Roland Barthes's semiology with the neo-Marxism of Henri Lefebvre" (Poster 2007 [1994]: 381). For Baudrillard (1988, 1996), organization and use of objects to produce social relations is not independent from discourse and the transformative effects of ideology. Similar to use of the notion 'sign-systems' in social semiotics, Baudrillard (1996) writes about 'systems of objects', in which an

[17] However, Poynton (1993) also acknowledges that contemporary social semiotic approaches (e.g. Hodge & Kress 1988) are engaging with aspects of poststructuralist theory, while they are still limited in their political and methodological orientation.

object's consumption refers to its sign value. Baudrillard's social functions of object systems in production of discourses can also be related to Henri Lefebvre's (1991 [1974]) social constructivist notion of *social space*, as well as Csikszentmihalyi 's (1998) framing of 'design and order in everyday life'. In this view, the interaction between social action (such as *production or consumption*) and symbolic communication takes place in the socio-cultural domain, and it is largely based on circulation - and transformation - of signs. Social semiotic theory of communication attempts to rebalance these power and attention issues by putting equal emphasis on both the *initial maker* and the *interpreter* of signs, and by sketching out a framework for communication that begins with interpretation of and response to a prompt, and transformation of messages by multimodal means (Kress 2010). Meanings are made in two ways: *inwardly productive* (interpretation and transformation) and *outwardly productive* (sign-making). On one hand, the design process provides the semiotic grounds for communication by the production of the message. On the other hand, the interpreter's engagement, and active attention provide another translation[18] as a new, inwardly focused sign system (Kress 2010).

The multimodal perspective is also challenged about the intermedial aspects of media convergence and 'culture of appropriation'. In his study on digital media production and 'culture of appropriation', Øystein Gilje (2008) integrates terms from socio-cultural theory and social semiotics to study student-designers' engagements with literary practices/events through *mastery* and *appropriation* as *mediated action*. Gilje analyzes how his students 'take culture apart' through literacy events (Gilje 2008: 32), for which he argues that a perspective *both* on learning and sign-making is necessary. He analyzes not only the observation of semiotic resources and their perceived affordances for specific social actions, but also the transformative relationships between resources and the means by which they are mediated. Gilje's most important argument, for the purposes of this thesis, is on the necessity to supplement social semiotics with socio-cultural theories, which is resulted from the theory's lack of interest in exploring relationships between social agents and cultural tools. When Gilje's (2008) perspective is considered with respect to Sarah Pink's (2011) phenomenological anthropology oriented critique of the approach, the possibility and necessity to supplement the systemic functional multimodal framework with ethnographic methods of inquiry become more evident.

[18] In general terms, *translation* means the movement of meaning across different modes, modal ensembles and cultures. Semiotic translation is theorized by two terms: *transduction* (movement across modes) and *transformation* (staying within the mode but re-ordering syntagms) (Kress, 2010). These two practices of translation depict the central aspects for semiotic change, in that they both reflect and shape cultural classifications and representations.

3.6. Conclusion: social semiotics and meaning potentials in virtual places

In this chapter, my overall aim is to present the relevant dimensions of the social semiotic theory in order to study the co-design and co-production practices in SL. I discuss the classical structuralist and constructivist social semiotic formulations of signs and sign systems, and the notions of *semiotic resources, meaning potentials* and *context of situation* (Halliday 1978, 2007) as the major constituents of my theoretical framework.

In order to analyze the creative uses of multimodal communication channels that are afforded by the VW, I focus on social practices of collaborative place-making in SL and try to explain the co-designers' experiences with specific aspects of the overall design processes. On the one hand, I refer to the contextual data provided by the observation of design processes to understand the contexts in which collaborative projects take place. On the other hand, I use the co-designed virtual places and artifacts as main analytical units for systemic functional analysis in order to inquire how their meaning potentials are constructed by negotiations of rhetorical intentions and intended social functions. For this purpose, I intentionally modify the systemic functional framework of social semiotics to match the framed multimodal paradigm, and produce an analytical matrix that emphasizes the experiential, interpersonal and textual meaning potentials in designed places and artifacts. I refer to the functionalist framing of social semiotics to draw the analytical matrix of contextual and functional units, namely constituents of the context of situation, and meta-functions of each semiotic resource in the overall semiosis.

The object of social semiotic inquiry, within my analytical framework, is two-fold. First, I consider SL as the semiotic entity, through the meaning potentials of which co-designers of collaborative design projects generate content. On this level, participants are considered as users of SL, and their experiences with particular affordances, constraints and transformations in SL's overall user interface, as well as the virtual space it represents. The second analytical object is the multimodal designs that the participants collaboratively design by using available semiotic resources; that is, SL and other available tools, platforms and materials used during collaborative design processes. In this respect, collaborative design of virtual places and artifacts in SL is considered as processes of multimodal semiosis, the result of which can either be creation of new signs or *resemiotization* of meanings within sign systems (Iedema 2003).

Another key issue is *multimodality*. Modes define the communicative channels through which meaning potentials of semiotics and material resources are actualized in social contexts. In the context of VWs, modes refer to various *affordances* and *constraints* of the digital platform. To illustrate the multimodal perspective, I consider not only the audio-visual channels (i.e. text, image, sound, video) but also their socio-semiotic interplay within the co-designers' practices (i.e.

avatars and presence, spatiality, interactivity, chronotopes, heterochrony) as resources for meaning-making. Drawing on the multimodal approach to architecture, I appropriate the systemic functional framework of social semiotics to the context of virtual places and artifacts. Therefore, I am focusing on *experiential*, *interpersonal* and *textual* meta-functions (O'Toole 1994, 2004) and how they represent, orient and organize multimodal resources in design of places and artifacts. Locations of artifacts in virtual space, their positions towards each other and the avatars, or the social affordances of tools for facilitating interaction among designers are among the foci of the multimodal framing of co-production in VWs. In terms of the analysis, my emphasis is particularly on two interrelated aspects of the theory: (1) *multimodal analysis,* which foregrounds the meaning potentials and interrelations of modes in construction of sign-systems, and *(2) MDA,* from which I borrow the 'nexus of practices' perspective to analyze the interactions between social actors, places and tools. Finally, I refer to the poststructuralist and socio-cultural critiques on the shortcomings of multimodal analysis, and how these niches can be solved with methodological reconsiderations. Following this logic, I will further elaborate on my use of the nexus of practices perspective and the general MDA approach in the Analytical Framework chapter in order to support my analysis with observational and participatory ethnographic data in the three case studies. The following chapter will continue elaborating on the theoretical framework by presenting three relevant discussions from design research field: (1) the definitions of design, (2) affordances and constraints as modes of design communication, and (3) collaboration and co-production in design practices, in relation to virtual places and artifacts.

Theoretical Categories	Concepts and references	Analytical Implications
Social Semiotics and Sign Systems	• Triadic model of signs (object, sign vehicle and interpretant) (Peirce's 1998 [1894]) • Second-order signification and metalanguages (Barthes 1967, 1977, 2009 [1957]) • *Actively responsive understanding (*Bakhtin 1981, 1986) • R*hetorical approach* attribute(s) power to meaning, instead of meaning to power.(Hodge and Kress 1988) • Meaning constructed in the 'act of sign production and interpretation' (van Leeuwen 2005a)	Places are constructed as sign systems. The post-structuralist approach emphasizes the dynamic relations of sign-makers and the meaning potentials. Users of digital media also construct their own mediated traversals within the semiotic resources.
Multimodality	• Mode as socially shaped and culturally given semiotic resource for making meaning (Kress 2010) • Semiotic resources as systems of meaning at people's disposal (Jewitt 2009). • Modes are shaped through social interactions in specific contexts (Kress and van Leeuwen 1996, 2001) • Multimodal cohesion as orchestration of sign systems as multimodal arrangements (Van Leeuwen 2005) • Design translates rhetor's intentions into 'semiotically shaped material', and transform the available resources into "means for action in the designer's interest" (Kress 2010: 22) • Systemic-functional model for studying architecture as multimodal sign system (O'Toole 1994, 2004) • Hypertextual traversals and hypermodal interaction sequences in digital media (Lemke 2009b)	Multimodal analysis emphasizes the use of socially available modes and their relations. In SL, digitally mediated communication in three-dimensional places presents specific multimodal arrangements. The analysis should stress on the contextual functions of design elements, and discuss the orchestration of modes to produce meaning potentials.
Space and Place	• The experiential perspective, defining place as an "organized world of meaning" (Tuan 1977) • Phenomenology of spatial experiences and subjective interpretations of place (Turner and Turner 2004). • 5 categories: segregation, permenance, permeability, separation, rhyme (Van Leeuwen 2005a) • Meta-functions of three dimensional space (Stenglin 2008, 2009) • Meta-functions in architecture (O'Toole 1994, 2004) • Task of architecture is "to bring order and relation into human surroundings" (Rasmussen 1959: 34) • Cognitive/perceptual and physical characteristics of sense of place in architecture (Najafi et al. 2011) • Relation between space and place is a social one, it is the *sense of place* which frames interactive behavior (Harrison and Dourish 1996) • Concepts of *presence* and *telepresence* (Steuer 1992) • Role of *spatial practices* in the sense of place, and the importance of both space and place models in design of collaborative virtual systems (Dourish 2006	Places not only communicate messages, but also provide experiential affordances and constraints. Space refers to the objects and dimensions, place contains the actors and their meaningful practices. Being and acting in place is a semiotic experience. Architecture provides a systematic paradigm to analyze the social construction of places. However, the meta-functions need to be revised and appropriated to spatial experience.

Place semiotics and Nexus Analysis	• Every semiotic act (verbal or non-verbal) is placed within a place and a context of social relations (Scollon and Scollon 2003) • Nexus of practices and nexus analysis as semiotic perspectives (Scollon 2001) • Geo-semiotics: social actors, place semiotics, interaction orders, visual semiotics in places (Scollon and Scollon 2003) • Mediational means and analyzing mediated social action (Norris and Jones 2005) • Hypermodal traversals in digital media, chronotope and heterochrony (Lemke 2009a)	While multimodality explains the textual organizations, nexus analysis supports the socio-cultural view. Analysis of the social contexts and the collaborative practices provides a rhetorical approach to place-making, uncovers the social relations of power and organization.
The Systemic Functional Framework	• Ideational, interpersonal and textual meta-functions (Halliday 1978, 2007) • Semiotic resources, meaning potentials, context of situation (Halliday 1978, 2007) • *Text* as a social construct and as a *process* (Halliday and Hasan 1985) • Field, tenor, mode (Halliday 1978, Lemke 2009b). • Design, discourse and genre as semiotic relations (Kress, 2010)	The three meta-functions offer an analytical framework to analyze the meaning potentials in particular contexts. Virtual places are considered as objects of textual analysis. The analysis frames the field of communication, its participants, and the channels by which signs are constructed.
The Socio-cultural Perspectives	• Phenomenological anthropology (Pink 2011) • 'Affordances' in relation to perceptual processes rather than as a set of rules and representations that can be categorized and differentiated through distinct sensory channels (Pink 2011) • The problematic notion of the 'social' and the power relation that societies are built upon (Latour's 2005) • The functionalist linguistic framework should be supported with poststructuralist techniques of analysis that emphasize the production and circulation of discourses (Poynton 1993) • Modes and meanings of virtual environments with a socio-cultural perspective (Poster 2007 [1994]) • Culture of appropriation, supplementing social semiotics with socio-cultural theories (Gilje 2008)	Multimodal socio-semiotic perspective can still fall shorthanded in the study of dynamic social relations. The meanings of affordances, as well as modes and resources, are re-build through interaction. Methodologically, this requires a post-structuralist twist to semiotics, and integration with ethnomethodological approaches and socio-cultural theories.

Table 3. 1 Theories and concepts in Social Semiotics that are relevant to the analysis of collaborative place-making in SL

4. Theory and practice in design research

> Design activities are to no small measures communication activities, aimed at a consensus among all those concerned on what a product should be for or mean to potential users (Krippendorff 1990: 18).

Introduction

This chapter aims to outline the subsequent key dimension of the theoretical framework in order to emphasize a particular aspect of the overall research question, namely the theory and practice of designing places and artifacts as a social and communicative practice. Throughout the chapter, I discuss how and why I chose co-design as a field of practice for research, and how theoretical knowledge produced by design research helps construction of my analytical framework.

The chapter begins with a discussion of perspectives and definitions of the notion design, borrowing terms from various design disciplines including industrial design, graphic design, interaction design, architecture and urban planning. In this section, I discuss the ways in which design researchers theorized the role of designerly practice in everyday life, both as a professional field of conduct and as a basic human activity. On this aspect, I draw my initial propositions on design educator, practitioner and philosopher Victor Papanek's (1984) ideas, who advocated that design is a conscious attempt to impose meaningful order in social life[1].

I discuss how design refers to a specific type of problem-solving activity, in which potential problem and solution spaces advance reciprocally throughout the process. I refer to design studies professor Nigel Cross' (2007) notion of '*designerly ways of knowing'* in order to outline some essential definitions on how design relates to a broad-but-yet-specific field of human activity. I also emphasize theories on *affordances and constraints* (i.e. Gibson 1986, Norman 1988, 1998, 1999, 2008, McGrenere and Ho 2000) to discuss the characteristics of knowledge embedded in products of designing, and to explain how designers of objects communicate with their users and allow particular actions while limiting others.

The analytical framework, which will be outlined in the following Methodology chapter, includes study of the designed virtual places in combination with socio-technical contexts of collaborative design. Therefore, I emphasize participants' interpretations of what designing in SL means, in terms of translating their rhetorical processes into multiply-discursive collaborative design processes by making use of SL's affordances for content generation. In this chapter, I will also

[1] Ironically, Papanek's influential book on sustainable and socially responsible design is entitled "*Design for the Real World: Human Ecology and Social Change" (Papanek 1984).*

elaborate on my particular focus on the collaborative design of virtual places by the help of domain-specific theories and discussions on *design* as socially constructed and constructive practice, the semiotic nature of its social functions. Following this logic, I argue that designing virtual places and artifacts includes construction of *functional representations,* through the intended affordances and constraints of which the co-production of user experience takes place. In the case of user-driven design in virtual worlds such as SL, these practices refer to not only use/consumption of pre-fabricated products, but co-production and constant peer evaluation of the co-produced places and artifacts. Therefore, in this chapter I discuss how research on participatory design and user-driven innovation can help expanding our understanding of co-design and co-production practices in VWs. On the other hand, my focus is primarily on the role of design in construction of meaning potentials through forms and functions, mainly in relation to the systemic functional framing of experiential, interpersonal and textual meta-functions in social semiotics (i.e. Halliday 1978, 2007, O'Toole 1994, 2004, Kress 2010).

Finally, I outline particular theories and research on (co-)designing VWs, and task/object-oriented collaboration in VEs. In this section, the main focus is on practices and sense-makings of users in order to participate in the making of the communicative environments, and co-construct meaningful activities within them. Here I exemplify my arguments with various research studies on user collaboration and creativity by using different media platforms and affordances. One purpose of discussing a variety of collaborative technologies is to relate the discussions on 'affordances' in this chapter with the notions such as 'meaning potentials' and 'modes', which are key terms for social semiotics as described in the previous chapter. This second analytical chapter ends with a wrap-up of my synthesis of reflections from design research, in relation to the previously mentioned social semiotic framework and the following methodology. Here I build my central discussions on three theoretical aspects: designing as construction of meaningful and functional representations, collaboration as a design strategy to tackle ill-defined design problems, and the role of design knowledge in co-production of user-generated content and user-driven innovation.

4.1. Defining Design: Design as Practice, Product and Discourse

German design and cybernetics professor Klaus Krippendorff traces the roots of etymology of *design* back to the Latin *de* + *signare*, which means 'making something, distinguishing it by a sign, giving it significance, designating its relation to other things; owners, users, or gods' (Krippendorff 1998). Professor of design, management, and information systems Richard Buchanan (2001a, 2001b) proposes two types of definitions for design: descriptive definitions which single out one particular aspect of the subject and explore its socio-cultural dimensions in depth, and formal definitions which identify several features and tend to propose a balanced formulation of their

relations. One example of the formal type definitions is design professor and historian John Heskett's understanding of design as "the human capacity to shape and make our environment in ways without precedent in nature, to serve our needs and give meaning to our lives" (Heskett 2002: 5). An influential example of descriptive definitions of design is proposed by Welsh design scholar John Chris Jones, who defines design as "initiation of change in manmade things" (Jones 2009 [1992]: 78). Jones' framing of design focuses on social change, which starts with supply of materials and components to a producer and ends with the evolutionary effects upon society at large. Although Buchanan (2001a) mentions that two types of definitions can be interchangeable according to the needs of researchers and/or designers, he proposes a rather formal definition as: "[d]esign is the human power of conceiving, planning, and making products that serve human beings in the accomplishment of their individual and collective purposes" in his keynote speech on design research and the new learning (Buchanan 2001a: 9).

> The definition suggests that design is an art of invention and disposition, whose scope is universal, in the sense that it may be applied for the creation of any human-made product (Buchanan 2001a: 9).

Although several domain-specific definitions also exist, one common notion is often stated in design research; that is, design as a social practice cannot be limited or dominated by one specific profession, institution, or social group. Design is a communicative activity that takes place in various levels of human practice, and refers to a general body of specific practices, methods and ways of thinking (Buchanan 2001b) on how humans to interact with their environments. In his inspirational theory on relations of design, human ecology and social change, distinguished professor of architecture and design Victor Papanek (1984) claims design is a 'basic human activity' which is an essential constituent of social reality. Through design, humans aim to transform their environments, tools, and ultimately themselves.

> All men are designers. All that we do, almost all the time, is design, for design is basic to all human activity. The planning and patterning any act towards a desired, foreseeable end constitutes the design process. (…) Design is composing an epic poem, executing a mural, painting a masterpiece, writing a concerto. But design is also cleaning and reorganizing a desk drawer, pulling an impacted tooth, baking apple pie, choosing sides for a back-lot baseball game, and educating a child. Design is the conscious effort to impose meaningful order (Papanek 1984: 3).

For Cross (2007), who draws this particular argument upon Papanek's (1984) 'design for the real world' approach, design is a primary capacity of making sense of and modifying the environment

and a fundamental aspect of human intelligence. However, Cross' (2007 [1990 and 2001][2]) analysis of design knowledge tends to advise educated designers and design educators rather than analyze design activity as a social process in all its social appearances; an approach which is primarily apparent in his emphasis on outstanding professional designers to study design activities.

> My starting point is that people are designers – some people are very good designers. Designing is something that all people do; something that distinguishes us from other animals, and (so far) from machines. The ability to design is a part of human intelligence (…) But we also know that some people are better designers than others (…) either through some genetic endowment or through social and education development (Cross 2007 [1999], 49).

For Cross (2007 [1999]), design is r*hetorical* (bears a particular argument constructed by the designer), e*xploratory* (not searching for the optimum solution to given problem, but setting off to discover unknown territories), e*mergent (*solution and problem develop together in flux), o*pportunistic (requires an abductive* path of exploration), r*eflective* (dialogue or 'conversation' between internal and external representations), a*mbiguous* (unfinished or open concepts until the last possible moment). The design activity aims 'conception and realization of new things' by using, appropriating and transforming existing resources; therefore it has both a prospective and a retrospective nature. Although designing often includes solving problems, design activity cannot be generalized/explained as a conventional problem-solving activity in which framings of problem and solution spaces are usually more tightly bound. In other words, it is possible to claim that "[d]esign has its own distinct 'things to know, ways of knowing them, and ways of finding out about them'" (Cross 2007 [1982], 17).

Depending on the context of its use, the word *design* can refer to: (a) a process (the act or practice of designing), (b) the result of a process (design sketch, plan or model), (c) products manufactured with the aid of design (designed artifacts or places), or (d) looks, overall pattern of products (style) (Walker 2009 [1989]). In terms of professional practice, design is used as an overarching term for creative practices in many domains, including graphic design, fashion design, interior design, engineering design, architectural design, and industrial product design. Design also has close relations to neighboring fields such as arts, crafts, engineering and mass media. Contemporary emergent domains of design research also include interaction design, service design and environmental design (Simonsen et al. 2010), including all forms of digital products alongside analog products (Buchanan 2001b). Particularly with the introduction of digital media, the

[2] Nigel Cross's theories on 'designerly ways of knowing' were later collected and edited by Birkhaus Press, while each chapter in the book dates back to a different period in the author's thought. I prefer to include the original publication year of each chapter from his book in brackets, in order to make it easier for the reader to follow the progression of Cross' thoughts and make the arguments built on his theories more chronologically substantiated.

traditional distinctions between design professions that are dealing with 'symbols and images' (i.e. graphic design) and designers who focus on "things" (i.e. product design) are combined as a focus on "actions" (i.e. interaction design) via multimodal *human systems* (Buchanan 2001b).

In his cognitive theoretical analysis of designers and design processes, Willemien Wisser (2006) describes design as 'construction of representations' as specifications of an object to be produced, and adds that designing is a 'cognitive activity' with different 'forms', rather than a 'professional status'. "This means that the activities of many professionals who are not considered as 'designers' would be qualified 'design'" (Wisser 2006: 161). In this respect, engaging in designerly activity, whether it is the result of a professional contract or personal interest is considered as a communicative practice in psychological and social domains. The main difference between Wisser's cognitive framework and Krippendorff's *product semantics* approach is the emphasis on 'cognitive processes and structures implemented by designers', thus the foregrounding of sign-maker's perspective. By combining insights from *symbolic information processing* and *situativity* approaches to design, Wisser (2006) defines design as 'construction of representations', both as the activity of representing and internal/external structures that are being constructed. Rather than 'transformation', which would refer to resources for representations being 'given', the cognitive approach defines designing as a practice of 'construction' to include both generative and transformative features of meaning. In addition to the functional, social and ecological values created by design, one primary task of designers is to make objects as meaningful representations for societies to construct discourses on.

On the other hand, the description of design as 'construction of representations' is contested by the semantic approach of Krippendorff (1990), who believes representation is only one of the possible languages through which design 'speaks'. A mere cognitive approach to design undervalues the importance of experiential and textual meaning potentials, and lacks the necessary socio-technical view to study affordances and constraints embedded in the products as practical functionalities. A design problem is not only a problem of visual form, but it also includes construction of affordances that make sense to the users in various functional associations, and allows them to derive a range of possible action models. While designers of objects make sense of the affordances and constraints as potential patterns of use, users may develop various other meaningful associations in their own socially-conditioned contexts. In a broader, semiotically informed perspective "design is making sense of things" (Krippendorff 1990: 8), and designers communicate with users by generating, transforming and disseminating (potential) discourses via mediation of objects.

Co-operation among designers, producers and users is an essential part of the domain's design culture in most creative industries. Today, especially in industrialized cultures, *designers* are not necessarily *makers of the objects* themselves (Cross 2007 [2001], Walker 2009 [1989]), and the principal goal of design is often to provide specifications (i.e. drawings, models, descriptions) to communicate a specific design proposal (Wisser 2006). The modes and efficacy of communication between designers and manufacturers is therefore a vital aspect of design communication, as is of central importance especially considering the new computerized models of distant collaboration. However, it is also possible to criticize comments such as "[d]esigners are not to produce the artifact product, but its specifications" (Wisser 2006: 115), especially considering how digital design tools allow content-generators to perform roles of both designers and producers in many cases, such as SL. In this respect, SL presents a special type of environment in which both mediated presence and collaborative design activities take place through a standard user-interface, and offers a social world where both designers and users share virtual places via their avatars and build objects in real-time. As a matter of fact, in SL the word 'design' is used almost interchangeably with the word 'build', and inworld content generators are often called 'builders' rather than 'designers'.

Design research and the designerly ways of knowing

> [U]nlike social science, design research was never in a situation where it had to argue that design matters. Design research had to defend why it was research, other than just professional design (Simonsen et al. 2010: 6)

Design researchers Cross (2007 [1982]) and Bruce Archer (2004) stress on the particular characteristics of design research that makes it a unique form of cultural practice as well as the product of such practices, and advocate the study of 'designerly ways of knowing' as field on scholarly inquiry on its own right. Both Archer and Cross refer to the object of focus in design studies as 'Design with a capital D', which articulates the socio-cultural and communicative nature of design activity as "the collected experience of the material culture, and the collected body of experience, skill and understanding embodied in the arts of planning, inventing, making and doing" (Cross, 2007 [1982]: 17). Following Cross' theoretical and methodological perspective, Simonsen et al. (2010) outline three categories in which design research can be particularly explored, and in some cases, combined:

- Research *for* design (research-based design)
- Research *into* design (research analyzing how design works)
- Research *through* design (design-based research) – which also include design through research (Simonsen et al. 2010)

Research *for* design aims to provide useful knowledge to inform practitioners, create models and frameworks for 'scientific' designs; thus it is considered as a functionalist perspective. In design *into* research, the focus is on how design is done. Researchers primarily focus on practices, interactions and communications of various participants of the design process, while it is possible for the first two types of design research to inform each other mutually. As the third perspective, research *through* design draws a frame in which design and research cannot be thought separately. A relevant approach is described as *design science* in the information science and engineering fields (Hevner 2007, Iivari 2007). Design science aims the development of 'constructive research' methods (Iivari 2007) for new software and product development. Therefore, "design science research is essentially pragmatic in nature due to its emphasis on relevance; making a clear contribution into the application environment" (Hevner 2007: 91).

Nigel Cross (2007 [2000]) discusses the history of design and science relations, and emphasizes two major turning-points. According to Cross, the first paradigm was introduced by the 'scientific design products' period in 1920 that was shaped by such influential artistic movements as the DeStijl movement and architectural style of early modernist designers like Charles-Édouard Le Corbusier. The second, and more methodologically-oriented, approach was defined by Cross as a search for 'scientific design processes'. Cross corresponds the development of scientific design method movement to the consequences of "application of novel, scientific and computational methods to the novel and pressing problems of the 2nd World War" (Cross 2007 [2000]: 119), which was reflected in such ideas as Buckminster Fuller's (1963) 'design science revolution' and Herbert Simon's (2009 [1996]) 'sciences of the artificial'. In this period, rational scientific thinking and objectivity and were foregrounded as universal values in design practice and education[3]. Within the academic field, the first Conference on Design Methods marked the birth of design methodology (Wisser, 2006), and introduced notions such as *systematic design* and *design methods*. However, the design methods movement of 1960s was also criticized later, primarily by the early pioneers such as Christopher Alexander (1999) and J. Christopher Jones (2009 [1992]), as its major principles were found to be developing much too structuralist, behavioralist, and lacking the social dimension of human activities. According to Julier (2008), 1980s and 90s were fundamental decades for design practice, mainly because of the proliferation of modern production methods, such as just-in-time and flexible production facilities, division and distribution of labor capital and spaces of manufacturing, as well as the role of state in capitalist organization/regulation of production and design practices. This 'neo-Fordist' paradigm in modern capitalist societies also gave way to new explorations in design, and new ways in which designers

[3] The effects of systematized design methods and scientific rationale was also visible in the designed forms of the era, such as Fuller's 'geodesic dome' which was designed to emphasize a mathematical formulation of universal physical laws on rigidity, tension and compression.

communicate with societies via designed artifacts (Julier 2008). These social developments have been amplified in certain ways by the introduction of digital technologies and global information networks. As consequence, inter-relations between designers, objects and users have been re-formed in design theory to place emphasis is on 'designer-user cooperation' rather than 'designer as authority' (Krippendorff, 1990). Drawing on these various definitions and perspectives on design, the next section will continue with the discussions on the socio-cultural functions of design, particularly focusing on the notions of *affordances* and *constraints* as semiotic resources.

4.2. Socio-cultural and communicative functions of design

Within the social semiotic framework, design refers to (re-)semiotization of socially available resources as sign systems, translation of discursive intentions into material and form, and making compositions of semiotic and material resources to facilitate multimodal experiences. As I have explained in the previous chapter, the multimodal approach to social semiotics has its epistemological roots in Halliday's (1978, 2007) critical socio-linguistic theory on systemic functional analysis of language in use. The multimodal approach aims to expand the linguistic perspective by analyzing the design and use of multiple communication channels in social situations, and develops domain-specific frameworks to study the sign-generation practices with various resources, including written and spoken text, image and sound, film, architecture, and digital interaction design. Here, I first discuss the notion of affordances, which is a central terms of both social semiotics and meaning-oriented design theories. Then I discuss the construction of meaning through design in relation to the complex and ill-defined nature of design problems in order to discuss the emergent nature of design solutions through constructive dialogue.

Affordances as Meaning and Actions Potentials

> In essence, it is not enough that a product works; it must also fit the hand and mind of the person who uses it (Buchanan 2001a: 16).

Affordances can be described as 'meaning/action potentials' that are partially nested in the world, purposefully organized by the designers, and actualized by the users in particular contexts and situations. In the case of Second Life, I am particularly interested in how the VW platform affords its users to collaboratively design and create new content, in forms of virtual objects and spaces, to facilitate communication and social presence among avatars. The multimodal analysis also focuses on the affordances and constraints of virtual places as intended by their (co-)designers.

The foundational debate around 'affordances' and 'constraints' is characterized by two major theoretical contributions: James Jerome Gibson's (1986) *ecological* view places the affordances into in the world of objects and explain them through our ability to recognize what the world

potentially offers to our senses. Donald Norman's (1988, 1998, 1999, 2008) *user-centered design* view includes the *designer* and the *user* as two major determinants of how an affordance is defined. Norman categorizes the 3 major features of any useful object as: conceptual maps, affordances and constraints; and defines 2 groups of affordances as *real* and *perceived* affordances. (Norman 1999) In Norman's perspective, design is at play as a way of communication between users and designers through the management of these aspects by the designer. Norman's (1999) 'conceptual models' are claims (attempts) for learning the affordances and constraints of a tool. Therefore, they do not necessarily have to match with the designer's image. For Gibson (1986), and Norman's earlier works (1998, 1999), affordances primarily nest in the world. They are characterized by the features of the object that can, to a certain extent, be designed. But they are also perceived and realized as 'meaning and action potentials' by the user as they interact with objects and actors. Therefore, affordances are not simply properties of the environment (Chemero 2003). The meaning/action potentials of signs are purposefully organized through the elements of the built environment, in which they are perceived and actualized by the users in social situations for specific goals.

Affordances are not binary (Gaver 1991), but they have degrees depending on the context of perceptual information (Mc Genere and Ho 2000). Joanna McGrenere and Wayne Ho (2000) propose the idea of '*degrees of affordances'*, where *affordances of an object* and the *informational cues that specify the affordances* are differentiated. They also make a distinction between *usability* and *usefulness*. An object cannot be characterized by one visible affordance (i.e. chair- sitting[4]), but with the many possible ways of use its users can interact with it in a given situation and context. Usability is directly related with the perceived affordances of the object as well as the organization of information cues that specifies the object's affordances. Usefulness is focusing more on the interactive relationship between the use of the object and goals of the user. Mc Grenere and Ho's (2000) description of affordances through '*usability'* and '*usefulness'* as fundamental components of affordance is an important distinction. Design is at play in construction of both of these aspects. Designers try to imagine how the users could possibly try to use the object, while users try to imagine what affordances the designer could have embedded in the design of the object. In this respect, affordances and constraints are a channel of communication between designers and users.

> The new digital or electronic medium (…) represents a blending of modes of communication, a synthesis of images, words, and artifacts, and a blending of actions, environments, and systems of use that are both physical and cultural (Buchanan 2001b: 194).

[4] In the case of the simple proposition "Chairs afford sitting", it is possible to ask questions such as: "Which chair? What is a chair? When/how/how long does it afford sitting? What is meant by sitting? Who/how many people are sitting?

In the context of HCI, the notion of affordances become subject of yet another debate, primarily because of the new experiential relations users construct in their engagements with products of digital media. Hartson (2003) categorizes affordances in interaction design as 'cognitive, physical, sensory and functional affordances', and analyzes the affordances of collaborative media spaces. He also offers the idea that affordances are present in groups. Hartson's analysis is particularly interesting, in that it manages to categorize a number of affordances that were not-yet-present in collaborative media in the early days of CVEs. In cases of collaborative digital media, affordances do not only refer to functional tools, but also social environments in which mediated interaction takes place. Karel Kreijns and Paul Kirschner (2001) describe *social affordances* as certain properties of computer-supported learning environments that act as social contextual facilitators relevant for the learner's social interaction. In this view, proper design of platforms and their affordances could enhance collaborative learning through their use.

Affordances are based on learning, as no meaning potential can be actualized without the socio-cultural values linked to it. In his essay on 'the problem with affordance', Martin Oliver (2005) argues that the term 'affordance' has lost its connection with the actual object, which is the moment-to-moment interactions using specific artifacts. Both affordances and constraints are context-specific potentials, which can only be described as 'constraints of that object using this affordance in this specific context/situation' (Oliver 2005). In this respect, he argues that we should avoid calling what we study 'affordances', but 'claims'. My understanding of affordance differs from Oliver's (2005) in one specific aspect; in that, I focus not only learning through interaction with a specific object, but co-production practices within systems of objects and networks of individuals in social contexts. On the other hand, from a sign-maker's point of view, Oliver's idea of 'claims' makes sense, as designers 'claim' to produce certain discourses, and facilitate certain interactions with their designs.

Design is considered as a mode of communication between (co-) designers and (potential) users (eg Mansell 1996, Thackara 2005, Julier 2008, Gauntlett 2011).In fact, the collaborative design processes in SL often take place within the same environments in which users experience the designs (Weber et al. 2008). This makes it virtually impossible to distinguish between the contexts and products of design in SL. However, I argue that a content-builder's experience with SL's affordances and constraints may differ from a non-builder's, mainly in terms of the difference in goals, resources and practices according to their conditions of engaging. Therefore, an affordance of SL for one user may be interpreted as a constraint for the purposes of another user, while lack of one affordance can as well be chance to achieve another goal.

In sum, I consider affordances and constraints as *interpretively flexible* meaning and action potentials that determines the potentials ways in which we can interact with things. They are related to the context, determined by goals and intentions, skills and competences, tools and their capabilities, the method/approach and environment. Collaborative design tools can inspire creativity, while their complexity can also cause frustration and unsociability. Affordances refer to potentialities for building what is possible with the tools, while limitations refer to the requirements of constant learning, creative problem-solving and peer-based collaboration. Innovative designs and creative ideas do not always result from multitude of affordances, but also from limitations and potentials for development. Creative use of semiotic resources enables the designers to present affordances and limitations that re not thought to be possible at the moment. In order to capture the complexity of emergent meaning potentials in construction of affordances and constraints, I follow a methodological strategy that allowed me to inquire collaborative design activities in their social contexts, and produce data from various resources, including (co-)designers' own reflections.

Meaning-oriented design theories and the social semiotic framework

In fact, a similar attitude towards capturing the complexity of design in social context is often underlined by design researchers. As mentioned before, while a significant amount of emphasis in design research is laid upon the study of *designerly ways of knowing* that are 'embodied in the process of designing', an equally important resource for designerly knowledge is the analysis of 'products of designing'. In other words, "[t]here is great wealth of knowledge carried in the objects of our material culture" (Cross 2007 [1982]: 26).

The socially situated relationships between design and meaning-making is a central discussion for social semioticians, as well as the so-called 'classical' semioticians; although their fundamentally structuralist perspective on this issue has also been widely criticized. Design research is fundamentally concerned with the multimodal experiences rather than their translations to the domain of language, the social functions of which are not similar but equally important for the social scientific research. For instance, Buchanan advices researchers to be cautious in "applying verbal language as a model for understanding the practices and products of design" (Buchanan 2001b: 192).

> If we mean by language only words, then the effort will yield little more than a superficial understanding of the nature of products or of design thinking. But if we recognize language as symbols in a variety of modes of expression, then we may have found a way of gaining access to some of the most significant parts of design (Buchanan 2001b: 192) .

Design reflects individuals' interest and agency in participating in the world of communication by producing and expressing messages as meaningful sign systems in social semiotic framework (Kress 2010). Meaning potentials of these systems as semiotic resources, as well as of the designs that are made by their compositions, are associated with their experiential, interpersonal and textual functions (Halliday 1978, 2007), which are actualized by the context of situation and analyzed through their potentially meaningful relations within the communicative process.

While meaning-oriented design theories focus on interpretative readings of designed objects as signs constructed in social contexts, theoretical explorations in design research field includes alternative approaches which consider design within wider socio-cultural and ecological landscapes (Thackara 2005, Krippendorff 1990, 1998, 2006). Krippendorff's theses on 'the semantic turn in design' emphasizes the analysis of meaningful practices of interacting with human interfaces, and the ways in which design can support and/or intervene with their understanding of their practices of 'interfacing with designed products'. Taking Mihaly Csikszentmihalyi's (1998) observations on design and construction of meaningful order in everyday life as a point of departure, product semantics claims that practices and products of designing are only meaningful within a *symbolic ecology* of interacting actors, objects, and environments. Similarly in Krippendorff's words, meaning of an object does not lie on the representational features on its surface level, but it "emerges in us, with practice, the practice of living with our environment and in particular contexts whenever we cognitively connect our actions and perceptions in an experiential circle of use" (Krippendorff 1990: 4). Product semantics studies symbolic qualities of man-made forms in their cognitive and social contexts of use, and formulates the application of the knowledge embedded in products of design (Krippendorff 1998). The primary difference from traditional semiotics is that in product semantics objects are considered in a context (of other things, situations, users), and mainly a social context that includes other people. Meaning refers to a cognitively constructed relationship. Design connects features of an object and its meaning potentials in (real or imagined) contexts into a coherent unity (Krippendorff 1998).

Buchanan (2001a) proposes 'systems thinking' as a model for the new paradigm of design. "The focus is no longer on material systems—systems of "things"—but on human systems, the integration of information, physical artifacts, and interactions in environments of living, working, playing, and learning" (Buchanan 2001a: 12). Rhetorical content of design in manifested in four interrelated orders: symbols and images, physical artifacts, actions and activities, environments and systems (Buchanan 2001b). Following this logic, what makes a product 'useful, usable, and desirable' are not only its visual form and representational features, but also the contextual fit between the object's potential affordances with its socio-cultural environment and domain-specific needs of its users.

> It is certainly important that designers know how to create visual symbols for communication and how to construct physical artifacts, but unless these become part of the living experience of human beings, sustaining them in the performance of their own actions and experiences, visual symbols and things have no value or significant meaning (Buchanan 2001a: 11).

Socio-cultural and ecological perspectives on design often emphasize the designers' role in shaping the world, generating and solving problems that affect people's lives globally (Thackara 2005, Simonsen et al. 2010).

> Uncertainty, unpredictability, irrepressible emergence and the lived everyday creativity of collectives makes the world fluid. This fluidity must be matched with sensitive, responsive and 'fluid' practices of researching and designing (Simonsen et al. 2010: 12).

Human communities are capable of achieving extraordinary things by creativity and design, while their actions and decisions may also have damaging consequences for the environment. This emergent nature of design introduces wider cultural and ecological dimensions to designers' practice. For Simonsen et al. (2010) approaches in sustainable design should be "synchronized with social innovation in everyday practices" thus involving policies and politics. Therefore, design activity in an ecological context should fundamentally follow and interdisciplinary and critical path in order to capture the complexity of social practices in a wider (global) context. In this perspective, the term 'making products' implies a broad range of phenomena "including information, artifacts, activities, services, and policies, as well as systems and environments" and it is a "connective activity that integrates knowledge from many fields for impact on how we live our lives" (Buchanan 2001a: 7).

Design professor Guy Julier (2006, 2008) proposes broader meta-theoretical dimension to study how design shapes and is shaped by the dynamics of the socio-cultural environment by proposing a shift toward 'design cultures', rather than simply talking about 'visual cultures'. For Julier, design denotes "the activities of planning and devising as well as the outcome of these processes, such as a drawing, plan or manufactured object" (Julier 2008: 4), thus it can be used both as verb and noun. In this view, design culture is both a context-informed process/practice produced within the complexity of everyday life, and a form of agency for social and environmental change. Julier's perspective of 'design culture' (Julier 2006, 2008) shifts the focus of study from a '*problem-solving activity*' to a '*problem-processing activity'*, which incorporates related knowledge from various disciplines such as sociology, anthropology, ethnography and geography. With its broad epistemological foundation, the perspective of design cultures presents a network of *interdisciplinary* practices, rather than simply a *multidisciplinary* network of various actors.

The socio-cultural perspective on design reminds the multimodal framework in certain aspects, particularly in its tendency to shift the focus of analysis from the *visual* and *material* to *design* cultures (Julier 2006). On the one hand, design culture is articulated by the proper combinations of the visual, audial, spatial and linguistic elements. On the other hand, it also reflects social values, power structures, beliefs and norms of interaction in particular societies. Following this logic, Julier argues that digital communication and virtual reality technologies opened up new trajectories for design, as they present "an, albeit extreme, metaphor for change in the rules of engagement between subject and object" (Julier 2008: 11). In these new spaces, cognition of design culture is much more spatial and temporal, in contrast to visual representations in two-dimensional graphic spaces. Multimodal interaction takes place not only during the users' interactions with the object of design, but also designers' processes of creating, prototyping and testing their ideas. In fact, Julier's theory continues to develop models to study and understand 21st century design cultures, especially the transformations brought about by the introduction of virtual reality technologies and virtual environments as new multimodal environments for design-based interaction. By using Henri Lefebvre's (1991 [1974]) notion of 'production of space' as his starting point, Julier (2008) analyzes virtual environments as new 'spaces of consumption' (as well as new tools for design) and emphasizes the emerging role of designers as 'cultural and technological intermediaries'. By discussing immersive VR technologies, MMORPGs and virtual worlds such as AlphaWorld and SL, Julier concludes "just as life 'on screen' is in fact restricted by the available formats and technologies, so it is also constrained and regulated by a range of issues outside the box" (Julier 2008: 187).

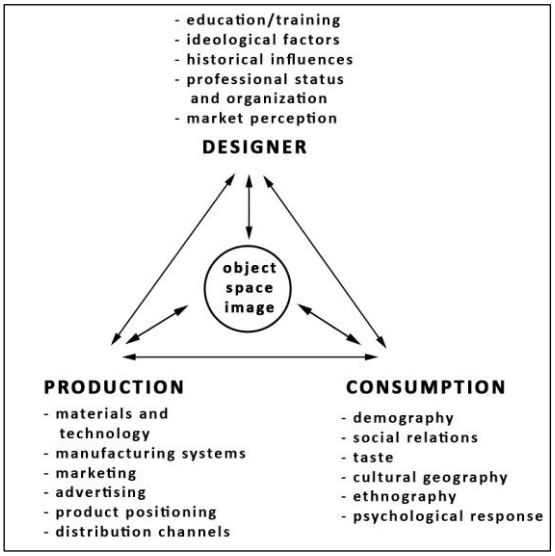


Figure 4.1"Domains of design culture" (adapted from Julier 2008: 13)

A solely production-based account of design culture would not be sufficient to understand its emergent complexity, and objects of design should be understood as interrelated dimensions of interaction between information and values among designers, producers and users. Julier (2008) criticizes the product semantics approach for relying too much on subjective definitions and interpretations, thus ignoring the differentiating effects of social context and time on cognition of concepts such as' traditional, conventional or progressive'. The *design culture* approach offers to deliver a more diverse understanding of socio-cultural aspects of design, and theorize design as a cultural cycle of production, reproduction and interaction of information and values among realms of design, production and consumption. On the other hand, Krippendorff's semantic view also proposes a multi-dimensional framework to understand design as psychological (use), socio-linguistic (language), techno-economic (genesis) and ecological dimensions of human interaction. Julier considers the role of designer as creating value; in fact, various types of values including commercial, social, cultural, environmental, political and symbolic values are collectively created by design cycle. In fact, the socio-cultural and ecological framing of design as human activity (i.e. Kripendorff 1990, 1998, 2006) suggests that designing takes place in social, cultural and ecological contexts of human existence in terms of both its contexts and consequences. While I borrow particular ideas from Julier's design culture approach, in my analysis I combine social semiotic framing of contexts of multimodal communication, semiotic resources and their meaning potentials with the product semantics approach. My analysis particularly focuses on (co-)designers' interpretations of affordances and constraints, and the ways in which they use SL as a design tool to co-produce meaningful communication environments.

Ill-defined nature of design problems and creative problem-solving

Designers often employ a distinctive type of problem-solving strategy, which is based on generating and testing potential solutions, and modifying initial design principles to optimize the processes of achieving goals. Design ability is therefore founded on the construction of "a reflective conversation with the situation" (Cross 2007 [1990]: 37). However, designing is not simply 'problem-solving'. In comparison to traditional forms of inductive and deductive inference in scientific rationale, Cross (2007 [1982]) relates the constructive nature of design thinking to *abductive* reasoning, which a result of a necessary critical thinking on ill-defined problems, and logic of 'making and thinking'. Cross contrasts design to the epistemological, ontological and methodological traditions of sciences and humanities and locate it as a 'third culture', while acknowledging that this 'three cultures view' is a limited but useful model to articulate unique characteristics of design culture. For Cross, the third culture emphasizes what it means to be *designerly* rather than *scientific* or *artistic*, and it could be better comprehended as a culture of 'technology'. Technology is not simply 'applied science', but it is the application of scientific and

other possible types of knowledge to practical tasks in social domain. Construction of a 'distinct *designerly* form of activity' is based on creativity and problem-solving by synthesis. Cross (2007 [1982]) identifies five aspects of *designerly ways of knowing as*: designers tackle (1) 'ill-defined' problems, by using a (2) 'solution-focused' mode of problem-solving, and (3) a 'constructive'mode of thinking, in order to (4) use 'codes' that translate abstract requirements into concrete objects and (5) to both 'read' and 'write' in 'object languages' (Cross, 2007 [1982]: 29). For Cross, ´designerly ways of knowing' studies "the artificial world" by "modelling, pattern-formation and synthesis" in order to emphasize "practicality, ingenuity, empathy, and a concern for 'appropriateness'" (Cross 2007 [1982]: 18). By taking departure from Buchanan's (2001a; 2001b) and Cross' (2007, 1982) ideas, Simonsen et al. (2010) describe the relation between scientific thinking on problems and solutions and the role of intuition, emotion and aesthetic judgment.

> Design research is [thus] about problem solutions, and this 'way of knowing' has common features across and beyond specific applied fields and professions. Designerly practice involves envisioning and trying out solutions, it requires science, but also intuition, emotion and aesthetic judgment. Thereby designers' knowledge is constructive with pragmatic abduction, reaching beyond debates over induction versus deduction in science (Simonsen et al, 2010: 5).

The design activity is solution oriented rather than problem oriented, and often includes "finding appropriate problems, in addition to solving them, and includes substantial activity in problem structuring and formulating, rather than merely accepting the problem as given" (Cross 2007 [2001]: 99) . Designers often synthesize several aspects of the problem space with various possible solution spaces, re-formulate particular aspects of the initial problem in the light of potential solutions and create something new that could potentially bring its own problem space within the designed solution. Designers tend to use solution conjectures as the means of developing their understanding of the problem. As the design problem cannot be fully understood in isolation from consideration of potential solution spaces, it is natural that solution conjectures should be used as a means of helping to explore and understand the problem formulation (Cross 2007 [2001]: 102). Hence, designers work not only on proposing and detailing the solution space, but also on transforming the initial design problem by appropriating it to different contexts. This emergent nature of design activity is partly resulted from its 'ill-defined' (Cross 2007 [1982]) or 'wicked' (Buchanan 1992) ways of problematizing its subjects. The task of designer is not to produce a *correct* or *perfect* solution to a given problem, but rather creating 'conjectured solutions' that could contain the problem 'within manageable bounds' (Cross 2007 [1982]: 24). In other words, designers often (have to) change the problem in order to find a (potentially usable) solution. The difference between design thinking and scientific thinking is marked by this fluctuating nature of

design problems, while its variation from artistic thinking is visible in its emphasis on the function as well the meaning. From a cognitive-process perspective, Wisser (2006) mentions the 'double status' of 'problem' and 'solution' in design as mutually constructive, emergent notions, which refer to a complex process rather than two defined sets of specific 'problem-solving' decisions.

> As long as the designer does not consider the design project as "finished", the "design problem" is not yet "solved"! (Wisser 2006: 17)

It is not only the 'ill-defined'ness (or 'wicked'ness) of the design problem that makes it a challenge to systematize and generalize. Design problems also bear other particular characteristics that causes design processes to differ from conventional problem-solving activities, such as the role of creativity in defining solution spaces, complex character of problems, "the way in which the artifact is constrained by design-problem representations" (Wisser 2006: 131). On the other hand, it is also possible to consider the potentialities that are brought by this fluid nature of design problems, as they force designers to explore, experiment with and innovate new forms of interactions by bending the initial design briefs. Freedom and courage of designers to question and modify the limitations of the problem context is often a strong motive behind ground-breaking innovations. The ill-defined character of problems also lead designers to consult/use knowledge from other related domains, thus expand the ideational trajectory of possible solution spaces. As creative expertise of designers increase, Cross (2007 [2001]) claims that designers tend to employ a broader 'systems approach' rather than accepting narrow criteria, frame the problem in distinctive and/or personal ways, and use 'first principles' as foundations for design. On the other hand, Cross (2007) also notes that while structured approaches and methodologies on how designers should work in order to achieve good solutions efficiently, design practices in life are usually enacted in an 'ad-hoc' and 'unsystematic' way. Although it is possible to relate this fact to the variety of possible methods and traditions through which designers are educated, from a broader perspective it is also possible to claim that the context of situation demands particular actions to be taken while limiting others. Another important characteristic of the design activity is its social and participatory nature, which facilitates collaboration among various stakeholders (i.e. designers, users, producers, policy-makers) during various stages of the social lives of products. Several approaches in the design research field concentrates on the study of these social interactions, and the effects of emergent roles of designers and users in design processes, mainly by the facilitating affordances of digital technologies.

4.3. Collaborative design, user-driven innovation and social creativity

Collaborative design tasks involve complex design problems, the necessary knowledge on which is usually distributed among various stakeholders (Arias et al. 2000). A share understanding of the problem space, as well as development of potential solution spaces, depends on their capacity and efficacy for working and thinking together through mediational means. Collaboration in design activities refers to the idea of 'distributed cognition' ,which emphasizes that the "heart of intelligent human performance is not the individual human mind in isolation but the interaction of the mind with tools and artifacts as well as groups of minds in interaction with each other" (Arias et al 2000: 88). The distributed cognition approach aims to provide platforms and tools consumers in order to allow them to express themselves, and develop a design culture based on people's meaningful interactions with each other through objects and spaces. As Ernesto Arias and his colleagues describe: "[n]ew media that allow owners of problems to contribute to framing and resolving complex design problems can extend the power of the individual human mind" (Arias et al. 2000: 84).

A relevant example of fields of study here is the user-centric and participatory approaches to product design, and particularly user-driven innovation (i.e. von Hippel 1976, 2001. Jeppesen and Molin 2003, De Moor et. al. 2010). A central notion in user-driven innovation approaches is the transition from the idea of 'isolated innovators' to 'communities of user-innovators', where a great deal of knowledge sharing and learning take place within the interactions of users (Baldwin et. al. 2006). Within the theoretical framework presented here, community-authored virtual worlds, such as SL, are considered as socio-technical environments for the users to explore their innovative potentials, and experiment with different modes of co-design in a shared virtual environment. The users interact in different contexts, by gathering different data and using different tools, and experiencing different pressures on a design problem (Jeppesen and Molin 2003). Therefore, creating and managing user-driven innovation is shaped by the proper motivation and coordination of *people* to develop and implement new *ideas* through various forms of social relationships (Van de Ven and Poole 1990). As the creative users explore the possible *design spaces* within the provided solution space, they generate various possible design solutions and methods, while generating a detailed 'mapping' of the solution space. Until the solution space gets 'mined out', users continue to produce and share knowledge among 'communities of user innovators', and try to expand the possible space. (Baldwin et. al. 2006, von Hippel 2001) The creative integration of the users can be enhanced by organizing and designing appropriate toolkits for them to work with. With potentially innovative toolkits provided by the platform developers; users can develop new technical ideas, new products and new methods; some of which can later be developed into

user-driven innovations. Von Hippel (2001) describes his 'innovation toolkits' idea as 'true design freedom', which is, coincidentally, a description often used for Second Life by the builders (as shown in the empirical studies and the survey of literature). Second Life is also a collaborative tool for users to explore, learn and communicate through co-creation experiences; as they form communities and build virtual places for knowledge sharing. Most of this learning takes place in the form of 'trial and error', which, for innovation theorists, is a particular form of situated learning, based on learning-by-doing and collective problem solving. For Von Hippel (2001), allowing this flexibility of 'trial and error', and providing user with user-friendly tools and libraries should be among the major objectives of *toolkits for user innovation*.

However, perspectives on co-design that put merely 'the consumer' or 'the user' in the center in order explain collaboration through consumption and/or usage activities bear the risk of lacking the necessary emphasis on creative problem solving and co-production. In this specific aspect, user-generated content in SL differentiates from the consumer oriented 'toolkit' approach. Unlike mass customization businesses, where "customers are integrated into value creation by defining, configuring, matching, or modifying their individual solution from of a list of options and pre-defined components" (Piller et al. 2005), SL's toolkits allow users to co-design and co-produce the product - the VW - itself. Various types of users interact with each other with different extrinsic and intrinsic motivations (Ondrejka 2005), and they occupy various places in the virtual market as economic actors (Baldwin et. al 2006).Therefore, it is also important to note the effects of the level of complexity and the need for investment of time and effort in learning how to build in SL as prevailing factors in designers' co-production experiences. My focus is on active participation of users through collaboratively designing and producing the content of the platform the use of other SL users through mediation of the avatars. Therefore, I frame co-design of SL as the assemblage of these collaborative design practices, including the design problems and various solutions that emerge in different contexts. At this point, Arias et al.'s (2000) formulation of several principles for software systems is helpful to frame the affordances for collaborative design. In their view, *software systems must evolve through their use, they must evolve at the hands of the users, they must be specifically designed for accommodating this evolution, and evolution of systems must take place in a distributed manner*.

It is important to focus on not only individuals and their internal creative processes but also their interactions in social contexts in order to fully study how creative collaboration works in distributed design teams. Andreas Larsson (2003) describes the collaborative work of global design teams as 'thinking together apart', and emphasizes the importance of 'objects to think with' distributed design environments. For Larsson, "[d]esign collaboration is framed by the social world, and it is therefore impossible to independently interpret the nature of design specifications

and artifact descriptions without understanding the social situation in which they were created" (Larsson 2003: 153). In Larsson's view, members of a design team are in constant negotiation about vocabularies, objects and places of design, through which they shape both the context and content of the situation. In collaborative design activities, meaning is collaboratively constructed through these negotiations and discussions between (co-) designers. Therefore, the results of design activity cannot be separated from its social character.

On the other hand, respective roles of actors and contexts of collaborative design are often in flux, being constantly re-constructed through creative practices of individuals and their interactions with others. In collaborative activities, roles are 'both an outcome of and a rationale for' social situations, where "[n]egotiating positions, and contributions to the negotiations, shift during conversation as meeting participants collaboratively establish what is to be done and how collectively they will justify what they agree to do" (McDonnell 2009: 49). Therefore, roles of social actors are 'assumed' rather than 'inherent qualities'; and each actor (i.e. designers, customers, manufacturers) can contribute with their own domain-specific points of view.

> To understand the complex web of relationships we need to take account of the social expectations of all those contributing to a design (McDonnell 2009: 49).

Depending on the context of design activity, the context of creative problem-solving may often shift from the individual sense-making to the interactions of a collective (Hargadon and Becky 2006), whether these collectives are small groups or large populations of media users. Andrew Hargadon and Beth Becky (2006) develop a model of collective creativity which includes both 'individual insights' and 'momentary collective processes'. Their model identifies four types of social interaction, which triggers enactment of social roles and practices within creative problem-solving activities as: *help seeking, help giving, reflective reframing, and reinforcing*. Their model emphasizes the contextual factors by "shifting the emphasis in research and management of creativity from identifying and managing creative individuals to understanding the social context and developing interactive approaches to creativity" (Hargadon and Becky 2006: 484). According to this understanding, individuals seek collective efforts and competences of social groups when they do not have necessary expertise, ability or motivation to generate creative solutions alone. Such a reconsideration of collective cognition in combination with creative problem solving in design activities provides a necessary framework to study moments of collaborative creativity, and how design-based discourses are generated, negotiated and communicated through both individual and collective insight.

Effective collaboration requires a complex set of conditions, including the interpersonal relationships among actors, the characteristics of the task, the quality of communication, social and

institutional contexts (Grossen 2008). In particular, studies on collaborative student activities show that the social *ecology* of participation often results in unexpected patterns of creative problem-solving, thus facilitates a more interactive learning process. Creative problem-solving does not only mobilize existing knowledge resources, skills, competences or points of view, but also developing them through social action. Emergence of innovative solutions or unexpected outcomes is therefore dialogic process (Grossen 2010), where interaction among participants is defined by "tensions between different temporalities, spaces, identities, third parties and present participants" (Grossen 2008: 248). Studying these tensions means thinking about co-production in terms of intersubjective meaning potentials and intertextual practices.

4.4. Conclusion: Synthesis of reflections from design research

In summary, design theory supports the social semiotic framework by providing insights on the designerly ways of knowing, participating in and organizing the social world of objects. In this chapter, I discuss how I used particular notions such *affordances* and *constraints*, *creative problem-solving* and *social creativity* in relation to the social semiotic framing of affordances as meaning and action resources. I aim to investigate how designers generate creative solutions to ill-defined design problems, how they co-produce these problems, and how they collaboratively give shape to the potential affordances and constraints. My perspective on affordances involves a variety of dimensions, including the functional affordances of the user-interface and social affordances of the virtual place. Collaborative virtual environments afford sharing a virtual place through the avatars, building, testing and evaluating designs by the use of specific interfaces; while these tools also bear certain inherent constraints for learning and social action. Theories on collaborative design, co-design and user-driven innovation can guide the construction of the analytical framework by providing certain directions for studying collaborative design of virtual places and artifacts. The tools and resources that are provided by SL, in addition to th supplementary digital media, can present potential toolkits to the co-designers to work together on design ideas, develop concepts and solutions, and co-produce the virtual model. In most cases, these teams share the virtual places and use their avatars to communicate and socialize. On the other hand, my analytical perspective aims to emphasize the consideration of these activities as practices of *co-production*, rather than considering mere user and/or consumer involvement in institutionalized product development processes by using limited *toolkits* for participatory design. The social world of SL presents not only tools and resources, but also communities and networks for designers to reach out, and 'think together apart'. Therefore, the aforementioned theoretical perspectives on design research support the social semiotic framework by expanding the scope of multimodal analysis by a socio-cultural cognizance of the designers, their methods and purposes.

Theoretical Categories	Concepts and references	Analytical Implications
Defining Design as Practice, Product and Discourse	• *De + signare*, 'making something, distinguishing it by a sign, giving it significance, designating its relation to other things" (Krippendorff 1998) • "The human capacity to shape and make our environment (…) to serve our needs and give meaning to our lives" (Heskett 2002: 5) • "Initiation of change in manmade things" (Jones 2009 [1992]: 78) • "Human power of conceiving, planning, and making products that serve human beings in the accomplishment of their individual and collective purposes" (Buchanan 2001a: 9) • Design is a 'basic human activity' and a constituent of social reality (Papanek 1984) • Design is r*hetorical*, e*xploratory*, e*mergent*, r*eflective*, a*mbiguous* (Cross 2007 [1999]) • "Design has its own distinct 'things to know, ways of knowing them, and ways of finding out about them'" (Cross 2007 [1982], 17). • *Design* can refer to a process, the result of a process, products manufactured with the aid of design, or looks, overall pattern of products (Walker 2009 [1989]) • Design as 'construction of representations', the cognitive approach (Wisser 2006) • Representation is only one of the possible languages through which design 'speaks', the semantic approach (Krippendorff 1990) • 'Design is making sense of things" (Krippendorff 1990: 8)	I consider design activity not only as a professional status, but a primitive human activity to organize the socio-technical environment. Therefore, the analysis of design includes not only the visual character, but also the experiential and semiotic functions. Representation is a language of design, through which designers communicate with users. The rhetorical character of design foregrounds communication, and symbolic interaction.
Affordances as meaning and action potentials	• *Ecological* view: affordances and our ability to recognize what the world potentially offers to our senses (Gibson 1986) • *User-centered design* view: *designer* and *user* as two major determinants of affordance (Norman 1988, 1998, 1999, 2008) • Affordances are not simply properties of the environment (Chemero 2003) • Affordances are not binary (Gaver 1991), they have degrees depending on the context of perceptual information (Mc Genere and Ho 2000). • *Social affordances* of computer-supported learning environments (Kreijns and Kirschner 2001) • Both affordances and constraints are context-specific potentials, or 'claims' (Oliver 2005)	Affordances are meaning and action potentials that are embedded by designers, and actualized by users in certain situations. Therefore, the affordances and constraints are dialogic constructs, and the ways in which they function as representations results from their semiotic nature.

Meaning-oriented design theories	• The knowledge carried in the objects of our material culture (Cross 2007 [1982]) • The practices and products of designing are only meaningful within a *symbolic ecology* of interacting actors, objects, and environments (Thackara 2005, Krippendorff 1990, 1998, 2006). • Product semantics studies symbolic qualities of man-made forms in their cognitive and social contexts of use, and formulates the application of the knowledge embedded in products of design (Krippendorff 1998). • 'Systems thinking' as a model for the new paradigm of design. "The focus is no longer on material systems—systems of "things"—but on human systems (Buchanan 2001a) • Sustainable design should be "synchronized with social innovation in everyday practices" (Simonsen et al. 2010) • 'Design culture' (Julier 2006, 2008) shifts the focus of study from a '*problem-solving activity*' to a '*problem-processing activity*',	One way to understand design is to observe the products as cultural objects. The semiotic perspective on language can be applied to design through the product semantics approach, while the socio-cultural dimension should be supported. The perspective of 'design culture' is, thus, helpful for exploring the networks of actors, resources and practices of design.
Ill-defined nature of design problems and creative problem-solving	• Design ability is "a reflective conversation with the situation" (Cross 2007 [1990]: 37) • The role of intuition, emotion and aesthetic judgment (Simonsen et al. 2010) • 'Ill-defined' (Cross 2007 [1982]) or 'wicked' (Buchanan 1992) problems in design • The 'double status' of 'problem' and 'solution' in design as mutually constructive, emergent notions (Wisser 2006)	Another objective is to observe the processes in which designs came to be. But this is challenging, as the problems and the potentials solutions evolve interdependently during design.
Collaborative design, co-design and social creativity	• Collaborative design tasks involve complex design problems, the necessary knowledge on which is usually distributed among various stakeholders (Arias et al. 2000) • Collaborative work of global design teams as 'thinking together apart', and the importance of 'objects to think with' distributed design environments (Larsson 2003) • To understand the complex web of relationships we need to take account of the social expectations of all those contributing to a design (McDonnell 2009: 49). • Collective creativity includes both 'individual insights' and 'momentary collective processes' (Hargadon and Becky 2006) • Emergence of innovative solutions or unexpected outcomes is a dialogic process (Grossen 2010), including the interpersonal relationships among actors, the characteristics of the task, the quality of communication, social and institutional contexts (Grossen 2008).	The process of collaborative design gets even more complex in distributed design studios. The analysis should include not only the ways of 'thinking together', but also the agencies of relevant human and non-human factors. In data production, it is important to consider both the 'individual insights' and the 'collective processes' to capture the emergent design solutions.

Table 4. 1 Theories and concepts in design research that are relevant to the analysis of collaborative place-making in SL

5. The analytical framework

Introduction

In this section, I outline how the analytical framework in this PhD research was constructed among theoretical and methodological traversals among several relevant disciplines, to discuss the ways in which I structure the strategies of the data production and analysis. As mentioned before, my overarching epistemological perspective to collaborative place-making is framed by the systemic functional and multimodal approach to social semiotics. On the other hand, I also argue that there are certain shortcomings to the systemic functional framing of the multimodal approach; especially when the research objective in focus is collaborative design in mediated social contexts. A design-oriented theoretical perspective can supplement the analysis by focusing on motivations, tools and methods of the designers. I aim to foreground the *social* aspect of semiotic sign-making through reaching the actual designers, or sign-makers, in collaborative design cases, and including their perspectives on virtual places and SL's affordances and constraints. For this purpose, in this section I discuss how I frame the multimodal analysis and support it by considering the socio-cultural contexts, the actors, the places and the mediational means as parts of my overall analytic viewpoint. In the following sections, I will outline the systemic functional analytical framework, as well as the ways in which I analyze mediated social practices of co-production through a practice-oriented socio-semiotic view.

5.1. Systemic functional framework and analysis of mediated social practices

The overall methodological goal is to bring together the study of *texts* – virtual places and the artifacts that constitute them –, the study of *social interaction* – processes of collaborative design, building, and evaluation – and the study of the *material world* – affordances and constraints of available tools and resources -. For this purpose, two specific approaches to social semiotic theory have been used to build the analytical framework: (1) Gunther Kress and Theo van Leeuwen's *multimodal analysis* (Kress and van Leeuwen 2001; *also see* O'Toole 1994, 2004, van Leeuwen 2005a, 2005b, Jewitt 2009, Kress 2010); and (2) *mediated discourse analysis (MDA)* – a different but closely related variation – that was outlined by Ron and Suzie W. Scollon's 'nexus analysis (Scollon 2001, Scollon and Scollon 2004) and 'place semiotics/*discourses in place*' approaches (Scollon and Scollon 2003), and a series of articles on analyzing *mediated action* edited by Sigrid Norris and Rodney H. Jones (Lemke 2005, Scollon 2005, van Leeuwen 2005b).

As explained in the Introduction chapter, I consider the user-driven development of Second Life as a '*socio-technical*' phenomenon (Liewrouw 2006). Within this framework, not only tools and their affordances are important but also the individual and social forces that shape the sign-production (and meaning-making) activities; as they too have a role in determining the collective actions of designers and how they constantly constitute the technology as '*in-the-making*'. Research studies on collaborative new media environments should also consider both the affordances (and constraints) of the media and the new social patterns of collaborative design and user-driven innovation that are emerging from within the communities of users of these technologies (Deacon et al. 2007). Therefore, I suggest that combining multimodal analysis with the MDA perspective offers a promising methodological ground, through which I intend to study both textual and social dimensions of place-making.

Combining the semiotic analysis with observation of actors, places and practices

Multimodal analysis provides a systemic functional framework (of semiotic units and meta-functions) to analyze how meaning potentials are constructed through multimodal organization of socially available semiotic resources. It places the semiotic assemblages (*texts* or *objects*) to the center of analysis to uncover how modes refer to concepts (or conceptual categories) through interpretation. In multimodal analysis, it is important to focus on how the semiotic choices of sign-makers generate experiential interpersonal and textual coherences and provide affordances or constraints for meaning-making. It considers –but not deliberately studies – the socio-cultural contexts in which signs are produced.

> Semiotics takes as its priority the study of the features of the text itself: *what* it represents and *how* (…). Semiotics does not exclude the facts about the artist's life and social milieu and economic circumstances and psychological makeup, or the broader social, political, and cultural history of his (or her!) period, but leaves them for later consideration when their relevance has been proven by aspects of the text itself. (O' Toole 1994: 129)

Modes are analyzed as semiotic units with a "hypertextual" view, which emphasizes the complexity of multimodal arrangements and the dynamic relations between modes. Therefore, it is possible to frame to purpose of multimodal analysis as uncovering the *nexus of meaning potentials* within the text.

However, such an interpretative framework also has ramifications, as it may lead the analyst to assume that the semiotic functions are just 'there', waiting to be found within the text itself. This would certainly contradict a fundamental principle of meaning-making social semiotic theory, since "there is no such thing as an 'essential meaning' (…) but rather a potential range of meanings

to which all the systemic choices in all three functions predispose us" (O'Toole 1994: 163). Such an understanding would also limit the scope of the analysis of multimodal semiosis since the motivations, experiences and reflections of the sign makers would not be uncovered. Thus the social semiotic approach would have been shifting towards its structuralist roots. This framing cannot sufficiently address - let alone, explain – the domain-specific social and cultural changes within the socio-semiotic context in time and through the interactions of subjects, including the researcher's. Furthermore, it is possible to claim that one cannot have a proper "sign-maker's perspective" (Kress, 2010) without studying what the design of virtual places and artifacts *mean* to their makers. In other words, multimodal analysis provides a framework to also reflect on the researcher's own interpretations and conceptualizations of what the meaning potentials are, and to do so in a systematized way. However, in a design-oriented perspective to meaning-making, it is equally important to understand how the designers find and use semiotic resources, make sense of the affordances of tools, and organize their practices in order to produce meaningful places and artifacts. In this view, every decision that is made, every obstacle or challenge that is faced, or every conscious attempt to build meaningful structures of multimodal compositions, i.e. shaping things in certain ways, contribute to the making of the overall sign system. Certain aspects of these social practices are conditioned by the availability of semiotic resources as well as the affordances and constraints of the available mediational means. Therefore, a socio-cultural view to the co-production practices should support the socio-semiotic analysis of the multimodal objects of design. For this purpose, I employ a mixed-method approach in data production, including not only textual analysis of places but also interviews and observations with designers, and integrate the socio-cultural perspective of MDA with the systemic functional framework of multimodal analysis.

Why multimodal social semiotics, and not linguistic analysis?

Although the perspective of social semiotics to meaning-making originates from socio-linguistic theories, contemporary social semiotic frameworks often shift the foci of their analyses towards the use of various semiotic resources in the making of multimodal phenomena. In this perspective, while the use of language and linguistic metaphors to describe the objects are still effective, the main purpose of conducting a socio-semiotic analysis is to uncover the relational structures and patterns of semiotic associations in the coherent use of socially available modes. Furthermore, virtual places are not merely linguistic phenomena. It is possible to deduce spatial cues from people's conversations and expressions on their social practices in virtual places, while they are experienced visually and spatially through the use of digital interfaces. Therefore, the study of making of places, in which mediated social interactions take place, provides the empirical ground for multimodal analysis.

The multimodal social semiotic approach of this analysis therefore supplements linguistic analysis with design theory and a place-oriented perspective to meaning-making. Here, the analysis is not constrained by people's verbal expressions of spatial experiences, but actually offers a window to look into their semiotic practices in and with the virtual places; focusing on the *making* of sign-systems rather than their verbal representations. Therefore, this is also a practice-oriented semiotic framework. My interest is in the relations and the socio-cultural contexts in which these relations are constructed. This approach provides not only a socio-cultural supplement to the multimodal theory, but also a methodological strategy for production and analysis of data in different virtual social contexts.

In the following sections, I will reflexively discuss these two dimensions of my analytical framing in detail, and argue how and why I find it useful to combine multimodal analysis with MDA to support the analysis of virtual place-making.

5.2. Multimodal Analysis

Multimodal analysis builds on the socio-linguistic foundations of social semiotics (Halliday 1978, 2007, Hodge and Kress 1988) in order to develop theoretical and methodological accounts of (1) special characteristics of visual semiotics, and (2) relations between images and language in textual analysis (Kress and van Leeuwen 2001). In their multimodal socio-semiotic approach, Kress and van Leeuwen sets out to create a theory of semiotics that is "appropriate to contemporary semiotic practice" by analyzing the "specificities and common traits of semiotic modes which takes account of their social, cultural and historical production" (Kress and van Leeuwen 2001: 4). In Kress and van Leeuwen's perspective, two main foci of multimodal analysis are:

1. The semiotic resources of communication, the modes and the media used, and
2. The (multi-layered) communicative practices in which these resources are used (Kress and van Leeuwen 2001: 111).

As explained in the theoretical framework, the multimodal social semiotic approach considers the co-production and use of places and artifacts as semiotic domains of communication. It therefore allows the analysis of collaboratively designed places and artifacts in SL as digitally mediated multimodal discourses.

The multimodal paradigm critiques the idea that different modes in multimodal texts have strictly bounded and framed functions in making of meaning; instead "common semiotic principles operate in and across different semiotic modes" (Kress & van Leeuwen 2001: 2). Meanings are made not only by using a multiplicity of *semiotic resources*, but also in a multiplicity of *places* and

contexts, which, in turn, makes each design process/solution unique. As Kress and van Leeuwen explain "discourse effects choice of design, but choice of design in turn affects discourse" (Kress and van Leeuwen 2001: 128). Methodologically, the multimodal approach requests the researcher to be aware of a wide trajectory of communicative channels, and adopt data production methods to match the needs of the multimodal environment in order to capture the meaningful relations between modes and specificities of design.

Multimodal analysis of 3D virtual places

As I have discussed earlier, the overall systemic-functional perspective of social semiotics has been developed to describe the modes and modal relations within linguistic expressions (Halliday 1978, 2007, Hodge and Kress 1988), and the analytical framework has later been expanded to include multimodal phenomena such as images (Kress and van Leeuwen 2006 [1996]), movies (O'Halloran 2004), functional objects (Kress 2010), artwork (O'Toole 1994) and interactive software (Lemke 2002). The multimodal framing of communication theory also encompasses critical issues of meaning-making, such as the use of semiotic resources in particular social context to generate meaning potentials, and therefore provides the backdrop for the semiotic analysis. But the modes and resources for meaning-making have distinctive semiotic functions for each context, and for each type of multimodal arrangement. Understanding the ways in which semiotic resources are used to generate meaning potentials in *three-dimensional space* requires the consideration of more than just the structural, functional and visual components (Stenglin 2009), but rather involves the *experiential* view of space/place relations (i.e. Tuan 1977). In the case of virtual places, it is not only the modes but also the media (or 'mediational means') of interaction that produce such distinctive contexts.

In this view, as I have explained in earlier chapters, space and place refer to distinct but interrelated semiotic concepts, both of which are constructed through the appropriation of social and cultural codes. While space is understood as a systematized abstract geometrical term and it refers to three-dimensional measurements that contain objects and movements, place is directly related to experience, meaning-making and communication in mediated or non-mediated spaces. Construction of place and the actualization of meaning potentials in places are fundamentally bound to *spatial practices*, through which individuals not only experience but also transform the social contexts of multimodal communication. I therefore analyze SL's virtual places by drawing on this framing of the semiotic relationships between space, place and spatial practices as social semiotic concepts that are actualized in a particular social context through specific mediational means. Following this line of thought, I frame the analysis of virtual places by two central aspects: (a) multimodal representation of the three-dimensional spaces and the artifacts that constitutes

them, and (b) experiential and interpersonal features of the virtual places that make them suitable to accommodate social interactions in SL.

For this purpose, I employ a place-based understanding to digitally mediated technology, and develop a new analytical model for the systemic-functional analysis of three-dimensional virtual places. In this approach, I mainly use O'Toole's social semiotic framing of architecture (O'Toole 1994, 2004) and Maree Kristen Stenglin's (2008, 2009a, 2009b) theses on the three meta-functions of three-dimensional space. Both of these perspectives advocate that there is a *part-whole* relationship between three-dimensional space and its components ('elements' or 'ranks of scale'), including those which frame the spaces (i.e. walls, windows, elevations). In fact, the idea *framing* is helpful for describing the interrelations between space and place in a social semiotic framework. As a central analytical concept in social semiotics, *framing* (Van Leeuwen 2005, Kress and Van Leeuwen 2006 [1996]) refers to both "physical boundaries around a space" and "the impact such physical boundaries have on the social inter-action between participants within a space" (Stenglin 2009: 54). This dualistic view of space and place results in a similarly dualistic methodological framing, following what Stenglin (2009) calls the "logogenesis of a building" which covers both the static descriptions of three-dimensional spaces and the ways in which their meaning potentials unfold dynamically (to create a *sense of place*).

As outlined in previous chapters, the systemic-functional framework that I use to analyze the multimodal discourses within the three case-studies is developed upon O'Toole's analytical model on the *Experiential, Interpersonal* and *Textual* meta-functions of architectural design (O'Toole 1994, 2004). In his *hypertextual* model of multimodal analysis, the semiotician has at her disposal "a map of the total 'meaning potential' and can pinpoint the rank of unit and semiotic function of any element or combination of elements" (O'Toole 1994: 84). This provides the analysis with a perspective that includes the dynamic interplay between semiotic resources and the social situations in which they are used. The analysis of each meta-function indeed helps to interpret the others, since the three meta-functions are not totally independent in the construction of the overall meaning potentials (Lemke 2002).

In terms of the *Experiential* meta-function, I aim to explore the ways in which the practical functions of virtual places are represented. Following Stenglin (2009: 38), I admit that the "ways of construing representations of human experience" has two implications: "the first is concerned with field; the second is concerned with [two[1]] types of structures". Here, it is important to note how the designed places and artifacts afford movement and orientation of avatars, and how the

[1] 'Serial' and 'orbital' structures (Stenglin 2009). Brackets by the author.

representation on experiential meaning potentials are reflected in the systemic choices made by the designers to shape certain design features.

The *Interpersonal* meta-function includes the categories of social relations and their relations with design features, such as representation of co-presence and power relations, visibility and intertextual metaphors (i.e. conceptual distinctions between virtuality and reality). Within this meta-function, it is important to consider both the individual psychological relationships with the semiotic objects (i.e. 'binding' and 'bonding' [Stenglin 2008, 2009]), and the social practices which are constructed through interacting with them.

The *Textual* meta-function is concerned with the "systemic choices that relate a building to its context as well as those that constitute it as a coherent text" (O'Toole 1994: 79). This third dimension of semiosis also focuses on how the place is organized through divisions, partitions and elevation, and how various spaces are connected to each other. The textual meaning potentials provide semiotic patterns of information so that the place-as-text 'hangs together' (Stenglin 2009).

In Chapter 8 (Table 8.1.), I present a detailed systemic functional matrix modeled to analyze the relational semiotic categories among the meta-functions and orders of systems (rank-scales) in the design of virtual places and artifacts. I follow O'Toole's (1994, 2004) advice of 'shuttling' between boxes in different areas of the matrix to uncover the significant features. What I particularly search for in the analysis is the 'nodal points' (or 'hot spots'), in which the *experiential* functions about containment, the *interpersonal* functions about contact and the *textual* functions about cohesion interact to carry rich meaning potentials (O'Toole 1994).

Borrowing the term from C.S. Peirce and O'Toole, I aim to shift the focus from a structuralist analysis of the semiotic text to the analysis of the dynamic processes of *semiosis*. In his analysis of displayed art, O'Toole claims that "semiotic analysis of (…) representation, modality, and composition reveals networks of options" (O'Toole 1994: 122). Therefore, the results of such social semiotic analyses are often presented as a *system network*, which explains not only the modes and what they represent, but also how they are related within the textual coherence of designed places (Van Leeuwen 2005, Stenglin 2009).

To analyze what O'Toole calls 'dimensions of semiotic space', one starts by grouping meaningful elements into compatible categories and arrange them in a rank-scale hierarchy. Then it is possible to construct the matrix of meaning potentials and various features of design (i.e. virtual places, divisions and elevations, interaction spaces, elements) to form a metaphorical 'backcloth' against the 'traffic' of dynamic meaning-making processes (O'Toole 1994). Thus, it is possible to frame and study certain aspects of semiosis as cultural production.

From multimodal analysis, I draw central conceptual relations between discourse, design, production and semiotization that I use to discuss how different modes are arranged (and 'stratified') within meaningful texts as semiotic resources. The analytical matrix that I generate –by revising O'Toole's (1994, 2004) model for social semiotics of architecture – helps uncovering the 'semiotic spaces' of design communication in virtual places, their three-dimensional organizations, interaction spaces and other design elements, and the coherent patterns in their *experiential*, *interpersonal* and *textual* meaning potentials. Furthermore, I aim to follow O'Toole's approach "to discover systematically the particular meanings of a given painting [virtual place] and to show how the options that the artist [designer[2]] chooses to construct these meanings are systemic" (O'Toole 1994: 125). The perspective of semiotic spaces as potential meaning and action resources also brings forth the notions of *affordances* and *constraints* as channels of indirect communication between the designers and the users via their products (virtual places and artifacts). On that note, I shift the focus of analysis to the study of mediated discourses and practices.

5.3. Mediated discourse analysis and nexus analysis

For the analysis of collaborative practices, I draw on the analytical categories from the sociocultural tradition, and analyze collaborative design through a network of contextual factors that affect sign-making activities. This part of the analytical framework borrows concepts from a specific stream of social semiotic studies on relationships between *discourse* and *practice*, particularly drawing the key aspects from *MDA*. The unit of analysis in MDA approach is *mediated action* –social action mediated through the use of cultural tools – that is realized by the meaning potentials - affordances and constraints- of *mediational means*, as users deploy them in their social worlds in certain situations (Jones & Norris 2005). I present and analyze not only the multimodal compositions of design elements within virtual places and artifacts, but also the mediational means by which they came into being, the social actors who participated in their making, and the processes through which they become materialized.

Ron Scollon (2005) introduces the term 'mediational means' – means by the use of which mediated action takes place – and points out the two major problems with the MDA approach's view of language and other semiotic systems as mediational means. Following American psychologist James Wertsch's logic, Jones and Norris (2005) elaborate on the structure of 'mediational means', and determine two types: 'technical tools' (material objects) and 'psychological tools' (sign systems). Although both types of tools are considered as being *material*, they are also psychological and semiotic as well. Mediational means operate within (users' meaning-makings and actions with) affordances and constraints of the tools, as users appropriate them into their *habitus* with their

[2] Brackets inserted by the author of the author.

social/communicative practices. Users also often use mediational means as 'open texts' and appropriate them in ways that are not within their normative uses (Jones and Norris 2005: 50)

In order to exemplify my perspective on these issues, I will refer to two studies on *mediated discourse* and *action* by Theo van Leeuwen and Jay Lemke. Van Leeuwen (2005) focuses on a comparative analysis of a conventional exhibition design with an educational CD-ROM; and Lemke (2005) studies the relations between virtual places and temporal experience in the VW of *The Sims*. Both studies put forward the issue of 'virtuality' into MDA's agenda. Van Leeuwen's analysis focuses on 'reading paths', or the ways in which the text functions as an environment for a multiplicity of reading processes, and structures the analysis at two levels: "[v]isual analysis of the text, to study the environment of the staged, goal-oriented process, and the pathways it allows" and "observational, 'ethnographic' genre analysis of the user's trajectory, to study actual staged, goal-oriented reading processes, and so access the (usually internalized) generic patterns that inform it" (van Leeuwen 2005: 85).

It is also important to think about how the concepts of movement and time are experienced in digitally mediated interaction, as it is not only the (avatars of) visitors but also the co-designers who traverse these virtual places. Lemke (2005) analyses 'The Sims' – a game-oriented VW platform for avatar-based socializing – by using two key aspects of (bodily) *traversals in time and* (real or virtual) *space*: *chronotope* – a term borrowed from Russian philosopher, literary critic, and semiotician M. Bakhtin (1981, 1986) to denote 'culturally typical movements and pacings along trajectories of activity' – and *heterochrony* – 'according to which meaningful activities are linked across timescales by our use of discursive-semiotic artifacts'- (Lemke 2005: 110). Lemke's multimodal theory of '*place, pace and meaning*' uses *chronotope* and *heterochrony* as theoretical and analytical tools for the inquiry of temporal organization of meaningful activities through the use of semiotic artifacts as mediational means. I find Lemke's (2005) use of the terms *chronotope* and *heterochrony* particularly helpful in analyzing the spatial practices in virtual places, both in terms of the potential visitor experience and the co-production practices through which virtual places are made. As explained in the theoretical framework, the social semiotic lens to multimodal meaning-making considers *space* and *time* as semiotic resources, and explains the semiotic transformations of/in space and place by analyzing the construction of meaningful spatial practices through semiotic resources. Lemke (2005: 115-116) puts forward an important framing to the study of social action in virtual places by focusing on "the dynamics of space and place" which "makes an immediate connection to time and pace" as semiotic resources for "expressive meaning-making", that is the phenomenological and semiotic coupling of bodily and temporal experiences in the analysis of user interaction with/in virtual places. Lemke's use of MDA for studying virtual game spaces is important not only because it defines meaningful action through the use of a

phenomenology of time and space (and the distinctions between space and place) but also because of its focus on movements in social places (chronotope) by the use of semiotic texts (signs) to mix the timescales (heterochrony) and link the short-term interactions to long-term projects.

5.4. Organization of the analytical sections

I take these issues of spatial, temporal, phenomenological and semiotic dimensions of experience (interactions with actors and places) as the point of departure to examine the VW designers' meaning-making processes about the world's affordances and constraints for their specific purposes. Drawing from Scollon and Scollon's (2003) four-themed formulation of place semiotics, I propose four themes for the analytical matrix to understand how human action unfolds in *three-dimensional* and *multiply discursive* spaces:

- **Social Actors**: The co-designers of virtual places and artifacts, their habitus and performance of social relations.
- **The mediational means**: Places, platforms and tools which have facilitated and/or contributed to design.
- **Co-design processes**: Communications, interactions, and collaborative practices among the co-designers in time and in particular places.
- **Multimodal Semiotics**: The ways in which virtual places and artifacts are designed to orchestrate modes as social semiotic entities and organize mediational means to afford meaningful user experience.

Social actors, mediational means and the co-design processes are analyzed together in Chapter 7, as I consider them central constituents of the social context, through which interaction orders in co-production processes are formed. The aspects of *mediated action* and *mediational means* are central to this chapter, where I discuss the findings on interactions between actors, tools and objects of collaborative design. I use the concepts of affordances and constraints to describe the meaningful and functional relations between designers and their tools at this stage of analysis.

I am focusing on two main categories of affordances within my objective of studying co-production of virtual places and artifacts: (1) the affordances that are presented VW platform and used by the co-designers during collaborative design processes, and (2) the affordances that the co-designers intend to present to the visitors in order to enable them to explore and make use of their designs. The two levels of interaction in SL are within my scope are: (1) goal-directed interactions between the co-designers and the user-interface, (2) social interactions among avatars that are co-present in virtual places. *Affordances of the user interface* determine how people use, navigate, and access information via the mediation of devices and graphical user interfaces (GUI). At this level, the

affordances emphasize the interaction between the user and the platform. *Affordances of the virtual place* emphasize control and mediation of interactions with the avatar to maintain presence, co-presence and connected presence in simulated 3D space. At this level, affordances are concerned with the interaction between the avatar and the social world. As mentioned, affordances and constraints are transformed into meaningful action potentials through the practices of the designers as they evaluate their goals, resources, skills and possible limitations. In Table 5.1., I present and categorize the relevant affordances in relation to these two interrelated domains of user interaction.

Affordances[3]/SL as...	Graphical User Interface (GUI)	Virtual World (VW)
Experiential (Representational) Affordances	- Membership/log-in - Coordination of movement in virtual space - Avatar creation and modification (self-expression) - Content generation and modification - Inventory	- Navigation, movement, interaction (walk, fly, teleport) - Avatar-based interaction in virtual places (movement, dance, gestures, etc.) - Visibility and perspective (in-avatar/in-camera) - Design by walking around
Interpersonal (Orientational) Affordances	- Communication and collaborative action (text, voice, etc.) - Learning and knowledge-sharing - Inventory exchange and resource sharing - Groups and communities (group chat) - Integration with Web	- Design together - Avatar to avatar interaction - Social affordances of avatars, artifacts and places - Symbolic interaction, iconography - Communicating objects, interactive BOTs
Textual (Organizational) Affordances	- Technical features & limitations - Customization, personalization (GUI and visibility) - Search, import/export of virtual objects (content) - Multimodal interface elements (text, image, sound) - The building (content generation) interface	- The SL Grid (world-map) - Persistence of the world, openness to modification and replication - Organization of artifacts and places by building blocks (prims) - Multimodal arrangements (image, text, sound, 3D) - Open and closed space in virtual places

Table 5.1. Matrix of SL's affordances and domains of interaction

[3] Affordances is understood as 'meaning and/or action potentials'

My analytical framework includes a combination of multimodal semiotics and mediated discourses as analytical foci to explain the modes and their relations within the socio-semiotic complexity of co-production practices. For this purpose, the research design has been constructed in such a way that would allow the production of data from various resources in various social situations (situations of collaboration, design and use in both real and virtual spaces) and enable me to represent the multiplicity of discourses in collaborative design. During the three case studies, I participate in inworld meetings and design sessions, watch avatars at work, follow their linguistic expressions via text or voice chat, capture snapshots and video recordings in addition to my field notes and interview transcriptions, and –as a general approach – inquire the social histories of events and decisions that the co-designers experience. My goal in combining these contextual factors with the multimodal textual analysis through MDA is to point to the social embeddedness of designs with the context-specific discourses that are co-produced during the design process. I intend to keep a reflexive stance towards my own interpretations and generalizations, as I continuously try to triangulate my findings by using different sources of data.

The three case-studies and capturing the nexus

The three case studies that I analyze represent various situations and motivations in which users (or occasionally non-users) of SL come together to collaboratively produce content in the form of virtual places and artifacts. While the first case-study focuses on a multi-disciplinary team of researchers and designers generating a virtual laboratory in SL, the second case is about international university students and their learning processes, and the third study includes a series of interviews with the avatars of a popular music location in SL. The collaborative projects in the three case studies show similarities in terms of the environment (SL) and availability of tools for content-generation, while I am also interested in differences in terms of contexts and products of designing. An important criterion in selection of cases is that they are collaboratively executed, and that the co-designers strived for practical functionality: the co-designers of all three cases aim to produce designs for inworld avatar interaction, instead of prototyping real-world constructions in SL or completing pre-determined tasks in a laboratory setting. This analytical framing has implications for not only the practical design features (Experiential meaning potentials) but also the compositional (Textual) and social (Interpersonal) functions of virtual places. Therefore, the systemic-functional matrix in Chapter 8 is organized visually in order to reveal the relations between various units of the overall semiosis.

Findings from the three case studies were analyzed by a rigorous and dynamic coding process. First, a combination of the multimodal data produced by observations and interviews was subject to open-ended coding and analysis, which led to the generation of further and more structured

codes. Producing theoretically-grounded and focused categories via reconsiderations of initial open codes ultimately led me to create the systemic-functional matrix for further theorization. One axis of this analytical matrix comprises Halliday's (1978, 2007) systemic metafunctional categories (experiential/representational, interpersonal/orientational, textual/ organizational) (see also Lemke 2002, 2009a, Kress 2010). The second (vertical) axis is constructed by concepts that are adopted from MDA, particularly the notions of 'nexus of practice' (Scollon 2001, Scollon and Scollon 2004) and 'place semiotics' (Scollon and Scollon 2003), in which social actors, places, interaction orders and multimodal semiotics of objects are in focus. For the multimodal analysis in Chapter 8, I have also revised and re-appropriated the concepts of rank-scale in architectural design from O'Toole (1994, 2004).

> "[O]ur reading of any work of art -indeed, of any semiotic message - is in part structured by *absences*, by elements that might, and perhaps should, have been visible in the text but for some reason are not" (O'Toole 1994: 150).

My purpose in producing the complex analytical framing as a matrix of interrelated semiotic dimensions of collaborative design is a pragmatic one. I consider the findings as interrelated units of a 'hypertext' (O'Toole 2004) within the overall data-set, and I set out to explain causal relations between situations where the co-designers make certain decisions to signify (or not signify) particular characteristics in their designs. Differences in contexts of collaborative design in three case studies provide me with a wider trajectory of situations in which co-designers may (or may not) engage in collaboration. On the other hand, focusing on three different cases present limitations for analysis, and foregrounds the need for self-reflexivity as researcher.

5.5. Conclusion: The analytical framework as a bridge between theory and methodology

The overall analytical framework is explained visually in detail in Figure 5.1, which also summarizes the stages of research design and my analytical strategies for producing, coding and interpreting the multimodal data. In the following section on methodology, I will outline and discuss the more specific aspects of the research design, data production methods and coding strategies, as well as the ways in which I intend to capture a critical reflexive stance in compliance with abductive logic. However, it is important at this point to note that the multimodal social semiotic theory provides certain methodological guidelines and frameworks to study the meaning potentials in semiotic phenomena. In this respect, the systemic-functional framing of three-dimensional spaces (and digitally mediated places) provides particular considerations on the meta-functions and design features, which ultimately has led to the generation of the analytical matrix in Chapter 8. I use this matrix to comparatively study the experiential, interpersonal and textual

characteristics of design in virtual places, such as the organization of spatial elements, divisions and elevations of interaction spaces and other design elements. At this point, I turn to another approach that is closely related to the epistemological framework of social semiotics, while it offers a whole new methodological perspective to study the actors, places and practices of multimodal communication. I consider the context, motivations, tools and practices of co-designers as essential resources for studying meaning-making as a social phenomenon. Therefore I revise the multimodal perspective with a more socio-culturally aware ethnographic approach to support my own systemic interpretations. In fact, what I integrate to my analytical framework by applying the MDA is not a strictly defined methodological path to follow, but more of a socio-cultural perspective to support the analysis of multimodal semiosis. Ultimately, the overall analytical framework that I described in this section aims to apply and critically develop the multimodal social semiotic approach in order to develop an operational model for studying the co-production of virtual places and artifacts in SL as *nexus of multimodal semiosis*.

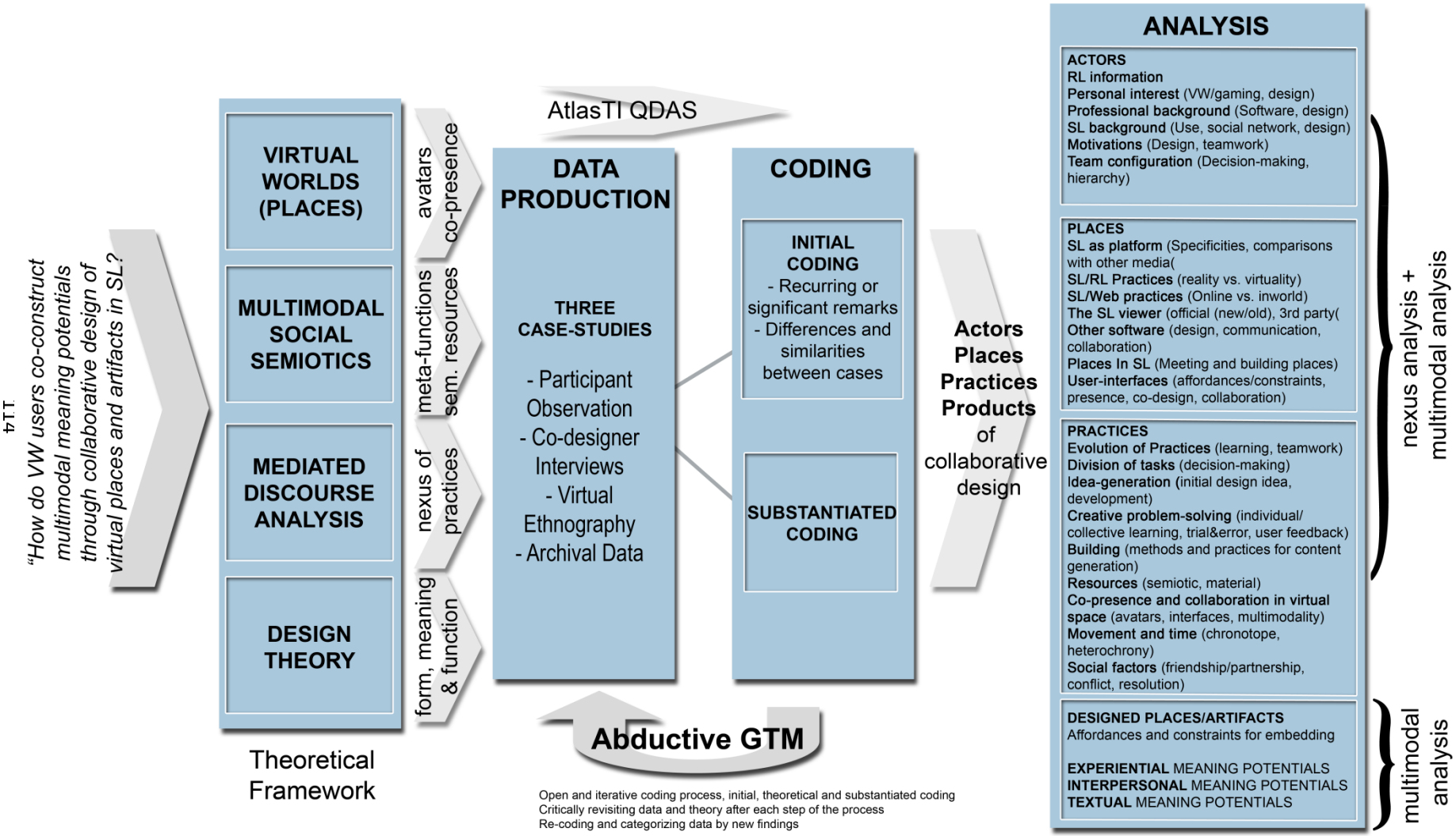


Figure 5. 1. The analytical framework in relation to the theory, methods of data production, coding and analysis

6. Methodology

Introduction

This chapter aims to outline the overall methodological framework that I build for the study of the collaborative design processes in VWs, and the empirical procedures that I used to produce, categorize, and interpret the qualitative data from the three case studies in SL. In this chapter I also outline and discuss my methodological reasoning for using a multiple case study approach, the strategies for sampling the three collaborative design cases, and the relevance of the analytical matrix to the previously outlined theoretical and analytical frameworks.

First, the chapter presents an account of the overall methodological background in reference to the qualitative research framework, and sets out the operational research questions in reference to the aforementioned epistemological convergence of *socio-semiotic* and *designerly* ways of understanding virtual places. I draw insights from the empirical perspectives of material semiotics and grounded theory methods (GTM) as methodological bridges to the aforementioned analytical framework, which combines multimodal analysis of virtual places with the analysis of the nexus of actors, places and practices of place-making. I will argue the use of GTM in relation to the *Abductive* method of inference, which allows the researcher to develop a more reflexive mode of scientific reasoning. Secondly, the chapter turns to a discussion of the research design. Here, I will elaborate on the methods that I have used to observe co-designer interactions in the three case studies, and the strategies that I have developed for sampling and production of the data. In this section, I will discuss issues on execution, analysis and presentation of observations from virtual ethnography, participant observation, and co-designer interviews. Finally, the chapter ends with discussions on reflexivity, limitations, ethical considerations and intended methodological contributions. Here I aim to justify my methodological discussions and the relevant issues about validity and reliability of generalizations in relation to 'double hermeneutic' inference logic. Finally, the chapter lays out my intentions for the central methodological contributions to the fields of communication and media studies in VWs.

6.1. Relevant methodological perspectives to the social semiotic framework

The overall methodological framework of this PhD study is set within the interpretative systemic-functional approach to qualitative research. In the analytical framework, I have presented discussions n the use of multimodal analysis (i.e. Kress and van Leeuwen 2001, van Leeuwen and Jewitt 2001, van Leeuwen 2005, Jewitt 2009, Kress 2010) in combination with mediated discourse analysis (MDA) (i.e. Norris and Jones 2005) in order to take the contexts and the products of

designing into account, as well as their transformations during the process. The social semiotic framework explains the *contexts (of situations)*, semiotic resources, *meaning potentials* and *social functions* of sign systems (Halliday 1978, 2008, Hodge and Kress 1988, van Leeuwen 2005, Kress 2010), as well as their *multimodal* organizations within *place semiotics (*Scollon and Scollon 2003*)*.

A general aim of this section is to present and discuss the relevant perspectives to the methods in which I conducted the inquiry, generated the particular research questions and strategies, and built the analytical model to interpret the findings. Therefore, it builds on the overview of the relations between the overall research questions, the research design, and my rationale in using SL as the field of study. The discussions hereby should be considered in reference to the context-specific affordances and constraints of VWs for conducting qualitative research, which have been outlined in the theoretical framework.

Methodological questions and objectives

I propose two operational research questions in order to set out the methodological strategies and develop guidelines for the inquiry of the main research question[1]. These operational questions aim to support the analysis by putting emphasis on the two central theoretical foci, which were drawn on the synthesis of multimodal social semiotics and design research.

1. How do social actors, places and practices construct nexus of co-design practices in order to engage in and give meaning to SL's affordances and constraints for collaborative content generation?
2. How do virtual places and artifacts reflect their social functions and the co- designers' rhetorical intentions through multimodal representations of potential affordances and constraints?

The first operational question focuses on the analysis of mediation of discourses in design practices, and inquires how the various nexuses of practices are produced. The second question emphasizes the textual dimension of systemic functional analysis, and aims toward multimodal analysis of the products of designing. The three central concepts in the social semiotic framing of communication –*semiotic resources, meaning potentials* and *context of situation* – guide the analytical framework. I draw on concepts such as 'actors, places, practices, co-production and co-design' from an interdisciplinary array of theories to discuss the methodological implications of

[1] *How do the VW users co-produce multimodal meaning potentials in virtual places and artifacts through collaborative design, as exemplified by the social semiotic analysis of the three case studies in SL?*

multimodal analysis in virtual worlds. I particularly focus on social negotiation of affordances and constraints as construction of meaning potentials in design. In synthesis, the overall methodological question that I frame in this chapter is "how can the rhetorical perspective of social semiotics on multimodal semiosis contribute to our understanding of co-production practices in VWs?"

Virtual methods and virtual worlds as the field of study

For new media researcher Christine Hine (2005), the 'claiming of the online context as an ethnographic site' points to a major 'methodological shift', in which the new communication medium 'provides the occasion for' examination of new problem areas. She claims "the method and the phenomenon define one another in a relationship of mutual dependence" (Hine 2005: 8). Hine advises researchers to ask if changing the mode of communication affects any methodological assumptions or practices that underlie the research. Hine's description of virtual methods – and more specifically ethnomethodology in virtual space- is important in a number of aspects, as it offers 'the archives of social networks and virtual worlds' as both 'contents' and 'discourses' to be analyzed (Jensen 2010: 130), and potential new ways and terminologies for conducting research online, such as virtual focus groups, online ethnography, cyber-research, web experiments and other offspring from old familiar methods (Hine 2005).-In this perspective, the social world of SL can be considered both as the *cultural context* and the *cultural artifact* (Hine 2000, 2005*)* for collaborative design practices.

Following the socio-semiotic approach to multimodal sign production, I define collaborative design of virtual places and artifacts as processes of multimodal semiosis, in which not only final products of designing are considered as analytical units but also the social actors, and the variety of (digital and non-digital) media platforms that they use. I conceptualize virtual places and artifacts as semiotic entities, which bear the traces of their co-designers and social situations in which they came to being. My focus throughout the analysis is on the inquiry of how different designers experience collaborative design processes in SL, and how they build discourses on particular affordances and constraints of the platform. The purpose of my multiple-case-study based methodological framework is to explore the social construction of experiential, interpersonal and textual meaning potentials in collaborative design practices for co-designers with different contexts and conditions of engaging with SL.

Here, I combine the multimodal framework with the participant ethnographic approach in order to support the interpretative textual analysis with participants' social histories based on their socially and individually situated perspectives, which frame their rhetorical intentions. For this purpose, I

have been participating in various social events, meeting with inworld designers and following collaborative design activities in SL for more than 3 years, during which I have conducted three structured case-studies by mobilizing the inworld and offline (RL) social networks that I established. My intentions in presenting such a framework is particularly to stress the emergent epistemological and methodological convergence in relation to social semiotics and design, especially in the light of growing dominance of multimodal expression in contemporary digital media platforms such as VWs. In my analytical framework, SL represents this socio-technical convergence in both tools and practices, and the three case studies illustrate various situations of virtual place-making as nexus of multimodal socio-semiotic practices. This methodological perspective requires a reflexive account of collaborative design as a communicative social action in which signs are continuously constructed and reconstructed as social semiotic resources through *mediational means*.

Although I frame the co-design of virtual places as *social practices,* one problematic issue about observing design processes in VWs is the flexible and vague boundaries of their social contexts. In collaborative virtual environments where users share virtual places and interact via avatars, it is possible to build and test the designs, and evaluate them by the feedback given by the community. When individuals do not have necessary knowledge or expertise, or required resources for idea generation and building, they consult the collective knowledge resources of the VW community. By using available media tools, they interact, seek and/or provide help, evaluate and develop each other's creations and reinforce collaboration in co-design and co-production processes. SL also contains various libraries, locations and archives of commonly used construction elements (textures, objects, effects, etc.), which support users to start exploring with resources at hand; therefore, improving opportunities for creativity and participation. Collective problem-solving, therefore, becomes an issue of interest and social investment; which is not only defined by membership and presence in an established group, but also by the time and energy participants commit to forming new types of social groups and collectives (Hargadon and Beckhy 2006). The social actors, therefore, become parts of a wider and more complex network of social relations and interactions with human and non-human elements that contribute to the making of sign systems.

Material semiotics and the perspective of Actor-Network Theory

A relevant epistemological and empirical perspective has been put forward by the 'material semiotic' (Law 1992, 2009) approach of actor-network theory (ANT) (Latour 1997, 2005), which aims to unravel the formation of 'the social' construction of meaning by tracking the networks and meaningful associations between both human and non-human actors in technologically mediated action (Lemke 2000). The actor-network approach provides a 'family of material-semiotic tools,

sensibilities, and methods of analysis' to uncover the complex relations and movements through which social realities are constructed by groups (or collectives) (Law 2009). Although my research is clearly not an ANT study, here I would like to mention certain characteristics of the material semiotic method, which is relevant to the analysis of socially constructed meaning potentials.

Sociologist John Law (1992) frames the objectives of the *material semiotic*s by social relations, particularly including and emphasizing the enactment of power and organization as network effects. For Law (1992), the theory of actor-networks is essentially concerned with 'the mechanics of power', and the methodological task should be to study 'how this comes about' in *heterogeneous networks (Callon and Law 1997)*.

Most of our everyday interactions are mediated through objects, and it is possible to argue that all these socio-technical networks participate in the making of the 'social' (Law 1992); thus, they should be included in the study of material semiotics. For social action to occur as a material practice, the environment in which the action unfolds needs to be able to accommodate it in certain ways. Therefore, ANT's description of non-human actors is also closely related with the notion of affordance (i.e. Gibson 1986, Norman 1988, 1998, 1999, 2008, McGrenere and Ho 2000), which I have introduced as a part of design theory.

An 'actor' in ANT is a semiotic definition (Latour 1997). Actors, in this perspective, include not only the people but also the places, the artifacts and the media that they use to interact, as "*any thing* that does modify a state of affairs by making a difference is an actor" (Latour 2005: 71). The material semiotics of the social world considers all the participating actors as constituents of the social ordering, and asks how the materials become *resources* or *constraints* (Callon and Law 1997). Therefore, this approach shares many practical links with ethnomethodology in terms of its search for local connections (Latour 1997).

It is also important to characterize the networks heterogeneously (Callon and Law 1997), and to stress on the effects of organizations, inequality and power (Law 1992). People and machines are not only networks, but they are also processes of transformation, compromise and negotiation among actors (Callon and Law 1997). Therefore, the methodological approach in material semiotics foregrounds the exploration of the 'strategic, relational, and productive character' of actor-networks (Law 2009). It provides an empirical account of the theory of agency, knowledge and machines in order to answer the 'how' questions about *structure, power* and *organization* (Law 1992). This perspective provides an ontological framework, as it covers the *enactment of realities*, as well as epistemological and methodological ones, as it concerns itself with the making of knowledge and the ways in which social science can unravel the complex meaning formations (Law 2009).

Human and non-human factors in social semiotic analysis

For social semioticians such as Lemke (2000), the emergence of meaningful order in complex social systems should include the perspectives of not only the participating actors but also that of the observer, and of the *eco-social* systems in which meaningful interactions occur. We, therefore, need a theory that explains the meaning-making interdependencies that involve both human and non-human actors.

A major shortcoming of social science, according to Latour (1997, 2005) is that it often considers the 'means' or 'tools' used in construction of messages as mere 'intermediaries', which transport the meaning without transformation, rather than 'mediators', which 'transform, translate, distort, and modify the meaning' as they deliver it. This is why semiotics is a necessary step in studying social construction of meaning, as it allows the researcher to follow the contexts and environments in which assemblages are made including both natural and material entities (Latour 1997). The semiotic resources, both in terms of objects/texts and the spatial actions that take place by the use of them, have social histories that render the dynamic complexity of the actions meaningful. Here is also where the perspective of affordances is helpful, as it is used to define the meaning and action potentials constructed by the mediation of objects. Mediated actions are always material processes, and meanings are results of collective action in these eco-social systems (Lemke 2000). Therefore, the perspective of material semiotics is helpful in studying qualitative changes in the eco-social system through semiosis, which is not just a social and cultural practice, but also a material activity with human and non-human actors (Lemke, 2000). In combination with the meta-functional analysis of sign-systems, this materialistic perspective to semiotics is important for social semiotic analysis in order to understand the eco-social dynamics of semiosis and its relations with social practices. When it is considered as a study of associations (Latour 2005), the ANT approach provides a relevant background theory to explore the social construction of meaning.

On the other hand, the systemic functional method of social semiotic analysis differentiates from the study of actor-networks, particularly because of the privileged position of the text as the domain of meaning potentials. Here, the non-human actors are conceptualized as 'mediational means', through which human actors claim the role of co-designers to produce the virtual places. The material semiotic approach of ANT focuses on connections in expense of rendering the social world flat, whereas my perspective distinguishes from ANT in epistemological and methodological aspects. The *flat* modeling of social systems in ANT would render them with no distinct levels, but rather *complex intersecting networks of interactional processes*. On the other hand, this *flat* and *heterogeneous* model would also emphasize one key notion of mediation: namely, the artifacts (Lemke 2000). The design and interpretation of meaning potentials in virtual places and artifacts

are contextualized by the socio-technical world, as they fluctuate in time and through the co-designers' social interactions. As I have mentioned in Chapter 4, the start of a design problem is '*wicked*' and the design is always '*unfinished*', and this is even more so in SL's collaborative projects. Therefore, instead of looking at and then comparing only outcomes of the processes, the methodological task should be to explore all the possible resources of meaning, understand how the critical definitions, evaluations and practices on the designed environment evolve during the process, both in terms of the collaborative activities and the communicative 'repertoires' of participants (Liewrouw 2006, Haddon 2005).

Although the analysis of *mediated social action* is also foregrounded by the MDA approach to social semiotics, humans as social actors, and their agencies in the context of situation is still central. The non-human actors are considered as a part of my analysis if their affordances and/or constraints have considerable influence on the ways in which semiotic practices are organized. Following Lemke, Kress (2010) and others, my analysis focuses specifically on the making of sign systems as multimodal assemblages of social meanings and practical functions. Thus, I foreground the phenomenological perspectives in use and co-production of semiotic resources in making of sign systems when I analyze the actors, places and practices of collaborative design.

On the other hand, I believe the collective knowledge on these issues is also socially constructed and constantly re-produced by individual and collective meaning-makings, and therefore, is highly contextual. To observe collaborative co-design of a VW, I continuously keep interacting with the social world of SL, its designers and creative communities; and try to grasp the possible viewpoints that make up a 'virtual world' paradigm, as experienced by these (world-) builders. This is why I believe the consideration of social semiotic analysis in reference to the actor-network approach of material semiotics can offer a promising methodological ground, through which it is possible to study both (textual and social) dimensions of place-making.

Grounded Theory as a methodological bridge between theory and analysis

I apply the analytical procedures of GTM (Strauss 1987, Strauss and Corbin 1990, Glaser 1993; Bryant and Charmaz, 2007) for coding and analysis, as method for production and interpretation of the emergent data to support the systemic functional analysis. The characteristics of the grounded theory approach helped me to develop analytical strategies for the observation of collaborative social practices, the procedures applied for the constantly comparative coding and categorization of data, and the strategies for mapping of the theoretical domain.

I use GTM as a supporting analytical tool, and appropriate certain GTM procedures (i.e. Strauss 1987, Strauss and Corbin 1990, Glaser 1993, Charmaz 2002, 2005, 2006, Bryant and Charmaz

2007) to case-study data in order to systematically analyze the insights from various participants in each case study. I find the constructivist abductive stream in GTM (Charmaz 2006, Reichertz 2007) particularly helpful in generating analytical categories from the empirical data and critically reviewing my interpretations and generalizations. I appropriated several aspects of the grounded theoretical model to my research context, particularly the substantive – open and selective - and theoretical coding procedures (Holton 2007) which I used to construct analytical categories of collaborative co-design activities in SL, and to explore their relations among each other in social contexts.

The role and meaning of prior theoretical knowledge for research has been an extensive discussion topic, particularly apparent in sociologists Anselm Strauss's Qualitative Analysis for Social Scientists (1987), Strauss and Juliet Corbin's *Basics of Qualitative Research*, and Barney Glaser's (1993) account of empirical orientation in coding and categorization of data (Reichertz 2007). Although none of these approaches explicitly systematized the abductive logic, later works tried to bridge the gap by offering methodological explanations of abduction (i.e. Reichertz 2007, Jensen 2010). A more contemporary interpretation of the method was proposed by Kathy Charmaz (2002, 2005, 2006), who advocates a *constructivist grounded theory approach* within the interpretative qualitative research with 'flexible guidelines' (Creswell 2007). Rather than aiming unified methods and a single core category, Charmaz's constructive approach emphasizes use of *active codes* and consideration of multiple social realities.

In accordance to the qualitative research framework of this study, I use GTM to theorize social processes by examining and categorizing meaningful activities that shape real people's experiences in real social situations (Dey 2007, Bryant and Charmaz 2007, Stern 2007). I use the Metrotopia case as a pilot study through c*onvenience sampling* for generating initial categories for an overall view (Morse 2007). It is also stated by GTM theorists that series of smaller related studies with different contexts, instead of a large case-study with a large number of participants, could help discovering the social reality with the actors' points of view (Stern 2007). As explained before, the findings from three case studies contribute to the emergence of categories from the observation of design processes in various stages and contexts. The first case-study (participant observation of Metrotopia's design) aims to provide initial grounding categories for a similar type of open-ended coding, after which I constructed new operational questions and research design strategies for the following cases. During the analysis process, I revisited the initially formed categories in order to theorize the findings from multimodal analysis and MDA, and used theoretical concepts to guide the potential interpretative directions to emerge from within the data. The analytical matrix, as well as the framing of the overall research question, have been revisited and modified in the light of these emerging empirical insights, which led me to consider the participants' voices and

perspectives as the primary source of information. Here I also mention the strategic use of abductive logic in relation to GTM framework (Reichertz 2007), which shaped and framed the overall research process, from the construction of research questions to processes of production and interpretation of, and theorizing from empirical data.

Application of the abductive logic

The abductive logic aims the construction of new hypotheses through critical re-evaluation of findings (cases) and existing hypotheses (rules), and constant evaluation of what the case means. This emergent blend of multidisciplinary interpretivism and empiricism in research methodologies has its roots in more fundamental debates about social scientific knowledge production, namely 'induction' and 'deduction', as well as perspective of 'abduction' as a third form of scientific inference. Jensen (2010) defines the 'abductive sub-stream' as an explicit model of scientific reasoning, by relating it to the 'inductivist heritage' – defined by logical positivism, empiricism and reductionist objectivism – and to the 'deductive mainstream – defined as 'hypothetico-deductive' approach to test hypotheses - (Jensen 2010: 133-134). He claims that while standard accounts of theory of science still tend to focus largely on either the inductive[2] or the deductive[3] reasoning, 'abduction' is still rarely considered as a valid form of inference although it has the capacity for explicit scientific reasoning and generalization (*also see* Eco 1984).

For Danish communications professor Bente Halkier (2003), one of the main intentions behind the abductive method of inference is to keep a "systematically open mind towards possible interpretations of categories, and dynamic of the empirical field"*(Halkier 2003: 116).* Research studies often take their point of departure from existing hypotheses (by deduction), which can be tested against a number of instances (by induction) in order to formulate a new rule (by abduction). Jensen (2010) describes "the point of abduction" as: "it introduces a rule that may explain why one encounters specific (more or less surprising) facts … in a particular context" (Jensen, 2010: 132)[4].

In relation to the GTM perspective, Jo Reichertz describes the overall perspective of abduction as "assembling or discovering, on the basis of an interpretation of produced data, such combinations of features for which there is no appropriate explanation or rule in the store of knowledge that already exists" (Reichertz 2007: 219)**.**The point of abduction in GTM is to challenge theorization

[2] Examination of several instances to a law
[3]Inference from a general principle or law to individual instances
[4] Rooting back to Aristotelian accounts of reality, knowledge and method, Jensen's (2010) use of the term 'abduction' is mainly drawn from Charles Sander Peirce (1894) and Umberto Eco (1984), both of whom emphasized the interconnectedness of knowledge-in-the-world and context-specific observations in scientific process. The interconnectedness of the three kinds of inference as scientific method is more apparent in Peirce's later works, where he also ties the idea to the foundations of pragmatism (Fann 1970).

through empiricism, and propose a more flexible, but yet still a "rule-governed and replicable production of new and valid knowledge" (Reichertz 2007: 216). The abductive logic offers an 'attitude towards data and towards one's own knowledge' rather than a 'mode of reasoning' or an 'exact method' (Reichertz 2007), and therefore contains a highly situated (context-based) interpretation. In the abductive approach, the aim is not a pure reflection of reality but mental constructs; in other words: "neither (preferred) constructions nor (valid) reconstructions, but *usable* (re-) constructions" (2007: 222).

I use the abductive logic of inference as an overall methodological strategy in order to capture the emergence of socially produced meanings in persistently developing digital platforms such as SL. My analysis outlines how the forms, functions and associated meanings potentials of collaboratively designed places and artifacts are transformed as the socio-technical contexts of co-designers change. Therefore, the abductive logic is a necessary component of the analytical framework in order to capture the complexity and semiotic flux in social functions of design in SL. This semiotic flux can only be properly understood through the interaction of various discourses, including those of the researcher, as I believe "data are produced, not collected" (May 2002: 1). Therefore, my selection of VWs as field of data production and collaborative content generation activities as focus of analysis has surely affected the ways in which I appropriated existing theories and generated my own hypotheses during the research process. I have written and re-written analytical insights from the data, generalizing, re-categorizing and logically outlining the causal relations between observed interactions within cases. Due to the dynamic nature of the analytical framework, I often had to revise my initial research objectives, and modify my research questions, while I was elaborating on the overall focus of my research. Construction of *validity* and *reliability* on the finding is, thus, considered a matter of characteristics of the chosen research methodology, and its construction of meaningful causal relations among its subjects and objects.

6.2. Research design

Between 2009 and 2011, I conducted three case studies, in which I observed, worked together and interviewed with virtual world designers with varying levels of expertise and experience in SL. These case studies are outlined below in summary:

- Participant observation of the multidisciplinary design process of a virtual laboratory (Metrotopia) and interviews with co-designers.
- Observations and in-depth interviews with the co-designers of Pop Art Lab, a streaming music sim in SL funded by a Danish national cross-library organization.

- *Communication and Design in Virtual Worlds* Workshop observations and focus group interviews with students

Methods of data production showed variations from case to case, depending on the availability of resources and possible level of engagement with participants including geographical distance, project time schedules, etc. This section and the next section will outline the strategies and methods for the production of qualitative data from case-studies, and the ways in which I sampled the three collaborative design cases from within the social world of SL.

Production of the qualitative data

I aim to analyze how they reflect on the perceived affordances and limitations of the virtual world, including the socially available semiotic and material resources, user interface and external relations with the surrounding new media landscape. I use observations of collaborative design processes and interviews with participants as professional and amateur builders, and non-builders as the main data sources. The empirical data produced from the cases is supported with interviews and semi-structured conversations with VW experts, professional platform and content developers and archival records on related VW and CVE technologies. Expert interviews and supporting ethnographic data are also used to support the case-study data. Due to the social context of each project, my role in the research processes changed from an apprentice/learner to a tutor/teacher, and an interviewer. However, the use of mixed methods for data production in these three case studies provided an overall mapping of the VW's affordances and constraints for collaborative design, and how residents make sense of them for co-producing various types of digital content[5].

Based on the main research question, several topics of interest for categorization of the escalating amount of data have raised, which gave way to the development of the aforementioned operational questions. Operational questions were also developed to guide the interviews as well as the categorization and coding of field notes and other data sources. Interventions and re-assessment of empirical categories, as well as methods of triangulation and validation, were reconsidered during different stages of the process, following the analytical strategies of GTM. Follow-up interviews and long-term partnerships with some of the participants enabled access to cases in various 'moments'

[5] In addition to the observations from these 3 case studies, another major resource of expert knowledge was collected from a number of interviews and semi-structured recorded conversations during my visiting scholarship at Stanford University's Human-Sciences and Technologies Advanced Research Institute (H-STAR). During my stay, I had the chance to meet with Virtual Worlds, Web3D, Augmented Reality and Virtual Reality experts as well as platform and content developers, professional users and communities such as digital fabrication specialists, builders, performance artists and educators. Although these resources are not included as empirical data here, inspirations from these conversations with VW experts and technology developers are often integrated into my arguments, especially found helpful to discuss the further implications of findings on larger socio-technical scales.

of collaboration. Participant observation throughout the design process also provides insights on the changing roles of various actors during several inworld and offline stages of the process (Hine 2005, Deacon et al. 2007). Furthermore, by participating in collaborative design and learning activities, it is possible to gain first-hand experience on content design, while conducting ethnographical observations of SL builders and builder communities in their cultural contexts. On the other hand, I aim to initiate discussions on the past experiences and reflections on '*how it could have been done better*' by in-depth interviews with expert designers and novice users (students) after the design process, when the designs are open for testing and evaluation. Especially during the focus group interviews with students after the workshop design process, participants establish unprecedented relations between SL's affordances and their experiences, and generated a number of ideas on how building tools and resources should have been developed.

The selection of the three cases also depends on the contextual variations of collaborative design projects and the characteristics of the social actors who participate in their making. Similarities and differences in how expert designers and novice users of SL is particularly of interest for my analytical purposes. As it was documented in a number of research studies before, creating content in SL requires a significant amount of knowledge, experience and effort. This forms a challenge especially for beginners who are trying to cope up with this intricate *'learning-curve'* that is caused by the complexity of the building tools, as well as the time investment needed to get familiar with SL's social norms and resources (i.e. Sanchez 2009, Pfeil et al. 2009). Therefore, observing various interpretations of and solutions to the learning-curve supports the analysis, as this perspective includes how specific affordances and limitations are perceived by novice and expert users, and how these affordances and limitations affect their collaborative design processes.

In order to capture the social complexity of collaborative design activities in SL, a wide range of interconnected interpretive methods are employed during different stages of the research process, as "no single methods can grasp all the subtle variations in ongoing human experience" (Denzin and Lincoln 2005: 12). The qualitative analysis is based on the multimodal data produced as a collection of field notes, image and video captures, face-to-face and online interviews, focus groups, semi-structured conversations and various archives. The data is handled with an abductive and grounded theoretical perspective, in which a continuous resonance of empirical findings and theoretical categories lead to intensive coding and analysis procedures for production of meaningful conclusions.

In the introduction to their influential handbook on qualitative research, Norman Denzin and Yvonna Lincoln (2005) describe the research process by using the 'bricolage' metaphor, which defines an approach that crosscuts several disciplines, fields and subject matters as well as

perspectives and methods. The evolution of my research process followed a similar pattern; in that, it involves a wide variety of different methods, including multimodal analysis, virtual ethnography, participant observation, interviews, and archival content. The range of data production methods that were used throughout the three case studies depends on the context and availability of observable participant experiences. For instance, the participatory observation of design processes in Metrotopia project has been supported with interviews with participants to include the inner worlds of the co-designers. One possible benefit of using a mixed method for data production is the possibility to observe both instances of idea-generation, problem-solving and knowledge sharing by participant observation, while questioning how the co-designers make sense of these processes with relation to their general VW experience by in-depth interviews. My qualitative research design process, particularly as a result of the influence by GTM, consists of continuous traversals among epistemological, ontological and methodological choices, and reconsideration of the '*multiculturally situated researcher*' (Denzin and Lincoln 2005) as the co-creator and the voice of the (collaboratively) produced knowledge.

Danish media and communication studies professor Klaus Bruhn Jensen's (2002, 2010) schematic explanation of the 'six levels of empirical research' in social sciences and humanities (below) is also helpful for elaborating on the process of research and how each interconnected level of research includes (double) hermeneutic synthesis of previous findings, reflections and narratives in a dynamic fashion:

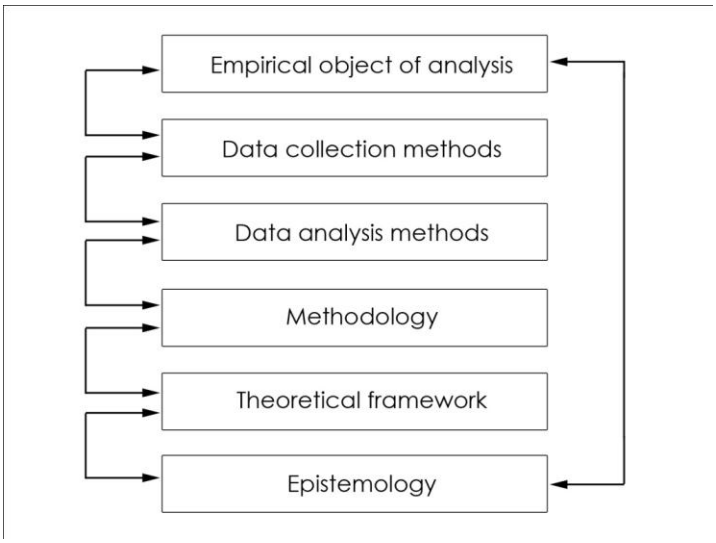


Figure 61. Six levels of empirical research (Jensen 2010: 129)

The evolution of methods, questions and categories within my analytical framework shows a direct relationship to the progression of empirical studies, and the contexts in which observations took place. I use findings from observation of the co-designers' processes in certain situations of

collaborative design, in addition to semi-structured interviews with designers on their general meaning-makings.

I see the research process as a form of communication, rather than mere representation; thus use reflexivity as an analytical tool (i.e. Deacon et al. 2007, Sánchez-Jankowski 2002, Hine 2005). In this respect, I often shared my interpretations from the case studies with interdisciplinary colleagues, and opened my work to scrutiny through several international conferences, research events, and research group meetings at Roskilde University. In addition, the interview questions, especially in later interviews, included participants' reflections on what others have articulated and my interpretations of common attitudes and sense-makings. By this method, I was able to revisit my initial assumptions in each step, and reconfigure the methodological framing of the analytical objectives continuously throughout the process. I handled each case study as a whole at once, while critically analyzing the relations between social actors, contexts, practices and designs among all of the three cases. In the following chapters, I present the analysis by comparatively analyzing the three cases, with the intention to represent the significant similarities and differences in relation to the contexts of co-design practices.

Multiple case studies

In the empirical studies, first, a 3-month multidisciplinary design process of a virtual laboratory (Metrotopia) was observed, while I was also an active participant of both design and research teams throughout the process. The data is produced by recordings and snapshots of various stages of the design project, participatory design notes, and interviews with the two interdisciplinary members of the design team. The significance of the Metrotopia case-study for the analysis is two-fold. First, the interdisciplinary collaboration of researchers and designers provides a potentially rich environment for studying the social situations in which design solutions emerge. In addition, the participatory design approach provides a methodological window to take part in the socio-technical practices of meaning-making.

Consequent to the fulfillment of its primary research purpose, this virtual laboratory was used for teaching purposes by Prof. Dr. Sisse Siggaard Jensen (Roskilde University) and me, where we asked our students to work collaboratively in the city's sandbox to create virtual artifacts in a 3-week workshop; and join focus-group interviews afterwards. The data in this second case-study is produced by image and video recordings from various stages of the design process, the students' final presentations, and the transcriptions of the four group interviews. This case-study foregrounds the experiences of novice users, and situations of collaborative design in which the co-

designers are not necessarily geographically distant, but their co-design practices are mediated by their avatars.

The final case study includes observations and in-depth interviews with the designers of Pop Art Lab (PAL), a streaming music sim (virtual island) in SL that is designed and built as a result of the inworld interactions among various individuals, who are not only geographically but also socio-culturally and professionally distant. I have interviewed the four members of the PAL design team, and conducted various ethnographic observations about the use of the virtual island, mainly because the (fourth) design of PAL has been done by the time. PAL is a substantial example of the naturally-occurring situations of collaborative design, where like-minded users come together through the social world of SL and realize their collective visions.

Case study method, as a research strategy and focus, is usually employed to obtain a deeper understanding of a situation and make a more comprehensive theoretical and empirical assessment of social reality in a context-dependent, interpretative approach. Rather than providing "thick" generalizations from single cases, case study allows researchers to explore individuals, organizations and processes in detail and requires the observer to focus on simple through complex interventions, actors and operations, relationships, communities and/or programs to reveal the multiplicity of narratives to tell the stories (Baxter and Jack 2008). Case study is considered as a focus and/or strategy on what is to be studied (Stake 2005, Thomas 2011). Therefore, the possibilities of generalization and theory-building are closely related to how the research questions were formulated, and what procedures are applied to produce the most comprehensive and representative data that is available within the case(s). Robert E. Stake (2005) mentions that if a case study research should be designed to emphasize particularity and uniqueness in its theory-building approach, the researchers should consider several aspects of the case contexts, including nature of the case, historical background, physical setting, potential informants, other contexts (i.e. political, legal, aesthetic), and other cases through which it is recognized. As explained earlier, my intentions in constructing the social semiotic framework as an analytical matrix between elements of context situation and semiotic functions of sign systems are directly related to the methodological choices. All three case studies that I have observed included co-designers with different backgrounds, skills and interests in participation. While the Metrotopia team came together by the research team as an external initiator, PAL's design team is a result of inworld socialization and friendships. On the other hand, the context of the Communication and Design Workshop has been relatively more synthetic; in that, the requirements of the pedagogic agenda had to be taken into consideration at times.

Whether the unit of analysis is an individual, a program or a process, the caseworker focuses on "how?" and "why?" questions, covering the contextual conditions by exploring the blurry boundaries between the phenomenon and its context (Baxter and Jack 2008). One way of limiting the scope of study is to place artificial boundaries to the research framework, such as limiting certain variables (time/place, time/activity, definition/ place etc) to define what will and will not be studied within the project. In my analysis, the limitations are drawn by the previously mentioned *contexts* of using SL as collaborative platform, considering the use of SL as a limitation of *media* as well as *place* (Bartle 2004, 2008). As collaborative design activities in SL can occur both as synchronously and asynchronously, case studies often unfold in various time-scales adopting the contextual limitations of each project. As Lemke (2005) emphasizes, social semiotic research on mediated social action cannot simply consider time as a linear or cyclical entity, but requires special attention to how collaborative spatial practices unfold in different temporalities, resulting in different experiences of time, space and movement in different contexts.

Credibility, validity and scientific value of case study methods are also common topics of discussion. Stake (2005) describes case-study as *a small step toward grand generalization*. Even though there is a possibility to produce generalizations and empirically grounded over-arching theories from case studies, the essential purpose is to make an in-depth and reflexive observation of a social situation to pose *foreshadowed problems* about the subject matter (Stake 2005, Flyvbjerg 2006). In that respect, generalizations are not necessarily seen as the ultimately desired end-result, but possibilities to ground empirical findings on previously established theories on human activity to explain similar phenomena in larger contexts. Within the constructivist paradigm, what is expected from a case study approach is pluralism in voices towards social construction of reality, since the nature of the empirical focus allows close connections and dialogue between researcher and participants, allowing participant to describe their views of reality for researcher to understand (Baxter and Jack 2008).

Selection of cases and strategies for sampling

During the 3-year research process, I have been involved in SL's co-design environments, and I have been in close contact with the VW's creative communities for the sake of analytical integrity of ethnographic findings from various inworld/RL sources. In terms of collaboration, SL offers a wide range of user practices, whether these are on content creation, sharing, trade or education/knowledge-sharing. A number of specialized design professions have emerged, including avatar clothing, furniture and decoration, custom design islands, freebies, vehicles, texture-workers, scripters; and they have the chance to share their products with other residents through the inworld economy. SL designers collaboratively give shape to virtual world and its

material resources either by visiting sandboxes or sending messages to builder messaging groups to ask a question, or by outsourcing a design task to a fellow designer, or simply by going shopping for freebies or scripts. In this wide range of co-production practices, I am focusing on virtual places and artifacts that are created by the collaborative efforts of residents for a specific purpose, or several particular purposes of knowledge production and sharing. Although collaborative content creation in SL occurs in multiple social layers and contexts[6], my focus is primarily on social practices of collaborative idea-generation, problem solving, building, and evaluation of virtual designs within the project team and their presentation to users/visitors.

According to Flyvbjerg's (2006) Kuhnian insight on scientific discovery, thoroughly executed case studies would provide context-dependent knowledge on human experiences or *expert activities,* as practitioners gain differentiating levels of competence through acting in the world. Following the logic of Flyvbjerg, selection of the 3 cases in this PhD emphasizes maximum variation cases, in which multiple cases are observed with one or more significant variables, such as time, place, activity, or context. In fact, the common question "what is this a case of?" bears considerable importance in case selection for multiple case studies, since it is aimed to explore not only commonalities but also differences between and within cases in a theoretically grounded method.

Robert K. Yin's (2003) model defines three types of case study models (explanatory, exploratory and descriptive), while Stake (2005) proposes two essential types (intrinsic and instrumental) and collective case-studies for multi-sited approaches. While Stake's i*ntrinsic case study* focuses mainly on the case itself, hoping to understand it in detail and caring less about '*what it is a case of*', the instrumental case study examines the case to provide into an issue or redraw a generalization on a social theory, in which the case plays a secondary, supporting role. In reality, these categories do not necessarily qualify case studies into a singly typological unit, but they rather describe the purpose and orientation of the researcher towards certain ways to approach the case. Following Stake's line of thought, the multiple case study approach of this PhD study can be considered as a gradual composition of intrinsic and instrumental cases, the structure and methodical orientation of which was continuously reviewed, assessed and modified throughout different stages. The relevant characteristics of the three case studies are outlined below:

[6] i.e., builders of freebies that were used, or scripters who use the SL's Linden Scripting Language

	METROTOPIA	COMMUNICATION & DESIGN WORKSHOP	POP ART LAB (PAL)
TYPE OF CASE STUDY	intrinsic (exploring contexts, actors, affordances and methods)	intrinsic (teaching in SL) + instrumental (novice users in their learning environments)	instrumental (naturally occurring inworld collaborations)
ACTORS	multidisciplinary team of researchers & designers	communication students (little or no VW experience)	inworld team of SL builders (professional & amateur)
CONTEXT OF DESIGN	a virtual laboratory in the form of a city (whole sim)	fictional narratives, avatars/characters and spatial objects	abstract virtual place for social music-listening experience (whole sim)
CONTEXT OF COLLABORATION	collaborative design for research purposes, professional, long-term (3-4 months)	pedagogical group study, teaching/learning environment, long-term (3 weeks)	inworld collaboration for personal/professional interest
DESIGN METHODS	inworld+RL collaboration, collaborative design	inworld+RL collaboration, collaborative design	mostly inworld collaboration, collaborative design
RESEARCH METHODS	participant observation, interviews	participant observation, focus group interviews	interviews and field observations

Table 6.1. The three case studies in comparison

I aim to triangulate findings from the expanding empirical knowledge by using various data resources, data types and points of view for interpreting the observed phenomenon. For Stake (2005), triangulating descriptions and interpretations ought to be a continuous (iterative) process, which is not applied only in a single step but all through the study. Triangulation enables researcher to use multiple resources to verify and clarify meanings by identifying different ways in which the case is experienced, and provides stronger substantiation of constructs and hypotheses (Eisenhardt 1989). Thomas (2011) uses the Foucaultian concept of 'polyhedron of intelligibility' to describe triangulation as a '3D view of the subject'. By following Wieviorka's (1992) model, Thomas describes the two essential elements of a case: its *'practical, historical unity'* (*subject*) and its '*theoretical, scientific basis'* (object, or analytical frame). For increasing the efficacy of triangulation, Baxter and Jack (2008) also mention *prolonged and intense exposure to the phenomenon under study, member-checking, peer review of data and field notes and continuous self-reflexivity* as other possible ways of grounding the analytical framework with empirical and theoretical validity. Another method of triangulation is applied in terms of the sampling of cases

and selection of participants in combination with related interviews/conversations with VW experts and design professionals, in which the main purpose is to enrich the variety of viewpoints and understand the nature of collaborative design activities in SL to a wider extent. I aim to cover a wide spectrum of experiences and sense-makings on the subject matter in order to reveal uncovered aspects and foreshadowed problems from a critical standpoint. As a result, the overall case-study framework includes participants with different levels of experience and competence in SL, observing collaborative design processes in different contexts, such as professional/ educational, inworld/RL collaboration, and using the various methods of data production, such as field observations, snapshots/video, interviews, and focus groups.

6.3. Methods of data production

An important aspect of interpretation and triangulation in case study research is the positioning of the researcher in relation to the subjects to be studied. As case study does not prescribe any specific methods to produce data and draw and analytical framework based on a particular research design, strategies for being involved in the field, either as an observer or a practitioner, teacher, policy-maker etc., would essentially depend on the researcher's goals. In this section, I will discuss the methodological strategies, by explaining the particular reasons for the particular methods that were applied in the light of theoretical framework. Here, I aim to present the logic behind constructing the empirical framing of participant observations and co-designer interviews with other inworld and online data resources (i.e. snapshots of virtual places and artifacts).

As explained earlier, the main research question aims to understand the experiences of designers, who engage in collaborative design projects in SL, as they construct situated and reflexive meaning-makings. Therefore, my approach towards this aspect of the research question intends to be as open and exploratory as possible. By observation of the co-design processes, and individual and focus group interviews with actors involved in collaborative projects, I try to make a theoretically and empirically grounded documentation of the activities and reflections as possible.

Participant ethnography and participatory design in SL

My overall goal in participating in the social contexts was to take advantage of the 'uniqueness of a specific case' and let theoretical insights emerge from interactions, in order to achieve what Eisenhardt (1989) calls "controlled opportunism." As Kemmis and McTaggart (2005) suggest in their essay on participatory action research, the role of researcher in participating and in-so-doing changing the social context requires particular attention to the evolution of research objectives, questions and methods. What is expected from participatory research is a sense of development and evolution in *understanding* of *practices* and *situations* (Kemmis and McTaggart 2005).

For Deacon et al. (2007) the researcher and the researched can 'inhabit same universe of discourse' and be in relationship" for continuous objective assessment, since "observation includes a range of research methods which allow direct access to the social behavior being analyzed" (Deacon et al. 2007: 250). In this perspective, participants are not merely objects of research but they are subjects with individual and social consciousness. Therefore, I consider research activity as a way of understanding and learning about phenomena, and believe that most advanced form of learning takes place when researchers place themselves within the context (Flyvbjerg 2006). In order to experience how the virtual places and artifacts are co-produced as multimodal semiotic entities by the users of SL, I also chose to share and, to a certain degree, participate in the social practices. My intention was be aware of the potentials as well as the pitfalls of the technology as they are experienced by the participants, but still be able to keep an analytical distance. My choice of participating in the social context as efficiently and productively as it was contextually possible results from of my interest in exploring the social environments for collaborative design in SL, and expanding the scope of research by including insights from all possible forms types of creative practices within the world.

On the other hand, as the nature of *participation* requests, I had to take part in the cultural processes personally at times. In some significant stages of development of Metrotopia, for instance, I had to make decisions as I became more competent with the design culture and tool/resource structure of SL. In a sense, my own experiences as an industrial designer with experience in exhibition space design in RL and a '*newbie'* in SL, offered me a chance to do a pilot '*ethnography on myself and my learning process of SL'*. I believe within a multiple-case study research, and as the first of three, Metrotopia project provided a valuable learning opportunity, which I utilized to increase my analytical competence and confidence in the interpretation stage. Similarly, in the "Communication and Design in Virtual Worlds" Workshop, my position as the co-educator required me to teach, monitor, coordinate and evaluate student processes. Should have the students been introduced to building in SL with another approach, maybe their experiences and sense-makings would differ in some unprecedented ways. The first pedagogical and methodological solution for this potential problem was to provide students with a variety of physical, online and inworld resources, such as tutorials, exercises, YouTube videos, and widen their perspectives on what can be done in this world. Another methodological decision was to introduce students to the internal market and society of SL, and not limiting the design project to the given resources in a restricted virtual space, but instead, motivating them to explore, find and appropriate inworld resources as they learn about the virtual world. As mentioned earlier, I aim to focus on not only the practical functions and affordances of interface tools, but also the social contexts in which these are used as semiotic resources in design. This particular consideration was

also the reason why this case study was not composed of only classroom observations and observer's own notes, but supported with focus group interviews with student groups letting them reflect on their experiences in and opinions on SL. In the third case study, PAL, my position as the researcher led me to study the co-designers' meaning-making processes externally, by mainly consulting the individual interviews that I conducted with the members of PAL's design team.

Interviews and Focus Groups

I used interview as an 'auxiliary method' to participatory observation methods in case studies to "understand implicit meanings and tacit understandings" (Kvale and Brinkmann 2009: 115) within co-designer groups. In addition to the participatory ethnographic observations in Metrotopia and Workshop cases, I conducted 7 individual in-depth interviews with the co-designers of Metrotopia and PAL projects, and 4 focus group interviews with the 15 students of Communication and Design Workshop, as well as several semi-structured interviews and informal conversations with various platform and content developers.

During the interviews, I intended to capture the semiotic reflections from participants' experiences through intensive conversation and dialogue on particular topics. Each of these interviews usually lasted between 60 to 100 minutes. Interviews were conducted in various locations and by using either face-to-face or mediated means. One of the Metrotopia Interviews with the Caitlyn (the client), two of the PAL interviews with the client and a co-designer of the project, and all focus group interviews with the workshop students were conducted in the same physical space in person. The collective discussion of Metrotopia's design and two of PAL interviews took place in SL by either using voice or text chat. The reason for not using voice in one of the interviews with the PAL's chief of design was a personal limitation. As she was hearing impaired, we preferred to conduct an open ended follow up interview via email to supplement the chat conversation in SL. As Joëlle Kivits (2005) explains the online research relationships through email interviews, the asynchronous mode of online interaction requires different considerations. While text-chat affords real-time conversation by turn-taking, direct response to questions and a convenient transcription at times, email responses tend to be more detailed and elaborated as the interviewee has more time to reflect of past issues. On the other hand, meeting and discussing in SL provides the chance to navigate the designed places with avatars, and reflect on the specific design issues on location as the interview continues through the chat. It is also possible for the interviewees to express themselves by creating and/or modifying virtual objects, sharing landmarks or other inventory items and using their avatars to orient their responses in virtual space.

The interview questions included the inquiry of their general backgrounds, including their prior experience with similar worlds and practices, their reflections on the overall design and process of designing virtual places, and their general ideas on affordances and limitations of SL as a collaborative platform for content generation[7]. As a general rule of thumb throughout the interviews, I aimed to stay active and alert to determine particular leading topics of discussion, and ask *probing questions* to evoke reflective responses and discussions for further elaboration (i.e. Mann and Stewart 2000, Charmaz 2002, Kvale and Brinkmann 2009).

The choice of using focus group interviews with the workshop students aimed to tap the possibility of generating a lively collective discussion on group processes and bring forth expressive and emotional views in the course of collective interaction (Tonkiss 2004, Kvale and Brinkmann 2009). Although conventional focus groups usually involve six to ten people, my student participants consisted of 3 groups of 4 and 1 group of 3 students. Students are involved in the research as learners who had an intensive 3-week experience with SL, after which they produced and presented designs to a public audience. In this respect, I was more concerned with the internal formation and negotiation of accounts within each group in relation to their collaborative processes. As expected, specific parts of the student discussions were particularly rich and interesting in terms of their collective reflections and critical remarks.

Transcription and coding of the interviews were done in accordance with the grounded theoretical procedures of initial coding and *selective* or *focused coding* (Charmaz 2002). As I have discussed in the previous chapter and outlined in Figure 5.1, the initial coding of the interviews is used to categorize the data on the social actors, the places and practices of collaborative design, and the products of designing. In the more focused stages of coding, several codes were generated to explore the relational patterns between the semiotic resources, the socio-technical contexts and the meaning potentials in virtual places. Some of these codes emphasized the co-designers' personal backgrounds, skills and resources, whereas others explained how practices are organized by the use of these skills and resources. The experiential, interpersonal and textual meaning potentials, as they were interpreted by the co-designers, are the central categorizes in the analysis of virtual places and artifacts, as well as the interview discussions on these issues. My overarching aim in using the GTM perspective to dynamic coding of the multimodal data is to be able to reflect on the dynamically constructed meaning patterns among participants of the three case-studies. I used standard word processing applications for transcription and organization of data, and made use of the qualitative data analysis software Atlas TI for the intensive coding and analysis procedures. In order to answer the continuously developing analytical questions, I explored the data for insights

[7] See the Analytical Framework flowchart (Figure 5.1) for further details of the interview topics and the coding process.

within each consequent case study, returned to the field for more empirical observations, and integrated the findings with theoretical framework to fill the gaps by re-working the codes. My primary intention – primarily in reference to the aforementioned constructivist approach - is to avoid forcing the findings into pre-conceived categories and stay in touch with the socio-technical context in flux[8].

6.4. A reflexive account of methodology, limitations and contributions

It has been often claimed that, in production of scientific knowledge, researchers' own beliefs, values, opportunities, relationships and methods play a significant role in development of their analytical frameworks (Liewrouw 2006, Stern 2007); mainly because "*methods, after all, are not neutral devices*" (Hine 2005). The methodological choices of a research study affect not only the face-value of its outcomes, but also the integrity and comprehensiveness of its research design (Deacon et al. 2007). Sánchez-Jankowski (2002) mentions the importance of self-reflection, by stating that ethnographic work should not be evaluated merely on face-value, and systematic evaluation and assessment of reliability and methodological integrity is necessary.

> When we talk about methodology we are implicitly talking about our identity and the standards by which we which our work to be judged (Hine 2005).

For Bente Halkier (2003), the ability to generalize based on qualitative data is constructed through "a range of scientific choices, argumentations and performances" (Halkier 2003: 116). In this view, reflexivity plays a key role in the scientific process, as it is both "legitimate and important to be able to analytically categorize the complexities of an empirical field as it is to uphold a stiff kind of theoretical cogency" (Halkier 2003: 117). While such reflexive generalizations can provide clarifications on theoretical concepts, they can also be used to map a socio-cultural field of communication and to explain the dynamic interplay between communication phenomena.

Another important point to keep the reflexive stance is the potentials and limitations of new media technologies, and obtaining a critical view towards their social meanings. As Danish media and communications professor Kirsten Drotner (2008: 17) informs, "economic divides and socio-cultural patterns of production and use change at a much slower pace than do technologies" and it is important to make sure that "the transformations brought about by digital media" are not overstated. Therefore, another major methodological challenge with emerging technological paradigms such as SL is the trap of technological determinism and descriptiveness in terms of analysis. I intend to develop a theoretically and empirically grounded but critically discursive

[8] For more methodological insights on the use of qualitative interviews in relation to GTM, Mann and Stewart (2000) and Kvale and Brinkmann (2009) are helpful resources.

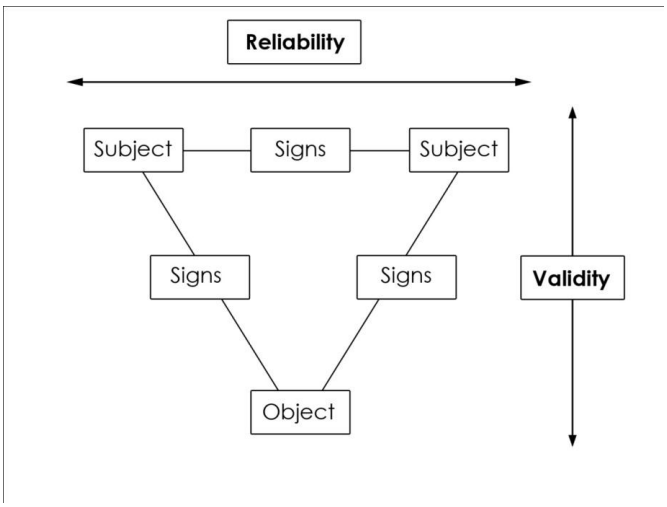
approach to collaborative design instead of being merely '*fascinated by the potentials*' of the technology or a *'comparison to the face-to-face gold standard*' - as Hine (2005) criticizes- in order to contribute to VW research field, and to communication research in general.

As explained earlier, I intend my theoretical and methodological reflections on meaning-making through design and communication to traverse across a variety of disciplines mainly within semiotic and sociocultural traditions. I intend to increase reliability of interpretations by giving voice to several –theoretical and empirical- voices, while I keep continuous evaluation of validity by reflecting on how the relations between research questions and methodology are constructed. I have reviewed and modified my methods, as well as research questions, several times throughout the research process. I prefer to follow Robert Stake's (2005) advice on how the *brainwork* in a case study should be *observational but (more critically) reflexive* in order to produce (and, possibly, answer) *foreshadowed research problems*. My intention is to be as reflexive as possible on the choice of methods, and assess their efficacy with respect to the initial research questions and methodologies. Especially while describing the analytical strategies developed for this research study, I take a critical stance and evaluate my positions as 'the researcher', in addition to teacher, apprentice, builder, observer, or user, etc.

Double hermeneutics as strategy for inference

During the process of qualitative research, the researcher is often situated within the natural settings of social practice, interacting with real actors and collecting their interpretations of what has happened, how/why they think it happened, and what the perceived consequences are (Jensen 2010). In this respect, both the researcher's own interpretations and those of the participants of the study have equal importance in constructing the representation of framed social reality, and research as a co-construction of meaning. Klaus Bruhn Jensen refers to this process as "double hermeneutics", which means "interpreting, not least, people's own interpretations of how and why they communicate" (Jensen 2010: 11). In the introduction to his edited volume on 'Qualitative Research In Action', Tim May (2002) relates the idea of *double hermeneutics* to *reflexivity* by discussing how epistemological and ontological presuppositions that "render the world intelligible" construct (or are 'built into') the assumptions of the researcher, especially if the context of research requires "a double movement of reflexivity in terms of possessing a point of view on the point of view" (May 2002: 4). The role of double hermeneutics in co-construction of research as a communicative practice is based on the antifoundational premises on co-production of knowledge and interactions of subjects, as well as their internal transformations during the research process. In this view, knowledge is the product of socially and culturally situated discourses (Ashmore 1989, Finlay 2002), therefore the research object and identities of participating actors are co-

created/constituted in the situated knowledge production process. In Ashmore's (1989) reflexive thesis on 'sociology of scientific knowledge', co-creation of knowledge – including research knowledge – is considered as a 'social negotiation' of meanings. Linda Finlay (2002) uses a 'meta-reflexive' voice within her analysis to emphasize 'how the researchers and intersubjective elements impinge on and even transform research'. For the antifoundational qualitative research logic, positions of the researcher(-s) and participants are multiple, and constantly shifting. In my research framework, I try to deal with this "fluidity of conceptions" (Ashmore 1989) by emphasizing the multiplicity of voices (rhetorical intentions) within designs, and follow Finlay's (2002) reflexive "maps" metaphor by considering 'introspection, intersubjective reflection, mutual collaboration, social critique and discursive deconstruction' as analytical strategies.



- Figure 6.2 Dimensions of validity and reliability (Jensen, 2010: 141)

In figure 6.2 (above), Klaus Bruhn Jensen's conception of reliability and validity as subject-sign relations is outlined. According to Jensen (2010), a reflexive approach to reliability and validity of research depends on the dynamic sign-relations among the object and various subjects as socially situated social actors. May (2002) associates the limits of reflexivity with 'willingness to subject one's own position and what it does or does not authorize as a result to critical scrutiny" (May 2002: 2). I propose several strategies for dealing with these issues of subjectivity and reflexivity, all of which - including *research-as-bricolage, triangulation and multidimensional flexibility of research design* - should be considered in relation to the research questions and methodological objectives (i.e. Denzin and Lincoln 2005). *Triangulation* of data resources, methods and perspectives is an important strategy to enhance the potential to generalize from findings, as multiple viewpoints as resources would expand the scope of analysis and enable the researcher to compare/relate these views to each other within observed social structures. The relationship between triangulation and validation is based on an idealist/relativist ontology and

antifoundational epistemology, which is reflected in particular methodological choices. As mentioned above, it is a conventional notion in qualitative social research that the multiplicity of meanings and representations provide the valid scientific inference, rather than the search for objective reality. In my view, main goal of researcher as 'bricoleur' or a 'quilt maker' is to learn how to borrow from many disciplines and how to juxtapose and superimpose aesthetic and material tools (Denzin and Lincoln 2005). Although the 'bricolage' metaphor does not necessarily require triangulation, the underlying logic of knowledge co-production through assemblage requires a similar way of adaptive and reflexive thinking on situations and settings of research (Hine 2005).

Limitations of research and ethical considerations

> *Methodological solutions gain much of their authority through precedent, and it is not clear as yet just how far the heritage of research methodology applies to new media and what gaps in our understanding are still be exposed (Hine 2005).*

Engaging in a (self-)discussion on the limitations of a research study would unavoidably bring forth questions and critical perspectives on limitations of chosen methodologies. One obvious consideration about the limitations of this research study is the problem of representativeness and general applicability that results from the case study approach. It is possible to claim that there are other types of collaborative projects, participants of which may experience the affordances and processes quite differently; and my involvement could have compromised my position as the observer. To discuss the limitations and disadvantages of participatory observation methods, Deacon et al. (2007) pose several methodological challenges to consider, including how participation hinders observation and observation hinders participation, role of sponsorships and representativeness of observed cases, issues on representation and impact of the knowledge produced through observations, limits of participation and immediacy, and issues of transference of the data to address a specific audience. On the other hand, they also advocate the advantages of observation by referring to its potentials to offer various subjective understandings, and in-depth contextual knowledge of location-based practices and a grounded research with richness and color in presentation.

Although it is true that with an in-depth qualitative approach it is not possible to grasp every possible instance of collaboration and communication taking place in the social world (and definitely not in a pure objective stance), I aim to increase validity and robustness of the analysis by triangulating the findings from the case studies. In addition, as Flybjerg (2006) notes, case studies provide *context-dependent* knowledge and experience about expert activities, as well as students' competence development as they were involved in co-design processes. Therefore, the purpose of multiple case studies is to analyze this context-dependent knowledge of co-design processes, rather

than make overall statements and generalizations about SL usage. The issue of representativeness is also related with strategies of sampling and access to resources. In the case studies, one of the important determining factors for selecting collaborative co-design processes to observe was the availability of the VWs Research Group's already-existing partnerships to institutions, residents and builders. The establishment of these academic and professional partnerships, before and during the PhD project, enabled me with a wide variety of knowledge resources, which, in turn, might have limited the scope of the project in terms of sampling of data resources. However, I believe my approach legitimizes the validity and reliability of its fundamental participatory ethnographic framework by triangulation of the knowledge resources, utilization of multiple methods and resources of data produced from multiple case studies and the focus on designer's discourses to be emphasized.

On the other hand, no matter how variously multiple these data resources were, they were still mostly *virtual*. There are both negative and positive aspects of conducting qualitative research in virtual environments, most of which are documented by previous research[9]. In this study, several virtual methods were applied in combination with more traditional methods, including avatar-based participatory design observation, inworld voice/text chat, Skype and e-mail interviews with designers, collecting virtual objects and travelling with avatars, etc. Major limitations of these methods were the anonymity caused by the avatar-based presence, lack of face-to-face cues during interviews and observations, and needs for technical infrastructure, as well as complex coordination and communication skills in VEs. While some participants provided me with the RL names, some preferred to use only their avatar names with limited personal information[10]. The problem of anonymity was not a major one for the design of this research study, mainly because I had personal (either offline or online) access to most participants, while others, who I know only as avatars, were already working in these projects for a long time and had their avatars' name recognized by others. Participants were all able to confirm each other's participation during the interviews, which helped resolving these considerations on anonymity and credibility. On the other hand, the lack of physical presence is replaced with the potential to overcome geographic and physical barriers and meeting participants in a shared virtual environment in real-time interaction with their avatars. This aspect of SL offers freedom to navigate, move/modify and create virtual objects and multimodal demonstration of discussion issues. Considering the fact that these inworld interviewees included a hearing-impaired British university student, or an engineer from France who wanders the sims of SL as a builder for the last 3 years, this decentralized, multimodal and

[9] For instance, see Jensen (2012a, 2012b) for detailed discussions of avatar-watching and video interviews combining both real and virtual environments.

[10] In my analysis, I changed each participant's name to a pseudo-nickname, usually inspired by the names that they have provided me.

interactive communication capacity can also be very handy for conducting case-study research with a variety of participants in a variety of situations.

All in all, I believe the idea of considering SL as a cultural context, in which cultural artifacts and spaces are collaboratively co-designed and co-produced by members, comes with the possibility of conducting ethnographic research in these contexts. Following this logic, my approach can be considered as a natural consequence of my arguments on how a virtual world can be defined, and how its members have a role in collectively re-creating its semiotic resources by participating, experiencing and co-producing the "*world*" itself.

Intended methodological and analytical contributions

I intend to expand the boundaries of interdisciplinary studies on VWs with a non-descriptive pragmatic approach to virtual place-making as multimodal semiosis in the social domain, and offer a comprehensive analysis of affordances and constraints in relation to their social contexts of use. I believe it is possible to propose a new understanding of the nature of collaborative design activities in SL by combining the multimodal analysis with the analysis of the social actors, places and practices, and by using a number of resources for observation and data production to amplify the many possible contexts. The three case-studies that I present in my analysis are selected purposefully to emphasize the diversity in these potential contexts, which brings forth certain methodological and analytical strategies in return.

First and foremost, the consideration of the socio-technical or in Lemke's (2000) words 'eco-social', world introduces new methods for the analysis of multimodal semiosis, and new resources to extract data from. In addition to the multimodal framing of design and co-production, the socio-cultural perspective on social semiotics can explain why and how specific modes afford specific actions in specific contexts while constraining others in collaborative making of signs. Therefore, the social semiotic analysis of how co-designer groups and communities collaboratively design and build the VW as a socio-technical phenomenon that is constantly *in-the-making* would contribute to the existing academic perspectives on virtual communities, social creativity and user-driven innovation in computer-mediated collaborative environments.

As explained in previous chapters, user experiences with (only) navigation and interaction within the world could be significantly different from a content-creator's experience, which involves extensive learning and practice of specific interfaces, methods and social interactions. Here, the perspective of both human and non-human factors is important in the analysis of co-design practices, as the social actions through which places and artifacts are designed is closely related with the interactions of the co-designers with socially available tools and resources. This is also where the notions of affordances and constraints as parts of the eco-social system of semiosis. An

in-depth qualitative understanding of inworld design processes, their participants and socially available resources for making virtual places and artifacts as multimodal sign complexes would help understand these socio-cultural dimensions of collaborative digital content creation.
A sociocultural perspective of design in collaborative virtual environments can also initiate further research and discussions on how multimodal competences can be facilitated more efficiently in design and education of forthcoming virtual world platforms, including the emerging fields of Web3D, VR and augmented reality.
In the light of these analytical perspectives and the theoretical framework, this research study aims to illustrate SL as a complex and socially dynamic research field to conduct socio-cultural ethnographic observations on collaboration, design and innovation. The semiotic framework is important to explore the ways in which social cues on the meaning potentials of virtual places and artifacts are co-produced by design. The multimodal perspective to the social semiotic framework provides a systemic model to analyze the experiential, interpersonal and textual potentials, and uncovers the ways in which the co-designers embedded affordances and constraints for the visiting users. The methodological combination of multimodal analysis and MDA provides a coherent framing for the study of co-design activities as socially contextualized semiotic practices. Investigating the potentials and limitations of SL in this context could inspire new methodological experimentations and proliferation of new understandings in virtual research methods about user-driven design practices and digital communication.

7. Analyzing the social contexts and the processes of collaborative design

Introduction

The first of the two analysis chapters focuses particularly on the social contexts of collaborative design in SL, and the processes through which virtual places are co-produced by the socially available material semiotic resources. My motivation for including the analysis of the social actors, the mediational means, and the practices of co-design is drawn on the nexus analysis perspective, as well as the rhetorical perspective of multimodal social semiotics, which foreground's the sign-maker's intentions in construction of meaning potentials.

The analysis in this chapter begins with the profiles of *social actors* and discussions on configurations of design teams in the three case-studies. I introduce each case-study and the participating co-designers, and then set out various perspectives on their motivations, as well as the organization of the design teams in relation to particular social issues, such as power relations, task divisions and group hierarchies. The three case-studies show several differences and similarities in terms of their participants, and the ways in which they organized their practices. My aim in this part of the analysis is to present the socio-cultural factors that shape the co-designers' engagements with the co-design processes, and discuss the contexts in which they use SL for their purposes. The second section in this chapter foregrounds the use of *mediational means* and their affordances. In this section, I analyze several issues in relation to their roles in constructing the collaborative practices, including the use of SL's graphical user-interface and its specific content-generation tools, and the ways in which the co-designers find and appropriate material and semiotic resources by using a variety of media platforms. The final analytical section is about the analysis of collaborative design processes. Here, I analyze the use of SL's virtual places and avatar-mediated co-presence affordances for co-design purposes, the perspectives and design strategies on the interconnectedness of SL's places within the world's grid, and the ways in which the co-designers organize their practices in time and (real and virtual) places. The overall analytical contribution of this first chapter to my framework is to present a socio-technical framework that supports the rhetorical approach by uncovering the communicative purposes of the sign-makers, the means by which their messages become materialized as virtual places, and their methods for collaboratively designing and producing the places.

7.1. The social actors and configurations of the design teams

One general aim of this chapter is to present the findings on social contexts of the collaborative design projects. Therefore, the first part of the analysis focuses on the social actors, who contribute to co-production practices. First, I outline the profiles actors in the three case-studies by particularly focusing on their purposes and motivations for engaging in collaborative design projects, and the competences that they find relevant in shaping their experiences. In some cases, these competences refer to the past experiences with MMORPGs or 3D modeling software; whereas for some designers, their meaning-makings are shaped by their professional identities. I also discuss the possible semiotic relations between these individual conditions of engaging and the ways in which the co-designers make sense of the potential affordances and constraints of different platforms. The discussion of findings for each case study continues with the findings on the social organization of co-design teams, particularly focusing on the power relations and the division of tasks among the co-designers.

Metrotopia and interdisciplinary collaboration in design of a virtual laboratory

The Metrotopia project includes the design and building processes of a virtual laboratory in SL, which was created to facilitate both research and education activities on virtual worlds, design, communication and media studies. The project team in the Metrotopia case includes two interdisciplinary groups contributing in different stages and levels of the design process: the research team, who often met at the university in person to discuss the general purposes and requirements; and the design team, who generated, evaluated and modified the design of the virtual city. The two teams shared members, although their processes were not necessarily always synchronized.

The process was initiated by a professional contract between the research team and Aspen, who was the head of design. Roles and responsibilities of the actors, requirements of the design project and several deadlines for different tasks and the overall project were described in detail in this official document. According to the contract, Caitlyn was the client of the design which would be run in the sim owned by the research project, and Aspen was the chief designer in charge. Since this project began in 2009, which was the beginning of my first year in PhD, I was both participating in simple building tasks, finding alternative design resources from the Web for Aspen and Caitlyn to evaluate, and learning how to use various tools by the help of Aspen.

Caitlyn is an American post-doc researcher who was working in Denmark for the time being, and conducting research on virtual worlds, computer and video games with a methodological focus on people's sense-makings in their engagements with various technologies. Caitlyn's first introduction

to SL was a few years ago (2004-2005), while this was a very brief experience. She says her active engagement with the virtual world (VW) began with her involvement in the project in 2008, which is also when the Metrotopia project was initiated. Caitlyn is neither a builder nor a frequent user of SL. She describes herself as a gamer who enjoys games with "*short-term investment*", as she get frustrated easily. However, her interest in the Superhero concept roots to her personal interest as a "*fan*" as well as a researcher. She defines herself as "*client and idea-generator*" in the overall process. According to Caitlyn, her participation was about *"content generation*" rather than "*design or structure generation."* Although she does not actively generate content by using SL's building tools, Caitlyn had a significant role in generation of the overall layout and organization of places and artifacts within the city. She also created a special avatar for a specific character to represent Metrotopia and communicate with the city's followers, named "*Mayor Sandalwood*." Caitlyn's purposes as a media and communications researcher and her interest in the related contexts –such as gaming, virtual worlds and superheroes – have notable consequences in her decisions, and the ways in which she relates the design of Metrotopia to her research study.

The overall design and production of Metrotopia was done by Aspen, who is a Danish computer programmer and a SL entrepreneur, offering professional inworld design services since 2007. Aspen owns and/or has designed several other locations (sims) in SL, one of which is WonderDK island that neighbors Metrotopia. He has been asked to participate in the project through existing collaborations with the design team, but this is their first collaborative project on this scale. For Aspen, having practical content-generation experience in SL is an important advantage, and his large inventory of resources (i.e. objects, landmarks for resource archives) enabled the team to work faster. In his view, experience enables designers to recognize what can and cannot be done by using SL's affordances, and such considerations are a part of the design process from the beginning.

My involvement in the design process of Metrotopia included active participation, through which I observed the interactions of the co-designers while I also learned and practiced content-generation under the supervision of Aspen. I had access to both research team and design team meetings, in addition to which I joined several inworld gatherings in which team members generated and evaluated ideas, and organized the places and artifacts within the city. My professional background as an industrial designer and existing competences in other 2D and 3D content creation software enabled me to adapt to the working methods of both teams. My purpose in active participation was to observe tools, resources and methods for collaborative design with a hands-on approach. To do so, I undertook various design tasks and primarily followed Aspen's and Caitlyn's specifications in creations.

The core design team consists of Caitlyn, Aspen and me. However, social actors who were involved in generation of ideas or objects that were used in the design include various other people. Among these actors, members of the research team were influential in idea-generation, particularly the project leader Jeanet who is also responsible for the management and the budget. In terms of content generation, various actors were involved in outsourcing of certain design tasks, such as the 20 superhero costumes and the custom-made video screen in the Museum which allows visitors to view only a pre-defined set of YouTube videos about Superheroes[1]. These contributors were found through inworld and online channels, such as advertisements in SL groups and designers' blogs.

In sum, the trajectory of social actors who contributed to Metrotopia's construction shows diversity in terms of their purposes, interests and individual capacities to participate in collaborative design practices. An interesting aspect of collaboration in this case-study is the interactions between the research team and the design team, both of which have specific purposes and methods for co-production. Since design of virtual places and artifacts involves handling of various types of semiotic and material resources, each team contribute to design with what is socially available in their specific contexts of engaging. The project is relatively systematized and documented, and the design requirements were based on Caitlyn's research. Therefore, participants of the Metrotopia case-study and their roles within the project are distinguishable.

Power relations and division of tasks in the Metrotopia project

In Metrotopia, division of tasks follows the co-designers' professional affiliation with the project and experience with the platform, which are framed by their individual and social conditions of engagement. As mentioned, the design team supplemented the research team, which consisted of members of the VW research project, and some participants were members of both teams, including Jeanet (leader of research team and owner of the sim), Caitlyn (the client) and me (the participant observer). The design brief and initial requirements of the construction were defined primarily by Caitlyn, who define her participation as more of "*content generation than design or structure generation*." In the Metrotopia project, hierarchy of actors within the project was agreed on by a professional contract, in which several deadlines for specific phases of the project and the overall purposes of Caitlyn's requirements were laid out. For Caitlyn, when the study started, the design had to be done. She says "*anything that could be changed would have to be changed after the study was done*." Therefore, power relations among participants and their influences in decision-making situations were mostly structured by mutual agreement in order not to lead the

[1] The contents of Metrotopia also included several 'freebies', which are objects collected from various vendors within SL. Collection of these free objects have been done by many members, including Aspen who has been collecting freebies for 2 years, and freebies are not produced for particular places but for open-ended use contexts. Therefore, perspectives of each individual vendor/designer who provide particular objects in the city are intentionally excluded in my empirical framework.

process into turmoil within the research project's limited time-span. As the virtual city was designed according to Caitlyn's methodological specifications, she made the final call in most design related discussions, while Aspen and I were creating alternative designs (i.e. buildings, interiors, open spaces, signs) and placing them into the sim for testing and evaluation. Some design tasks, including production of the 20 superhero costumes for the bazaar and the video screen in the museum, were either outsourced to other inworld creators, or they were collected from within the world's internal markets. The objects were either created or collected by various members of the team, but they all had to be transferred to Aspen before they were placed into the city. Aspen explains that one of SL's structural constraints is the major reason for this specific practice. In Aspen's view, *'large structures'* such as the Museum in Metrotopia contain many prims, the proper management of which *"prevents things getting messed up with various owners of various parts of a structure*." Therefore, he explains the "*normal way to build*" as a form of asynchronous task division, where each designer builds their ideas and then come together to discuss and evaluate. Selection of ideas was mostly done by inworld discussions by avatars, in which participants gathered in Metrotopia and discussed designs while modifying them on the spot.

Metrotopia's design team is an example of a professionally organized interdisciplinary group, members of which have different –yet relevant – purposes of being engaged in the collaborative design process. The relations of hierarchy and power among the two teams had significant effects on the shaping of visual semiotic characteristics of Metrotopia, as the priorities of the researchers were to be satisfied before any other *designerly* experimentations were done. On the other hand, the experience and domain-specific knowledge of a SL designer can often guide certain decisions, particularly when potential affordances and/or constraints are in question. Therefore, although several chaotic moments existed, the social organization of the design team presents a relatively homogeneous formation and a well-defined hierarchy that is constructed for a limited time; in contrast to the fellow co-designers of Pop Art Lab (PAL).

Pop Art Lab and the role of inworld relations in collaborative design teams

PAL is a virtual island - also known in SL as a *sim* - that is built for streaming popular music in various genres while offering the visitors virtual places for avatar-to-avatar interaction, and multimodal visual, artistic and social experiences. In contrast to Metrotopia, the design team of PAL is established and configured by inworld relations, and the process is not professionally contracted. Most members of the PAL design team have been spending time in SL together for more than three years, and few (including Curiza, AmyLee and Xavier) participated in design of several previous versions of PAL. The design process of the current (fourth) version included

Curiza as the owner of the sim and PAL, AmyLee as the head of design, Shaggy and Xavier as the co-designers along with several other contributors.

Curiza is a Danish music librarian, who specializes in networking and distribution of music archives to various libraries in Denmark. Curiza is not a builder, but he has been active in the idea-generation stage. He also provides the main content, which is the four streaming genres of music that he selects and organizes from his archive. Since Curiza's professional affiliation is with a media company, he mentions how they support PAL in terms of equipment and music. He says "*I just recycle the research I use from 8 to 4. And extract the best of it into this environment*." Curiza also describes himself as a '*gamer for a long time'*, and a SL resident for less than a year. His first introduction to SL was during what he calls "*the hype*", through co-worker' recommendations. On the other hand, he describes the reason behind his interest in SL with a reference to his personal life. Curiza says SL was a place for him to go for socializing, meeting friends and other Danish parents after his children go to sleep, which is the only time he could spend some quiet time and have fun without leaving them alone at home. By using his networking skills, Curiza built a wide archive of creative social resources (i.e. designers, programmers, artists, musicians), and he believes he is successful at managing these various resources in working together while having fun. Curiza also mentions his particular interest in exploring the creative aspect and user-generated content in SL.

The project was managed by AmyLee, who is a student in Britain[2]. AmyLee contributed to the project both by content-generation and decision-making. Her decisions were the final according to the team' hierarchy. AmyLee has been in SL for three years, and she has been generating content for the last two years. She explains how becoming a content generator affected her SL experience as: "*that totally changed my interest in SL and the way I live in it now*." She mentions SL as the "*only tool*" for her in generating content. Although she is and has been involved in professional projects in SL, she describes herself as "*not a pro*" as her designs can only pay for her "*fashion addiction*." AmyLee has tried to run a furniture business in SL, after which she decided to work on custom builds such as PAL, or the international *Mamachinema* film festival. She is the only member of the current PAL team who has been paid for her work. However, she says she would have done such a project for free as long as she has fun doing it. AmyLee is deaf . She describes her interest in SL as a way to "*rebuild*" herself when she turned deaf, and "*as a way of having a place where [she is] not impaired*" because at that time, there was no voice-chat in SL. AmyLee has not been deaf since she was born, which means she can "*still imagine how it is for people to listen to*

[2] Since I have never met AmyLee in real-life, our communication was through our avatars, text-chat and e-mail. The type and amount of personal information that is discussed during the interviews were left to the participants' own choosing, and I inquired such issues further only if they are relevant to the design process. AmyLee preferred not to share more of her personal information about her offline identity during our interviews, including her nationality.

music inside SL." For her, designing a virtual place for music means offering "*very good visual experience along with the music in the sim*" as her "*signature*."

Xavier has also been involved in PAL's design since 2008, and he designed the first version of PAL in cooperation with AmyLee. In the current version, Xavier designed the club and generated the textures for the 600+ cubes that generate PAL's dominant visual field. Xavier is a Danish urban planner and architect, who has been working on large scale real-world building projects as well as computer game designs. He also has a special interest in producing and archiving textures, and he describes himself as a "*Photoshop freak*." In addition to graphic software, Xavier has 3D modeling skills for using several external software, as well as generating sculpted prims in SL. Xavier's initial interest in SL was professionally oriented. He mentions how he became curious about the VW when he was informed about a large-scale Danish architecture firm's initiative to build the virtual headquarters for IBM in SL. He mentions that his general interest in SL transformed from a professionally oriented one to having fun, whereas after a while he was engaged in professional projects in SL, too. Xavier built a race track in SL and managed a number of sims, while he came to the conclusion that it is not possible to build a "*sustainable economy*" by designing things in SL. He also mentions the differences between designing real-world buildings and virtual places, and how he had to "*forget what [he] learned as an architect*" because "it becomes a limitation" when one wants to "*invent a totally new approach*" for designing virtual places. Currently, he transfers most of his game-design activities from SL to specialized game engines (i.e. Unity and Unreal) mainly because of the world's limitations to create a satisfying interactive experience. Xavier's designs are still on the market in SL's official online store[3].

Finally, Shaggy is a French engineer, who describes his occupation as "*not the creative type of job*." In fact, this is one of the major reasons why he is in SL as a builder, as he states that exploring other people's creative works is his main interest. Shaggy is a close inworld friend of AmyLee, and he has taught her how to design in SL. His involvement in PAL project was facilitated by his friendship with AmyLee. He worked with her in construction of the overall layout, and generated the idea of using cubes to generate the three-dimensional grid that forms the ground plane of PAL. Although Shaggy has been in SL for three years, he says that he hasn't been interested in the social interaction aspect, which is also probably why he hasn't been involved in many collaborative projects (in his terms). Shaggy has been generating content in SL for years, but he describes SL as the wrong place to try earning money. For him, what makes SL interesting is building and exploring other people's creations; and the reward is not necessarily money but social recognition

[3] *https://www.xstreetsl.com*

and appreciation. He says "*if you charged him [Curiza] with the usual wage by the hour of a creator, this sim would be extremely expensive*."

During the PAL interviews, both Curiza and Shaggy mentioned the discussions of entrepreneurship and earning a significant amount of money is SL, which they associated with the *media hype* around SL. In fact, not only Curiza, and Shaggy talk about the hype aspect but also Xavier and Caitlyn mention the *hype* as one of the first reasons why they have heard of SL in the first place. On the other hand, Shaggy mentions that his answer to newbies who want to get rich in SL is always the same: "*if you came to SL for money, just go away, not your place. You won't see the interests of SL if you just want money*." For Shaggy, the actual reward for content creation in SL is the social reception and appreciation, as well as learning and exploration. However, Curiza focuses on a similar aspect and takes a more optimistic stance towards the future business potentials of SL: for him "*it's still an investment, because (…) sooner or later there'll be massive people coming in.*"

The configuration of PAL's design team shows significant differences from the Metrotopia team in terms of the conditions in which participants engage in collaborative design projects. In the PAL case, co-designers had long-standing inworld friendships, and their contributions were shaped mostly by their personal interests rather than a professional contract. In Curiza's words "*[t]here wasn't really any strategy back then, because [we] were friends and this was something new.*" Curiza, AmyLee and Xavier have been involved in PAL since the beginning, although their roles and contributions change in each version. Their inworld relations also contextualize their collaboration preferences, and methods of working together. For instance, Curiza lived in Xavier's old sim before PAL idea was generated, and he was volunteering for Xavier as a "*police officer*." Similarly, PAL's current members are often included as officers, who are - as Curiza explains – "*people who have been sitting there all the time anyway*." On the other hand, the two cases show similarities in terms of their makers' intentions, especially considering how both Caitlyn and Curiza aimed to generate places for particular types of avatar interaction with reference to their professional affiliations, which are also influenced by their personal interests.

Power relations and division of tasks in the Pop Art Lab project

Therefore, In PAL project, the structure of the design team show differences in terms of its social history, and the situations in which the team's internal power dynamics reached its current condition. Since PAL's design team is based on inworld friendships and voluntary participation , rather than a professional contract, decision-making was based on more flexible grounds, and respecting each other's' efforts becomes even more important. For Curiza, who runs the project and owns the sim, "*when you work with people and you can't pay them, you have to respect what they do*." In his view, this is partly because people invest time and effort in their designs and they expect

recognition. On the other hand, he also mentions the challenge of conflicting egos, especially in collaborative design projects. For Curiza, it is important "*from the start on [to] find out who's the best for this build*."

For AmyLee and Xavier, current design of PAL contains elements about which they both feel partial. However, both co-designers try to anticipate each other's' perspectives and leave the specific design decisions to the actual designer of the particular places within PAL. AmyLee mentions that when she sees another person building, she usually thinks "*I would not have thought doing it that way, but it's cool*." Xavier believes he and AmyLee had "*two approaches*" to the overall form, and he was more focused on "*emphasizing the landscape*." However for AmyLee, providing walkways for easy access was a more important consideration. Xavier also mentions the importance of "*respect*" to someone else's ideas in collaboration. Respecting other designers' efforts and collaborating on separate design tasks generally affects the ways in which the co-designers work together, divide the tasks, and develop design concepts. The co-designers usually do not change the design of an element without consulting the others, as permanence of their contributions depend on how such changes are applied. Xavier's and Shaggy's comments often refer to the risks of improper organization of collaborative practices, where too many voices cause chaos and instability in co-production of designs. Both Xavier and Curiza describes the unorganized design processes –where everybody is able to build and change others' builds – as "*anarchistic*" experiences, which had to be changed due to growing problems in their group. This was especially a problem during the earlier stages of PAL's design, when a member of the original team was expelled because of these personal conflicts between the co-designers. According to Curiza, the girl was "*kicked out*" because of a stylistic conflict based on "*replicating RL architecture.*"

For the current project, Curiza decided to make AmyLee responsible for the final calls, and treat her decisions with respect. In his comment below, Curiza describes why he chose AmyLee to lead the project, and how he reacted to some people's critiques on his selection of AmyLee instead of Xavier, who is a professional architect in RL and an advanced builder in SL. For Curiza, his previous '*anarchistic*' method did not work any longer, as too many voices from too many creative minds would eventually lead to '*ego conflicts*'. On the other hand, he also mentions how giving designers "total freedom" can result in successful "*magic builds*."

> Curiza: Builders, they really have huge egos about their stuff. And really, you could compare it to being in a music band where you also have a bass, and a guitar and a drummer and a singer. And you have to be able to create the magic; you have to be able to let everyone play.

For Curiza, the hardest part of being the boss in a collaborative project was to "*handle 4 egos*." So, it was easier for him "*to say 'Emily, you are the boss*'." He describes the motivations for his decision as: "*Emily was the girl who have invested most of the time, who have helped me so much, so it was also kind of a way for me to thank her and show her the respect she deserved*." He also explains why he prefers not to create any new content in his own sim before getting AmyLee's approval. Again, Curiza builds his discourse on a metaphor based on art, comparing the creation to "*painting a picture*" where "*you don't want to paint a picture and then call a new artist to paint it over*." For Xavier and Shaggy, the problem with the initial process configuration was '*having too many voices'* at the same time, trying to create and have a say in the general formation of the design. For Xavier, who is a RL-professional architect, this leads to a self-inquiry about his social identity as a builder in SL. He reflects on his condition in this new social context as *"[m]aybe I'm a professional, but my idea doesn't rule over somebody else's, because I might be professional in RL, but in SL everybody's equal*." For Shaggy, the challenge with involving too many people in collaborative design is based on their ability to produce constructive criticisms and "*motivated reasons*." He claims that the effective approach is to include people "*who wouldn't say 'oh it's great', but would say 'I like this and this and this' and 'here's why I like this work' or ' here's why I don't like it this way*'."

As seen in the comments above, PAL co-designers Xavier and Shaggy believe that having too many uncoordinated creators and styles would eventually lead the design to conflict. In PAL's design, division of tasks was mostly decided upon by individual conditions and interests of the co-designers. Specific locations and design elements were produced by each designer, such as the club interior by Xavier or the seating units by AmyLee. Therefore, there are stylistic differences in particular elements, as the final designs were evaluated by all members, and decided upon primarily by AmyLee and Curiza. In terms of organization of individual design processes of design elements and collaborative evaluation of ideas and designs, the PAL case also shows resemblances to the Metrotopia project.

The virtual worlds workshop and learning through collaborative design

The 'Communication and Design in Virtual Worlds' Workshop was organized in Roskilde University in September 2009 as a part of the bachelor track in Communication, including 15 international exchange students. The teaching language was English and all students were visiting from other European universities. Therefore, the participant profiles in this case-study show quite a variant social trajectory, which was also influential in the variety of their meaning-makings on SL. There was one common characteristic among all students: all of the fifteen students were female.

However, this was not an intentional decision, but it was conditioned by the course selection process in the international track and students' individual choices.

When the workshop began, students were divided into four teams in order to work in groups. Teams were created randomly; therefore the international students were not expected to have prior experience in working together. Furthermore, none of the students had experience in SL[4], and only two students had 3D modeling skills and a handful had gaming experience in MMORPGs. The theoretical and practical parts of the overall workshop covered these areas in general, but mainly focused on the use of SL as the educational tool. We provided continuous supervision both in the classroom and via SL during the course, and organized class sessions where the students were introduced to SL's various capabilities. A correlation between students' experiences in 3D modeling and MMORPGs and their interest in exploring content-generation capabilities was observed, whereas the number of gamers within the sampled group was not large enough to generalize. On the other hand, particular students who described themselves as incompetent in design-related tasks also showed less interest in SL's building tools, while some students mentioned that they were fascinated by the *shopping/resource collection* potentials. Therefore, there was no clear hierarchy in groups, and the divisions of tasks were usually led by their individual interests.

Power relations and division of tasks in the workshop projects

In the workshop case, divisions of tasks in four student groups were shaped by two common factors: students' personal interests in various activities and the limitations of collaboratively producing complex objects with SL's permission system. While some students found 3D content-generation capabilities interesting, others preferred to explore SL to find free content, or surf the Web for other (semiotic or material) resources. In the end, students came together at Metrotopia's sandbox/park to assemble their objects and finalize designs. Limitations due to SL's object permission system were also among major constraints in construction of their working methods. Students had major problems with linking their objects, or their objects tended to disappear or explode when they tried to modify collectively-owned assemblages. The problem was linking different objects to each other. Another common problem was selecting objects that do not belong to the assemblage of a group's design. As students discuss the problems they faced during content generation, they also mention the spatial limitations of the sandbox to accommodate all four groups. However, this issue – sizes and affordances of collaborative working spaces – is related to how and why the sandbox was constructed, and how the virtual place was appropriated to this new

[4] A few students who knew about SL had only been logged in for short times, often not engaging in content generation activities. Some students had gaming experience, but not with each other.

context[5]. On the other hand, this also brings forth another important aspect in terms of power relations that is the educating, requesting and delimiting role of me and Prof. Jensen as both the teachers and the researchers in SL. Although the groups had homogeneous internal organizations, the power dynamics between *us* and *them* were not as simple. After all, their decision making processes were monitored and guided by the requirements of the course, and their capacities to explore SL's social and material resources were bound to the limited time schedule. The students were free to develop their concepts and prepare multimodal presentations as long as they stayed true to the conceptual narrative of the fictional plot, which was written as a bridge between the superhero concept and the workshop designs. Therefore, the Workshop case-study also shows significant characteristics in terms of the design teams and their social organizations, which differentiate this case from the previous two and point out new analytical directions.

Synthesis of the analysis of social actors and power relations

To sum up, the social actors and their relations show a wide social trajectory. In all three cases, the teams consist of international groups. The social trajectories in each case include a variety of people with little or no content-generation skills to experienced builders, gamers or non-gamers, or amateur enthusiasts to professional architects. Initially, engaging in content generation activities in SL does not necessarily require particular sets of skills or resources. Downloading the SL viewer, creating and account with an avatar and logging in the VW by using the interface are the only obligatory steps one has to go through. On the other hand, experienced designers believe that that their experience contributes to their ability to find resources, as well as new solutions within SL's constraints. It is also important to note the presence of supplementing social resources for design, such as collection of freebie objects or scripts used as textual elements of certain parts of the overall design. Thus, collaborative generation of meaning potentials often involve negotiations on a variety of discursive features, styles and ideas. On the whole, diversity of social actors and their socially negotiated discourses mark this section of analysis.

All of the three projects show similarities in terms of the team structure and methods of dividing the tasks among the co-designers. In all three case studies design tasks were divided among participants and assembled into their final forms as a collaborative effort through evaluations and modifications of members. Both the Metrotopia and the PAL design teams had specific clients and chief designers, though RL professionalism was not always the major determinant in determination of positions in team hierarchy. In Metrotopia, mutually agreed positions of each participant were executed in a more structured way, and within a strict time-schedule because

[5]During the workshop, a metric grid was placed on the ground level of Sandbox in order to help students orient their avatars and objects in virtual space during content-generation.

Caitlyns's research schedule had priority. On the other hand, PAL's time schedule and division of tasks within the project were more flexible, and each participant was given more freedom to create their own working styles. Workshop students had limited time to learn and perform content-creation in SL, thus they used what was in their reach to utilize their existing collective potentials; they organized their tasks according to their individual interests and the ways in which they believed they could contribute most efficiently[6]. Their interests were also led by their prior experiences with similar software –either 3D modeling or VWs – and their capacities to employ these tools/platforms to their group activities. The three cases showed that the environment in which design activities take place affect designers' sense-makings of the affordances and limitations of the platform, and the final products of designing. At this level, the effects of professional experience with creative tools, or personal interest in digital content creation, becomes more apparent, as the co-designers begin to question the affordances and constraints in reference to their existing relevant knowledge.

7.2. The mediational means and their affordances for virtual place-making

In the second part of the analysis, the analytical focus shifts to *the mediational means,* by which collaborative design activities take place as digitally mediated social actions. Here, the analysis foregrounds the co-designers' experiences with the affordances and constraints of semiotic resources within a multiplicity of places/platforms. Here, the focus is on SL and other digital media platforms, as well as the physical places involved in the collaborative processes[7]. One purpose of this second level of analytical unit is to question the role and effects of *place semiotics* (Scollon and Scollon 2003) on the meaning-making processes, and attempt to frame *places* as *semiotic resources* for generation of ideas and new knowledge in the form of digital content. In Scollon and Scollon's terminology, *place semiotics* deals with "the meaning systems by which language is located in the material world" (2003: x). I consider places in relation to the social practices that take place within them, and describe the virtual places of SL as particular *nexus* of practice (Scollon and Scollon 2004) in which semiotic cohesion of avatar-mediated interaction depends on certain affordances and constraints of the environment. In this respect, this focus of this chapter can be framed as the analysis of the 'non-human' factors in organization of collaborative practices. My purpose in this part of the analysis is to inquire how the co-designers interpret and use these affordances and construct multimodal discourses upon various semiotic and material resources that are socially available in this convergent multimedia nexus. With the help of in-depth

[6] Naturally, this suggestion bears the assumption that students participated fully and willingly to the assignments in the course, and they were honest about their reflections in the interviews. However, it was also observed that some students were more willing to participate than others, and they have contributed more to the design than those who were hesitant.
[7] This focus will shift in the following chapter, where I will analyze the virtual places that are produced by the project members as multimodal products of design.

interviews, combined with findings from participant ethnography and design observations, the analysis on *place semiotics* focuses on a particular aspect of the collaborative design activity: I intend to discuss the role of environmental factors (i.e. platforms, interfaces, tools, resources) in making of virtual places.

Second Life as graphical user interface (GUI)

Engagement in SL requires installment and use of particular software, called the *viewer*, instead of the conventional Web browsers. The official SL viewer has been developed by California-based Linden Lab. New versions of this viewer has been released and updated multiple times since my empirical studies began. These developments in SL's viewer and contents of the world have been included as topics of discussion with participants. Therefore, I aim to frame the analysis by not only a list of the currently available affordances and constraints but also interpret the social discourses that result in their use. In figure 5.1, I review a snapshot from SL viewer version 1(.23.5), which was the default viewer until 2011, in order to illustrate how the interactive elements of the user interface are presented to users.

As seen below in the figure, SL as user interface bears a significant complexity –relatively more than modern web browsers- in terms of how options are laid out graphically, and how commands from the GUI would be translated to the virtual environment and to actions of the avatar. By using specific functions on the GUI, users are able to navigate in virtual places, interact with virtual objects and avatars, socialize with virtual communities and create new content. The layout of the graphical elements is organized to make structurally and functionally related elements closer and visually linked (detailed menus on top bar), while functional groupings (buttons, pop-up menus, chat, the virtual environment) are modally differentiated. Multimodality is apparent through not only the use of text and images but also by the purposeful organization of colors, transparency and geometric elements to signify particular functions.

Moreover, the virtual environment that is being operated through the GUI is considered as fundamentally multimodal. The users are able to experience movement and co-presence within interactive virtual environments that signify spatial experiences with images as well as audio-visual media and other modes of digital representation.

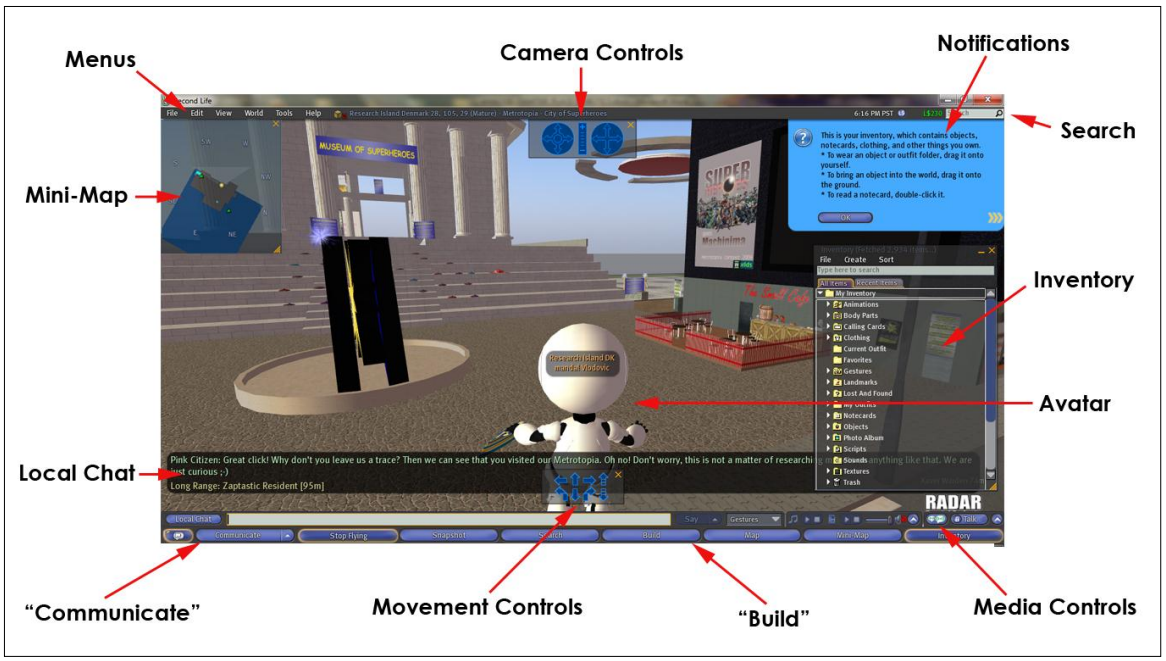


Figure 7.1. SL Viewer (version 1.23.5) Screenshot and Explanations

In general, the interface is often found too complex[8] for beginners, and the learning curve steep enough to frustrate certain users for various reasons. Caitlyn says although she probably looks "*like a newbie*" to other avatars, she doesn't really pay much attention to learning how to make advanced modifications on her avatar. For Curiza from PAL, the built-in complexity of menus and options is an essential part of a good experience, which is a deduction he makes through his gaming experience. For Curiza, "*a game you can finish within 4 hours is not a good game*"; and although he believes that he can "*only use 10 to 20 % of what you can do in there [in SL] right now*", he thinks SL shows similar qualities in terms of user experience. On the other hand, reflections on the complexity of the interface also show variations depending on their past experiences with similar software, whether it be MMORPGs, other VWs or 3D modeling software. While (ex-) gamers interpret the SL user interface with relation to their past gaming experiences, 3D software users mention the balance between complexity of the tools and freedom to create more complicated forms. For Caitlyn from the Metrotopia project, as well as for most students in the workshop groups, SL presents a considerable amount of complexity in terms of its user interface, especially in terms of detailed avatar modification and content generation options. This complexity often results in confusion and frustration.

[8] In fact, complexity of the user interface and variety of user profiles led Linden Lab to develop a *basic mode* for their latest viewer, which –among many others- can be interpreted as their attempt to communicate with a wider user-base and accommodate the socially situated needs of their users more effectively. However, the new *Basic* mode is not so meaningful for designers because it includes neither the standard content generation capabilities of SL nor detailed interaction with virtual objects and inventories. Similarly, the new browser-based system for accessing SL through the Web, *Skylight*, is also excluded for similar reasons, although PAL recently began to participate in the project.

Comparisons with game experiences and MMORPG interfaces were often made by workshop students who were also gamers. For instance, NEL from the Awesome Three group mentions how user-interface controls in World of Warcraft feel much "*intuitive*" compared to SL, especially in terms of keyboard-mouse combinations for navigation. She explains how she started typing when she was trying to move the avatar, or activating unnecessary functions because of this confusion. Although the maximum number of avatars was not felt as a limitation in workshop projects, similar technical limitations of lagging affected the workshop processes. As CEL from the *Superheroes and Supervillains* group in the workshop mentions: objects *"look like phantom, or you see half of the screen and not the other half*" and it gets slow –often impossible - to teleport. NEL from the Awesome Three group mentions how they were "*quite often stuck in objects*" or sometimes "*in a building in Metrotopia or under water. And you have to swim around to get out of there*."

Another reason for frustration, especially for the newcomers is the technical limitations such as lagging while loading sims, insufficient CPU capacity and not being able to teleport. In both Metrotopia and PAL interviews, experienced designers mention the issue of lagging as a general limitation, as the sims they design cannot accommodate more than 50-60 avatar at the same time. Curiza describes this limitation as a "*real showstopper*", mainly because it makes it impossible for him to attract the attention of professional musicians or potential sponsors (such as 'Coca Cola') for large-scale projects. SL's user interface provides users with the ability to customize their visualization settings, such as level of detail or options for media streaming, which could offer a solution to the technical limitations to a certain extent. In addition to being able to customize the interface to a certain extent –by menu options or HUDs- according to their needs, users can change the environmental settings, which allow them to customize their visual experiences by changing the level of detail in sight or shifting between day and nighttime.

As I mentioned earlier, the user interface of SL viewers are continuously being developed by Linden Lab and third parties. During the time of the interviews, the new-generation SL viewer[9] was recently launched with a number of important new capabilities, including a new GUI with Web-browser-like capabilities, new ways of searching and browsing through inworld content, and enhanced affordances for building virtual objects with HTML integration. On the other hand, this major change in their ways of interacting with SL has also been received with suspicion and some confusion. I observed that the main resistance is often not about the new constraints but about the requirement to change their old habits and adopt a new interface paradigm. For instance, Shaggy (PAL), "*changing where the menu items are and how you interact with the viewer is difficult for*

[9] I consider viewer 2 and the following versions as next-generation viewers, as their capabilities for accommodating, visualizing and functionalizing virtual content improved significantly with such features as the HMTL-embedded surfaces, imported organic models with Mesh surfaces and new organization of the GUI.

builders, because when you build a lot you have your own habits." Curiza, who describes himself as a very active networker, mentions a "*very simple little thing*" that required him to change his working methods as: "*when you work like I do in there, and you have a friend list with a few hundred people (…) And it's often maybe only 3 persons that I really need to talk to. I can't find out who are online, and when. Are they online now?"* For builders like Shaggy, AmyLee and Xavier, such conventions and habits provide a solution space for the design problems they are facing, and such changes could mean investing more time and effort into learning than into building. Use of the viewer show variations from user to user, and differences between a builder's perspective and a non-builder's perspective on the changes would depend on their specific needs and expectations from the interface. As AmyLee expresses: "*there is no SL without the viewer, the limitations of SL reflects in the viewer, that's all*."

Tools for content generation and their affordances

In order to become a content generator in SL, users have to interact with another (relatively more complicated) part of the viewer interface, which could be found under the "build" menu. Through the use of this particular interface, users of SL are allowed to design virtual objects[10] (the smallest structural unit of which is called a *prim*), apply textures and scripts to the prims, and modify objects in virtual space through either numerical entries or manual commands.

Although several other types of content generation practices exist in SL[11], a fundamental component of the building affordances is the *primitive* system. In the official SL Wiki[12] a primitive, or prim, is defined as a "*single-part object*" which is "*represented by a set of parameters, including shape/type, position, scale/size, rotation, cut, hollow, twist, shear, etc.*" Prims consist of standard three-dimensional geometric shapes, such as cube, sphere, cylinder or cone. In figure 2, pictograms of standard prims can be seen on the upper right corner, with each shape representing a particular type of prim. Similar to the overall GUI, the design interface of the viewer reflects a multimodal organization of forms and functions: textual, numerical and graphical elements are used to differentiate various forms of information. Colors and shapes of functional areas are designed to present close proximity in relation to their hierarchies. As mentioned before, prims are the primary geometric units of construction that enable the users (as designers/builders) to create simple virtual objects, which can later be transformed into complex artifacts and places through

[10] Although it is possible for any 'newbie' to begin generating content in designated places (sandboxes) and save a copy of their creations to share with others, it should also be noted that advanced level builder-ship in SL requires certain investments, such as owning a land/sim on which one's creations can be placed for others to use.
[11] Such as script and texture making, and integration of new building technologies such as sculpted prims and Mesh file imports, in addition to the default prim system. However, these other techniques were not used as a part of the design in the three projects, therefore, I discuss the co-designers' reasons for their exclusion rather than detailing their affordances.
[12] http://wiki.secondlife.com/wiki/Primitive

modification, combination and appropriation of available shapes. The building process does not only take place within the graphical field but also on the spatial field-of-vision, as seen below in the middle with the wood-textured box with building details activated. This field contains the representation of 3D virtual places and artifacts, as well as the avatars of the SL users including the co-designers'.

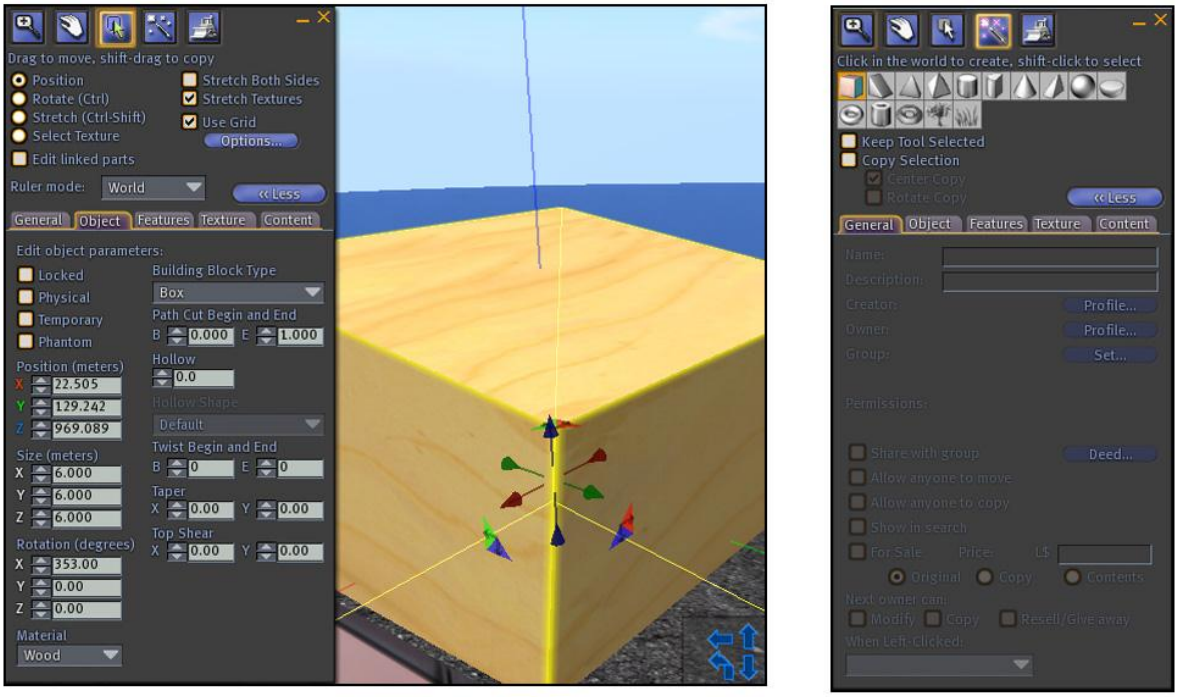


Figure 7.2. Snapshot of the "Build" tools (SLViewer 1.23.5)

Constructing meaningful artifacts through various arrangements of these primitive geometries as structural elements, images as textures on surfaces, and scripts as components for adding interactivity is also a semiotic experience. It involves inscription of rhetorical intentions into the design through the use of socially available semiotic resources. For experienced builders, learning the potentialities and limitations or the building tools expands the possible solution space, after which the hindering effects of the learning curve may be less obstructive for some co-designers. Caitlyn explains why she –as the client and primary user of Metrotopia – never found the chance and will to learn how to use the building tools (the design interface) and got frustrated by its complexity. She mentions that she "*had to stumble (her) way*" through trial-and-error, while "*figuring out things as (she) went along*." For Caitlyn, the problem is complexity of the interface and the facts that it wants her "*to know numbers and to be able to do minute controls*." For

instance, the 'prim-limit'[13] is an effective limitation; and for Aspen "*a good SL builder can create an object with very few prims, and that includes picking the right prim type*."

If the learning curve is perceived to be too steep by new coming users, this might be a major reason for frustration. For both AmyLee and Shaggy, the importance of having prior awareness of the affordances and constraints relates to the unique characteristics of user experience in this particular environment. Producing content in SL is described by AmyLee as a "*balance between complexity and ease of use*." Shaggy prefers to describe these characteristics as "*specificities*" of SL rather than affordances or limitations, as he does not believe "*there could be any creation without constraints*." Instead of fighting against these specificities, Shaggy thinks that designers should "*understand those constraints" and use them properly in their creations."* Following this logic, he describes the practical limitations caused by economic use of prims and textures among these specificities[14], which significantly shaped the way PAL was designed. AmyLee mentions that the way to overcome the challenges of these specificities is to learn specific "*tricks*", the knowledge of which is usually gained by experience, training and collaboration. For AmyLee, an important constraint in PAL's design was "*having areas where you could create separate streams*", which they used "*as an opportunity to make some colored areas*." Similar to Shaggy, AmyLee also believes "*if you have only freedom, you don't create*", thus the specificities are important.

In the PAL case, (co-)designers often reflect on how particular content-generation capabilities lead to particular design decisions. For instance, Curiza mentions how the generated the initial PAL concept when he became aware of the possibility of dividing sims into parcels to stream different media, Xavier describes how he designed the first version of PAL by experimenting with prim types and options, and AmyLee explains how the 600+ cubes that construct PAL were required to consist of a minimum number of textures to make the sim accessible for slower computers. These textures were created by Xavier in Adobe Photoshop, and imported to SL to be applied on surfaces of prims. The consideration of prims as primitive geometric shapes to construct complex forms leads (co-)designers to think in terms geometries such as cubes, spheres or cylinders, and generate forms that are possible and feasible to create by using the affordances and constraints of prims as structural elements. Xavier explains his views on how designs in general "*tend to be more geometric*" as designers tend to "*think in prims*" and how to "*break it down to geometric forms*" because "*you just know that that'll work in SL*." In most cases, designers' views on potential affordances and constraints become effective from early stages of design process. In others, experimentation and improvisation guides the organization of semiotic and material resources. For

[13] Limit of maximum number of prims allowed on a sim.
[14] The co- designers often choose to economize the prims and textures for two reasons: (1) SL's internal limitations of the maximum number of prims that is allowed on a sim, (2) allowing sims to be rezzed (visualized) quickly in visitors' screens and not overloading their computers.

Shaggy, who recommends designers to "*understand those constraints and how you can use them; not fight against them but live with them*", several constraints shaped the overall design, including the maximum number of prims ('prim-limit'), and requirements to produce a "*fast rez-ing*" place with few textures and simple objects.

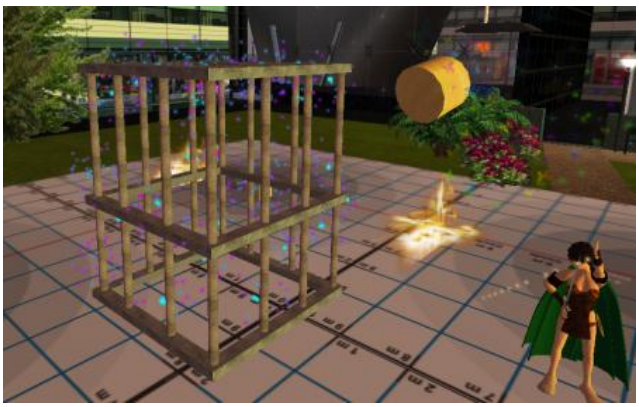
Unlike Shaggy or Curiza, Xavier has professional experience with game-design and necessary competences with the game creation tools such as Unity and Unreal engines. He mentions how his professional team asked the question '*Can you make a real computer game in SL?*' and found out that it was not as easy. As to Xavier, one of the main differences between creating a game in SL than in other specialized software is the limitation of changing, modifying and affecting other people's avatars and possessions, and adding satisfactory interactive affordances to the designed places/artifacts. On the other hand, the pros of SL for Xavier are the ability to work and build together, and being able to use the world's socio-cultural resources as semiotic resources in design processes.

As professional users cannot find their tools, or use them the way they are used to, and get frustrated. On the other hand, builders also feel frustrated when they feel like they do not have the necessary knowledge and skills to keep up with the pace of technological advances; they seem to develop a sense of resistance to change and improvement. In the case of PAL, both Shaggy and AmyLee comment on the effect of limitations of participation in relation to technological development of SL's infrastructure (such as introduction of sculpted prims) and their social consequences (such as less venues and chance for amateurs to create and compete). AmyLee claims that "*SL shows a lot of examples where amateurs are more creative than established professionals*" and this is why she wishes "*things would stay like this*." For Shaggy, "*if the creation process becomes technically more difficult, it would be more difficult for newcomers to build*." Finally, he undecidedly adds: "*If I was coming to SL now, maybe I wouldn't start building because it would all appear so complex*."

For the workshop students, the initial solution spaces and potential resources depended on the structure of supervision, as they lacked the necessary first-hand experience. Within the progression of the course, students had the chance to learn the tools and try to develop techniques for more effective processes, whereas they still needed frequent support. For the students, a major challenge in the building process was to create a desired shape that they have sketched, imagined or found before with prims in 3D space. Students often conformed to *the next best thing*, by appropriating their designs to what was conceived as possible by resources accessible/usable by them.

Students who had little or no experiences with SL's controls for navigating the avatar and the camera mentioned how their content creation activities were hindered by their inability to properly

arrange their fields of view and match the objects in virtual space. The two snapshots below are taken from one of the collaborative design sessions of the student group in SL, where it is visible how the students designed the two pieces together, which they later tried to combine in a specific way and failed. The problem was controlling the orientation of the avatar, the camera and the object of design within the virtual space in perspective view, which is the default way of viewing SL[15].




Figures 7.3. and 7.4. Snapshots from the design process of "Superheroes and Supervillains" group in Metrotopia's Sandbox

In sum, the difference in sense-makings can be related to the differences in the co-designers' conditions of engaging and their personal reflections on the "complexity vs. freedom to create" issue. SL presents default tools and resources to every content designer, whether they are inworld professionals or amateur enthusiasts. Therefore, although the experienced designers may often find the complexity low and creative potentials limited, amateur (or pro-am) designers can see many affordances that they cannot find in other platforms. These differences are apparent in the different responses to the affordances and constraints of the prim system as a resource. Therefore, it is important to consider not only the characteristics of the tools and interfaces for design, but also their use as semiotic and material resources.

Semiotic and Material Resources

In Metrotopia's design, several virtual objects were collected and re-used within the city. The resources that were collected collaboratively by participants include material resources such as textures, designed objects and scripts, semiotic resources such as exemplary images and videos. These resources were gathered from various platforms, including several locations inside SL, online texture libraries, Internet search engines and archives on superheroes. Aspen mentions how

[15] Unlike professional 3D modeling software, which usually divide the modeling screen into 4 points of top, front, side and perspective views, SL facilitates camera angles only in perspective view.

he often used the Internet for "*finding similar buildings, and get some inspiration about how a RL building of this type was created*." Caitlyn explains how she used online resources to collect Superhero pictures to show at the museum. Internet was also used to facilitate asynchronous communication (i.e. email) and file transfer. For larger files, flash-drives were used to exchange files in face-to-face meetings.

Especially in the Metrotopia project, the semiotic potentials of transmedia resources (i.e. movies, comic books, computer games) significantly shaped the team's collective meaning-makings. In fact, a considerable amount of design-related discussions were on the appropriation of these transmedia resources into the designed places in SL, such as translating the visual/graphical characteristics of comic books into 3D virtual environments and avatars. Caitlyn explains how she was able to find "*movies that are superhero movies*", and "*video games that are superhero games*", in addition to the MMORPG which was the "*only one real superhero MMORPG*" at the time. For her and the design team, the question was "*what to do in SL*?" Caitlyn and the design team found various semiotic and material resources to replicate (or in some cases appropriate) the genre conventions, and the overall semiosis of visual and interactive elements was based on consistence with the aforementioned media categories.

PAL's initial ideation process was also the result of similar transmedia logic to Caitlyn's reasoning for building in SL in relation to other platforms. Co-designers have evaluated various possible media platforms and their affordances and constraints and developed concepts based on their interpretations. For instance, the modular toy system LEGOs was an inspiration in initial design prototype of PAL. The co-designers said they even generated some concepts on it, but never followed through.

Another discussion is the comparison of processes of appropriating materials from existing (inworld or online) resource libraries and/or creating objects from scratch. Although resource-collecting (or re-use of existing resources) may have the potential for the co-designers to save significant amounts of time, the existing resource libraries in SL were often found disorganized, complicated and inaccessible due to inefficacy. Design of Metrotopia contains a wide variety of freebies and purchased items that were mostly collected by Aspen. Aspen refers to the recurrent use of inworld resources as an important part of Metrotopia's design. Furthermore, the variety of resources that were used in construction of Metrotopia wasn't limited only to artifacts, but included scripts, textures, interactive components and pose-balls for animating the visitors' avatars in certain body poses imitating Superheroes.

Figure 7.5. (left) Snapshot of the ship and other freebie models in Metrotopia harbor

Figure 7.6. (right) Snapshot of my avatar posing with the freebie poses, holding a light saber collected from the Fight Club/Dojo in Metrotopia

Although PAL includes some elements that are appropriated, the co-designers describe the overall design as one-of-a-kind. AmyLee also mentions how she "*tweak*[s] *some open source scripts*" although she is not a programmer herself. Tweaking, or appropriating and re-using, is also a method she uses for applying textures that are found online, as "*usually you need to rework them. at least, resize and clean.*" In the second interview, she also mentions how certain objects have been "*carried over from previous designs*." On the other hand, the co-designers of PAL and workshop students had more in common about their complaints on issue of not being able to find desired resources and/or having to spend much time trying to find what they are looking for in improperly organized freebie stores. In both cases, the co-designers often mentioned how finding freebies that work –and work the way the designers want it to do – requires effort and time investment, especially with freebies. In some cases, the challenge of collecting inworld resources is not the lack of content; but, on the contrary, it is the abundance and disorderly presentation and archiving of accessible resources, and inefficacy of the tools for browsing/searching them.

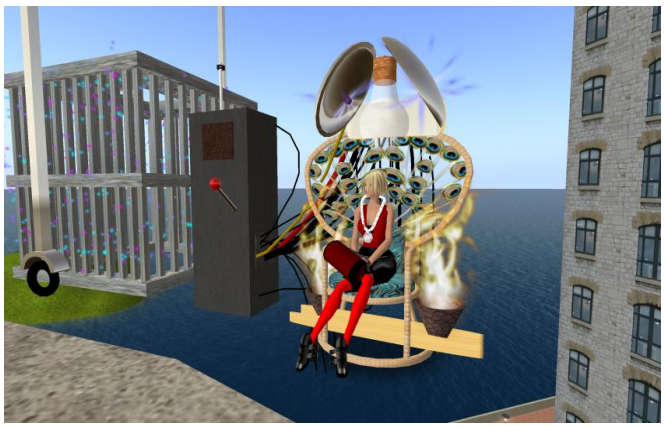


Figure 7.7. (left) The chair with feathers, purchased and used by Superheroes & Supervillains group

Figure 7.8. (right) Batman costume purchased and appropriated to female heroes in Metrotopia

The variety of comments from the workshop interviews illustrate the variety of experiences in which students found meaningful to engage in SL's social world, and emphasize certain activities including shopping, building or avatar customization. While some of the groups tried collecting and reassembling objects from within SL, others decided to generate the digital content from scratch by using prims. Therefore, some students found shopping for freebies and sold items affordable and fun, and others preferred to work with the building tools while transferring the resource-collection tasks to team-mates. Another common attitude can be summarized as the '*we couldn't find it so we made it ourselves*' approach, in which the students tried to find the resources they need but could not succeed to find satisfying ones so they changed their strategies during the process. As explained above, similar strategies were also developed by the co-designers of the Metrotopia and PAL projects, as they all include both collected and internally-generated design elements. During the workshop, most students felt more competent in designing and clothing their avatars then finding and using resources for building. For the students, transmedia resources were often helpful in collecting visual inspirations on their characters from various online resources, such as Google Image Search or Wikipedia. In the focus groups, use of inworld resources was a much discussed topic. Most students found the inworld archives (resource libraries, freebies collections and shops) not very user friendly, and/or too costly. Similar to content creation, finding resources becomes harder when students search for specific objects, whereas it is considered as relatively easier and more fun when students were free to explore and try out things. As most students did not prefer to use their credit cards and buy Linden currency to be able to make inworld exchange, they were encouraged to explore the free resources and learn about the cultural complexities of SL by traveling outside Metrotopia and socialize with others. Although each group was given a small amount of initiation money (in Linden currency) some student groups preferred to spend more on virtual goods and resources, while others chose not to spend any more and work with the internally available resources. One particular issue was particularly stressed out and recurrently mentioned by the students; that is the confusion caused by the improper storage and presentation of free resources (freebies).

To sum up, use of semiotic and material resources in the three case studies reflect the multimodal logic, as well as the transmedia patterns that often cover a variety of media platforms. The co-designers use SL's internal resources in addition to several other types of online resource collections, including texture archives, image-banks, and social media platforms. Resources also vary in terms of type and content: as some resources can only provide inspiration, others can be used as design elements (i.e. textures, scripts) or they can be appropriated into the overall project as fully-functional artifacts (i.e. freebies, pose-balls, furniture). In general, resources are

appropriated (and often modified[16]) to fit the requirements of the design task, whereas the co-designers also often choose to create objects from scratch with default resources (i.e. prims), which provide a wider semiotic solution space to generate complex forms from primitive structures. Prims impeccably illustrate the socio-semiotic thesis: meaning potentials of these primitive semiotic resources are conditioned by their contexts of use, through which the co-designers produce new places and artifacts as multimodal sign-systems.

Official and third party viewers

As mentioned above, usability of the SL viewer and the affordances of the GUI are rather controversial topics. Most experienced builders, especially the PAL team, have been using third party viewer software for their particular affordances, in addition to the official viewer. For instance, Xavier's viewer preferences clearly represent his context-specific needs and expectations from the user interface. For Xavier, viewers are interchangeable due to the differences in their affordances and constraints for the specified type of interaction: he uses one viewer to reduce lag in crowded places, and another one when he is building. Among the most popular of third party software, *Emerald* was specifically targeting builders with a set affordances, such as the group labels on object, auto-return, double-click teleport. During the time that I have been conducting the interviews, Emerald was discontinued and it is no longer available. Ironically, before it was termination, AmyLee explained how useful these are for content-generators, and added: "*I just hope there will still be alternative viewers like Emerald still on!"* For Curiza, however, using third party viewers bears certain risks, the most important of which is the (potential) breach of privacy. He also adds how experience and social capital is an important factor in trust and privacy issues; he has been in the world long enough to developers of some third party viewers (Phoenix and Emerald), thus trust is not an issue in these cases. Another reason why Curiza prefers not to use the third party versions of the viewer software and sticks with the official releases is to have the ability to communicate and interact with newcomers, people who do not use the alternative viewers. A similar problem has also occurred during the transformation of the default viewer from version 1 to 2, which has certain capabilities (such as HTML embedding on prims) that could be viewed only if the user is accessing the world via the new (official) viewer. His choice of the viewer also reflects the interpersonal aspects of his interaction with SL. In Curiza' view the "*spirit*" that was carried on from the early days of SL was to "*help each other*", and that he wouldn't be able to help new people learn if he does not see what they see. Curiza' comment is important in this respect, because it provides clues about how the use of technology is not only predicated upon the

[16] The permission system in SL allows the first creator of virtual objects to control the modification, copy and transfer options of the object.

technological developments but also their social and cultural reflections in practices of communication.

Media convergence and collaborative design practices

Throughout their collaborations, the co-designers often use SL as a part of the larger digital media landscape, and they reflect on experiences with several other platforms in comparison with the affordances and constraints provided by SL. This overarching media landscape covers a number of different platforms/tools, including Web-based interfaces and social media, other VW platforms, several other digital content-generation tools, games and game-design software, and future/prospective uses of the technology as reflected on by the co-designers.

The co-designers mention a variety of online platforms, including social VWs with or without user-generation of content and MMORPGs, mainly depending on their interests and expectations about the affordances/constraints of SL. The selection of SL among the various possible three-dimensional VW platforms can have both practical and personal reasons. For instance, in both the Metrotopia and the PAL cases SL is mentioned to be the only alternative for some of their purposes such as being able to create virtual environments and controlling the flow of visitors and content within the designed places. Caitlyn mentions several other VW platforms (including Twinity, WoW, Habboo, Small Worlds) in comparison to SL, and concludes that SL is *"still the most flexible in terms of design."* These worlds generally afford *customization*, although collaborative content generation in SL requires complex interactions and processes. For Caitlyn, the innovative potential of SL lies in its ability to "*introduc[e] new experiences, (…) new ways of doing things, new ways of thinking about things*." In her point of view, similar to Curiza' and Xavier's (PAL) ideas, the future of VWs is more segmented and specialized for the needs of prospective users, such as military, health or education. In her vision of this segregated functionalities and differentiated contexts of use, Caitlyn also mentions the aspect of interoperability[17]. For her, interoperability among commercial VW platforms is not likely to happen, as platform developers have more incentives to keep their copyrighted assets in protection, and would not allow their users/customers to re-use and/or remix the content that was generated in one world to be used in another. Since Caitlyn's vision is based on the commercial Web paradigm, she also finds the potentials and possibilities of open-source software development and the growing amount of sharing and remixing practices online relevant to her research.

[17] Transfer of avatars and assets from one platform to another

In terms of the supporting content-creation software, it is possible to distinguish 3D modeling tools and 2D image-editing software[18]. The perceived affordances and constraints of these tools are among the primary reasons why the co-designers explore outside SL's default tools. A popular 3D modeling tool, which is often used to create sculpted prims SL designers, is a game-design software called Blender, which was developed by an independent Dutch group called Blender Development Fund. Compared to SL Blender has many additional functionalities and affordances, the learning of which requires builders to practice, experiment and build objects that could be imported to SL. I will discuss these various methods and practices of making multimodal arrangements by the combinations of 3D objects, images as textures, and scripts as interactive components in detail within the following sections on design processes and multimodal semiotics in virtual places.

For the PAL team, the virtual world of SL means not only a place for collaborative working but it is also where they have met each other, had friendships and personal interactions. For Curiza, spending time in SL is essentially not very different form his time spent in other social media platforms, socializing while listening to music in a 3D environment can offer similar, or more advanced, affordances for such navigations. He says he is "*logged in to SL as (he is) logged into Facebook, or (...) Skype."* In Curiza's (PAL) vision, SL's real potentials lie in its integration with the Internet for "*connecting both worlds" and finding new* ways to access, use and share designs with wider audiences. He mentions how he has been talking to various artists in SL, and persuading them to the potentials of expanding their 3D works to the social media audiences. *Shaggy* mentions two other examples in his comparison: *Google Docs*, which is an online collaborative document editing tool, and *Microsoft Office*, which a document editor for individual working and not online collaboration. For Shaggy, SL is very useful in collaborative design as it allows designers "*to see the changes as they're done*", which is only recently developing in most online technologies. *Shaggy*, who suggested the notion of "*specificities*" for creation of user experience in virtual environments, technological developments have the potential to chance some of these specificities and change the way how SL looks in general. With the introduction of Mesh imports, for instance, Shaggy believes that "*creators will have much more freedom for shapes. And THAT might change a lot how SL looks like*."

In the Workshop case, several students had experience with video games and MMORPGs, which also enabled them to reflect on the similarities and differences of SL with the particular game technologies. Comparisons with MMORPGs, gaming experiences and game-design in relation to interfaces and virtual places of SL were common topics of discussion. For instance, in Venus and

[18] These external software include 3D Studio MAX, Rhinoceros, Blender, Sculpted Studio as 3D modeling software; Adobe Photoshop and Illustrator, MS Paint etc as 2D graphics software; and Sculpted Studio as inworld sculpted prim generation software. Especially with the introduction of Mesh-imports into SL's grid, the role and importance of external content-generation software became much more relevant

the four Moons group, a few members had knowledge of and experience with The SIMS, an interactive game-like social world where avatars and their homes can be customized and social relations can be established. In a discussion between the *Venus and the four Moons* group interview, students argued why SL is not a game like SIMS, and how come it is not as interesting as online social media platforms such Facebook. For RUT from the group, SL is not a game because "*you can create something on your own*", while she also mentions simpler avatar-creation options in games such as SIMS. For AGN and RUT, the importance of freedom to create is to provide a chance to be '*unique*' and '*different*'. However, for some of the workshop students, SL was indeed a '*boring*' place where they could not see the point of presence and participation, and were not open to socializing with RL characters concealed behind avatars as anonymous representations. In another discussion between *Superheroes and Supervillains* group, students argued how come SL feels '*boring*', and MAJ explained how she felt about SL in a frequently mentioned way: "*It's not boring when we had something to do, when we meet, when we have to do stuff*." For most students, a significant challenge was not being able to socialize with people in ways that they are used to doing online. What was visible in the group discussions is that students' experiences with other digital media platforms, with which they have more familiarity, affect their experiences, and often lead them to compare the two platforms in relation to their media practices. Students also often compare SL to Facebook and other popular social media. RUT comments on importance of social networking as: "*If you have lot of friends, like a broad social network in SL, then you'll get back to SL. You have new friends. For new friends that you can only see in SL, maybe you'll come back again.*" Whereas some students comment on the lack of real-world information on avatar profiles.

In SL, more often than not, user are represented only by their avatars' visual characteristics and their profile pages which lists their interests, groups and favorite locations, but not necessarily their RL identities, if at all. On the other hand, the co-designers of the other two other projects were more successful at tapping the social environment as a resource, such as the hiring of outsourced builders in SL or the way PAL design team met in SL only through their inworld identities. The efficient use of inworld knowledge resources and the integration of other external resources to SL depend heavily on the co-designers' intentions, motivations, as well as their socio-technical capabilities in SL. This perspective links the prior sections of analysis to the next section, where such personal and cultural differences and/or similarities reflected on the analysis of the collaborative design processes, and the practices of the co-designers, in which they use these platforms for their specific purposes.

Synthesis of the mediational means and places of collaboration

When users download and log into SL's user interface for accessing the VW and acting in it, users engage in a complex interaction with a particular type of software and a network of user-generated virtual places. Being introduced to SL, a new user (now 'resident') first needs to learn how to use the GUI[19] to create and use an avatar, in order to navigate in virtual places and interact with the world. Therefore, learning how to modify and operate an avatar is a useful introduction to learning how to use SL. The capabilities of the avatar (combined with other objects in the spatial representation and the GUI) reflect the affordances and constraints of user interaction in SL.

On the other hand, the co- designers often bring their prior knowledge and experience on various other digital tools. During the participant observations and interviews with the co-designers, one recurring topic for analysis was the use of supplementary software and/or platforms to conduct the individual and collaborative tasks. Therefore, I aimed to explore and discuss the need for using multiple platforms to support the collaborative design work, to see which platforms are preferred during the process, and for what reasons. The commonly discussed issues were the use of official and third party SL viewers, 3D modeling and image-editing software, and other platforms the Internet, which the co-designers found helpful at times.

As outlined in the previous section, the participants of the three case-studies show a significant variety in terms of their conditions and motivations for engaging in SL and participating in collaborative design activities. Therefore, it is possible to argue that possible similarities and differences in participants' semiotic experiences are due to their *habitus*, and their interests in participation. The participants' interpretations of the physical and/or virtual places they inhabit have a semiotic effect on the ways in which these places are perceived as affording and/or constraining their motivated collaborative design practices. This relation between the co-designers' interpretations and their design ideas is noticeable in cases such as Metrotopia or PAL, where the co-designers aim to build larger-scale regions that are filled with networks of interconnected virtual places.

Another significant factor that shapes the co-designers' ideas is their opinions of the general inworld aesthetic norms, or what they would describe as "*SL-like*." Whether as a way of conforming to the SL's common semiotic norms of representation and production[20], or as resistance against the norms in order to draw a unique path for semiotization, the co-designers use SL as a semiotic

[19] Graphical User Interface
[20] The world has been reviewed, and often criticized, as to having a too-American outlook, with its sunny beaches, clubs and ideally-shaped avatars that collectively gave way to a particular form of inworld aesthetics. For Xavier, who describes his first reaction to SL as being "*provoked by the very American layout*", the first objective was to "*make something that was in contrast to that*."

resource for inspiration. Such interpretations of the nature of the virtual evidently affects the ways in which the co-designers make their semiotic choices and arrange the multimodal sign systems within their collaborative designs. The semiotic translations between the *grounded* and *virtual realities* take place on two levels: either through the re-semiotization of codes of *realism* into the virtual environment or by emphasizing *virtuality* and freedom from the constraints of RL. In either case, the selection of *what will be used as a code* and *how the semiotic resources will be assembled into sign systems to signify messages* is up to the co-designers' individual and collective conceptualizations of what *reality* and *virtuality* means within the context of SL.

7.3. The collaborative design processes

Following the analysis of the social actors and mediational means, this section presents findings on the mediated practices of the co-designers within the collaborative design processes. In this section, I investigate how the social interactions in collaborative design practices are performed, and how the processes of collaborative idea and content production are organized in different social contexts in SL.

The purpose of analyzing the social orders of collaborative design projects results from the *nexus analysis* perspective that aims to consider social conditions in which social actions take place. Drawing on the methodological principles of mediated discourse analysis (MDA) (i.e. Scollon and Scollon 2003, 2004, Norris and Jones 2005), I consider collaborative design in SL as 'nexus of practice', at which "historical trajectories of people, places, discourses, ideas, and objects come together to enable some action which in itself alters those historical trajectories in some way as those trajectories emanate from this moment of social action" (Scollon and Scollon 2004: viii). Following this logic, in this chapter I focus on these various social trajectories by framing SL as a network of virtual places, and by consulting the co-designers' reflections on their experiences with SL's affordances and constraints as semiotic and material resources.

The first part of this section illustrates how collaborative projects are organized in virtual places by the use of SL's affordances for interacting with others and co-producing new content, mainly the role of avatars as personal spatial mediators. Then, I continue the discussion of findings with the notion of interconnectedness of the virtual places on a visual grid, and expand the focus from place-making to world-making as co-production of networked instances (Bartle 2008). The discussions in this part also refer to the earlier theoretical arguments about the similarities and differences between three-dimensional VWs and the graphical spaces of the Internet. Finally, the analysis in this chapter ends with the discussions on the organization of collaborative practices in time and space, by which I emphasize the notions of 'chronotope' and 'heterochrony' as

constituents of the nexus analysis. Here I analyze the ways in which the co-designers in different cases execute different stages of the overall co-design project, organize their actions in real and virtual spaces either synchronously or asynchronously. The conclusion to this section also serves the function as an analytical bridge to the following chapter, where I will discuss findings of the multimodal analysis of virtual places and artifacts that are co-designed and co-produced as a result of these collaborative practices.

Second Life as place, and avatars as spatial mediators

Two significant visual semiotic functions of avatar-mediated presence in virtual were observed within collaborative design: (1) providing users with a visual representation of their interests in participating in the world (interpersonal function), and (2) providing visual information about the sizes, scales, positions and actions of the actors in relation to each other and the virtual space (experiential function). The experiential function of avatars is related to their role in occupying a definite volume of the representational space and being able to change positions/locations with relation to other objects and the space itself. This way, SL affords a particular type of visual reference, in which visual characteristics of participants matter because of their respective positions in 3D virtual space and their interactions with objects and/or avatars that occupy the space. Importance of the interpersonal functions of avatars in shaping the user experience was mostly a topic of discussion with inexperienced users, whereas experienced designers mention generally on the experiential functions of avatars during the content generation process.

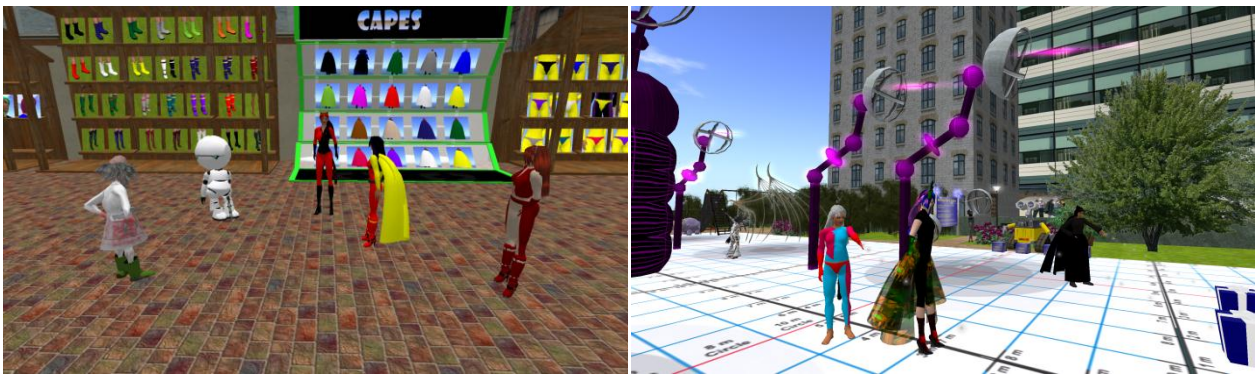


Figure 7.9. (left) Metrotopia design team and other members in an inworld meeting
Figure 7.10. (right) A group of workshop students using Metrotopia Sandbox for building

In a typical inworld meeting during the Metrotopia project, as illustrated in Figure 9, participants meet in virtual places for collaborative working and use their avatars to travel (walk and/or fly) around the objects of design. They discuss the ideas and comments on each other's' work by using several channels of communication, including text and voice. The snapshot above is taken from an

inworld discussion about the costume bazaar design[21]. Often times, these inworld meetings function as an idea sharing, testing and evaluation platform for the co-designers' works (to be assembled into the overall design of the sim), while in other cases the co- designers meet to create and modify virtual objects together. In all cases, the visual semiotic function of having avatars in designed places is also mentioned as helpful in presentation, testing and discussion of designs.

As I previously mentioned, SL's constraints on collective ownership of virtual objects, and collaborative modification of collectively made assemblages, result in particular forms of task division among design teams. In the Metrotopia case, all objects were transferred to Aspen before he placed them into the city, after which he transferred ownership to the research group. During the resource collection phases, avatars often spent their times separated from each other. Real-time collaboration was also used for evaluating, modifying and testing designs. Collaboration is facilitated by various modalities, including text and voice chat, local, group or personal messaging, avatar positions and actions in virtual space and object exchange between inventories.

The co-designers of PAL also mention the affordances for real-time collaboration and content generation by using avatars in shared places. Shaggy claims what differentiates SL from other graphical interfaces for digital content creation is being able to "*feel like you are inside the universe*" and being able to represent visual presence as the way one wishes. He compares his collaborative experience in SL to Microsoft Office, and claims that the real difference is "*that you really live inside the thing you're creating*." For Xavier (PAL), importance of avatars in design process results from their roles as visual referents: avatars "*make the scale*", thus "*you can actually walk around your building*." Xavier's emphasis on the role and importance of having a visual reference to body scales may have been led by his professional background as an architect. His experience with large-scale constructions requires knowledge of human body and its relations to the physical environment as an essential component of the design process and a semiotic resource. Although it is possible to model human-like objects located within the design and take renderings (stills or animations) for presentation in some "*professional tools*" that Xavier mentions (i.e. 3D Studio MAX, AutoCAD and Rhinoceros), some others afford creation of interactive virtual environments (game engines such as Unity and Unreal). However, neither types of creative 3D software afford multiple avatars to be present during the design process, as they are essentially 3D modeling (or world-creation) software interfaces and not VWs or CVEs. In PAL, the central design concept is based on the navigation of avatars within the virtual space that presents music-listening as multimodal experience. During our interview, Curiza explains how he generated the initial idea

[21] Avatars from left to right: the chief designer of the project Aspen, me as the observer and part of the design team, Caitlyn, the project manager of the research team who also chairs the discussion and Öykü, research assistant who controls the camera that is recorded for analysis.

in his virtual home, imagining how he could have different types of music in different rooms. According to Curiza, he came up with this particular type of avatar interaction by when he realized SL's affordances to "*sub-divide the land*" and "*put up various music into the land*."

In terms of the actual content-generation process, the presence of avatars may or may not come in handy, depending of the context of situation. For instance, Aspen from Metrotopia project mentions that he doesn't even move or use his avatar during most of the content generation process and uses the camera-view options to travel around his object. Similarly, AmyLee (PAL) mentions the idle situation of her avatar while she is thinking about design outside SL as a reason for her preference to work alone, without intruders who expect interaction. In these situations, the "in-camera" experience of presence dominates the user interaction where the user's view is not limited or obstructed by the avatar, but by the translation of mouse and keyboard actions to camera movements. In both cases, the preference of working alone and collaborating for specific aspects of the process significantly shapes the ways in which the co-designers organize the synchronicity of their tasks.

Figure 7.11. (left) Avatar "Isis" from Venus and the Four Moons group (image from workshop blog)
Figure 7.12. (right) Superhero avatars and villain character "Wasting Man" from Water Avengers group (image from workshop blog)

For the Workshop students, avatar creation and their integration with the narrative of the overall design was a pre-requisite, therefore they had to learn the customization interface and search for inworld avatar-creation resources. The image on the left (Figure 4) shows a close-up image of Isis, one of the goddesses designed by Venus and the Four Moons group, with the intention of signifying a particular narrative and building a visual representation of their character. As seen below, the design of Isis and its certain visual characteristics (name, colors, body features, etc) are appropriated and meaningfully embedded into their story, which relates their discourse to their final design. According to the students: *"[t]he name Isis has a particular meaning"* which

"*reminds the sounding of the word 'ice'*" and signifies her superpower to "stop the circulation of blood and to change it into an ice[22]. The Water Avengers group, locate their narratives within a similar story, focusing on another signifier. Instead of ice and cold, the color blue signifies water for these characters, through which they appropriated semiotic resources to emphasize water pollution within their overall design: According to their story: *"[a]round 2030, the drinkable water was becoming very rare. Being able to drink polluted water, Wasting Man started to pollute water to keep it for himself*[23].

During the workshop, Metrotopia's sandbox was used as a common place for building together, in which students can walk and fly around the virtual objects they create in a confined space shared with other avatars. Confinement in a limited amount of space, especially at times when there is an abundance of avatars using the same sandbox was mentioned as a constraint by the students. However, this constraint was resulted by the workshop's inherent limitations of virtual place, as it is possible (and necessary) to provide enough space for building in multi-user places.

Co-designing connected virtual places on the Second Life Grid

In small design teams, collaborative design activities often take place in shared places. However, navigation in SL does not only take place by moving the avatar from one location to another by walking and/or flying in virtual space[24]. Movement between *sims* is often done by teleportation, which is usually sequential to searching and locating on the world-map. This map is an interactive and a customizable graphical representation of SL's Grid, the world in which all the other virtual places exist interconnected to each other via Linden Lab servers in California . The world map not only allows customization to an extent that shows places, people and events for users to browse through and teleport directly to, but also has an indexical function to represent world's overall grid, respective locations and scales/sizes of independent sims on it, detailed coordinates of the sims and social factors such as current population. Unlike the websites that constitute the WWW through hyperlinks, places of Second Life have spatial relations among each other and within the grid, which enables an avatar to travel from one sim to another without using a teleport link. The map important in the sense that it shows these spatial relations and allows users to have an overall view of the world's capacity to accommodate new places for social interaction.

[22] http://sisseruc09.wordpress.com/2009/09/25/goddess-isis-venus/
[23] http://sisseruc09.wordpress.com/2009/09/25/the-true-story-about-wateravengers/
[24] This particular form of movement will also be a topic of discussion in the following chapter.

Figure 7.13. SL 'World Map' screenshot (Metrotopia and surroundings)

The figure above shows Metrotopia on the grid. The northern side of Metrotopia faces two other sims, which were created for Aspen for different reasons. When Aspen describes organization of Metrotopia's design features, he mentions how "*Metrotopia is not alone in the universe*" and "*they have neighbors.*" The visual goal was to "*draw a line between Metrotopia and the neighbors*" which made the design team to find solutions in order to keep Caitlyn's research participants inside the city.

Shaggy (PAL) also mentions a similar issue of 'not having neighbors' as an opportunity to design freely in an open space, without visual or social obstruction. In fact, both Shaggy and Xavier from the PAL design team reflect on the issue of environment's role in shaping the overall idea and structure of design, though the two co- designers emphasize two different (but interrelated) aspects of affordances. For Shaggy, the surrounding environmental elements such as water or ground are also possible resources that could be used to add metaphorical realism and aesthetic quality. He says he did not use SL's terra-formed ground as a design element but "*water is something that really looks good in SL*", thus PAL's design includes some open locations in the sim to see the water, a beach, and a stage which is separated from the audience by water. On the other hand, Xavier compares his experiences with designing buildings in real-life (RL[25]) and mentions a canonical concept on phenomenology of architecture: "*Genius Loci*" (by quoting Norberg-Schulz 1980) to describe how building architectural places in SL has a different set of environmental contexts than the location-sensitive logic of RL architecture. Xavier mentions how he began to" *think like a traditional architect*" at first, and then how ideas changed when he realized that "*all kinds of normal stuff you use as an architect*" such as gravity and scale do not apply VWs.

[25] I use the abbreviation *RL* to refer to the so-called *real-life,* in contrast to SL, which is the Second Life. Although it is a very vague distinction, I choose to include this term as it is a common notion among the designers and other residents of SL.

Although Shaggy's perspective above focuses on semiotic appropriation of the real-world affordances for design of the virtual place, Xavier's architecturally-inspired assessment of Genius Loci emphasizes the opposite dimension, namely the absence of the physical environment. According to Xavier, the Genius Loci approach is "*not possible in SL [b]ecause if you have a sim, and it's an island, you have nothing (…) to relate to*." Therefore the major question for Xavier is"*how to develop an idea without the Genius Loci way to approach?"* through which it is possible to" *develop other ways to approach architecture."*

In terms of the comparison between real and virtual worlds, Xavier's comments are more professionally-oriented, as he mentions how he thought "*I can't really use my knowledge about architecture in SL, I have to start all over*." He emphasizes the lack of gravity, and the disappearance of the need for building traditional architecture structures such as pillars, roofs or walls. Concerning design in this new environment, Xavier asks a critical question: "*why are you building at all?" if "traditional reason for building is not there.*" According to him, this logic shaped the aesthetics of PAL's earlier visual design, and led him to build more abstract forms. Characteristically, Xavier and Curiza's comments on translations between SL and RL practices clearly reflect their professional opinions and previous experiences. Xavier's ideation of SL reflects a space of possibilities. For Xavier, such translations are sometimes hard to get used to, as they mean a mental overcoming of his prior education in architecture. Whereas certain environmental factors that would affect RL designs (such as gravity and other physical constraints) are not applicable in SL, therefore designers are not obliged to think in terms of RL constraints. Xavier's question refers to a blurring of semiotic frameworks, in which applicability and transduction of codes derived from one realm begins conflicting with the context of situation of the virtual realm.

Selection of the style and genre characteristics for Metrotopia and workshop projects are based on pre-determined visual characteristics of the superhero genre, some of which will be discussed in the multimodal analysis in Chapter 8. For PAL, however, providing a specific type of experience that is characteristic for virtual environments was in the project description from the very beginning. For AmyLee , who describes the overall design of PAL as "*SL-like*", the distinction between conceptions of these two dimensions is clear, and effective in her design decisions: for her "*RL is RL, definitely (…) SL is just additional fun*", therefore her interest in SL is directed towards doing "*what (she) cannot do in RL."*

Organizing Collaborative Practices in Time and Space

In this section, I analyze how the co-designers move - either physically or via their avatars – between the places and the digital platforms, and how they organize their collaborative practices within different time-schedules. I have already mentioned how avatars move - walk, fly, teleport –

between the virtual places. However, it is also important to mention the effects of *chronotopes* (Lemke 2005) on co-presence and collaboration. Following Lemke's (2005) formulation, chronotopes are used to describe how avatars move between virtual spaces, while *heterochrony* is used to describe how actions unfold in a complex network of time-scales, involving both representational (virtual) and actual (real-world) contexts.

SL affords both synchronous and asynchronous communication, and sequential and non-sequential collaboration in small groups. It is possible for avatars to meet and collaborate in real-time. It is also possible to work individually in separate locations, share objects or leave them around for others to see, and work asynchronously on different parts of the overall design. Avatars can be in different locations; multimodal communication via chat and inventory transfer is possible as long as both users are logged in. This particular affordance shapes the division of labor in design processes and organization of tasks in time.

Figure 1 illustrates one of the first real-time collaborative sessions in the making of Metrotopia, in which Aspen and I experimented with various urban compositions by using mega-prims to signify roads, buildings, etc. Aspen explains how the design team worked both asynchronously in the building of initial ideas, and in in synchronous collaboration during evaluation and discussion of alternative solutions. After each collaborative session, the co-designers went back to their own places, and scheduled their tasks according to their own contexts. This way, the team built a first model of the city, after which details began to emerge. Although figure 2 on the right shows both of our avatars together, this situation was in fact a preparation for individual work, where aspen marked different locations for new buildings with 3D numbers, so that the team could follow which design would fit which location.

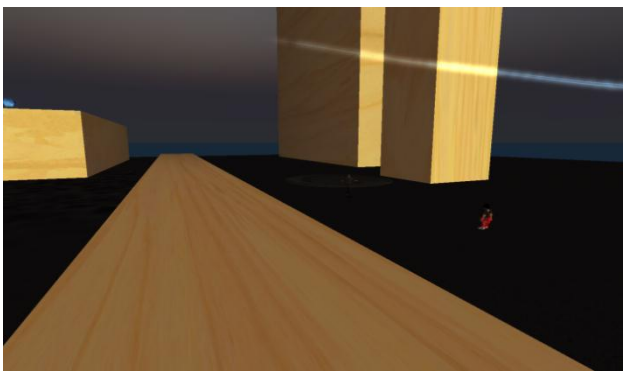


Figure 7.14. (left) Snapshot from one of the early building sessions in Metrotopia, where Aspen and I work on placement of various units by using mega-prims

Figure 7.15. (right) snapshot from a later stage, where Aspen and I work on final placement of the buildings, and Aspen marks empty locations with numbered cubes.

For Caitlyn, the major advantage of working in a virtual platform is about the affordances if presents in comparison to real-world design in terms of the limitations of time and waste of materials. She says if a similar spatial design project were to be conducted in the physical world where she is "*concerned about wasting materials*", she might have "*gone with an earlier design and just lived with it*." However, working with virtual materials in a virtual environment gave Caitlyn and the design team the freedom to "*keep tinkering with it until you get it exactly the way you want*." Aspen mentions the real-time collaboration affordances in construction of particular places. For Aspen, "*one of the great things about SL is that we can actually make changes while we talk about them*." He relates the efficacy of this type of working to idea-generation and concept-development processes, where the co-designers often use various modes to communicate with each other, test their ideas and modify the designs. Such collaborative practices were visible especially during the construction of the Costume Bazaar and the Museum. In both cases, avatars of the co-designers met in the said locations, discussed the overall layout and design of the places, and worked on the placement of various design elements while making final decisions about particular design requirements. This method requires spatial organization and temporal synchronization of social practices for a certain amount of time. On the other hand, when the co-designers work on their own schedules, the temporal mode of working is asynchronous. As Caitlyn states, their interactions with Aspen during the design process were based on a sequential development: "*He [Aspen] would be creating something and then he'd show it to me [Caitlyn], and I would say if I agree or if I disagree. If I disagree, [I say] what I think has to be done. And then he would make another change, and then he'd show that to me. If I'd like that one, I'd give it a go and be okay with it*." Throughout this 3 month interaction process, Caitlyn thinks "*the content generation for the museum, the costume bazaar, and figuring out the BOTs, and the decoration of the city*" were the most challenging and time-consuming features, as these were the cases when they "*had to communicate the most*." According to Aspen, design of the Museum was the most challenging, as he had to spend more than double the time than he has expected for organizing the exhibition. For designing the overall layout of the city, the design and research teams met at the university, made a sketch of the parcels and divided the streets in order to locate the provisional interaction spaces. These sketches allowed the co-designers to visualize their thoughts during both concept generation and development stages. While the purpose of sketching out maps was a more spatial one in concept-development, the second map was prepared by the team was focusing on placements, sizes and ratios of each design element in relation to each other and the surrounding environments. Caitlyn describes the second map as a "*more geographic style map*", which "*gives a sense of size as well because you can get a sense as to where the places are relative to each other and how much of a space you need to put them all in to place with each other*." After each meeting, the maps were photographed, and the co-designers began working at their own places to develop the

design. Although the design idea and the overall concept were determined by Caitlyn's research questions and personal experience, she says once the main idea was generated and the team "*started understanding what we could do in SL, the idea had to be changed*." On the other hand, visitor feedback or Caitlyn's observations with research participants has not gone into changing any aspects of the place.

The issue of synchronous and asynchronous collaboration was also a topic of discussion in the PAL case. Since the co-designers were from different parts of the world, they have been living in different time-zones, working and living in different life-worlds. The whole team has never met in person, but Curiza and Xavier met a few times in Denmark. According to Shaggy, it was often hard to get the whole team together in a certain (inworld) location and this situation shaped the design process profoundly because "*people will come here when they want to, and if they're not here then they're just not here*." Shaggy adds: "*this is probably because SL is not a priority for no one here. You go to SL just to have fun. It's not a job. So you do it when you have time, and you meet people when they are online*." The process of PAL's design was not much different in terms of the co-designers' working methods. On the other hand, the evolution of PAL's general design idea and the role of feedback from various social actors (including visitors) have specificities. Back in 2008, sub-dividing the land for streaming media was a new development in SL; which instigated Curiza's creative thinking. Thus, Curiza explains his initial purposes in generating the PAL idea as to "*find out what [they] can do in here, in 3D worlds*." Consequently, Curiza's idea was supported by a fellow Danish radio show, which invited its listeners to join in with ideas and co-develop the design idea. Curiza describes how various listeners called in to give ideas, and sending requests to be included in the design of the place. In fact, Curiza and Xray met through the radio show, after which they met in SL and became acquaintances. The idea of using unevenly distributed cubes, was generated by Shaggy and developed by him and AmyLee for the most recent version of PAL. Shaggy explains how he generated the cubes idea as "*just trying to close my eyes and say 'ok, I'm teleporting to PAL, what should be around me? What should it look like?*'", after which he generated several ideas. The overall idea to produce the ground plane by 600+ cubes came as a surprise to Curiza, who says he never mentioned such a design concept to AmyLee before. In fact, the way Shaggy describes how the idea was generated refers to Curiza's initial design principles, and the perceived constraints of the design context. Shaggy describes these initial design principles as "'*do's and don'ts*'" of the project. Such constraints in PAL's design included having an *open space* in which avatars can easily *navigate*, understand the overall concept, and be able to experience music within *four listening areas*. For instance, Shaggy explains why "*having the 4 listening areas pretty close to each other*" was a design strategy to make it "*convenient for people to walk from one to another*." User feedback has a much more central role in the evolution of

PAL's design. According to AmyLee, the team has "*gathered numerous hints and wills about what is good or bad in such a place*." For her, the main challenge is to "*let people understand what this place is about, and how they can use it*."

Internet was also used as a supporting platform in PAL's design. Curiza explains why he needed to use Google services to communicate and collaborate with his team, especially at times when they are not meeting online and working together in real-time. He says he is "*almost online 18 hours a day on Google*" and he prefers to communicate with the team via e-mail because he can only run SL at home. Although SL also provides notecards that can be sent to several team members, Curiza does not consider them as efficient collaboration tools. In fact, notecards are still used as a way of delivering information to visitors in PAL, as in Metrotopia. When visitors enter the sim, they are greeted by an automated message and offered a notecard with frequently updated information about PAL, its content and activities. However, needs of the design team exceeds the affordances provided by notecards for Curiza, who search for even more complex methods to collaborate with the design team. During the process, Curiza created a "*Google Chart document*" where he described how he wants the new design of PAL to be, and invited the design team to put feedback. Therefore, some idea-generation practices occurred outside SL, but still through digital means.

As I have explained before, the schedule of the PAL project was more flexible than Metrotopia's, and the overall design had been changing several times until this (fourth) version. The part of the process that frames the final version of the design took about 6 months. For Curiza, this was "*already 3 to 4 months delayed*", which was acceptable. The sim was already functioning as the design process of the new version went by on a separate sim, and Curiza says he "*knew Emily enough to know that if she could do this in her own tempo (…) then it would be 10 times better*." According to the co-designers, the most challenging and time-consuming part of the collaborative process was the texturing of the prims, which took about 2 months and required numerous tests and discussions. On the other hand, according to AmyLee, dividing the space and making the pathways was relatively easy and fast once they had the new design idea.

Similar to Aspen from Metrotopia, Shaggy also refers to "*the ability to let people create live*" as a main characteristic and advantage of SL. For Shaggy, real-time modification and shared virtual places are helpful in their collaborative practices:

> "*That is a really great idea because when you are with someone and you say 'ok, look at that cube. Don't you think it's a bit too high?', then you just lower it a little and instantly say 'ok, it's better like this' or 'no, it's not better like this'*."

On the other hand, Shaggy also describes the collaborative design process in SL as a "*sequential process*", in which they "*haven't been really working together as you could understand it in real world, like being all 3 of us [Shaggy, AmyLee and Xavier] around a table*." Similarly, AmyLee mentions the notion of real-time building affordances, but immediately adds that it is not the norm here. For her, collaboration in "*large-scale constructions*" is "*more a matter of sharing the tasks (this or that part of the sim, prims for one and texture for the other, etc.)*" According to AmyLee, the co-designers build at their own paces and places, as they "*don't necessarily have the same hours*." Therefore they "*mutually visit the other's build and make comments through IM*." She says her preference of working alone also has personal reasons; as she doesn't like people see her building, especially when she needs to "*test things, stop it, think about it, come back to it, etc.*" Shaggy explains that they "*built another place just to be quiet and not be bothered by visitors that are lost in PAL*", so that they could work *"[d]iscreetly, with nobody around*." Design, testing and evaluation of initial design concepts, as well as forms and functions were done in this other sim[26]. In this way, it was also possible to keep the actual PAL sim running, while they worked on the new design without intrusion. Another reason for keeping the work as a secret was Curiza's plans to make an opening ceremony, and surprise visitors with the new design.

For Xavier, an important advantage of SL is the availability of immediate feedback. Xavier's professional perspective leads him to compare the SL processes to real-world ones, in which a designer does "*sketching something, send an e-mail, wait 2-3 days, then you get feedback, maybe you have RL meeting saying "Ok, next week we will look at these possibilities" and another week before you meet again*." For him, collaborative design in SL requires a certain "*kind of a dialogue*" because "*it's not like RL, you have to sketch it all first and then you build it. In SL, you can build, then discuss and then change it."* According to AmyLee, "*when you work with someone, you can show how an idea looks like, not by telling or describing, but by building*" because "*thats the base in sl, its so easy to build, test, destroy and try again*." Therefore trial-and-error is an important part of the design process. This is also how the cubic landscape was designed. As Shaggy already had the overall idea of "*cubes with different heights like a digital landscape*", he and AmyLee had to improvise and imagine "*what it would feel like being there*." However, another reason of the trial and error method is the challenges posed by the constraints, such as the aforementioned permission options. No matter how experienced and skilled designers can be, certain constraints of SL effect all content-generators, especially the ones about permissions for object modification and transfer, which Xavier claims to have "*some very American limitations*" in SL. Objects cannot be

[26] During Metrotopia's design process, a similar platform was built 900 mt above the original sim for testing and building purposes. The successful builds were then being transferred into Metrotopia and placed in their planned locations by Aspen.

shared or collaborative edited by many users, instead they have to be *sold* (even for zero Linden Dollars) to avatars. In fact, such complaints have already been raised about the permissions by the co-designers in other cases, which could imply a need for more practical solutions for the object modification/sharing system.

In the Workshop case, both individual profiles of the students and the particular social context in which student projects were developed show important consequences in terms of students' working methods. As mentioned above, the workshop took place at the university campus for 3 weeks, during which students spent most of their daily times working together in (or around) the classroom. This can also be considered as a natural consequence of the general educational approach at Roskilde University, which is based on group-working and hands-on creative problem-solving. Following this overall framework of the university's educational policies, the workshop framed an intensive practical workload, and the need for collaboration as a major requirement.

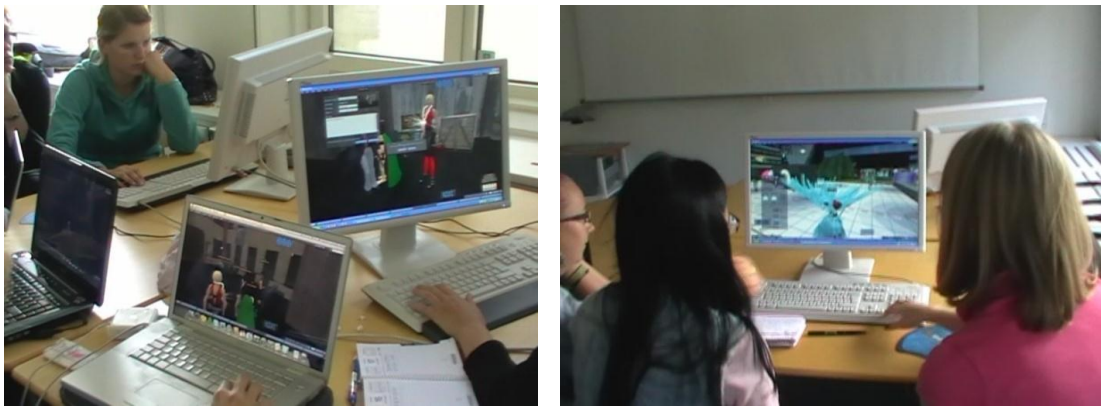


Figure 6.2. (left) The *Superheroes and Supervillains* group, working in the classroom by using their individual computers, and avatars in virtual space

Figure 6.3.(right) The Venus and the Four Moons group, using a PC to collaboratively build their objects

However, the students were free to choose their own working methods, as long as they used SL as the platform to collaboratively create their designs. As seen above in the two figures, while one group (figure 3) preferred to divide the tasks among each member, use different devices to log in and use their personal avatars to operate in SL, others (figure 4) built their objects by using one computer and getting together more closely in the physical space. Therefore, different groups chose to work with different methods, in different places and they organized their time schedules according to their own methods. It was also possible for any group to develop new working methods in accordance with the requirements of the context of their co-production practices. For instance, the Venus and the Four Moons group found it challenging to create the form of their oversized lipstick engines by using prims. The students used brainstorming and sketching when they worked together, thus, their main objective was to replicate the pre-determined shape of a

lipstick by available resources. They worked together on the construction of the overall form, whereas some details (i.e. chairs, animations inside the spaceship) were created separately by different avatars. However, sharing the tasks presented another serious obstacle. Students often found themselves dealing with error messages and unexpected consequences due to the object permissions. In fact, the problems caused by the ineffective use of object modification tools in combination with the sharing options was among the major problems in all student groups. The groups met in the Metrotopia Sandbox and attempted to use their avatars to co-create various objects and parts, after which they realized the importance of certain options, such as the limitations of assembling or animating collectively produced prims. At this point, the role of supervision and tutorship come in effect, as we both guided the students to use the options properly and intercepted when there was a problem. However, the permission and ownership system of SL's virtual creations remained to be among the central issues that the Workshop students had to overcome.

Other challenges were about students' motivations to produce complex multimodal presentations by using scripted objects, which was a particular challenge for them because of their limited experience with the scripting system in SL, and programming languages in general. Students tried to collect and re-use free scripts from within SL, most of which caused problems or needed modification. The collaborative design activities were also learning processes for the students, and their collaborations are often resulted from their need for people who could contribute with different skills, tools and resources to expand the scope of their design. Although the co-designers of Metrotopia and PAL were often able to find help from their inworld networks and acquaintances, the students lacked the necessary social capital in SL, thus they helped each other to solve problems, and shared knowledge gained from their explorations.

7.4. Synthesis of the nexus of social actors, mediational means and collaborative design processes

In the previous chapter, I have discussed the ways in which design teams are formed by individuals with different purposes and varying professional backgrounds, as well as knowledge of and experience in VWs. These human actors perform different tasks in different ways by using various tools and resources that are socially available to them. In SL projects, co-designers with different competences in content-generation often present heterogeneous networks of creative and collaborative practices. The fact that every co-designer brings new competences –as well as resources – to the collaborative project leads to particular configurations in group-formation and design methods. I argue that the co-designers co-produce the objects through multiply-discursive

collaborative practices in order to reflect their rhetorical intentions in design of such multimodal sign systems.

My observation shows that the social organization and methods of execution in collaborative projects show differences and similarities in terms of their social contexts, as well as participants' individual conditions of engagement. Design teams are often formed by shared interest, although each participant may develop their own individual interpretations about why and how a virtual place should be designed in specific ways. The various co-designers' access to the socially available semiotic and material resources, and their competences in appropriating these to their designs are conditioned by their interests and experiences in SL. While the affordances of the environment in which designs take place have a shaping effect in organization of processes, co-designers' knowledge and awareness of potential limitations also affect their meaning-makings, often times from the very beginning of the project. As a result, the ways in which resources are collected and used (or not used) as design elements are context-bound design strategies that affect the contents, forms and practices of designing. Design methods also show variations depending on the structure and configurations of design teams, on preferences of each designer about participating, and on the ways in which ideas are generated, evaluated and executed. The co-designers often prefer to work separately on their ideas, build alternative models and share the developed version with others to get their opinions, after which they usually travel back to their individual locations to work in their own time-schedules. In Metrotopia, the design idea was generated outside SL, as Caitlyn conceptualized her research methodology in reference to several media platforms (including SL) with a common theme (superheroes). Therefore, Metrotopia's development was based on SL, although the ideas for design came of external contexts. On the other hand, PAL's initial design idea was a result of Curiza's inworld reasoning based on his avatar experience, after which he shared his idea with his avatar friends. In the workshop case, the classroom presents a physically-boundary place. Although students were often let free to work from distant location using SL, or divide the tasks so that each avatar could contribute to the project, they often chose to meet in the physical location (classroom) and develop their designs by face-to-face communication. However, similarities also exist in the three case studies, especially in terms of collaborative evaluation and modification of designs (by using SL's affordances for real-time and asynchronous collaboration), and the ways in which the co-designers organized the design processes to include various multimedia resources.

Integration of new technologies and resources into collaborative design is driven not only by the technological infrastructure or design of user-interfaces, but also by the socio-cultural contexts and the rate in which users are open to adopt new ways of doing things with the media. Within this

perspective, analyzing the human and the non-human factors that contribute to the construction of multimodal sign systems is important for the epistemological dimension. Therefore, the social actors, the mediational means and the collaborative practices are considered as fundamental constituents of the social semiotic framing of the *context of situation* in the three case studies. In fact, the first two analytical chapters – the analysis of social contexts and multimodal semiotics – constitute a tightly-bound composite for the analytical framework, through which I discuss the nexus of discourses and practices as a part of the multimodal analysis. In other words, I am interested in understanding how SL represents both the content and context of communication as a complex semiotic nexus; that is a virtual place in which participants collaboratively design places.

Design activity shapes and transforms the environment in which it takes place; in turn, the environment also shapes the potential designs in terms of both the process and the product. In a social semiotic framework, sign-makers assess the environment in which they intend to communicate and participate in the communicate world by using socially available resources that these environments present to them. They engage in socially transformative relationships with their environments in order to (re-)semiotize the resources within their own cognitive and creative capabilities. As the co-designers individually make use of the platform in accordance with their purposes and capabilities, they also evaluate whether the use of other platforms and resources is necessary and whether SL could accommodate their choices. The use of Internet and other digital platforms support SL's affordances, and help the co-designers to bridge the gap of the constraints. The methodological intention for considering *place semiotics* as one of the fundamental situational components of social semiotic analysis is this reciprocal interaction between design and its environment. For this purpose, I focus on exploring the patterns of *intertextuality of real and virtual places in a convergent collaborative media landscape* as an analytical objective. Although forms and shapes are initially designed as mental constructs (and often as sketches on paper), they are actualized by the affordances and constraints for digital content production. In all three cases, the perceived affordances and constraints of SL were observed to have significant effects on the co-designer practices. To sum up, the analysis of collaborative design processes points towards a complex and dynamic nexus of semiotic and material resources that are used in co-production processes, and the semiotic effects of the co-designers' interpretations of the affordances and constraints on their practices. The following chapter will outline the multimodal systemic-functional analysis of virtual places and artifacts with the aim of unraveling their experiential, interpersonal and textual meaning potentials, often by referring to the discussions that are presented in this chapter.

8. Analyzing multimodal discourse in virtual places and artifacts

Introduction to the multimodal analysis

In the previous chapter of analysis, I have outlined the profiles of social actors, the configurations of design teams, the mediational means and the processes of collaborative design. The relationship between the overall analysis and the discussions in the previous chapter can be characterized as a contextual one, as the major purpose of the two analytical chapters is to analyze place-making in SL as a semiotic phenomenon that is contextualized by the socio-technical environment of collaborative design. In this final section, I analyze examples of multimodal semiosis in the design of virtual places and artifacts, and the questions I ask are concerned with how the co-designers make sense of specific affordances and constraints in particular social situations and design contexts. The analysis in this chapter foregrounds the experiential, interpersonal and textual meaning potentials that are materialized by the transformations of rhetorical intentions of the co-designers into semiotically shaped material (Kress 2010).

To conclude the overall analysis in these two chapters, I compare the three cases by drawing on Halliday's (1978, 2007) systemic functional framework in relation to Kress's (2010) multimodal communication theory[1] with particular structural elements that contribute to the multimodal coherence of each design project. As I have mentioned in the theoretical and analytical frameworks, I use O'Toole's [1994, 2004] systemic functional model for architecture, which focuses on the three meta-functions (experiential, interpersonal and textual) for the design of three-dimensional built spaces that accommodate meaningful human action. Although the analysis also emphasizes the conceptual differences between experiencing the virtual places and the physical places, the multimodal and experiential semiotic view of virtual place-making makes O'Toole's architectural model a suitable framework to base the analysis on. Following on this, I present the ways in which the collaboratively designed virtual places and artifacts afford movement and interaction, and how the semiotic bridges between the visual forms and the social experiences are constructed within the places. The chapter begins with the overview of this meta-functional framework and relates the three-meta-functions to the design of virtual places in SL in terms of the various scales of construction, including the virtual islands, the divisions and elevations of smaller-scale artifacts and places, the interaction areas and other interactive elements of design. The chapter then turns

[1] For analysis of multimodal discourses, also see Kress and van Leeuwen, 2001; van Leeuwen, 2005a; Lemke, 2002; 2009a.

to the analysis of the case-study data, and comparatively discusses the ways in which meaning potentials in virtual places are constructed in different contexts. In this part, I re-order the three meta-functions in my analysis, and present the finding of the textual meta-function before the interpersonal. The reason for this is two-fold. First, the textual meta-function is about the internal structure and the cohesion with the environment; therefore the analysis of the building blocks and the spatial organization of virtual places relate to the previous section on the experiential meta-function. In addition, the analysis of the textual function includes the multimodal elements of design as semiotic components of the overall sign system; therefore it offers a bridge between the analyses of experiential and the interpersonal meta-functions. The final section of analysis focuses on the interpersonal meta-function and discusses the meaning potentials in terms of signification of rhetorical intentions and the use of intertextual metaphors to create a visual identity of the virtual places. This section also analyzes the relations between signification of particular design concepts and their roles in creating a *sense of place* through social presence. The conclusion of this chapter also concludes the overall analysis, and serves as a bridge to the final chapter about the conclusions and discussions. In the following *Conclusions and Discussions* chapter, I will present an overall synthesis of the social actors, mediational means, collaborative processes and multimodal products of collaborative design as the four central analytical components, and discuss certain epistemological, ontological and methodological implications of this framework for the social semiotic analysis of virtual place-making.

8.1. Units of multimodal analysis and the systemic functional matrix

In the following section, I present an analytical model to study collaboratively designed virtual places and artifacts within different scales of construction as particular multimodal sign systems (*see* table 8.1). To generate the analytical model, I revise O'Toole's (1994, 2004) systemic functional analysis of architecture in combination with Lemke's (2005, 2009) analysis of chronotopes and heterochrony in virtual environments. This perspective provides the consideration of movement and time in relation to the affordances of the collaborative platform; therefore, it supports the experiential and multimodal view of social semiotics. In doing so, I aim to reconsider the systemic functional model, and generate a new framework for multimodal analysis of virtual places and artifacts.

The empirical grounding of the analysis in this chapter is found in the visual recordings of the places and artifacts in SL, as well as the interview data and the findings from participatory observations. In this way, I refer to the co-designers' experiences with the perceived affordances and constraints of SL in the process of constructing these places. Thus, I discuss how the co-designers collectively decide on the style and the contents of the entire places (sims), divisions of

these places, their elevations and connections in three dimensional virtual space. I analyze how specific places are designed for particular interactions, and how the organization of design elements constitutes them as functional places[2]. In this way, I categorize the structural components that constitute the virtual places in a rank-of-scale format, and analyze thesemiotic functions for each meaningful element.

This formulation of the rank-of-scale of virtual places mainly refers to O'Toole's (2004) social semiotic model of architectural design. He proposes that we look for four distinct dimensions in a systemic functional analysis of three-dimensional spaces and meaningful places: namely *building, floor, room and element*. On the other hand, these dimensions refer to physical buildings, whereas the two case-studies (Metrotopia and PAL) are designed as sims (virtual islands) and the workshop projects represent smaller-scale artifacts. Therefore, they do not necessarily show the same characteristics as real-world buildings, as the actions of the SL users are mediated by their avatars. Some of the relevant similarities and differences between the so-called real and virtual experiences have been outlined in Chapter 2. Therefore, I modify O'Toole's analytical terminology to fit the modal affordances of the digitally mediated places of SL, and focus the analysis on slightly different yet significantly similar categories of the ranks of scale. My purpose in critically adopting the architecture-based model at this level of multimodal analysis is to capture the spatial characteristics of interacting with virtual environments rather than a limited framing of multimodal analysis by merely graphical elements. To guide the multimodal analysis, I generate an analytical matrix (Table 8.1.) which is composed of two axes: the first (horizontal) axis is the systemic units of experiential, interpersonal and textual meta-functions and the other (vertical) axis refers to O'Toole's semiotic model of architectural places, which is divided into four scales of structural design[3]:

- Sim or virtual place (O'Toole's 'building' scale),
- Elevations and divisions in three-dimensional grid (O'Toole's 'floor' scale),
- Interaction spaces (O'Toole 'room' scale),
- Artifacts and information surfaces (O'Toole's 'elements' scale)

In the methodology chapter, I have argued that a coherent epistemological account of semiotic practices should be supported by insights and reflections of the actual designers – as sign-makers – to reveal underlying rhetorical intentions. The previous chapter therefore forms the empirical

[2] At this level, I consider both *three-dimensional artifacts* and two-dimensional *information surfaces in virtual space* as smallest unit of design elements.
[3] My choice of placing the two axis in this particular vertical/horizontal order has theoretical foundations. While the socio-semiotic meta-functions are often considered as homogeneously distributed amongst the meaning structures (therefore can be analyzed in any order), spatial elements are organized in a rank-scale, which requires special attention to different levels of detail in each scale.

background for the analysis of multimodal discourse in collaborative design of virtual places and artifacts, in which I engage throughout this final analytical chapter.

Following this line of thought the systemic model for social semiotic *analysis* in this chapter analyzes virtual places as *multimodal texts*, and investigates the underlying rhetorical intentions by consulting the co-designers' reflections on how and why they made particular design decisions. The semiotic effects of these rhetorical intentions relate to the analytical matrix in terms of their role in the construction of meaning potentials in certain ways that the co-designers consider meaningful and usable in SL. In other words, my primary aim in including both the contexts and contents of semiosis is to emphasize the framing of multimodal semiosis as a socially and environmentally shaped communicative practice. The three meta-functions represent the various ways in which places and artifacts can carry certain meaning potentials, whereas the rank-of-scale model provides the structural categories of virtual construction in more detail.

Constructing the experiential, interpersonal and textual meta-functions

Table 8.1 represents the analytical matrix constructed by the multimodal analysis of virtual places and artifacts designed within three case studies. The table shows the observed relations between design of various units/ranks of analysis in designed places and the experiential, interpersonal, and textual meta-functions. I often refer to the meta-functions as *meaning potentials* throughout the text in order to emphasize their roles in the construction of the places as meaningful sign systems.

My main purpose with this analytical matrix is to construct what O'Toole (2004) calls a "hypertext" as a tool for the analysis of the empirical data, which is "a nonsequential tool for exploring the hypertext of the building itself" (O'Toole 2004: 26). I use the hypertext metaphor to describe the fuzzy borders between analytical units, in reference to the dynamic modular structure of hypertext in digital media. Following this logic, I categorize the empirical findings as interrelated aspects of multiple meta-functions, and discuss my findings to include synthesis of various units to emphasize their dynamic social relations within the process of semiosis. For instance, a design element such as posters with graphics and text may use multimodal arrangements to guide the visitors towards possible paths to navigate and fulfill an experiential function. At the same time, they can also inform the visitors about the social regulations of the place and present interpersonal characteristics. In general, Metrotopia and PAL projects provide data which illuminate several elements of the matrix, whereas the workshop projects do not refer to such a large-scale place-making perspective. However, all projects deal with the construction and organization of artifacts and places in varying scales, whether they are as large as a few sims or smaller scale projects.

	EXPERIENTIAL / REPRESENTATIONAL	INTERPERSONAL / ORIENTATIONAL	TEXTUAL / ORGANIZATIONAL
***SIM* AS VIRTUAL PLACE (Building)**	Practical Functions: (research/education/content-sharing/community-building) Imagined use-contexts Public/Private Spaces Entry Point Map/Layout Flow of Movement (Open or Closed spaces) *Functional and non-functional areas* Orientation (Genius Loci?)	Genre and Style Metaphoricity Social Presence Size and Ratio (Avatars in Virtual Space) Direction: Verticality Mood *Modality* *Color* Cues for Navigation/Orientation Field of Vision / Visibility Intertextuality (reference/mimicry/contrast)	Modes as textual elements Textures and colors Light and shadows Opacity/Visibility Rhythm and contrast in shapes and forms – Division/organization of space *Open/closed spaces* Relation to environment Relation to neighbors
ELEVATIONS & DIVISIONS (Floor)	*Sub-functions* Access *Functional elevations* *Movements between levels*	Height Spaciousness Materials/Texture Separation of Groups (Privacy) Visibility / Accessibility Visual Links between floors/areas	Elevations in relation to each other Elevations in relation to ground-plane Color and texture Degree and permanence of spatial Organization
INTERACTION SPACES (Room)	*Functions of specific places* Types of interaction (user-object, user-user) Type of places (activity, community or content oriented)	*Modality* *Color* Foregrounding of functions Orientation Social Presence	Setting/layout Scale *Open/closed spaces* Relation to outside and other spaces Spatial connectors Focus of attention
ARTIFACTS (Element)	*Interactivity* *Functions of virtual objects:* Providing information Social interaction Decoration	*Style* *Modality* *Color* Relevance to environment Affordances Stylistic coherence	Structural elements (prims) Textures/maps Scripts and Animations Positioning
INFORMATION SURFACES (Element)	*Interactivity* *Functions of surfaces* Types of information: (still image, animation/video,	*Modality* Relevance Affordances Stylistic coherence	Information as texture Placement of surfaces Interaction with surfaces

Table 8.1. Systems and functions in design of virtual places and artifacts

The vertical axis shows the compositional elements of virtual constructions – places and artifacts -, and escalates in terms of size and scale from bottom to top. The horizontal axis lists the categories of meta-functions. Elements in each box describe the observed semiotic units in that particular level of interaction. As the table illustrates, particular analytical features, such as *modality*, *functionality* or *openness/closeness* of places iterate throughout various rank systems within the matrix. This means that such issues are relevant for analysis in various situations where the co-designers use these as design elements to provide different affordances. It also means that the hypertext logic of multimodal analysis operates not only among the different meta-functions, but also among the various scales and design elements that contribute to the overall meaning potentials. The meaning of these iterations refers to my interpretation of the systemic functional framework, as I assume meta-functional associations are constructed on various levels of interactions with places, some of which transgress the boundaries of single modes.

Although the systemic functional approach to multimodal analysis is often concerned with each mode as a particular grammatical system of expression, the theory also claims that modes do not operate in isolation and particular features transcend among different elements often resulting in consequences that affect their social functions (O'Toole 2004, Meng 2004). In SL images, texts, sound and 3D objects are often being remediated jointly, as parts a new multimodal ensemble to support the overall message in cooperation with other linguistic or spatial modes. In this respect, each of these components were analyzed in relation to their ranks of scale and their relationships in semiotic construction of objects, focusing on coherent multimodal arrangements within overall designs.

In the following analysis, I will systematically outline specific experiential, interpersonal and textual features of each of the three collaborative design cases to compare and discuss the modal configurations in relation to their rhetorical contents. The analytical insights are derived from conceptual traversals among the various elements of the overall matrix. Therefore, I constantly consider the semiotic affects, consequences and limitations of various design elements and how these interrelate to each other in multimodal composition of designed places and artifacts.

The three case studies show differences in terms of particular meta-functional features, such as representations of practical functions and syntagmatic organization of structural elements. The visual styles, sizes and proportions, intended affordances and forms of modal configurations show variations depending on the project contexts.

Metrotopia was designed as a virtual laboratory by an interdisciplinary academic and professional team to facilitate and observe specific types of interactions. According to the co-designers, the general aim for the visual style of Metrotopia was to reflect particular genre conventions on

Superheroes. Caitlyn, whose needs and specifications primarily led the design process, mentions that one of the principal ideas was to replicate an urban city landscape that is commonplace to the specified genre:

> Caitlyn: [I]t is just a *big city* with skyscrapers and a residential area, and a warehouse and a museum and a park. It's got all of your *basic urban structures*.

The PAL case is different in terms of its visual style. PAL is designed to emphasize the distinguishing features and affordances of virtual places, and freedom from certain real-worlds constraints, such as gravity and limitations of bodily presence. The co-designer interviews showed that the dominant concern in the design of PAL was to be 'not RL-like'. As the chief designer AmyLee explains, the emphasis on being unrestricted by so-called real-world constraints was a definitive factor in shaping of design style:

> AmyLee: [T]heres really nothing that *looks like RL* here, we dont really need to comply with the *rules of building in RL* ... so we made profit of it[4].

On the other hand, the workshop projects followed the stylistic and narrative logic of Metrotopia as they were fictional designs to be presented in the virtual city, while they were smaller in size and simpler in structure.

The analysis continues with comparative presentation of each design project within each analytical theme, borrowing and synthesizing certain concepts from the matrix. Each sub-chapter will focus on one particular meta-function, and discuss the findings from the three case-studies in reference to the design elements on various scales. The analysis of each meta-function also aims to discuss the relations between different meta-functions by exemplifying the various situations, in which these design elements are crated to fulfill multiple functions. Findings on the various scales, such as layout of the places, organization of functional areas, or use of textures and animations as design elements aim to support the analysis by providing insights on the semiotic and structural relations among various scales. Therefore, the categorization of the data within the systemic functional matrix also aims to transgress the boundaries of meta-functions or rank-scales, and emphasize the fluidity of concepts in the framing of the overall semiotic experience. I begin with presentation of data on *functionalities* and the perceived affordances in each design project and see these as experiential components. The second part of the analysis outlines the interpersonal meta-function, and includes the co-designers' descriptions about their rhetorical intentions and the ways in which they formed the multimodal semiotic resources to communicate particular messages, amplify

[4] As I explained in Chapter 7, AmyLee is deaf. Therefore, she requested our interview to be based on text-chat, after which I sent her a follow-up survey with open-ended questions. I use her original messages as data, thus some grammatical mistakes may appear here and there.

certain concepts, or enable certain activities. The final part of the analysis covers the findings about the textual meta-function. Here, I discuss the issues about internal and external semiotic cohesion in virtual places and artifacts, which implies both the composition of their internal components and their relations with the surrounding VW.

8.2. Constructing the experiential meta-functions: practical functionality, movement and presence in virtual places

The experiential meta-function refers to design of affordances and constraints for particular types of avatar interaction, and how their features are organized according to their intended use-contexts. The co-designers frame particular types of activities to facilitate particular experiences, while limiting others. Representations of affordances and constraints for these specific experiences are built into the multimodal configuration of each design project; and they are determined by two significant factors: the rhetorical intentions and choices of the co-designers, and the socio-technical environment which affords and/or limits certain creations. The design choices that are concerned with the experiential meta-functions may originate either from the initial design-brief (such as in Metrotopia and – to a certain extent – the Workshop projects) or the choices may develop over time and with the flow of user feedback (such as the emergent interpersonal features of PAL). On the other hand, the experiential meaning potentials are also closely related to the overall coherence between experiential, interpersonal and textual meta-functions in design. Therefore, I will analyze the intended practical functions in each case-study and the relevant design decisions in this section by taking their relations with the other two meta-functions into account.

Figure 8.1. View from Metrotopia: The City of Superheroes and Heroines residential area (currently Viking Ship Museum)[7]

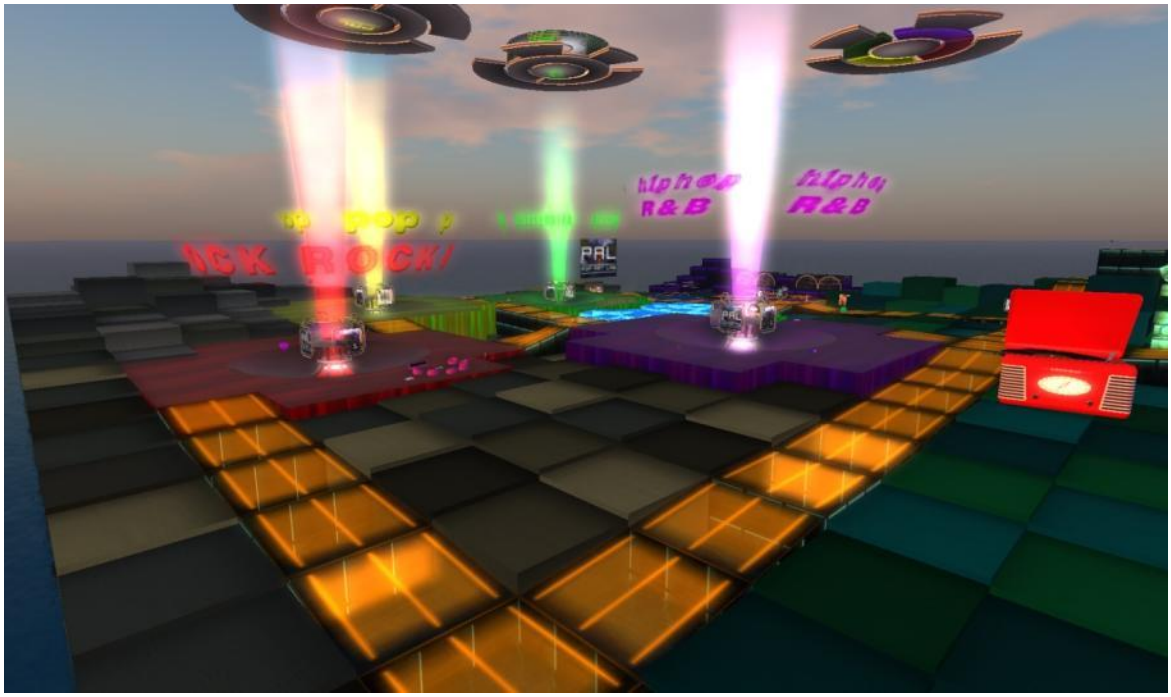


Figure 8.2. View from PAL (ground-level listening areas and upper-level pods with color-coded light paths connecting them)

[7] Image source: http://doctorasp.wordpress.com

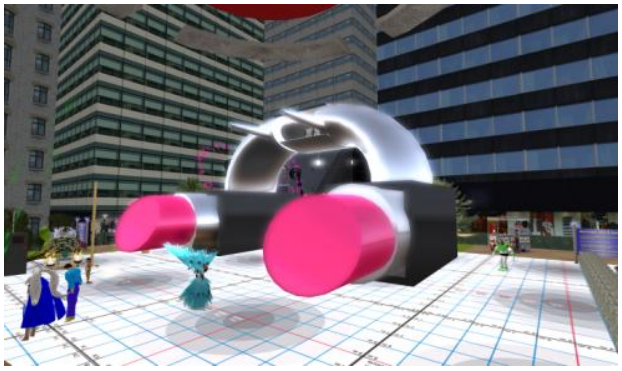


Figure 8.3. (left) Workshop case, Venus and the four Moons group (lipstick-shaped warrior spaceship)
Figure 8.4. (right) Workshop case, Superheroes & Supervillains group (brainwashing machine and magical jail)

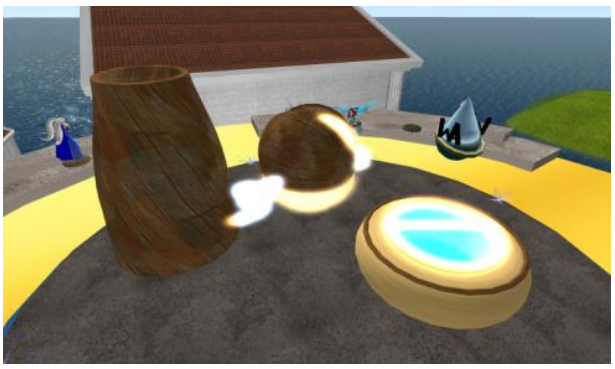


Figure 8.5. (left) Workshop project, Awesome Three group (stereo/dance floor against 'stupidity')
Figure 8.6. (right) Workshop project, Water Avengers group (water cleaning device and monument)

Design of Metrotopia and its primary function as a virtual laboratory

For instance, Metrotopia (Figure 8.1.) was meant to function primarily as a virtual laboratory for a series of experiments, while its secondary functions were to serve as a teaching environment, as well as being a location that is visited by random/frequent inworld visitors as they explore SL. The primary functionality was a decisive determinant in the construction of the layout of the virtual city, as well as the areas designated for specific types of avatar-mediated interactions within the overall place. The decisions about genre, forms, size of the overall place and the intended types of interactions were directly related to the context of Caitlyn's research methodology. Caitlyn expresses her initial intentions and progression of ideas that led to the design of Metrotopia as:

> Caitlyn: Metrotopia is a designed island in SL created for an experiment I have been running about how people made sense of virtual worlds. (…) And it is intended to reflect as much as possible all of the opportunities and the constraints that this VW has in it, as part of the structure of the virtual world.

Although Metrotopia was specifically designed for the participants of Caitlyn's research, the design team was also considering SL's social affordances, which would allow the virtual city to be populated by various other avatars; thus the team chose to make Metrotopia a public location and to allow other visitors in. Caitlyn expresses later that she "*wasn't thinking about other people, other visitors*" and first design principles were determined "*just for the participants of the study*." In our interview, Caitlyn mentioned that Metrotopia "*existed primarily to bring people to for a specific reason*" and her research participants are a "*different type of audience than the audience you hope to get just by existing*." However, particular design elements have also been placed in the overall design to accommodate the variety of visitor profiles, including random visitors and guests for various inworld events. After Caitlyn's research study - when the primary purpose of the design was accomplished – Metrotopia was introduced to public and several events were organized to "*market*" the city, including a Machinima contest and an opening night with live concerts. Therefore, the design of Metrotopia's experiential meaning potentials reflect this situation, and the organization of various design elements aim to accommodate different visitor experiences.

Although specific interactive places were designed and built within Metrotopia to represent particular types of interaction (i.e. information gathering, costume and avatar modification, fighting and exercising), certain locations did not satisfy the initial research expectations of Caitlyn. She believes that the design didn't involve enough '*questions'* to get participants more engaged:

> Caitlyn: It is this idea of the *questionings* that go on in a situation. First question is 'what is this place?', and then you get that question answered but you do not have any questions after that, you are not going to stick around. (…) But then as a *designer*, of the content at least, you CAN *structure questions in*. I mean, that is what happens with narrative text. There are a lot of questions as you go along. So, we didn't structure enough questions into the city to make it interesting enough to stay.

In her comment above, Caitlyn relates the *questionings* of the users, or visitors, to the decisions that are made by the designers. Here, she explains why she thinks her experience with the research participants was not as successful as she thought, by referring to both the experiential potentials for movement and the interpersonal potentials for engagement. On the one hand, it is the visitors who would make sense of the place; therefore their questionings about the possible affordances and/or constraints was the primary steering force behind the design of certain elements. On the other hand, Caitlyn claims that designers' task is to shape the users' environment in such a way that would make them want to ask more questions and therefore have prolonged interaction.

In Metrotopia, the co-designers present experiential meaning potentials by organizing the affordances and constraints of various design elements within specific locations in the city. Each of

these locations aim at specific types of activities, and in doing so, they also relate the interpersonal meaning potentials of the city. This way designers of Metrotopia assist users to generate further questions after their first impressions, or by asking '*what is this place?*' in Caitlyn's words, and continue exploring. Specifications of these activities – and the characteristics of corresponding places – in the initial design brief were made with an outset in Caitlyn's specifications, For instance, the design of the Fight Club Dojo was to enable the participants to fight like superheroes, as illustrated by Caitlyn's comment below:

> Caitlyn: It was more of just an idea of trying to figure '*what are the superhero tropes and how could we represent them in SL*?' (…) [S]ome of the main aspects of superheroes are like they fight with other people, so there's the Fight Club.

Figure 8.7. (left) Nort-west street view of Fight Club Dojo
Figure 8.8. (right) View from inside the Dojo. Four avatars are challenging each other with light sabers.

The Fight Club Dojo is a good example of how the intertextual meaning relations with the superhero genre are reflected in the design within the scale of interaction spaces and their elements. The experiential and interpersonal meaning potentials of these locations, as well as coherence of particular design elements, have intertextual references to particular genre conventions, and other media products such as movies, comic books and computer games. The visitors can choose among the weapons that are provided in the Dojo, and they can challenge other avatars in this place by battling each other with machine guns, swords or light-sabers. In fact, the exterior of the Dojo building and its surrounding environment also support the interpersonal and textual meta-functions, as exemplified in Aspen's comment below:

> Aspen: We decided to use an old warehouse to *make it look scary*. This is also very close to the harbor, so this is *where all the bad guys hang out*. So you don't see any shining skyscrapers around here, this is *a different part of town*.

The Fight Club Dojo is designed to provide the visitors with a closed space in which they can practice avatar interaction, or try out their existing skills by socializing with others via gaming. In this location only, avatars have hit-points, which is a strategy to increase the emphasis on the gaming aspect. As avatars shot each other, their hit points decrease[8]. When an avatar's hit point falls to zero, the defeated avatar gets teleported to another location outside the Dojo and she needs to travel back in. As illustrated in Caitlyn's comment below, the primary considerations in the design of this place included not only the visual characteristics of the building, but also its potentials to accommodate various types of social interaction:

> Caitlyn: The idea is to give them a place where that *type of interaction* can occur. And not only by shooting each other, but we also put in various barrels, there are dummies that we set up around here and there's a game, a shooting game. So it actually has a lot of *interactivity* to it. Again, we didn't have to program everything here, we were able to find these things and put them in here. All we had to do is to *create the space to allow the interactivity to occur*.

The way in which various multimodal elements are organized in Fight Club is evidently related to the practical functionality, thus the experiential meta-function, of the place, which provides certain types of affordances for participants to experience. Unlike many other interactive elements within the city, this place aims to facilitate avatar-avatar interaction rather than avatar-object interaction. The latter form of interaction is a more dominant feature of the design in some other parts of the city, such as the Proving Ground Gym, the Costume Bazaar or the Library. In these places, the visitors are expected to try out different ways of interacting with virtual artifacts for various purposes, including avatar customization, learning or leisure. On the other hand, these places were usually not sufficiently populated for a lively social interaction to occur between strangers, especially during Caitlyn's research process. In fact, the lack of sufficient social interaction in Metrotopia led Caitlyn to generate an agent-character - Sensei Serenity - who was an avatar that was play-acted by various team members according to a script. In that respect, this 'scripted-avatar' was designed as an element of the overall user experience in the Fight Club Dojo, "*because of what had to happen in there, or what had to be the potential for happening in there*" (Caitlyn). In summary, the analysis of the experiential meaning potentials in Metrotopia shows a variety of purposes and methods in which the co-designers aimed to represent their intentions as visually and semiotically shaped places. In doing so, the co-designers also create potential meanings about the visual characteristics and the structural compositions of their designs. The specific place that I have focused onanalyzed here, the Fight Club Dojo, exemplifies these interrelated meaning and

[8] Since it is technically impossible for SL avatars to 'die' (unless the owner deletes the account or Linden Lab pulls the plug) or be physically hurt, the hit-point system simulates injuries by numbers. As the avatars enter Fight Club, they are given 100 hit-points, zero means death.

action potentials in virtual places, as its visual and structural characteristics reflect the main purpose for which it was built; and at the same time, they construct several other significations to interpersonal and textual meta-functions.

The consideration of how potential visitors move in and around the virtual places is a major determinant in the design of experiential features. If the visitors are not using a landmark or personally sent teleport request to a specific location, their avatars normally enter the sim through designated entry points. The entry point (or the 'landing spot') designates how the first-time visitors will be introduced to a place and how potential movement paths are signified.

> Aspen: The landing spot, where people arrive on this sim, is a backyard which doesn't look very friendly. We have put up some signs asking people if they have the guts to become a real superhero. And then, they have to follow this dark path, and then they arrive here at the costume bazaar in the open

The landing spot functions as the location where initial discourses are formed about what the place is about, and what type of experience visitors should be expecting if they choose to continue exploring. In Metrotopia, as Aspen mentions above, the formation of the experiential function emphasizes the superhero genre conventions and a path of movement to access the costume bazaar, which is supported by multimodal presentations of verbal and non-verbal messages about 'becoming a superhero'. The multimodal configuration of various discursive elements, such as the posters and other non-verbal signifiers around the place, operates on the interpersonal semiotic level by setting the mood and style. As a result, textual semiotic elements support the experiential and interpersonal dimensions of design-based communication, providing the visitor with not only a visual reference to the Superhero concept but also a path to start exploring.

In Metrotopia's design, chronotopes between different areas within the designed place (sim) and movement within each interaction space is organized to fit the requirements of the initial design brief. These design elements include interactive posters, which were designed to visualize the specific place in coherence with the comic-book graphic style, while affording teleportation to the visualized location upon clicking. These posters were placed on the walls of a passageway that connects the costume bazaar to the city square. After the intended visitors (participants of Caitlyn's experiment) pass the 'dark pathway' and reach the costume bazaar to modify their avatars' appearances, this second passageway directs the movement into the main street (and the city square) while affording direct teleportation to various interaction spaces.

> Caitlyn: [W]e wanted to advertise, use the space for that, but also to say that if you don't feel like walking, or you don't feel like flying, you can teleport and you can go directly there. You don't have to spend time actually moving around.

Depending on the characteristics of the virtual environment (i.e. open/closed spaces, directing or limiting features), the avatars can walk, fly or teleport from one place to another. Although their users may choose to fly or teleport away and not follow the 'dark path' to the Costume Bazaar, the co-designers chose to limit the affordances by providing a direction to follow. Thus the organization of spatial relations between these design elements fulfills a semiotic function in construction of the meaning potentials about visual language and style, at the same time visualizing possible routes for chronotopes.

Evolution of PAL's design and its experiential meaning potentials

Although they are fairly similar in terms of size, Metrotopia and PAL (figure 8.2) show significant differences in terms of their experiential meaning potentials, as well their visual styles. The design concept is based more on abstract shapes and geometric arrangements, instead of representations of real-world buildings and urban places. The interpersonal associations with visual form and style, and the textual organizations of multimodal semiotic resources in PAL reflect the primary function of the sim. To begin with, the intended practical function and target user group of PAL differs from those of Metrotopia. As Curiza, who also owns and runs PAL, explains, the primary use-context is based on providing inworld visitors with new music releases:

> Curiza: I would define it as a *news channel* to come and hear new music. You could call it a *music library*, but (…) you can't loan anything. But you know, *like opening your daily paper* to read the news, then you can go there and just listen to the coolest new albums in a fast and fun and your own way.

From Curiza's comments above and below, it is possible to notice how the experiential meaning potentials of PAL were initially derived from his personal preferences, and the fact that he chooses to relax while he listens to music, although he sees himself as a good networker in his professional life:

> Curiza: PAL is a world, it's a fantasy land (…) It's a fantasy space where you should forget everything and just focus on listening to music, and relax. (…) PAL is actually created the way I wanted to create a space, a place where I wanted to come for having peace and have a great time. And by doing that, I thought (…) if I have pleasure being there listening to music, then other people might feel the same.

In the above quote, Curiza explains how he imagined himself in the position of potential PAL visitors, who he imagines may have the same aspirations or the like. On the interpersonal level, his primary rhetorical intention was to communicate that listening to music in SL is different compared to other online platforms. Curiza's decision to use SL as a platform was the result of his intertextual reasoning, assessment of his experiences with various other social media platforms and in SL, and his interest in the VWs particular affordances to facilitate a new ('more immersive') form of music-listening experience.

> Curiza: I thought "Ok, Curiza. You can't be the only one in this SL world, who needs, who wants a place where they just could come and relax *without people expecting you to talk*, and chat, and party and dance."

However, Curiza soon realized that the ways in which the co-designers embed their intended meaning potentials do not necessarily make sense to visitors of the place the same way. As Caitlyn also mentions, the visitors ask questions about the represented meaning potentials, and they associate the frameworks of understanding with which they are familiar. In this way they seek to understand how to socialize and interact in this particular context. The challenge for PAL's co-designers was not only to provide visitors with a multimodal experience but also to inform them about what the place is and what it is not:

> Curiza: But people thought it was a club!! And when people come to a club in SL and there is no people, they TP [teleport] away!

> Curiza: And it was NOT a club and I hated that … Well, it is fine to run a club, but it is massive work because you need hosts all the time, you need to have parties all the time. (…) It is fine to be at a party. (…) But *it is not the same when you host the party*. Because when you host a party, everyone wants you to be there. And reply in open chat, and reply in IM. And it gets very stressful, for me.

Curiza's second comment above refers to the semiotic potentials or meta-functions that determine PAL's primary function, as he emphasizes the experiential differences between PAL and a so-called virtual *club*. His perspective also describes a phenomenological experience, because his practices within PAL as the owner and manager of the sim are affected by the range of possible social interactions in the place, which is both constructed and represented by its design. Therefore, the experiential meta-function of PAL as a virtual place in SL is determined by the way it is designed, and Curiza's understanding of this aspect includes particular definitions while excludes certain others. Although both PAL and the aforementioned 'virtual clubs' present affordances for listening to music, attending live performances and socializing, PAL's emphasis is on content-experience, and not on the socialization aspect. PAL attempts to facilitate new activities, new multimodal ways

of expression and reception of digital artwork, and new experiential meanings for SL residents to experience through designed places. Thus, it is not just meant to be yet another SL club. In Xavier's quote below, it is possible to see how he –as a co-designer since the first PAL version – also thinks that the problem of being associated with a club is about people's expectations from the social affordances of the virtual place:

> Xavier: Curiza wanted it not to look like a club, because it was the *problem with the previous design*. People just dropped in, and said 'Oh, it's a nice club but there's nothing happening here right now'. And Curiza told them '*it's not a club. You just sit here and listen to the music*'. People couldn't get that with the previous design, so we tried to make them think like it DOESN'T look like a club.

Xavier has been involved in the PAL project since its early days, and his conceptualization of the design of PAL was significantly shaped by the feedback from previous versions of PAL. Thus, the overall multimodal composition of PAL was the result of a *reverse* semiotic thinking, where the co-designers constructed the interpersonal and experiential meaning potentials by thinking in terms of how *not* to design the place. A similar concern was repeatedly expressed by the co-designers AmyLee, Shaggy and Xavier when they reflect on how a virtual place for music should exceed the limitations of physical space. For AmyLee, the experiential potentials of PAL were among the top priorities in the sim's design:

> AmyLee: well we had 2 directions when starting, and i think we followed them pretty good... 1 is not being RL like, 2 is to have a design that makes people want to explore

> AmyLee: Old PAL was simple, symmetrical, small (half a sim size). It looked too much as a club, and people were disappointed because it is not a club. Also, the whole thing was visible at once, people were not really invited to explore. (...) We wanted the new design to be more open, different (not the club feeling), with various atmospheres (like the stage, the beach, the pods, the altitude pods, the mountain, etc.) And I think that people don't say any more "it is a club", but "what is this?" - which is the first step of an exploration.

The first quote exemplifies how the interpersonal ('not being RL like') and experiential ('a design that makes people want to explore') meanings were initially conceptualized by the co-designers of PAL. In the second quote, AmyLee explains how the design strategy was built upon the feedback they have received from the previous designs. The issue of 'making a place for people to explore' is a general purpose in the PAL project. The overall layout of the open space and the hidden places within PAL are purposefully designed in support of this function. Although PAL offers a variety of activities and hidden locations to explore, it is not easy to attract the attention of teleporting avatars, thus, to make them stay in the city and to encourage them to explore the place. As AmyLee

and Curiza mention, new coming avatars often spend little time in a place if it does not make sense to them, whereas visitors who invest time and effort will seek to comprehend what lies beneath the surface level:

> AmyLee: We know that the weakness for now is the *information to visitors*, and the way we deal with *the first 10 sec on the sim* (some people leave in 5 to 10 sec as they don't see the point!)

Here, AmyLee and Curiza reflect on their experience and learning in SL, as they acknowledge the interpretive and transformative agency of their users.

> Curiza: *It's like having a book*; and if you read the first 10 pages, it's not really exciting. But if you get hooked on it, then you get much more out of it. So that's how I see many sims in SL; that is, if you *invest some time* in it, you also get paid back in *rich experience*. But if you just look around and say "Oh there is no people", then you don't get anything.

Even though the overall design includes several alternative solutions to welcome the guests, to help them understand the island and learn what PAL is about, some visitors do not understand the main concept. Curiza relates this to the various conditions in which different visitors may engage in PAL.

> Curiza: So now, we kind of said "Ok*, our visitors are very diverse*." Some come because they search in Music, or in some style, some genre. And they get us. Other people come because they have heard that the design is nice. And then other people just come by accident, or because they find us on the 'Destination Guide' and want to check it out.

To sum up thus far, the analysis shows that the design of PAL has also been affected by the construction of its experiential meaning potentials by the co-designers, and the relations of these semiotic potentials are closely interrelated with the interpersonal and textual components of the meta-functional framework. According to the co-designers, the visual language of the exterior of PAL reflects its primary function, and aims to exclude certain types of semiotic associations by not including certain features. The analysis also points to the relations between the affordances of design elements and the potential social activities are important in construction of the experiential semiotics of the virtual place. On the other hand, the co-designers are aware of the diversity in the potential visitors' conditions of engagement; thus, they generate design solutions in order to communicate more efficiently with newcomers. As one significant example of this, the entry point to PAL is also mentioned as a significant feature in its design:

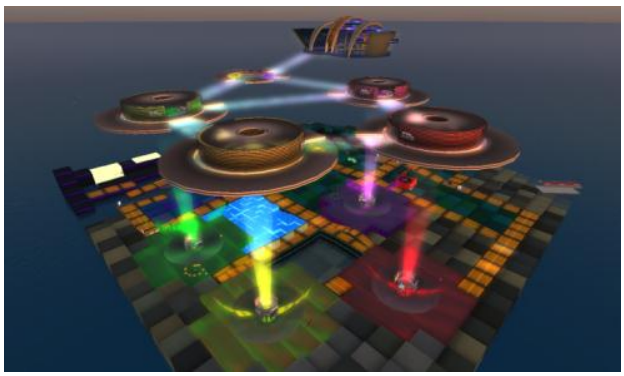
> Curiza: The TP is very important, you know, where you place the TP. We could've sent them directly into 'Rock' music dome, or whatever, but we kind of let them fall down (smile). So I would say we force people to explore.

In Curiza's comment the introduction of avatars to PAL is related to the emergent possibilities for the visitors' movements in the sim. The experiential dimension of 'letting them fall down' is therefore connected to the emergent semiotic cognitions of the users as they enter a new region. Visibility of the open-space design presents visitors with a first visual clue on the contents and their semiotic organization.

> AmyLee: So this makes the thinking different. In SL, you can fly, you don't hurt yourself if you fall, you teleport to places, etc. So this is a wide open space (I love flying through it!) There is a long pathway driving throughout the sim so people who like to walk can discover the sim at a slow pace. There is also a strong teleporter network, for people who want to go right to their point. We offer everything SL can offer to explore a place, in fact.

AmyLee thinks it the designer' task to consider "*how they walk, fly into it, what they will see from different standpoints*." For instance, open spaces allow the avatars fly and move more freely between locations, whereas teleport links can also transport them to specific places. Visual signifiers guide the visitors towards certain directions, or present paths to follow. In the quote below, Shaggy's view refers to how their assessment of visitor behaviors led them to make more open-ended representations for affordances:

> Shaggy: [P]eople, most of it, would walk in or fly or use the teleporters and explore. (…) And that was the idea we had at the beginning. We wanted some place that people would like to explore. Just not go there, sit there and listen to their music; but also walk and explore and be surprised (…) We tried to make as much diversity as we can in that space, so people can just appropriate this space to themselves.



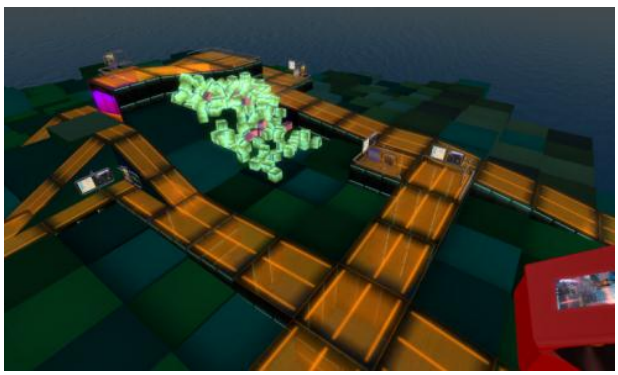


Figure 8.9. General view of PAL from above
Figure 8.10. Close-up view of the orange pathways that surround the sim

As a result, PAL's potential affordances to facilitate movement among places include both verbal and non-verbal signifiers (various combinations of image, color and text) and interactive elements that facilitate movements, or chronotopes. Following this line of thought, several visual signifiers

can be considered as the material foundation for experiential and interpersonal meta-functions, such as the *orange pathway* that crosses and divides the space all through the sim in order to provide visual guidance for visitors (figures 8.9 and 8.10).

The progression of PAL's design from its early designs in 2008 and 2009 to the current version in 2012 shows that most significant changes occurred in relation to experiential meta-functions, mainly the paths of movement and affordances / constraints of the designed places for navigation. The initial design of PAL in March 2008 (figure 8.11) reflects what Curiza describes as "*walk through sound/music design*" in which the visitor "*entered the lab in one end and had to walk through each dome which was kind of part of/connected to each other*." The design forced the visitors to move in a designated route and traverse various listening areas in a sequentially ordered closed space. Curiza states the problem with the first PAL was that "*very few [visitors] had a clue about what it was and what they should do*."

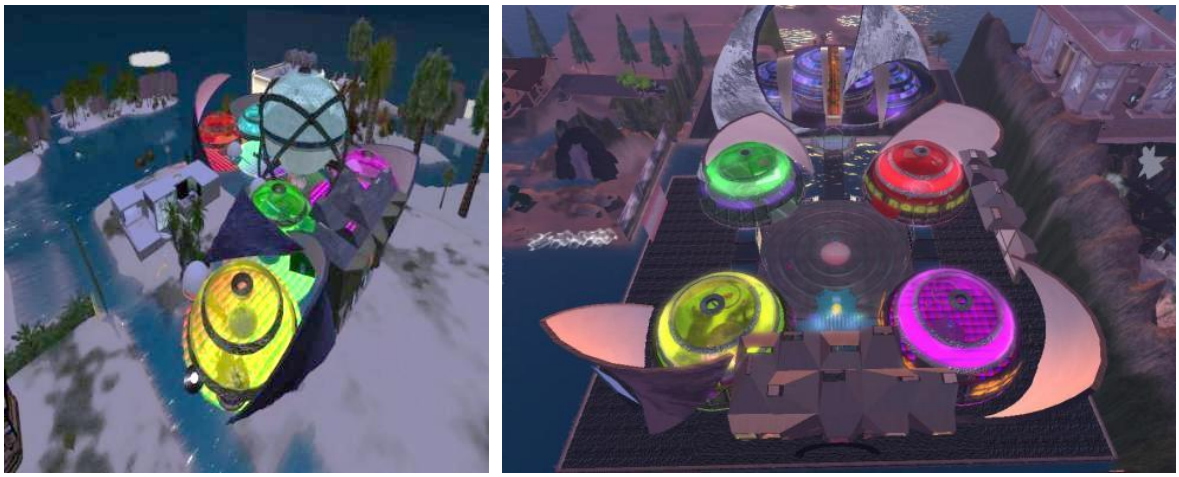


Figure 8.11. PAL's 'walk through sound design' concept in March 2008 (image by Curiza)
Figure 8.12. PAL's design in Jan 2009, after domes were separated and users enter from the center (image by Curiza)

On the experiential semiotic level, 'walking through sound' refers to the flow of movement through multimodal presentation of content, primarily music, but also dynamic information about the music streams and other graphics. The use of music with visual and spatial modalities such as colors and shapes aims to provide a semiotic coherence. With the following version designed in 2009 (figure 12)[9], the four listening areas were separated and a central meeting area was designed for positioning the entry point. The textual composition of various design elements was reorganized to emphasize the experiential meta-functions on practicality and exploration, while the

[9] In fact, first changes in the 'walk through sound' concept was made for PAL official opening night in September 2008, where Curiza and Xavier decided to separate the four domes (listening areas) and place the entry point to the center. The version in figure 12 is from January 2009 version, where Curiza says they "*kept that design and made it cooler*"

textual functions of the content (music) and its presentation (location-based streaming) remained essentially the same.

> Curiza: [T]he idea of this concept was to make it much more easy to navigate. And it WAS, it was clearly a success. (…) people landed here, in the center of it all, and they didn't have to think. They could open up their eyes and they would walk into some of these domes. Because there was water around it, so they were forced.

Although the 2009 version of PAL has a more flexible chronotope path for exploration, and more open spaces to navigate the avatars, for Curiza the idea is still based on getting the avatars "*locked into the center of it all*" and controlling their movements to a certain extent. The meeting area in the center designates not only the entry point, but also a position from which PAL affords multimodal selection/presentation of experiential meaning potentials. The current design of PAL, with its much more open field of vision and affordances to explore the place (relatively) without restraint, represents the result of such emergent semiotic processes. As the co-designers learn from the visitors' behaviors, their initial conceptualizations of affordances and constraints that determine the experiential meta-functions may change.

These social semiotic relations in Metrotopia and PAL projects make them compatible for a cross-case analysis. However, there are also important differences in terms of how the co- designers made use of multimodal semiotic resources, and how they re-appropriated these in their designs. Although there is a primary target group in both projects, they are also public locations. This means they are open to all visitors, and they can be searched and accessed through SL's default search engine. It is possible for these different visitors to make sense of the experiential – as well as interpersonal and textual - meaning potentials differently, depending on the contexts/conditions of their engaging. The co-designers try to consider possible affordances and constraints, while they may focus on particular features depending on initial design requirements. In the Metrotopia project, for instance, most of the ideas for interactive spaces, as well as the overall style and layout of the city, were decided upon by considering Caitlyn's needs as priority. Although the building phase made the material form and some functions emerge, Metrotopia's design has not changed much since the initial layout sketches of Caitlyn. In PAL, the primary objective (attracting visitors and sharing content) did not change; whereas the ways in which the co-designers chose to signify experiential and interpersonal aspects of the design were transformed in time; as did the textual composition of designed elements.

The workshop projects and construction of objects for avatar interaction

In the four workshop projects (figures 8.3 to 8.6.), the students practiced to use the GUI, create avatars, navigate, socialize and produce content in SL. The four groups of international students worked together both online and offline in order to design and produce virtual artifacts to communicate their social messages. As mentioned in Chapter 7, these four projects were designed as collaborative team-work during an intensive three-week workshop. The students were introduced to various resources beforehand to provide them with a richer solution space for building content in SL. They were also asked to accomplish smaller building tasks before they were engaged in their overall projects, by which we intended to familiarize them with various aspects of user interaction in SL. However, student groups' design projects also lacked particular experiential and textual features – in comparison to the other two cases, mainly because of the time limitations, and the frustrations by the steep learning-curve, as experienced by the students. Therefore, the workshop projects also show certain differences in rank-of-scale.

During the workshop, students were presented a fictional scenario based on a disaster which awaits the world in 2050. They were asked to design virtual places and artifacts in Metrotopia to find a solution to the imaginary problem. Details of the story were intentionally left open-ended for each group to determine their own problem-spaces. The collaborative working environment for students was the Sandbox/Park in Metrotopia; therefore group projects were limited in terms of size.

The first group project that I analyze (figure 8.3.) was produced by the group 'Venus and the Four Moons'. This group's scenario included four female deities visiting Earth (or SL) as Superheroes, and their fight to save the earth from male domination. The group's conceptualization of the solution space was highly influenced by gender politics. As students reflected in the focus group interview, their primary objective in choosing their visual style was to 'symbolize feminism'.

> LUT: At first we were thinking about designing a hairspray. Like some kind of poison
>
> (…)
>
> RUT: [W]e thought it won't look really like a hair spray. People won't understand it. Then we came up with the lipstick idea (…) it could look like other kinds of chemicals or something, not really a hairspray. So, we thought that the lipstick would be more symbolic (…) only women have these lipsticks.

As shown in Figure 8.3, the three-dimensional form of a lipstick was the foundation for their visual expression of their messages. The use of metaphors for symbolic expression of underlying rhetorical messages was also a commonly method used by the other student groups. One reason for

their interest in such metaphors for strengthening the interpersonal aspect of their design was their lack of proficiency in and access to semiotic resources of SL. Although the design projects were constructed by using prims, textures, animations and often sound clips, the students had difficulties to organize the interactive functions. For instance, the students wanted the spaceship to actually fly and be navigated by avatars, but their attempts to find and use a proper script to make their objects interactive failed. As a result, (interpersonally) the design is intended to be a 'spaceship shaped as a lipstick to symbolize feminism' while (experientially) what they could produce was a semi-functional model to represent their design concept visually. Therefore, students emphasized the representational aspects, through which they aimed to also signify the intended affordances for user interaction:

> LUT: It was the combination of power with fire behind, and feministic with the lipstick
>
> RUT: Yes, like two things in one, the power and the beauty. Symbolic things.
>
> AGN: I also liked the texture we put on our spaceship. And the texture of the moon. It really looked like a real moon …
>
> RUT: it wasn't a moon texture. It was like a stone or something. But we found it in Metrotopia (…)
>
> AGN: We just gave it more glow, more shine

Their decisions on the forms and the symbolic characters for expressing their overall message have an underlying semiotic framing. The problem with visual formulation of hairspray, and the choice of the form of a lipstick instead, can be considered as a conflict of interpersonal and textual meanings, the combination of which was intended to have multimodal semiotic coherence. When students found the rhetorical material to work with, their next challenge was to elaborate their messages by designing their objects. As explained in the previous chapter, the construction of a three-dimensional form by using prims as building blocks presents limitations; and these limitations were principally effective in the students' design processes.

The superheroes and supervillains group's (figure 8.4) narrative idea was based on appropriating popular movie characters and redesign them as supervillains. Their design included a 'magical jail' to hold the supervillains, a 'brainwashing machine' to symbolically change their attitudes, and a crane that links these two objects, which was intended to transport avatars from the jail to the machine but wasn't functional. As one student from the group mentions, their design concept was also based on visual metaphors and appropriation of intertextual semiotic associations:

> JUS: We wanted to symbolize nuclear power, countries that have the power to destroy the world. That was our communicative idea.

The third group project (figure 8.5) by the Awesome Three group contains two objects as design elements: an oversized pink stereo to disseminate messages on positive thinking and smartness, which also had large rotating antenna to represent broadcasting, and a multi-colored scripted dance floor, which students collected and reused for their purposes. For the Awesome Three group, a major challenge was to communicate the experiential functions of the design. They believe it is hard for non-users of SL to completely understand neither the meaning potentials of their designs nor challenges of the design process. In this group, the use of colors, textures, sound and animations as semiotic resources was significant, as the design of the group's concept was based on music and dancing.

The final group, Water Avengers, also designed two objects (figure 8.6). This group's design concept was based on water pollution, and similar to the Awesome Three group their aim was to create social awareness. However, the experiential meanings in their two objects do not show the same characteristics with the previous group, as their "*practical*" solution was meant to answer an experiential meaning while the "*symbolic*" solution serves as interpersonal signifier to their messages:

> CEL: There were two solutions to the problem
>
> GIU: One is more practical, and the swimming pool is like a monument
>
> MAT: The more important thing was to change the minds and behaviors of people
>
> CEL: Because you asked us to design objects that communicate something. We thought how can we communicate water pollution (..) then we thought monument.

The students in this group also mention the ways in which they used so-called "ecological" material textures and linguistic texts for constructing their rhetorical messages, supporting the multimodal idea. These "ecological" textures mainly included images of water and wood, which the students found in their SL inventories. Since one of the students in this group was proficient with graphic design software, they also utilized these tools to create texture maps, and imported these textures to SL.

Synthesis of the findings on experiential meta-functions in the three collaborative design cases

The first section of the multimodal analysis focused on the construction of the experiential meta-function, and investigated the ways in which virtual places and artifacts in the three case studies have been designed to accommodate movement, sense of presence and avatar interaction. The analysis of Metrotopia and PAL cases shows that designing virtual islands (sims) in SL requires the consideration of more than just avatar interaction with artifacts, as there are many issues about access, navigation and orientation of avatars in three-dimensional space, which have been mentioned by the co-designers. The student projects show considerable similarities to the other two projects in terms of students' intentions to design working models, whereas their lack of time, resources and experience with SL limited their possible solution spaces, especially in relation to signifying experiential meta-functions. As mentioned above, the student projects varied in size, but all of the four projects were smaller than the design projects in Metrotopia and PAL cases. The large-scale spatial organization of these two virtual places allows them to accommodate different types of avatar interaction with multiple visitors, and provides more comprehensive insights for the analysis of the experiential meta-function. On the other hand, the analysis shows that certain visual and structural elements are used to convey meaning and accommodate actions in all three cases. The use of graphics, textures and visual styles are among such elements, which not only determine the experiential potentials for movement and interaction, but also refer to the interpersonal and textual meaning potentials.

The analysis also considers the affordances for movement between and within these places as parts of their experiential meaning potentials, and investigates the modes of signifying movement, direction and orientation in the designs. This aspect brings forth the theoretical notions of chronotopes and phenomenology of avatar experiences in virtual places. Although certain design references to chronotopes were observed in the Workshop projects, the lack of large scale spatial creations make it harder to analyze this particular topic through this case study. On the other hand, examples such as the 'brainwashing machine' and 'magical jail' idea of the Superheroes and Supervillains group (figure 8.4), who attempted to connect these two compositional elements by an animated crane, show that avatar chronotopes were also considered as a part of the problem space. However in Metrotopia and PAL, various other strategies were used by the co-designers to afford particular types of movement, while constraining others. While the overall layout of space, location of entry point, and flow of chronotopes among interaction spaces are important considerations for place-making, semiotic coherence of experiential, textual and interpersonal meta-functions defines these places as meaningful communication environments.

8.3. Constructing the interpersonal meta-functions: visual style, social presence and the transformative agency of visitor feedback

I have already mentioned several cases in which the interpersonal meta-functions within the designed places and artifacts are related to their experiential meaning potentials. In this section, my aim is to discuss the ways of constructing interpersonal semiotic potentials to communicate with the visitors about particular design concepts, and the ways in which the design of virtual places and artifacts mediate communication by emphasizing a sense of social presence. I analyze how the co-designers of collaborative projects choose to employ some metaphors while avoiding others, and build their discourses in reference to the intertextual visual languages of various genres; in that, they consider semiotic references to various other sign-systems. Then, my focus shift to the design of interaction places, and how their interpersonal meaning potentials are constructed in order to facilitate co-presence and social interaction. Finally, I will outline some co-designer comments on how the visitors react to the intended interpersonal potentials, particularly cases where visitors build inadvertent associations with the place or expectations about its affordances and constraints. In this section and onwards, I will structure the analysis in terms of several analytical concepts and discuss the findings from the three cases in reference to each these concepts in the sub-sections, instead of categorizing the findings for each case study separately.

Design of visual styles, genres conventions and intertextual metaphors

As mentioned earlier, Metrotopia was designed to fulfill a practical function in Caitlyn's research experiment. Her reasoning behind design principles for the sim followed an intertextual path in relation to her goals in using SL as part of a larger media context for research. Signifiers as design elements in Metrotopia often refer to major tropes of superhero genre, in accordance with the sim's overall design which reflects American metropolitan structures with high-rise buildings, US-standard street lines and English as common language. Although the characteristics of the chosen genre have common fictional elements (i.e. costumes, superpowers, fighting) with the general 'fantasy' genre, Caitlyn claims Superheroes were "easier to replicate in SL' because 'it has a little bit more basis in modern world'.

> Caitlyn: [T]here are definitely movies that are superhero movies. There are video games that are superhero games. There are, well at the time there was only one real superhero MMORPG, there's a couple more now. But what to do in SL?

Next challenge for the co-designers was to find proper semiotic resources and appropriate them to the overall design to reflect it semiotic meta-functions. This part was done as a collaborative effort, whereas Caitlyn made most of the final decisions as to which tropes relate to the genre style.

> Caitlyn: [L]ooking at what makes up a superhero genre, what are the main tropes of the superhero genre, and then identifying those tropes, with which I have a lot of experience because I am a fan and I studied it before. I could figure out what would be the main things that people would be expecting to see in SL if it's related to superheroes.

Caitlyn's comment above illustrates how textual features that make up the genre framework are interconnected to the experiential and interpersonal meta-functions of the overall experience. She continues to explain how the overall layout was designed in accordance to the superhero genre:

> Caitlyn: So that reflects all of the various, well not all but some of the various genre conventions for superheroes, such as the costume. The whole island then is constructed to reflect superhero genre conventions. *It is a metropolitan area, hence Metrotopia..*

Possibilities of design exploration in Metrotopia were purposefully limited by the genre conventions, therefore the interpersonal meaning potentials serve a different purpose, which is essentially intertextual. Representation of 'basic urban structures' works as an interpersonal signifier, while orchestration of semiotic resources - organization of streets, division and organization of regions - supports the experiential meta-function. During the group interview with the design team, my comment on Metrotopia's visual form and its relations to American and Danish architectural styles open up a short discussion on signification of visual identity in design:

> Caitlyn: The overall decoration of the city is kind of a combination of American cosmopolitan and Danish cosmopolitan
>
> (...)
>
> Aspen: I don't think we have created this to look actually Danish, we were trying to create it to not be a specific place, to make it look -yes- cosmopolitan. It would have been very easy to make it look Danish but that was not the purpose. (...) And I also believe that most of the visitors on this city are non-Danish.

Figure 8.20. (left) Exterior view from Museum of Superheroes, aimed to reflect 'Greco-roman style'
Figure 8.21. (right) Multimodal organization of information about superheroes inside the museum

In our second interview, she explains how the overall American outlook is a result of commonality and familiarity with the visual language. According to Caitlyn, the team decided to "*replicate American metropolitan places, because those are more common for the superhero genre than European metropolitan places.*" Visitors are expected to make sense of the place quickly, by generating and resolving what she describes as 'questions' about what the place means and what potential affordances and constraints it offers for mediated interaction.

In the PAL case, the co-designers framed their visual language more freely, as they were not constrained by particular genre conventions. According to the co-designers, their aim was to emphasize the unique potentials of listening to music while experiencing the virtual place. By most of its co-designers, PAL's design was described as "*SL-like*" (AmyLee and Shaggy) or "*SL-ish*" (Xavier) rather than being associated with a particular genre. The co-designers indicate a form of semiotic resistance to norms of RL, and the physical constraints that "RL places" present. It was also mentioned that certain visual references were used in order to familiarize visitors to the landscape (i.e. "*natural*" colors and layout) while the overall visual expression is built on iteration of simple geometric forms, extensive use of colors, and flying structures that signify the virtuality of the place.

> AmyLee: [I]t was very important, right from the beginning, not to offer a RL replica. We really wanted to offer people a unique experience, something they can't have anywhere else. (…) I know some people are almost upset when they don't recognize the place as something they could see in their everyday life. But, anyway, this choice was natural, we all (Curiza, Shaggy, Xavier, me) wanted something totally SL.

> Shaggy: you'll have some people who will definitely need SL to be SL and some other people who will need to find in SL what they know in RL. You have all these kinds of people. So, you've got to please everyone.

For Shaggy, properly representing the balance of visual style/form and functionality was an important consideration in design from the beginning:

> Shaggy: [J]ust making something that is totally different and just the opposite of what you could see in the real world. But you don't have to be too much surprising. I mean, people must understand quickly where they are and what this place is about. So there's a balance to be found, at some point.

Curiza explains his original intentions as being 'futuristic', which lead to the first 'walk through sound' design of the virtual place:

> Curiza: I told Xavier "Xavier I want a music place where people can come, and it must look like you can do whatever you like, it must look like 2040 or something. Really futuristic"

It is possible to partially infer Curiza's position towards representations of 'futurism and virtuality' in relation to PAL –which he calls "*very non-human"* - and SL from his next comment :

> Curiza: If I want to create this futuristic music space, then … I can't mix in nature in that because it's on a computer, it's superficial. So why mix these worlds? I mean you can't smell a flower, which is one of the things what a flower can be. It can be very beautiful, but you can't smell it in there. Of course you can create some magic using plants and stuff like that, but it had just never been the plan for my sim.

Similar to Metrotopia and PAL, the workshop student designs involved orchestration of various discursive elements and actors, including images and characters from different mythologies, movie characters and their re-semiotization as trans-gender personas, and representation of ideological content through forms, colors and multimodal (verbal/non-verbal) messages. As the groups followed the pre-constructed narrative framing in Metrotopia, their projects differentiated in terms of the use of intertextual metaphors as narrative elements. For instance, the *Superheroes and Supervillains* group re-created popular figures from fantasy fiction films and developed a design concept in reference to these stories, whereas the Venus and the Four Moons group's design concept and the stories of their avatars as super-heroines reflected the ancient Egyptian mythology, with the conceptual support of their feminist approach to signification. The students had limited time and resources, thus they focused on the visual representation of messages rather than construction of complex interactions. In their final presentations, students presented not only their objects, but also their stories, their characters and a brief context-definition for illustrating the problem their project aimed to solve. Within my analytical matrix (table 8.1) construction of such intertextual representations, and genre frameworks, refer to both interpersonal and experiential meta-functions. Therefore, the semiotic cohesion of design elements not only affects the aesthetic style of the overall design, but also shapes the construction of interpersonal meaning potentials in particular areas for social presence and avatar interaction.

Design of interaction places and signification of social presence

Particular divisions and categorizations of the place often refer to designated areas for avatars to meet and do things together. Multimodal compositions of meeting places, and artifacts that constitute these spaces, usually refer to their meaning potentials as interpersonal and experiential agents. The interpersonal meta-function at this level signifies the meaningful social activities and the ways in which the co-designers organized the environment to afford communication between

avatars. In the Metrotopia and PAL projects, these communications often take place within the specific areas that are designed with specific affordances. Therefore, my analysis of meeting places focuses on the scale of divisions and elevations within the overall designs for various mediated social actions (adopted from O'Toole [2004]). I exemplify my discussions on findings such as sandboxes for content generation, stages for live concerts, or dance floors for listening to music while dancing and chatting. As I have explained earlier with reference to Caitlyn's comments, Metrotopia's designed layout illustrates the division of space into a group of places that emphasize particular types of mediated action. Fight Club Dojo is designed to accommodate using weapons and fighting with other avatars, Park / Sandbox is for creating (or rezzing) virtual objects, the Museum is for gathering information on Superheroes, or the Costume Bazaar is for avatar modification and character creation. PAL's layout also shows similarities in terms of functional division of space and use of semiotic elements to signify particular types of activities. PAL has colorful seating areas for public listening, upper-level pods as more intimate places, a social club. an open-air stage for parties and concerts, and a virtual TV studio for broadcasting live talk-shows. These places

Although not all workshop student projects had sufficient spatial and interpersonal characteristics to be considered as *interaction places,* the example I am going to analyze in this section (the oversize pink stereo and the dance floor by the Awesome Three group) bears certain affordances for social presence. By using particular examples from these various places, I will demonstrate my arguments on how interaction places are experientially, interpersonally and textually signified by the co- designers.

One example of these designated social spaces is Metrotopia's Park/Sandbox area. This area emphasizes SL's affordances for creating virtual objects, collaborating on content generation tasks and meeting builders. In fact, the Sandbox has been the most popular location in Metrotopia to this day; in that it attracts various random visitors to the city for building purposes. Therefore, the practical function of the Sandbox often re-appropriates its purpose as a social environment for a specific type of mediated action. Caitlyn describes the "*overall idea*" of the visual language as "*to replicate a standard park, a standard meeting place with trees and flowers and a playground*", while implying the area's meaning potentials as "*a standard meeting place, a place to hang around.*" Design of the Sandbox also had undergone a significant change during the workshop. The ground floor (with natural texture) was replaced with a colorful metric grid (which shows numeric positions and sizes on ground plane) to assist content-generators (figures 22 and 23).

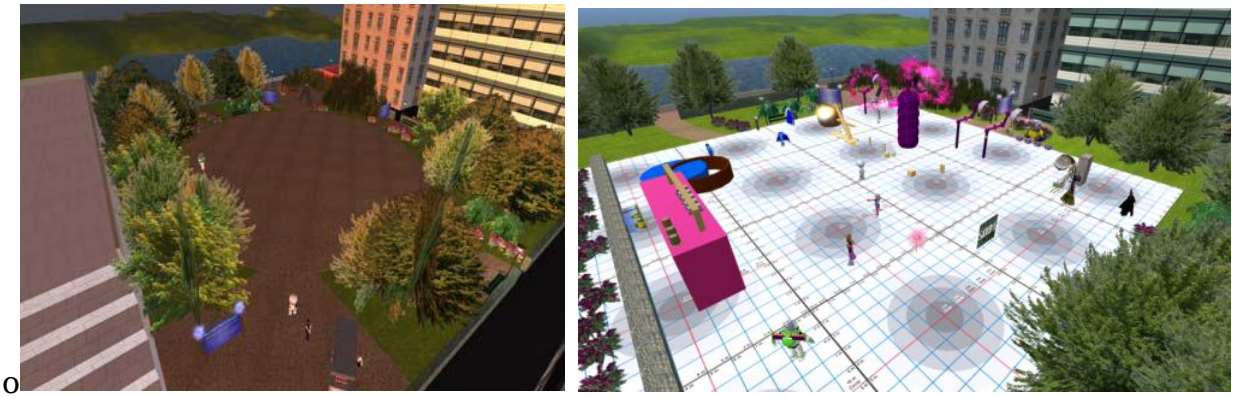
o 

Figure 8.22. (left) Metrotopia Park/Sandbox as it was originally built for Caitlyn's experiment
Figure 8.23. (right) The addition of the metric grid as ground plane to the Park/Sandbox during Communication and Design Workshop

In PAL, social areas within the four listening zones are marked by seating elements (figure 24) and various activity (pose) balls. Co- designers AmyLee and Shaggy mentioned the role of seating units in constructing the experiential potentials of a virtual place, inviting avatars to sit down, chat and socialize.

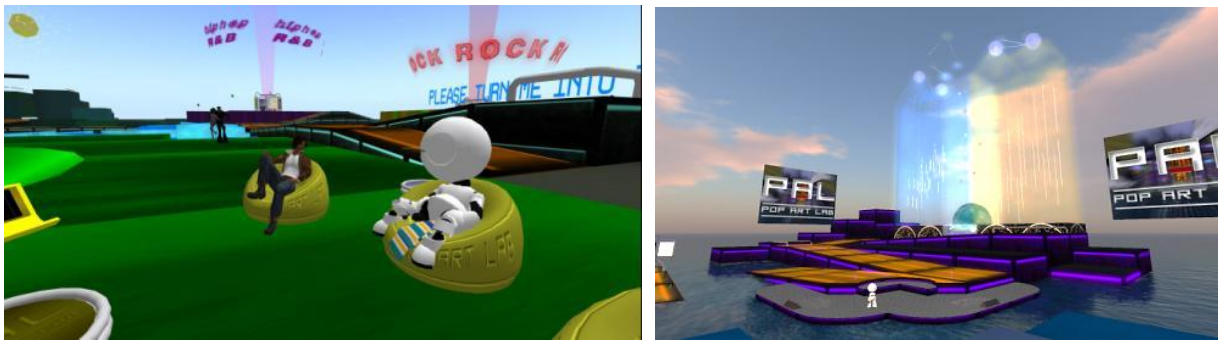


Figure 8.24. (left) Interviewing with Shaggy at PAL's Electronica Zone
Figure 8.25. (right) View from PAL's stage for live concerts and activities

In PAL, being inclusive in visitor profiles, and attracting random traffic is often an important concern for the co- designers. Curiza's comment below emphasizes the importance of social presence in creation of user experience, and how he thinks PAL's visitors react to the degree of social affordances in the virtual place:

> Curiza: I would say, I don't know the figures, but maybe 60 to 70 % of all people into SL, they come to a sim to *socialize*. So, *you can put up as much beautiful buildings*, as lots bots and explanation areas about how/what to do in this sim. But, they look at the map and they see there's two people, and then they disappear. And I really think that's up to 50 maybe 70 % of all my visitors in my sim. They typically TP away because they find out that there's *no people*.

Curiza's experience highlights that social presence is important for many residents of SL. This produces a challenge for the co-designers, as they aim to present the place not as a club, but as a social environment for music. While the challenge is attracting people's attention, it is then followed by the need to inform them properly about the experiential functions, make certain affordances for social activities visible. As AmyLee explains, her imagined user activity is nonetheless a social one: "*ideally, people could come here, bring friends, listen to music while chatting*." The use and organization of design elements in relation to their experiential meta-functions form representations of affordances and constraints for potential social activities. These design elements are used as multimodal signifiers for affordances and constraints, and aim to reinforce the overall semiotic purpose. These 'functional' signifiers may be seating units for avatars to sit together and socialize (figure 8.24), information surfaces to visit the PAL website and to learn more about the streaming music, or a ditch of virtual water that separates the stage from the audience. The concert stage of PAL (figure 8.25) is designed to accommodate various forms of social activities, including live concerts and Machinima screenings. The stage is visually separated from the area where avatars of the audience usually sit and/or dance, while the interior design of the stage is modified according to the characteristics of each particular event. The stage and its visual contents operate as interpersonal and experiential semiotic agents by directing the audience's focus of attention to the ongoing event, and signifying what type of activity is going on:

> Shaggy: If you want to do a stage, for example, you can do a realistic stage or you can do just the way we did. You put an area where the singer could stand. You put a microphone and a speaker. And with just 3 elements, people know it's a stage, there's no need to put something else around. (…) But the game is to find the 2 or 3 elements, where people see them and say 'oh this is the place to sit and discuss with people, or oh this is the stage' (…) So that was the game here, to find the absolute minimum to let people know where they are. And the rest can be just crazy.

As explained above, the primary experiential functions of this area are forming stage for concerts, separating audience from the band and/or screen, and producing a meeting area for social events. Within the interpersonal level, the design functions as representation of type and content of the social event. It is a reference to similar real-world events and set designs with the minimalistic approach, which is a result of not only the technical limitations (prim limit) but also the goal to create a "SL-like" virtual aesthetics.

The final example I will present here is a workshop group project by the Awesome Three group (figure 8.5.). Among the four group projects, this one shows the most discernible textual characteristics in terms of division and organization of space for specific experiential functions. Their object consists of two major textual elements: an oversized pink stereo with rotating antenna

and posters with positive political messages, and the multi-colored scripted dance floor. The visual style essentially refers to a multimodal experience centered on the music and the visuals. The experience is textually supported by the emphasis on the size and form of the stereo device - a visual and metaphorical link to the real-world product-, rotating antenna on both sides, and respective positioning of the speakers and the dance floor, which signifies a direction for the experience to flow. The co-designers want to attract the attention of avatars, to whom the actual rhetorical content (political message) is directed, to the meeting place that is provided by the dance floor. Therefore, unlike PAL, the primary experiential function of this space is not dissemination of multimodal content. The design has a dominant discursive political agenda to communicate with its visitors/users. Multimodality is used as a design resource by which the co-designers semiotize available communication channels for properly communicating their messages, while offering users with the affordances for getting engaged in the design.

Interpersonal meaning potentials and the transformative agency of visitors

In some situations, the co-designers' intentions with particular representations do not match with the actual use-contexts in which the meaning potentials are actualized by the visitors. In other words, I am interested in specific design cases, in which user feedback challenges the co- designers' semiotic associations with their objects, and possibly leads them to modify their design decisions. Metrotopia and PAL cases show important differences in terms of the visitor feedback aspect, mainly because of the relatively longer time schedules of these two projects. However, the limited time period of the workshop projects did not allow other visitors to try out and comment on the designs. Therefore, this section will exemplify the arguments by drawing on the first two cases.

For instance, Caitlyn reviews the research participants' efficacy of engagement with Metrotopia, and she concludes that the locations which succeeded in getting more traffic were the interaction places with specific experiential potentials. It is possible to relate Caitlyn's comment below to the construction of interpersonal meta-functions in order to capture the attention of visitors.

> Caitlyn: The costume bazaar worked really well, because they came up with a lot of interesting costumes. And the Dojo worked well, lot of people had some interesting interactions with Sensei Serenity. The rest of the island didn't work terribly well, because it wasn't interactive enough, it wasn't alive enough. There wasn't enough to do. So people would go away, and just go often do explore other parts of SL.

Caitlyn's observations led her to think that interactivity is an essential feature in design of places, in order to get people engaged. However, Metrotopia's design was not changed until observation stage of Caitlyn's experiment was over, mainly because of a practical methodological limitation: all

participants were required to experience the same environment in order for her research to be consistent. Therefore, the feedback from the visitors did not have a determining effect on the overall design of Metrotopia.

PAL's design process showed a significant difference in terms of the role of user feedback and the co- designers' interventions in the overall design. As mentioned earlier, PAL has been designed and redesigned several times since 2008. Most of the design changes were consequences of their observations of user behavior in current versions, and unexpected responses that challenge Curiza and others to revisit their initial decisions. I have already discussed design (re-) considerations as a result of the misinterpretation of PAL as a "club", in relation to construction of experiential meta-functions. In this example, problem with visitor reaction was mainly caused by the lack of proper interpersonal cues that signify the experiential potentials. In terms of the smaller scale interaction with interaction spaces and artifacts, one particular example was frequently mentioned by the co-designers. The issue is the presence or absence of seating units in virtual environment, especially during social events such as concerts and life shows:

> AmyLee: I was very surprised, for example, one day … I made a stage … and i thought people would stand, dancing, around the singer … but during the concert, most of them tried to sit somewhere (…) there was no seats, so they sat on anything

Shaggy explains that they include seats in later designs because of the positive feedback they received from earlier versions, because "people just feel like they're chilling" there. Xavier links the need for seating units to an experiential condition: visitors may want to engage in other, more personal, types of interaction while leaving their avatars stationary.

> Xavier: if you create a place in SL that there's nowhere to sit, some people would not like it. That's pretty strange because, I mean, you can just stand and you won't get tired

> Xavier: The other day, I was at a concert at PAL, and everybody was sitting down. I was standing and dancing, but it was funny. People sat down and watched the concert. I think "Why are the people sitting down?" (…) But I think because (…) in a concert, they chat, and they don't want their avatar do all these kind of dances or walk into somebody or dance into somebody. Then it's fixed, in a fixed place and I can focus on chatting or IM'ing or whatever.

In the case of virtual seating units, Xavier's confusion is caused by his interpretation of experiential and interpersonal features of avatar interaction: the question (for him) is 'avatars do not get tired, then why do they want to sit?' In general, it is possible to say that the transformative agency of the visitors in the PAL project was much more apparent, and the feedback that has been received throughout the years had significant effects on the construction of its design features.

Synthesis of the findings on interpersonal meta-functions in the three collaborative design cases

The analysis of the interpersonal meta-function focused on three central themes: the creation of a visual design language that is supported by intertextual semiotic relations to other meaning sytems, the signification of social presence and social affordances by the design of virtual places, and the ways in which the transformative agency of the visitors may cause the co-designers to re-consider the elements of semiotic cohesion. The analysis shows that the signification of interpersonal meta-function is closely related to the co-designers' individual and collective interpretations of the visitors' experiences, and their methods of engaging with the places in SL.

When the visual styles are analyzed, the Metrotopia and the workshop cases stand out with their noticeable references to specific genre conventions about fiction, fantasy, and particularly superheroes. On the other hand, the representation of what the co-designers describe as a 'SL-like' place brings forth a comparative situation, where the sign-makers derive their visual references from the contrasting paradigm that is the so-called RL, instead of following a conventional genre style. It was shown in Curiza's comments that his intentions were not limited to creating a SL-like place, but he imagined PAL as a 'futuristic' place. In all three cases, the construction of the interpersonal meaning potentials was related to the organization of spatial elements to signify certain activities that were also relevant to the design framework. In many cases, especially in Metrotopia and PAL, some of these activity-oriented places primarily aim to build a sense of social presence. According to the co-designers of Metrotopia, social presence in design can be achieved by the proper organization of the elements in a place, such placing several seating elements together, building stages for live events, or providing social places for the avatars to play, learn or build together.

Therefore, the analysis of the interpersonal meta-function shows that the meaning potentials at this level are also closely related to the ways in which the other two meta-functions are organized. In other words, the meaning potentials of visual and metaphorical elements in design are meaningful to the co-designers when they also afford certain types of social action, or evokes certain feelings. It is also possible to relate the construction of interpersonal features to the textual function, as the signification of social aspects is shaped by the internal and external organization of places. The following section will analyze the textual meta-function in relation to these discussions.

8.4. Constructing the textual meta-functions: building blocks, spatial organizations and multimodal cohesion in design elements

This section of analysis outlines the findings on the textual meta-function in the three design cases. I focus on the organizational coherence of various multimodal units that constitute virtual places and artifacts as meaningful semiotic texts. The textual meta-function is concerned with the structural compositions of different modalities and design elements that constitute the virtual places. Within the analysis of the textual meta-function, I will discuss the spatial organization of open and/or closed places in relation to their surroundings, the meaning potentials of building blocks (prims) as structural units, and multimodal cohesion within the organization of prims, textures and animations as elements of design. I will also focus on how specific textual features are designed and organized to explore the ways in which the co-designers choose to emphasize particular affordances and/or constraints to support experiential and interpersonal meaning potentials.

Three-dimensional organization of the virtual place: divisions and elevations

Textual elements of design include divisions and elevations of the sim and organization of interaction spaces as functional areas. In Metrotopia, these functional areas were designed to correspond to particular mediated activities, and most interactive spaces are located on the ground floor (except the posing studio and other smaller elements). The city is divided into smaller areas by placing textured mega-prims as streets, and connections between places signify different sections of a real-world city.

In both Metrotopia and PAL projects, open and closed spaces are used to fulfill various experiential functions. Connections between these places afford walking, flying or teleporting to specific locations. In Metrotopia, main connection routes signify city roads, and divide the city into several functional areas. Open interaction spaces in Metrotopia include the costume bazaar, posing studio (on the roof of gym), sandbox/park and the main roads[15]; closed spaces include the Fight Club, museum, gym, and welcoming area which contain the entry point. On both eastern and western edges, the main street ends with visual signifiers to inform visitors that the sim ends at that point.

[15] Although some of these places are surrounded by other buildings or objects, I describe them as 'open spaces' because they do not have a ceiling plane to avoid avatars to move in the third dimension by flying upwards. 'Closed spaces' are defined by all vertical and horizontal surfaces, such as a room in a house.

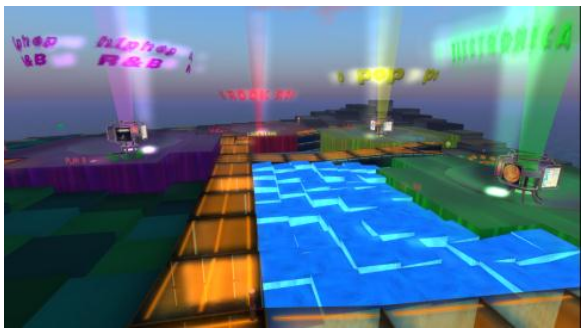


Figure 8.26. (left) The draw-bridge at east-end of Metrotopia's main street , which separates the sim from neighbors
Figure 8.27. (right) PAL's color-coded music zones and the "pixel landscape" made of cubes with "natural" colors

On the other hand, division of space in PAL demonstrates an important experiential potential. As visitors move their avatars within the sim and enter different zones, the music they hear through SL changes.

> AmyLee: in fact, each area contains one stream. you can define areas ("parcels") on the sim and give each a different stream . a parcel will have a style of music and will be the same whatever the altitude. [this is] why the rock pod is at the vertical of the rock area on lower deck, for example. theres a link between where you are and the music you get: thats how sl works

The visual and structural connections between the elevated places and the ground plane are conceptualized differently in the two projects. In Metrotopia, elevations are usually embedded into the sim's design as rooftops, where various interactive and/or multimodal elements are placed on top of high-rise buildings. This design strategy was partly a result of the co-designers' appropriation of chosen genre conventions as interpersonal meaning potentials of familiar Superhero narratives. However, in PAL's design, the emphasis on non-conventional aesthetics of virtuality becomes more apparent. Elevations from ground floor to the 'flying' pods are visualized by colorful light cones, emphasizing the structural affordances (of a 'gravity-free' world) in contrast to the physical constraints of RL.

The workshop project that I will revisit under this title is Venus and the Four Moon group's lipstick-shaped spaceship (figure 8.3), particularly how students elevated particular design elements. In this case, experiential meaning potentials were related to signification of the practical function of the object (a spaceship with weapons), while the interpersonal features on symbolizing 'feminism' were visible in their choice of specific forms and colors (two red lipsticks as engines). The area in which the spaceship ought to be navigated is designed as a control room for the four (goddess-)avatars to fit in, and students designed chairs for navigators to sit. This cockpit is placed

under the top-surface of a metallic arch, the visual function of which is to connect two lipstick-engines. In this case, textual meta-functions of various design elements support the signification of practical functions of design and rhetorical intentions of designers.

In synthesis, the analysis shows that the creating a sense of scale in designed places by divisions and elevations of design elements is a commonly used method for producing experiential and interpersonal meaning potentials. I consider elevation of surfaces and objects on VW grid as a design strategy to expand the range of affordances in designed places, and to use the three dimensional space more effectively. One particular factor behind the organizational logic of the place is the presence of avatars, and the need to present visually accessible signifiers for the practical use functions to communicate the affordances and/or constraints. As in PAL's 'pixel landscape' metaphor, emergent meaning potentials of textual elements can sometimes surface as the dominant visual element, within which other modalities are composed. Therefore, next section will focus on my observations on the use of prims as units of construction and semiotic resources for the co-designers.

The prim system as semiotic resource for virtual place-making

In Chapter 7, I have explained how the default way of constructing virtual objects in SL by using simple geometric units (prims) presents both affordances and constraints. The co-designers in the three cases usually produced complex forms by modifying and combining prims in various compositions, animating and functionalizing them by adding scripts, adjusting textures, opacity and/or glow effects[16]. The common method for building objects in all three case studies included the creation of arrangements of prims and appropriation of other resources (i.e. objects, textures, scripts). For instance, all high-rise buildings in Metrotopia comprised of prims, but textual organizations of geometric units show differences with respect to the intended experiential functions. While buildings that have interior interaction spaces (i.e. Museum, Fight Club) were built by using prims with various sizes as floor, ceiling and wall planes, non-functioning buildings were built by using minimum amount of prims (usually 3-4 mega-prims) to avoid overloading visitors' computers. Another textual constraint for place-making is the prim-limit, or the limitation of the maximum numbers allowed on a sim, which significantly affects the textual solutions employed in making large-scale designs such as Metrotopia or PAL.

[16] An alternative method to produce complex shapes is called 'sculpted prims', which allow designers to design amorphous forms as single shapes in auxiliary software and import them as 3D-displacement textures[16]. However, sculpted prims also bear practical limitations for constructing a satisfactory user experience (especially for visitors with lower CPU capabilities) and they need specific resources / competences to work with, and they were rarely preferred by the co-designers.

Use of prims as semiotic units is most apparently manifested in design of PAL's landscape. According to AmyLee, the 600+ colorful cubes construct PAL's ground floor. These cubes are identical in size, but they are organized in random heights in order to form a semi-continuous ground surface, partially leaving areas open for water to fill and divide paths. The landscape idea was designed and built by AmyLee and Shaggy, who later presented the matured version of the design (which was initially filled with *white* cubes) to other members. Both Xavier and Curiza –the two Danish members of the design team – mention the intertextual associations they have noticed with the Danish modular construction toy LEGO:

> Xavier: We were talking if we should do it like LEGOs and make the LEGO dots on top of each box, but that was too much. But we talked about that for a certain period.
>
> Curiza: We met there and she presented the basic sim design, of all these cubes, and we were just "AmyLee, have you ever been to LEGO in Denmark?" so actually we called it "PAL-LEGO" or "LEGO-PAL" or something. And I was almost ready to call LEGO to make them collaborate with us. But that was a bit funny because AmyLee replied that no she'd never been to Lego, she barely knew what it was.

The emergent textual semiotic associations with LEGOs brought forth a new design idea, thus initiated another interpersonal discussion about the visual language and intertextual metaphors. Although the co-designers did not follow this path and created an authentic visual style with prims, similarities still exist between the two concepts.

Here, it is possible to ask: Is it unusual that AmyLee and Shaggy never mentioned LEGO during concept design? Can designers be expected to foresee every possible semiotic association with their objects in all social situations? In this case, it was not the makers of the visual form - AmyLee or Shaggy- who made the semiotic association. Xavier and Curiza's intertextual recognition of the building blocks (cubes) opened up a new semiotic trajectory for the development of design, which was discussed for a while but not followed as a guiding aesthetic principle.

In fact, the 600+ cubes that construct PAL's dominant aesthetics operate in all three socio-semiotic levels. Textually, cubes function as simple geometries of modular units of construction. Although all cubes have similar textual features, which AmyLee describes as "plain colors with shadows and scratches", they vary in color and position.

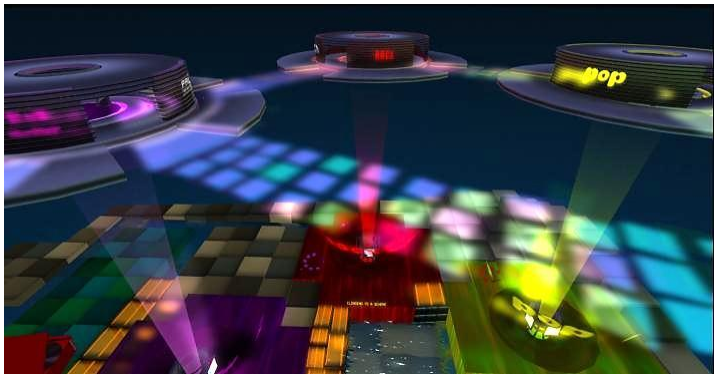


Figure 8.28 Air-view of the PAL sim, and light-paths for walking between upper-level listening pods

These variations lead to an emphasis on the experiential function, as the textual organization of cubes produce the ground plane and signify pathways to follow. Finally, the metaphorical associations to potential (real-world) places lead the co-designers to derive an interpersonal meaning potential, which was described by Xavier and Shaggy as a 'pixel' or 'digital' landscape:

> Shaggy: Basically the idea … was … an array of cubes with different heights like a digital landscape. (…) And when I had the sim filled with these cubes, I've done hills and valleys
>
> Xavier: The design is very abstract. It's like a landscape but it's made out of boxes. So it's like a "pixel-landscape", I think we can call it that. And that was the main idea.

Furthermore, these interpersonal relations, such as Shaggy's metaphorization of 'hills and valleys', lead Xavier to imagine it as a real-world landscape:

> Xavier: AmyLee built the landscape and she said "Come look, what do you think about it?." And I said "This is Scotland!", we have a valley and a river in the bottom down at the valley, the stage that is one side of the mountain, and all the audience is on the other side when you look across the valley.

Xavier, AmyLee and Curiza also comment on the later development of the 'pixel landscape' concept, especially in relation to the orange pathway that was designed to guide the visitor chronotopes toward various multimodal interaction spaces. Similar to the avenues and streets designed in Metrotopia to guide movement, PAL's open-space layout also affords visual clues to particular directions embedded as textual elements. On the other hand, this orange pathway was the subject of another discussion between the co-designers: while Xavier aimed at a pure abstraction of the 'pixel landscape' concept, Emily's intention was to guide the movements of visitors. Here, the decision making processes and the power relations within groups are also relevant in the analysis of a virtual place's semiotic potentials form a sign-maker's point of view.

Modes and multimodal design elements

A variety of audio-visual modes, linguistic and non-verbal signs, interactive graphics and spatial representations are often used as textual elements in designed places and artifacts. In Metrotopia, verbal and non-verbal modes were orchestrated in making of posters, orientation kiosks, costume booths and information surfaces, such as the custom-made video screen in the museum. Multimodal compositions of text and graphic design have been used extensively to signify the intended use-contexts, direct and support movement to particular locations, and provide a coherent visual language to the overall genre framing. One example is the Metrotopia logo:

> Caitlyn: The logo was designed because we wanted to have a specific visual representation for the island for branding purposes. (…) The experiment is not going to be going on for too much longer, and we are not going to destroy this place afterwards. We want to actually create a presence in SL, so we have a branding. And you'll find this branding occurring all over the city.

As Caitlyn reflects, the primary functions of the logo (branding and representing the sim) refer to its experiential and interpersonal meaning potentials in specific contexts. Selection of forms and colors aims to achieve visual coherence with other parts of the city and specified genre conventions.

Figure 8.29. (left) Caitlyn's initial sketch for the Metrotopia logo
Figure 8.30. (right) The final version of the logo that is used for branding the city

Similar to Metrotopia, PAL's logo (figure 8.18) is also designed to represent the sim, and it is used extensively as a graphic element around the city, as well as the PAL website[17] and its presence in other social media platforms. A similar practical concern of branding is also expressed about the design of PAL logo:

[17] http://www.popartlab.com

AmyLee: we have pretty cool logos (made by Xavier and some by RW), we wanted the whole sim to be part of the visual uniqueness of PAL brand.

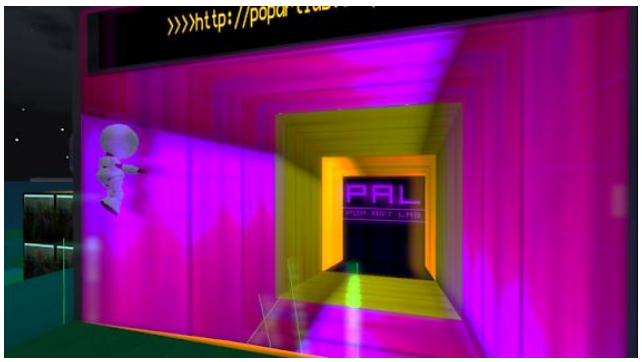


Figure 8.31. (left) The PAL logo

Figure 8.32. (right) Entrance to the PAL's underground club, with colorful textures and PAL logo

Extensive use of colors for specifying interaction spaces represents experiential (i.e. direction) and interpersonal (i.e. mood) concerns in design of PAL. The landscape is composed of rhythmic arrangement of cubes with different colors for different areas; and striking colors, such as in the entrance to the underground club (figure 19), are used to express direction. The co-designers claim to have used the minimum possible amount of textures, and differentiated the places by colors. If they do not economize in the use of textures, designing the 600+ cubes would mean using 600+ textures[18], therefore rendering the whole sim would be overwhelmingly CPU-consuming. Although most cubes have the same texture, Curiza's comment below shows that choice of particular colors as textual elements has its meaningful grounding in signification and appropriation of realism with preferred semiotic resources:

> Curiza: if you look actually in the sim design right now, (…) you will see that AmyLee have actually put in a lot of those nature textures. You have brown (…) You have green-like plants and stuff. You have blue like the water. If you look at it, all the colors on all these cubes are actually based on nature colors. So it was to make a balance between the superficial, the futuristic stuff and then try to put nature into these environments.

In Curiza's comment, semiotic effects brought by the appropriation of multimodal signifiers (including the choice of colors and the landscape) are described as metaphors for the combination of nature and future. However, in PAL's earlier design, a different attitude on the shaping effect of colors on signifying the VE is present, as expressed in Xavier's comment below:

[18] Colors and textures operate differently in SL. While colors are default properties of objects modifiable through the 'build' menu, textures are image maps that are embedded on the objects' surfaces. Texture maps are essentially image files that are attached to the 3D model, therefore they need be re-visualized every time the object is rezzed.

> Xavier: It was very, EXTREMELY colorful. Pink, red, shiny blue whatever, *very strong colors that you would never use in RL, I would never make something like that*. But for something like PAL, and in SL, it really worked out well.

Similar to color, *sound* is used a differentiating mode in PAL's design. As mentioned before, the primary functional purpose of the sim is to present music to visitors in a social environment, while the four streaming locations (plus various other social areas) differ in style of content. The visual style of the sim signifies the visual appropriation of its content, and its affordances for creation of experiential and interpersonal meaning potentials.

> Shaggy: So I had to think about *what music is*, and how to reflect music visually because SL is mostly about visuals. And here the idea was to make a good visual about music. And to me *music is rhythm*. And so, lining cubes was a good idea to *make a visual rhythm*. So that's basically why I came up with this idea in the first place.

The visualization of music and rhythm shaped the design of experiential features, while visual rhythm's interpersonal potentials were considered as the identifying feature of the new design. PAL's overall layout functions as a textual element in its overall semiotic cohesion; thus represents certain modal affordances. While such relations refer to the relations between music and visual rhythm in PAL's design, they also frame and shape the experiential and interpersonal relations between the avatars and the virtual place.

The workshop projects also show similar characteristics in terms of the use of layout and color as modes for semiotic expression. I have already illustrated some of the multimodal arrangements in the *Venus and the Four Moons* group's red lipstick-shaped spaceship and the *Awesome Three* group's pink stereo and dance floor designs. In the first example, the group used the color red, and the shape of a lipstick purposefully as a symbolic referents to feminism. In addition, their avatars were used as signifiers to specific concepts and visually coded with associated colors (i.e. Isis-ice - blue). In the second example, students' goal was dissemination of messages through text, image, color and sound. Their choice of color in their main object stereo (or variety of colors in the dance floor) aimed to support the semiotic coherence of their message. The aim of the students was not only to capture the attention by colors, but also to support the positive social message of the design.

To summarize this section, my observations showed that the co-designers often utilize semiotic potentials of various modalities (i.e. text, image, music, video, color, layout, visual rhythm, interactivity) to emphasize particular affordances and constraints of multimodal arrangements, and to achieve coherence between their rhetorical intentions and the designed forms. In table 8.2., I summarize the findings about the use of modes and modal compositions in the three case-studies.

Modality/case	Metrotopia	PAL	Workshop
Text	Information posters, logo and names of locations	Posters for events and information, names of genre-zones, interactive display of song titles	In some projects, mainly as posters that were collected and imported from Web
Image and video	Various graphic elements (posters, logo, shops, etc) designed, video screen In the museum (later in library and classrooms)	Various graphic elements (posters, logo, shops, etc) designed, video screen in public areas for events Machinima screening, etc. TV studio.	Images were either produced in Photoshop or imported from Web. Some images were also found from within SL.
Sound and music	No music, ambient sounds (barking dog etc.)	Music changes as avatars move around PAL, enter new zones	Music was planned as a rhetorical design element in some projects, while limitations existed
Color and texture	Textures were designed and/or collected to fit genre conventions, building textures to replicate American urban style	Color is used as primary design element (on 600+ cubes), changes represent various functional areas, and symbolize natural textures, glow and shine	Color is used as distinguishing semiotic feature in some projects (pink stereo), textures also used to symbolize meanings (wood: ecology)
Layout and spatiality	City layout, divided by streets, buildings and parks.	Abstract form, layout as 'Pixel-landscape', flying structures and elevations and 3D space emphasize affordances of virtuality	Spatial layout is limited, layout is designed for smaller size and scale interaction, layout is often used to symbolize
Interactivity	Interactive elements, functional areas are connected by streets and teleport links, interactive areas attract traffic.	Interactivity begins with the overall layout division (music-parcels),functional areas are connected by streets and teleport links	Interactivity is limited, students lacked resources to make their objects interactive enough, while some scripts were used

Table 8.2 Summary of observations on textual functions of modalities in relation to each case study

Texts and images are often used together to inform the users about various features, functions and/or ideological content within the overall designs. Use of sound as mode is definitely more apparent in PAL, as the division of space and design of almost every component within the sim aims to afford an authentic virtual music-listening experience. The experience of movement within various forms of streaming content (music channels) is visually supported with the purposeful use of different colors in different functional areas, while colors also serve as interpersonal signifiers (signs of virtuality). Interactivity (affordances of virtual objects to respond to user comments/actions) is mentioned as a powerful tool in getting visitors/users engaged in the designs, while learning and using scripting languages require considerable investment. Although it is possible to collect and reuse scripts from within SL, inexperienced content creators often find it challenging to use scripts as functional elements. This was most apparent in the workshop groups, as none of the students were experienced in SL. In brief, it was observed that designing virtual places and artifacts in SL requires handling a plurality of modes and their affordances/constraints as semiotic resources. Textual semiotic choices on selection and organization of various modes as multimodal arrangements lead to construction of both experiential (i.e., direction, functionality) and interpersonal (i.e. genre, ideology/message) features in design.

8.5. Synthesis of the systemic functional analysis in the three case-studies

I will summarize my findings and empirical inspirations from multimodal analysis of three case studies before the overall conclusion to the analysis in reference to theoretical and methodological frameworks. As outlined in Table 8.3, the three cases demonstrated various similarities in terms of the semiotic resources and the appropriation of their meaning potentials. On the other hand, the contexts and the social actors (both the co-designers and potential visitors) have a shaping affect in the orchestration of multimodal discourses. In all of the projects inworld communication environments are constructed for avatar-mediated interaction. The designs also represent particular discursive and practical choices made by the co-designers in order to utilize available semiotic resources and generate new meaning potentials –affordances and constraints - , or transform resources into experiential, interpersonal and textual meaning potentials.

In this perspective, the experiential meta-function describes the affordances and constraints for movement, presence and interaction inside the virtual places. The analysis of these aspects has shown that the primary purpose which defines the overall function of places and artifacts in the case-studies also determines certain visual and structural elements. The multimodal signifiers to certain locations, as well as the placement and positioning of various design elements serve the experiential meta-function; at the same time, they generate interpersonal meaning potentials and social affordances for avatars to meet and interact with each other.

The interpersonal meta-function focuses on the meaning potentials on a more conceptual level, and reveals the ways in which the visual languages in the design of virtual places have been generated in reference to other meaning systems through visual metaphors. As some of these metaphors refer to the fictional genres and real-world urban styles in Metrotopia and the workshop projects, PAL's design emphasizes a relatively more open-ended visual experimentation with the building blocks. The organization of visual and structural elements also determines the various ranks of scale in the design of virtual places. In different situations within the three cases, different areas were often reserved for specific social actions, such as fighting, chatting or dancing. The signification of these social places is often supported by the use of multimodal design elements, such as posters or scripted objects which inform the visitors about the possible activities.

In my comparative analysis, *multimodality* is foregrounded as a common shaping feature of the designed environments, in which user-avatars can experience the VW's various affordances for navigation, interaction and digital content creation. I have shown that the co-designers frame and materialize their rhetorical processes as designed objects, as they modify three-dimensional geometrical units (prims) and supplement their affordances for user-interaction with auxiliary modes (i.e. interactivity, animations, light and brightness effects). In most projects, verbal components, images, video and 3D interactive objects are used as interconnected textual elements of the overall multimodal arrangements, and various combinations of audio-visual elements such as colors, textures, geometric forms and spatial organizations are used to express certain interpersonal meanings. Following this logic, it is also possible to revisit the notion of layout as mode (Kress and van Leeuwen 2001, van Leeuwen 2005, Kress 2010). Context-bound methods of appropriating and organizing these design elements are considered as both *inwardly* and *outwardly productive* dimensions of sign-making (Kress 2010). Users' actions in physical spaces are translated to the language of the computer via several user-interface devices, and attention is divided between multiple frames of interaction. It is possible for users to be in multiple 'places' at once, or traverse between various virtual platforms, often transgressing limitations of synchronicity in time and in their interactions. This ties back to Lemke's (2005, 2009a , 2009b) phenomenologically-guided social semiotic theory on *chronotopes* and *heterochrony* as framing of virtual experiences. Therefore, I revise existing models of frequently occurring spatial categories (ranks of scale) in accordance to multimodal analysis of co-produced designs in the three case studies, and propose a state-of-the art analytical model for systemic functional analysis of virtual places and artifacts. The analysis shows that the categorization of virtual places and artifacts in a rank-scale format is helpful in determining the potential meanings on different levels, whereas it is possible for any meta-functional category to surpass the boundaries of scale and reveal different potentials in different situations on different scales of interaction. One example of this is the

placement of various interactive locations and objects within Metrotopia aimed at helping the visitors with orientation and interaction with the sim. In the interview data, most of the co-designers relate these decisions to the intended use-contexts of potential visitors and users.

An important notion that I emphasized throughout the previous chapters was *convergence* in terms of both socially-available *semiotic resources* and *mediated practices* of social actors using various media platforms, tools and modes. The analysis of the collaborative design processes shows that using SL as a collaborative platform to design and produce content does not necessarily limit user practices with inherent affordances and constraints of SL but converges with a wider landscape of mediated communication and co-production. Co-design practices often involve a variety of online and offline platforms within designers' reach to work on their ideas and search for shared inspirations, semiotic and/or material resources. Therefore, it is possible to discuss all the aforementioned semiotic dimensions as *nexus of practices*, and use the analytical matrix as hypertext to choose and combine various semiotic associations in making of multimodal experience.

The overall synthesis of the findings within this section are summarized in Table 8.3. When reading this table, it is important to remember that the meta-functions operate conjointly. I do not consider one meta-function without considering its relations to others within the design. Modes operate on experiential, interpersonal and textual dimensions, and multimodal coherence of designed objects and places refers to their various arrangements by the co- designers for intended use-contexts, reflecting the co-designers' interests in participating in communicating through design. Various discourses converge and diverge in shaping rhetorical intentions as design processes, as the co-designers and (potential) users engage in the design in different conditions and situations. Design process gives shape to potential affordances and constraints, which are actualized by users. The multimodal analysis of the three collaborative cases in SL shows that there is a dynamic interplay between the places and artifacts in SL, and the socio-technical environments in which they are produced. In the creation of particular semiotic and visual functions, the co-designers in collaborative projects consider not only the affordances of the platform but also the social environment in which other people will be getting engaged in it and experience its semiotic potentials.

Analytical category/case	METROTOPIA	PAL	WORKSHOP
Intended practical functionality	Research Education Public events	Sharing music Art communities Public events	Narrative construction Symbolic representation Limited functionality
Design of meeting places	Activity-oriented Divisions of a city	Genre+activity oriented Division by color and form	i.e. Dance floor
Open and closed spaces	Open areas for events, gatherings and sandbox Closed areas: museum, fight club, gym	Open landscape design Closed pods for intimacy Underground club for parties	Essentially open shapes, characterized by large-scale virtual artifacts
Chronotope and flow/path of movement	Division by streets and blocks of buildings Walk, teleport, fly Entry Point Sense of direction	Orange pathway Walk, teleport, fly Entry Point Sense of direction	Limited space for avatar movement Sense of Direction Movement in relation to the rhetorical message
Use of prims and other textual elements	Prims (plus collected objects and sculpted prims from SL)	Prims (authentic creation, no sculpted prims	Prims (authentic creation, no sculpted prims)
Modes and multimodal arrangements	Text Image/video Sound and music Color and texture Layout and spatiality Interactivity	Text Image/video Sound and music Color and texture Layout and spatiality Interactivity	Text Image/video Sound and music Color and texture Layout and spatiality Interactivity (limited)
Genre and Visual Language	Superhero, comic books Urban structure Divisions, streets and activity-places	SL-like Pixel/Digital Landscape Futuristic , Non-human Iteration of geometric units	Following the Metrotopia narrative Appropriated in relation to group story
User feedback and revisions of design	Design was not changed until experiment was over Additions were made for new use-contexts Research team's needs were primary	Design evolved since 2008, 4 major stages of design were observed User feedback (club idea, seating units etc.) was influential	Designs were not changed after final presentation Students were challenged by the audience

Table 8.3 Summary of findings from multimodal analysis in relation to the 3 case studies

9. Conclusions and discussions

9.1. Synthesis of the conclusions

In order to provide a socio-cultural semiotic perspective to virtual place-making in SL, I analyzed the social actors of collaborative design projects, the mediational means that they use to co-produce their multimodal messages as places, the processes through which they co-design and co-produce, and the multimodal semiotics of the products of their design processes, the virtual places and artifacts. This section will synthesize the empirical findings to answer the study's main research question:

> How do the VW users co-produce multimodal meaning potentials in virtual places and artifacts through collaborative design, as exemplified by the social semiotic analysis of the three case studies in SL?

I discussed the social actors in relation to power relations in groups, the mediational means in relation their affordances and constraints, and the collaborative design processes in relation the various nexuses of social practices that they generate. Finally, the analysis turned towards the three meta-functions in virtual places and artifacts, and the ways in which they present multimodal semiotic potentials. Therefore, the synthesis of the analysis in this chapter will focus on four central issues:

- *The social actors and power relations in groups*, which explains the ways in which individual SL users form small teams to co-design places and artifacts, and the roles and relations among various co-designers.
- *The mediational means and affordances for co-design*, which explains the tools and resources that are provided by the platform, as well as other means of collaboration and content generation that are socially available to the co-designers.
- *The collaborative processes in and with SL,* which presents the data from both participant observations and interviews to explain how the collaboration practices unfold in time via digitally mediated relationships.
- *Multimodal semiotics and the design of virtual places,* which constitutes the central analytical focus of multimodal analysis, and explains how the experiential, interpersonal and textual meta-functions are realized within the different ranks-of-scale in a design.

The final chapter presents an informed point of view in concluding the analysis. The conclusions begin with the synthesis of the findings and discussions, and reflect on the overall research framework and the research question. I will also propose alternative considerations and further research directions for the study of virtual places and artifacts as multimodal digital phenomena.

The social actors and power relations in groups

In the three case studies, design tasks were divided among participants and the products were assembled into their final forms as a collaborative effort through evaluations and modification efforts of the team members. Both Metrotopia and PAL design teams had specific clients and chief designers. In Metrotopia's design, the roles and responsibilities of the participants, as well as the provisional schedules for various design tasks, were agreed upon and documented by a contract.

However, in PAL's design team, being a relevant RL professional was not the major determinant in the configuration of social roles. The PAL team actually had a team leader, AmyLee, but this was the result of a more organic process, which developed throughout years of friendship and collaboration in SL. The 4-year-long evolution of the PAL design team gradually led Curiza to organize the team, and assign a '*chief of design*', while he also mentions that he wants the team to keep its amateur spirit. In time, decision-making in PAL's co-production became more systematized, and roles in the team became more hierarchical. The changes in the team hierarchy and the decision-making process had certain consequences about the final visual language of the design. In fact, a main issue of dispute was about the 'RL-like'ness of the proposed design style.

Collaboratively designing comprehensive virtual places such as Metrotopia or PAL does not necessarily require the design teams to be formed by professional acquaintances; neither does it necessarily limit participation to only designers. Furthermore, as I have shown above, social roles can change in time and from situation to situation. In my findings of these design cases, participation is shaped by social relations, and the internal power dynamics and decision-making patterns of design teams show variations in relation to the participants' conditions of and interests in engaging.

In workshop projects, the context was rather different. While fifteen international students formed four random groups with no apparent hierarchy, certain power relations also marked the process; particularly the fact that students were also learning how to use SL for these purposes, for which they needed constant supervision and tutoring. Therefore, the educational contexts brought forth new relations and considerations about power. The students were equally responsible towards each other within the group, but they were ultimately bound by the schedule and the requirements of the course. In many aspects, the effects of these contextual differences, the motivations for engagement

and the lack of prior experience, presented different results than the other two cases, where the design teams for other purposes.

The collaborative design processes may involve articulation of many voices through the use of socially available semiotic resources. To support their ongoing collaborations, the co-designers collect virtual objects, ask for help and/or ideas, or outsource their design tasks as a part of their inworld collaboration. As shown on the analyses, the rhetorical content is constructed through the interactions between a variety of social actors, including vendors, outsourced freelance designers, and the Linden Lab corporation as the developer of the platform. One influential actor in this social negotiation process is the platform developer, who controls, but cannot always definitively limit, which affordances and constraints will apply to content generation, and what semiotic resources will be socially available to content generators. However, the communication between Linden Lab and the co-designers of places is usually not direct, but they are mediated by the affordances and constraints of SL as the platform for multimodal communication. Therefore, organizations of the design processes are shaped by not only the social and individual profiles of the design teams, but also the socio-technical environment in which collaborative practices unfold.

The mediational means and affordances for co-design

The analysis of SL as a frame of reference for potential affordances and constraints of VWs for collaborative design brings forth the two interrelated dimensions of social semiotic analysis. First, the graphical organization of the user interface and its internal content generation tools provide the frame for a multimodal analysis. At this stage, the analysis shows the relations between visual interface elements and their functional relations to various mediated actions. The second dimension, which is about interacting with the three-dimensional social world of SL, requires the consideration of the social affordances for co-presence by avatars, and co-production of meaning potentials.

The social environments in which these design cases take place shape not only the process of design, but also its products. Places and tools that are used for designing may provide different affordances and constraints according to different requirements of the process. The social organization of collaboration depends on the participants' conditions of engaging as in the cases of Metrotopia and PAL, and their engagements are often conditioned by their perception of the affordances and constraints as demonstrated in the workshop case.

SL affords both sequential and non-sequential collaboration in relatively small groups in a virtual space shared by avatars. It is possible for avatars to meet and collaborate synchronously in shared places, or work individually in separate locations, share objects or leave them around for others to

see, and work asynchronously on different parts of the design. In both Metrotopia and PAL projects, the co-designers used separate locations for design and experimentation, mainly for the purpose of being alone and uninterrupted by random visitors, as well as fellow builders. In the Workshop project, the Metrotopia Sandbox was a location for collaborative design, although the limited space of the sandbox presented various problems. In terms of the experiential perspective, these can refer to both the spaciousness of SL, as it constructs a relative field for interaction, and the place-ness of SL, as it develops a sense of place through use and appropriation.

In all three cases, several participants met in both physical and virtual places for different purposes during the process. In Metrotopia, the physical meetings were used for concept generation and project development, which included tasks such as map-making. The entire PAL team has never met in person, and all of their collective decision-making processes are organized in SL. On the other hand, physical presence was a commonly used method for the workshop students, who used their avatars mostly to collect resources and generate objects in the sandbox. Therefore, my analysis focused on the physical locations in which participants meet and work together in person, the inworld locations where avatars meet, as well as certain sites on the Internet.

It is also important to note that these design teams generate their multimodal discourses by re-semiotizing and appropriating the socially available semiotic resources. The prim system, which provides the basic building blocks for producing virtual objects in SL, represents a specific set of tools and interfaces such as the object-texture-script model. The co-designers used these tools and interfaces for their own communicative purposes, often transforming the intended functionalities into new meaning and action potentials. The co-designers often used of various other tools and resources in cases where SL could not accommodate their choices or in cases where they have prior experience and better skills with another content generation tool. Although some digital formats can be imported to SL, not every kind of data is allowed in. Drawing on this observation, it is possible to relate the use of these other graphic design and 3D modeling software as semiotic resources for the nexus of collaborative design practices. The ways in which semiotic and material resources are collected and used (or not used) can become a design strategy that affects the contents, forms and methods of designing.

The collaborative practices in and with Second Life

For the social semiotic analysis, the collaborative aspect of design activities in three case studies illustrate how discourses on design and representation are negotiated, evolved and often transformed to new meaning potentials through time and collaborative action. Rhetorical intentions of the social actors diverge, and formations of social groups, or design teams, are often

in flux in inworld collaborative design activities. The design methods that co-designers applied show variations depending on the structure of design teams and preferences of each individual co-designer. Similarities also exist in terms of collaborative evaluation and modification of designs, and the ways in which the co-designers conceptualize the needs for avatar interaction.

In Metrotopia, mutually agreed roles of each participant were performed in a more structured way, and within a strict time-schedule, because the research schedule had priority. Caitlyn's research-oriented needs formed the first design principles, and formed a relatively strict framework for co-designers to formulate rhetorical strategies. Not only the process and time-schedule were organized according to her experiment, but also the form and content of various interaction spaces and their multimodal organizations were evaluated and confirmed in relation to her methodological requirements. However, in the PAL project, the design team was formed through inworld relations and the project was initiated by Curiza's personal and professional interests. Therefore, PAL's time schedule and division of tasks within the project were more flexible. This allowed each co-designer to generate ideas, test and evaluate these with other co-designers, and build their designs in various locations within PAL. Each member of the team was given more freedom to create their own styles. PAL's design process also differs in terms of its evolution and transformation throughout the years. In the workshop case, the students had limited time to learn and perform content-creation in SL, and their capacity to represent their messages was restricted by the learning process. The students divided the tasks by their individual interests and the ways in which they thought they could contribute more efficiently. Their interests were also led by their prior experiences with similar software –3D modeling tools or game-worlds – and their capacities to employ these tools/platforms to their group activities. In these three case studies, most of the actors had different motivations for being in SL and creating content, as well as participating in the specific design projects. Their access to and competence in socially available (semiotic and material) resources were related to their interests and past experiences in SL.

The design solutions can change, conform, adopt or resist to codes and conventions, such as the visual and experiential norms of simulating the real-world physics. In fact, the analysis shows that these meaning potentials result from a constant semiotic flux between the social actors, and the negotiations of their rhetorical intentions. The collective design decisions that are made during the inworld meetings, in which the avatars of co-designers meet in SL and co-produce the content together, are good examples of these emergent processes. During such meetings, the co-designers collectively encode the meaning potentials through multimodal channels, while the visitors' actual semiotic experiences may possibly be different than what the designers intended. Although for new users it may be harder to imagine how potential visitors will react, the more experienced content creators in the design team can have insights about how people navigate, interact and socialize in a

virtual place in SL. Both Aspen from the Metrotopia project, and several co-designers of the PAL project mentioned the unpredictability of the SL users, and the importance of being able to accommodate as many activities as possible in the design.

In many situations, the design solutions were emergent, and they took place by either by individual insight or during collaborative activities. Emergence of design concepts or solutions can occur in any step of the process, depending on the progression designers' interactions with tools, resources and other social actors. In some cases, the emergent meaning potentials of design features surface as dominant visual elements, upon which the social functions of other modes are stratified. An empirical example of this is the overall visual concept in PAL's design, which emphasizes the 'digital/pixel landscape' idea by the spatial organization of prims with various colors.

In general, the analysis shows that various features of the collaborative design projects are produced or co-produced during different stages of the process; and the ways in which the co-designers use the socially available mediational means as semiotic resources have a role in the making of the overall designs; thus, also in the construction of their social semiotic potentials.

Multimodal semiotics and the design of virtual places

The design of various places and artifacts in SL emphasize the multimodal logic: the co-designers integrate 3D models with textures, animations and sounds to produce semiotic arrangements by available modes. It is also important to note the modal characteristics of spatial representations. In other words, virtual places and artifacts communicate not only through their interactive and visual qualities but also by their organizations and positions in three-dimensional space.

The places can also be analyzed in terms of their functional associations, which bring forth the experiential meta-function in the systemic functional matrix. In analyzed cases, the design of these functional areas often refers to the social affordances and determines places to meet and socialize. Multimodal compositions of meeting areas and the artifacts that constitute these places usually refer to their meaning potentials as experiential and interpersonal agents. The analysis of particular divisions and elevations of the place foregrounds the use of designated areas for facilitating social presence and avatar interaction. In such places, certain design elements are used to signify potential social activities. Metrotopia's designed layout illustrates the division of space into a group of places that emphasize particular types of mediated action, such as avatar customization, fighting or content-generation. PAL's layout also shows similarities in terms of the division of space and use of semiotic elements to signify particular types of activities, though the functions of designated meeting areas are different. The design elements, such as seating units or private pods, are used as multimodal signifiers to represent potential meaning and action

potentials, and aim to reinforce the overall rhetorical purpose. The use and organization of design elements produce representations of affordances and constraints for practical functionalities, thus support the experiential meta-functions.

Analyzed design cases show that multimodality is employed as a design strategy in construction of virtual places and artifacts, and multimodal elements are placed within designs in meaningful combinations in order to signify particular messages, guide visitors to specific directions, or emphasize affordances for activities. Structural elements such as prim, textures and scripts afford and/or constrain particular actions for designers. They also frame potentialities and limitations for generating new design ideas. The multimodal configuration of various design elements, such as logos, posters, 3D objects and other verbal/non-verbal signifiers, operates on the interpersonal semiotic function by setting the mood and style. On the other hand, these multimodal design elements also support the experiential meta-function, as they provide the visitor with not only a visual concept but also a navigation path.

Textual semiotic choices on the selection and organization of various modes as multimodal arrangements also lead to construction of both the experiential (i.e., direction, functionality) and the interpersonal (i.e. genre, ideology/message) features in design. In the three observed cases, various strategies were used by the co-designers to afford particular types of movement within the place, while constraining others. One example of these types of arrangements is the division of streets and blocks of buildings in Metrotopia. The design of Metrotopia aims to guide the visiting avatars, by allowing the avatars to move, walk or fly, through determined passages, in addition to allowing them to teleport from one location to another. Chronotopes, the movements of avatars between places and the entry points to the virtual environments are important considerations, as they determine the flow of experience. *Navigability* (as experiential meta-function) is as important as the visual attractiveness and information richness (as interpersonal meta-functions) in construction of the semiotic experience.

The findings indicate that the experiential and interpersonal meaning potentials are also important features in three-dimensional scaling of the designed places for avatar interaction, which determines the sizes and spatial relations. One particular factor behind the organizational logic of the places is the presence of avatars, and the need to present visually accessible signifiers for the practical use functions to communicate the affordances and/or constraints.

In all three case studies, the overall purpose of design was to produce virtual environments for avatar interaction, rather than generating solutions for offline problems or generating prototypes for physically manufactured products. Therefore, co-designers' interpretations of avatar-based presence had a central role in their constructions of semiotic discourses on virtual places and

artifacts. In other words, the co-designers of places shaped the places that they design in certain ways that their imagined users, or visitors, would experience. The experienced designers often watch and learn from the reactions of the visitors, and develop new strategies to communicate the affordances better. On the other hand, some designers were more interested in experimenting with the affordances and test the boundaries of limitations.

As demonstrated by Xavier's comments, who is a professional Danish architect working in both VW and RL, SL may present particularly convenient affordances to resist norms and conventions in the so-called RL for design, and expand the boundaries of their imaginations. Several factors – including lack of gravity and other physical constraints on bodies and the prim system that allows complex forms to be comprised of geometric units – contribute to the visual representation of the notion of *virtuality*. On the other hand, in both Metrotopia and PAL cases, co-designers also refer to the use of particular *signs of realism* mainly to accommodate the experiential and interpersonal meta-functions, such as the urban landscape of Metrotopia with streets and high-rise buildings (Caitlyn) or the use of '*natural*' colors on cubes that form PAL's ground plane (Curiza). The analysis of such metaphorical systems invites a socio-semiotic reconsideration of how designers conceptualize the interpersonal effects of modality in virtual places.

The final designs emphasized certain ideas, notions or concepts that the co-designers generate during the process, either individually or by collective effort. The focus of analysis here was the ways in which semiotic meaning potentials were co-produced by the co-designers, and the motivations of the co-designers which made them to collaboratively give shape to SL's places and artifacts. The analysis of data from the three cases points to the relations between semiotic meta-functions and design features: Experiential meta-functions correspond to the features of movement and functionality, interpersonal meta-functions correspond to the features of visual language and representation of social presence, and the textual meta-functions correspond to the features of structure, organization and multimodal orchestration.

9.2. Implications for theory, methodology and practice

The findings point towards a complex nexus in co-production practices, and a semiotic flux in the social negotiations of meta-functions, as well as identities, places, tools, affordances and methods, which are also co-produced along the process. People with different backgrounds, skills, interests and purposes get together through complex mediated relations; configure design teams according to their interests and competences to design multimodal virtual places and artifacts. The three cases show that the social and material environments in which the design activities take place affect designers' decisions; thus, contribute to the meaning potentials of the final products.

Although not all of the co-designers in the case-studies are inworld professionals, there is a level of professionalism, group hierarchy, task division and hierarchical organization in the virtual design teams. From a design theory perspective, the changes in the contexts and motivations of the content generators in SL could support the idea that design is a form of communicative human activity, rather than a professional status (Papanek 1984, Wisser 2006). Figure 9.1. shows the framing of the potentials answers to the research question after the analysis of the three cases:

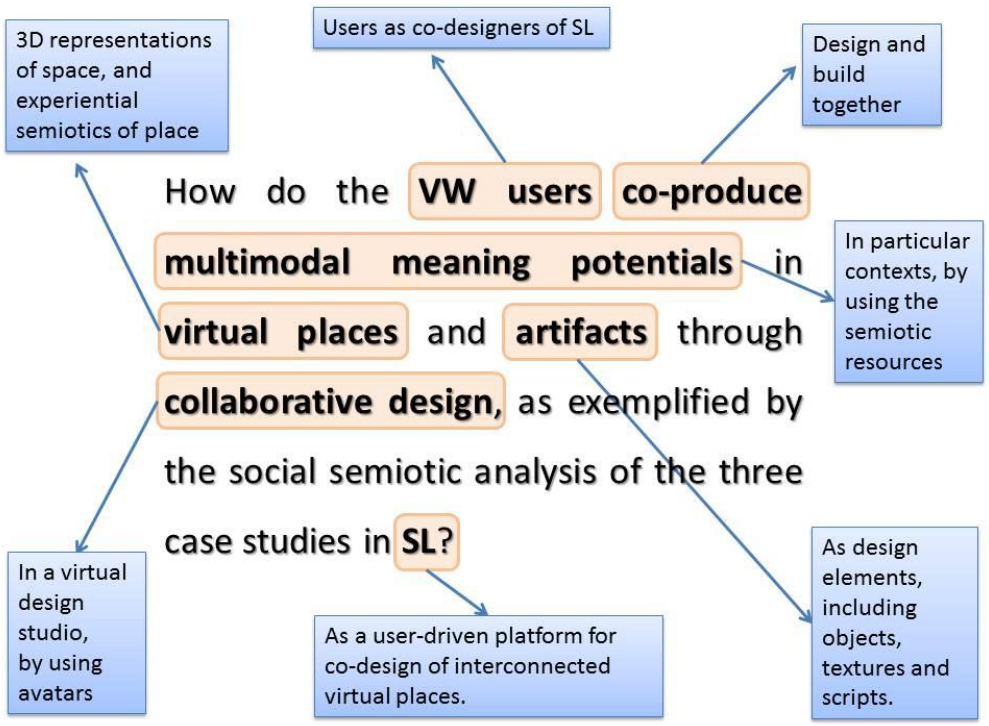


Figure 9. 1. The framing of the R.Q. after empirical analysis

The analysis of the three case studies and the discussions on the empirical findings will be discussed in reference to the following six perspectives, by which I believe a multimodal semiotic analysis of virtual places can contribute to various academic and professional fields of relevance:

- The implications of *analyzing virtual worlds as places,* where I discuss the relevance of a social semiotic approach and a place-oriented perspective with VWs research literature.
- The methodological and conclusions on combining the *analysis of multimodal place-making with the nexus analysis framework*, which supports the design-oriented approach of my analysis by focusing on the socio-technical aspects of co-design.
- *Social semiotics of design as construction of a sense of place*, which is about the relations between meaning, signification and design in virtual places.

- *Affordances as meaning and action potentials,* where I build my arguments on the semiotic and experiential characteristics of affordances, and provide empirical examples to argue the context-specific and dialogic nature of affordances.
- *Implications for platform and content developers,* which includes discussions on particular issues that forthcoming user-driven VW platforms could benefit from, mainly in terms of considering affordance as a meaning resource and a design tool.
- *Implications for designers, which* mainly includes the possible ways in which professional or amateur designers could think in terms of virtual places and artifacts to collaborate and co-design in a virtual studio environment.

Analyzing virtual worlds as places

When SL is conceptualized as a network of virtual places (Bartle 2004), it becomes possible to discuss not only the visual or structural characteristics, but also the experiential and semiotic potentials (i.e. Tuan 1977) that are actualized by practices of making and using these places. In other words, virtual places are not designed to be looked at, or simply be watched, but they intend to capture the attention of their users by providing an experiential space, and a social place, to be navigated by their visitors. This is the main reason for my application and critical appropriation of the architectural model for systemic functional analysis (O'Toole 1994, 2004), as I consider virtual places and artifacts semiotically more pertinent to the built environments than they are to words, images, paintings or music. Therefore, the analysis of SL's places with a multimodal framework provides important insights on the relations between modes, meaning potentials and functionality when the design of VWs is considered an architectural problem (Bridges and Charitos 1997*)*.

The analysis also shows that, during the collaborative design processes, the co-designers often make use of the spatial modes of avatar interaction, ~~as~~ they use the verbal modes of text or voice chat in combination with the non-verbal modes of avatar-mediated communication. In this respect the conclusions of my analysis draw similarities to both Ondrejka's (2005) comparison of three dimensional virtual places with the graphical Web interfaces, and Schroeder's (2011) theses on the role of verbal and non-verbal modes in collaborative action in CVEs. The virtual place also provides a distributed design studio environment (Maher and Simoff 2000, Reffat et al 2008), where the aim of the design activity is to transform space into 'inhabited place' (Weiley and Pisan 2008). The analysis also supports the role of design representations in distributed collaboration (Gu el al, 2011), and the importance of 'objects to think with' distributed design environments (Larsson 2003).

As mentioned in the literature survey, research studies on user behavior in VEs often focus on cognitive characteristics such as vividness or interactivity (Steuer 1992), and possibilities to apply RL behavioral patterns to virtual environments (Blascovich and Bailenson 2011). However, an equally important consideration in the study of virtual experiences is how people interpret the semiotic resources, and how they may choose to resist the social conventions of meaning production. In my analytical framework, SL refers to not only software for modeling three-dimensional digital objects but also a multi-user social media platform in which various design cultures emerge, blend and interact with each other. The effects of socio-cultural influences are also visible in the place metaphors (Prasolova-Førland 2008, Taylor 2009) and the offline everyday cultures (Book 2004), such as comic books or other forms of fiction. On the other hand, these influences may not always be appropriating the codes of a particular genre or style, such as Metrotopia, but they may be used to emphasize new ways of conceptualizing these places and the new forms of multimodal social interactions that are characteristic of SL, such as the 'pixel landscape' concept of PAL.

The analysis shows that the co-designers of both Metrotopia and PAL aim at constructing communities and social presence in their creations, as they also created inworld groups, organized social events, and provided attractions for potential visitors. The creation of the *sense of place* (Maher and Simoff 2000) depends not only on the visual organization of spatial elements, but also on the ways in which the designed place affords meaningful social interaction, or its *social affordances* (Kreijns and Kirschner 2001). Social creativity is not only about the collaboration of the designers, but also about the possibilities for the visitors to participate in the construction of the overall meaning of the place.

The framing of a VW as place also brings forth the phenomenological issues of space, time and experience through individual consciousness, as a foundation to the analysis of collective practices (i.e. Tuan 1977, Lemke2009a). The individual and social contexts of collaborative projects shape the way ideas and discourses are materialized through the use of socially available semiotic and material resources. The findings show that each participant contributes according to their capacities and motivations in collaborative design activities, whether these contributions include ideas, judgments and preconceptions, skills, resources or new content. Both individual insights and collective processes contribute to the creative solutions (Hargadon and Becky 2006).Therefore, including a variety of social actors in the analysis presents a multitude of perspectives on mediated discourses and provides a mapping of potential semiotic associations with tools and their affordances. This is where the integration of multimodal analysis with the ethnomethodological perspectives becomes useful to understand the co-production of meaning.

Multimodal place-making and the nexus analysis framework

The multimodal approach provides a systemic model for social semiotic *analysis* of virtual places as *multimodal texts*; while a socio-cultural perspective presents the embedded rhetorical processes within the designed messages by reviewing designers' reflections on how and why they made particular design decisions. Within the multimodal analysis of virtual places and artifacts, I systematically outline specific experiential, interpersonal and textual features of designs to compare and discuss the modal configurations and affordances in relation to their rhetorical contents. On the other hand, modes and their meta-functions should not be considered in isolation, as the overall aim of the multimodal analysis is to reveal the patterns of semiotic cohesion and study the dynamic interplay between semiotic resources and their social functions.

If virtual places are framed as multimodal sign systems, then making virtual places should be considered semiotic work. But, as Krippendorff (1990) claims, designing place in SL is not merely producing signs, but it involves producing useful and usable artifacts as multimodal arrangements. In this view, SL can illustrate a complex socio-semiotic network of actors, places and practices that lead to particular multimodal arrangements in the products of collaborative design. While a social semiotic optic alone may not be sufficient to explain how and why individuals combine various semiotic resources in certain arrangements, the poststructuralist socio-cultural approach (Poynton 1993) to systemic functional analysis develops our understanding of the contexts in which people use the mediational means and the resources for the production of semiotic phenomena.

However, the conventional dichotomy of media producers and users cannot explain the complex social relations of co-production in SL, and that these relations form dynamic nexuses of designerly practices. In the case of user-driven development of SL, the platform affords its users' participation through not only idea-generation and feedback, but also content generation and distribution. Therefore, designers in SL are not only brain-workers who generate concepts and the specifications for production, but they are also *builders* who make things for other people to experience. In doing so, they not only conceptualize their ideas by representing them but also build functional models in which other avatars can interact. In this respect, SL also differs from the user-toolkit approach in user-driven innovation studies (von Hippel 1976, 2001). As I have shown in the analysis, the co-designers in SL are usually also the *makers* of the objects. Even if a member of the design team chooses not to actively create prims, textures or scripts, the collaborative projects in SL are organized in certain ways that would allow the individuals to contribute in other ways, including resource collection, idea generation and testing.

Drawing on this point, I also consider co-production in the three case studies as pragmatic attempts to make functional environments for social action, rather than merely artistic expressions of their makers' aesthetic deliberations. In this respect, the socio-semiotic meta-functions refer to the sign-makers' collectively negotiated discourses on function, form and structure. In terms of the systemic functional framework, design of these multimodal digital objects represent the three meta-functions in terms of their practical functionalities and use-contexts as experiential meaning potentials, the style, genre and aesthetic qualities as interpersonal potentials, and the ways in which different digital elements come together to form virtual places and artifacts as textual potentials for multimodal sign-making.

In general, my observations in the three case studies point towards a socially constructed relationship between 'what is designed' (the multimodal content) and 'how, where and by whom it is designed' (the social context). A systemic functional framework based on mere textual analysis can only go so far as to answer the first question, and provide limited insights on the other (Poynton 1993). However, multimodal social semiotics today has a wide variety of approaches to investigate relations between 'the social' and the dynamic power relations, particularly by focusing on the situatedness of meaning in *mediated action* (i.e. Scollon 2001, Scollon and Scollon 2003). In this view, not only people's actions have semiotic effects, but also the places in which mediated social actions take place. The MDA and nexus analysis perspective provides analytical insights on the *how* and *why* questions, revealing how the world is experienced from the designers' points of view.

Social semiotics of design as construction of a *sense of virtual place*

As shown in Chapter 3, the social semiotic approach considers design as a reflection of one's interest in participating in the world of communication by using socially available semiotic and material resources in order to represent their rhetorical intentions. The systemic functional analysis considers design as multimodal orchestration of semiotic resources (van Leeuwen 2005) as experiential, interpersonal and textual meaning potentials, through which producers of any semiotic text (including language but also artifacts and places) communicate with their users. In other words, design transforms rhetorical intentions to 'semiotically shaped material' (Kress 2010). Furthermore, the rhetorical perspective provides a framing of design as both '*making of things*' and '*makings of discourses on things*', thus considers the rhetorical processes as the basis for design processes.

The analysis in SL also suggests that the design activity is based on signification, which results from framing and representation of certain aspects of reality. Virtual places and artifacts are constructed

as multimodal orchestrations of these various discursive and material relations through the co-production practices in social contexts. Various modes are transformed, translated and orchestrated as semiotic resources, the multimodal arrangements of which form the products of designing. The representation of bodily experience is translated and simulated by the mediation of avatars, which in turn affects the ways in which places and artifacts are constructed. The ways in which the co-designers reflect on the issue of virtuality is important because their perspective can provide insights on their semiotic processes, and their ways of interpreting the context of situation. The analysis shows that the discourses on *the signs of realism* and *virtuality* are often interrelated, and there is a dynamic semiotic interplay between the meaning potentials of specific modes in design and their makers' rhetorical intentions.

One particularly interesting way, in which the participants make sense of constructing virtual places and artifacts –and in general, being present in a *virtual* world –, is reflected in their comparisons with the physical reality. As mentioned in the previous analytical chapters, the co-designers often generate particular discourses on how their avatars mediate their communications in virtual places and allow them to perform actions that would otherwise be impossible, or rather unfeasible. Often times during the interviews, the designers mention how being in a *virtual* environment is different, both in terms of being unrestricted by physical (so-called RL) constraints and finding genuine affordances to design multimodal communication environments. Caitlyn mentions how SL affords the design team to experiment with forms and functions as they want because the team is not restricted by material limitations, such as logistics, construction costs of building models or waste of materials. In PAL case, AmyLee and others consistently mention how they aimed at a virtual place that would look '*SL-like*', both in terms of its visual form and its affordances to accommodate avatar interaction. Their explanations and descriptions of places and artifacts often refer to their more general comments on being in a specific type of environment where people (both designers and users) can expand the limitations of their imagination and experience things that are '*not possible in RL*'. In such cases, the so called 'hyper-real' physics of SL (Santos 2009) provides new affordances and constraints for the designers of places, and they build their multimodal discourses upon these metaphorical frames. I also relate such remarks to the conceptual separation of the *virtual* world from the so-called *real* to Roland Barthes' (2009 [1957]) idea of the *myth* as semiotic construct, through which the connotations of virtual and real can be explained as *second-order significations* in design concepts.

The social semiotic framework considers the construction of discourses on *reality* and *signs of realism* as social processes based on constant negotiation of power relations and social control (Kress and van Leeuwen 2001). In this perspective, participants of the communication process seek to impose their personal definitions and use their interpretations as 'semiotic navigational devices'

(Kress, 2010). The analysis of the collaborative processes also shows that the design problems and the design solutions often develop in a mutual deliberation, even though the project brief is sketched out from the beginning. This is in line with Cross' notion that design is some type of a 'reflexive conversation with the situation" (2007 [1990]). The co-designers in the three case studies generated particular environments for particular types of interactions, the semiotics of which essentially depends on the possible set of things that they can mean, and the things that can be done with them.

Affordances as meaning and action potentials

To summarize the discussion up to here, both the theory and my empirical analysis show that designing is a sign-making activity, the designed places and artifacts are multimodal sign systems, and the co-designers are socially situated sign-makers. They shape the meaning potentials by arranging socially available semiotic resources, and embed their rhetorical intentions into the designs they co-produce (Kress 2010).

The analyses showed that affordances are related to both making of meaningful associations (through compositions of modes, genres and representations) and practical functionalities (through forms, structures and usability). For instance, colors can signify direction of movement, music and space can be intertextually organized in making of avatar experience, and surfaces of objects can be used for various purposes, including transparent textures, interactive texts, images, videos, and interactive Web pages. The over-emphasis on the lack of particular physical constraints (such as gravity or health) led the co-designers to develop new ideas and affordances specifically designed for avatar interaction, including flying structures, use of extravagant colors or forms to emphasize the *virtuality* of the place.

For sign-makers, affordances are multimodal compositions of various semiotic resources that are formed by available materials to present certain meaning and action potentials. On the other hand, for users, affordances can be constructed on different semiotic associations, often resulting in unprecedented behaviors in different contexts. Therefore, I explained the relationship between affordances and potentialities by the systemic functional matrix, which emphasizes the role of experiential, interpersonal and textual meta-functions in making of semiotic texts. In a multimodal semiotic composition of design elements, signification of intertextual metaphors refers to the interpersonal meta-function, while the experiential meta-function directs focus to movement and facilitation of individual and/or social activities. From the sign-user's perspective[1], affordances and constraints are not only *signifiers* (Norman 2008*)*, they can also represent action potentials in

[1] Here, I refer to content generators as sign-users, too, as they are also users of SL's GUI and the resources it presents.

particular use-contexts. Therefore, it is important to support the analysis of semiotic texts with the contextual data provided by observations of sign-makers and their reflections on their experiences with generating ideas, developing solutions and imagining potential use-contexts.

As discussed above, the co-designers' individual discourses on representations of virtuality and reality affect the ways in which they negotiate the affordances of forms and functions. Mediation of presence with avatars is among the most influential specificities of this kind. SL differentiates from conventional 3D modeling applications with regard to this particular characteristic, combined with the affordances of a multi-user virtual environment and multimodal channels of digital communication that provide both synchronous and asynchronous interaction. While avatars in virtual space afford *designing by walking around* – navigating in 3D space with visual reference to the objects and actors of design - virtual places are designed for avatars who can "*fly*" and who "*cannot be hurt*" unlike human bodies in physical spaces.

As the analysis shows the designers try to understand and imagine why the users make certain decisions, such as using the seating elements while it is also convenient for avatars to stand up for long times. The sign-makers' interests result from their intentions to accommodate potential user behaviors. However, views on affordances and constraints are also subjective, such as AmyLee's comments on absence of voice chat before 2007, or AmyLee and Shaggy's comments on technological development. The ways in which different co-designers experience SL as a collaborative platform is related to their *conditions of engaging* with SL, as well as their preferred roles in the design process.

The sign-makers' rhetorical interests are translated into potential affordances and constraints in making of objects, and they are actualized by the visitor's engagement and transformative agency. Both content generators and users learn the norms of communicating through objects in this particular realm by investing time and mental effort. Perhaps the best example for the learning aspect of the affordance perspective is the process of the Workshop students, and how they practiced content-generation in an intense 3-week session. Therefore affordances and constraints are not only understood as visual signifiers, but they are purposefully designed to facilitate certain types of mediated action.

The balance of professionalization and amateur participation to user-generated content activities is also relevant to how affordances and constraints are perceived and negotiated by designers. A good example of this inclusion issue was expressed by AmyLee and Shaggy, both of whom do not want SL to change so rapidly that it would make their existing skills obsolete, especially with the introduction of Mesh modeling technology. On the other hand, RL professional Xavier mentions that he misses his tools and skills he gained from his education and professional experience,

although he also acknowledges the role of amateur spirit. A similar challenge was also observed in all three case-studies about different aspects and tools. This challenge may be explained by SL's inclusive approach to present creative socio-technical affordances by using a single content-generation system in order to facilitate various types of co-production activities. In doing so, the balance of complexity and usability aims to provide an innovative-yet- comprehensible toolkit to all content designers, often at the expense of not properly accommodating expert and professional users and their full creative capabilities. Another problem with this so-called balance is the challenges that the newcomers face when they begin learning how to use the prim system. The analysis of the workshop case showed that the students needed intensive supervision and during the processes, mainly because of the problems with the content generation system.

Generation of the places and artifacts as sign systems takes place not only between co-designers of virtual places and artifacts, but also between platform developers and various other (inworld and online) content communities. The co- designers are in many ways limited by the constraints placed by Linden Lab, and bound by their institutional (legal and organizational) restrictions. Content types, file formats and delivery methods are possible within systematized boundaries. The prim system can also present many challenges and limitations, as shown in the workshop project, when the designers do not have enough experience and/or competence in using the design tools. Use of the prim system requires a multimodal interaction with the graphical user interface; but equally importantly, it requires a special type of cognitive activity, which is the three-dimensional segregation of complex shapes into basic geometric primitives, such as cubes or cylinders. My analysis also showed that using prims to generate content is found as a complex endeavor by some co-designers, who chose to contribute the team in various other ways. The observations with the design teams in three cases, and particularly the comments of several workshop student as well as Caitlyn from Metrotopia and Curiza from PAL cases illustrated the many possible limitations that some SL users perceive. This perspective also has implications for the platform developers and the designers of VWs, as the fluidity of the notion *affordance* and the exponentially challenging limitations of the learning curve for beginners could endanger the foundation for meaningful places and artifacts to mediate communication.

Practical implications for platform and content developers

Therefore, systemic functional analysis of SL as a collaborative platform can also have certain implications for further development of VW platforms, especially when developers aim to emphasize affordances for co-production of user-generated content and user-driven innovation. In this view, not only the visual characteristics of virtual places are important, but also is the general semiotic coherence among the experiential, interpersonal and textual potentials. The analysis

suggests that it is important for the co-design processes to consider how the platform affords participation, communication and collaboration among various social actors with different social backgrounds and interests (i.e. geographical location, time-zone, RL occupations), how it provides places and tools for both synchronous and asynchronous design interaction, and how it utilizes the users' creative problem-solving skills in order to create communities of 'makers'.

An important factor in creation of co-production experience in SL is the movements of avatars and content between connected virtual places. It is important for such platforms to afford collaborative design practices to unfold in various time-scales (hetechrony) among various (virtual and physical) places. For instance, the analyses showed that the co-designers often prefer to work alone, although they are aware of the affordances for real-time collaboration in a shared virtual space by using their avatars to walk and fly around the object of design. Although avatars and virtual objects afford this certain type of interaction, it is not only the real-time '*design by walking around*' method and digital co-presence in shared virtual space that presents SL as a complex nexus of creative practices. It is beneficial to the VW designers when the platform offers places and affordances for users to be involved in progression of design, at the same time allowing the co-designers to have their collaborative and private spaces to think, experiment, try and fail. Thus, it is important to consider how a VW platform provides places, tools and resources for not only collaborative (real-time) content generation, but also asynchronous presentation, evaluation, testing and modification of designs.

Another important issue is how the platform provides tools that would balance '*complexity of use*' and '*freedom to create*' for a wide range of creative users. As demonstrated by the workshop students it is beneficial to the VW designers when the platform provides them with adequate resources (i.e. libraries, tutorials, search tools, community platforms, external Web resources) and support the development of innovative new design solutions. The semiotic association of 'prims' with LEGO modular toy series is a good analogy to illustrate how primitive structural elements can provide designers with larger solution spaces. The affordances of prim system for the construction of complex shapes by geometric combinations of simple objects provide a shared resource to think with; at the same time, the combinations of prims, textures and animations present meaning-making as an alternative design tool. However, as the analysis demonstrates, the interpretations of the co-designers of the prim system may be subjective, and a perceived affordance for a professional user may be interpreted as a limitation by a novice designer, or vice versa. As an alternative approach, limiting the potential affordances and constraints to emphasize a particular user group, such as professional architects/designers or amateur builders could help build interest-specific content groups. On the other hand, such an approach may reduce the possible range of

creative activities and reduce the potentials for interdisciplinary collaboration offered by social affordances of a VW platform such as SL.

Finally, while embedding potential affordances and constraints, the platform developers should consider how some VW designers can (and often are willing to) resist, challenge and test the platform to its limits. Modes and meaning resources in the tools of design can also differ from context to context, and are partly shaped by the VW's inherent capabilities. The experiential, interpersonal and textual meta-functions apply not only for the designed places and artifacts but also for the tools, resources and platforms in which the co-designers generate the social functions of the virtual places and artifacts as semiotic resources.

Implications for Designers

Co-production of virtual places and artifacts in SL illustrates innovative potentials of digital technologies for the participatory design of multimodal interactive experiences. As I have argued, the virtual places in SL present tools and affordances as a collaborative tool for real-time design and testing, synchronous and asynchronous collaboration, and places to generate, build and evaluate the designs together.

The spatial characteristics of virtual places and avatar interaction also present affordances for professional design projects, which could be affective in collaborative processes of not only architects, but also product or game designers. The analysis shows that the prim system provides the designers with a simple but comprehensive modular toolkit to produce complex geometries from simple geometric units. The standard object generation method and the *object-texture-script model*[2] in prims provide a wide solution space for creative experimentation and problem-solving. I consider this method of using simple modular units for multimodal expression also a helpful approach for design education, where students are often motivated to work in groups to generate ideas, build mock-ups and models and test out their designs through renders, simulations or sketches. It is also possible to develop potential solution spaces for designing in SL by incorporating other tools and resources, such as external design software and online resources. As the socio-technical environment develops by co-production of content and tools, so does the co-designers' search for more complex methods and tools. On the other hand, inclusiveness in tools and resources brings a considerable amount of complexity, thus presents a significant learning requirement for the beginners. The experience of social affordances differs when a person uses either a VW to design in a shared virtual space or a professional 3D modeling tool. On the other hand, the potentials and pitfalls of the VW technology for the context of professional design

[2] The method of producing virtual artifacts by applying textures and scripts on primitive geometric units (prims).

communities can only be fully understood when these technologies are adopted by professional design communities. In conclusion, I believe such a perspective could contribute to the research and practice of collaborative design in digital environments by focusing on the multimodal semiotics of collaborative design activities in VWs, outlining the modes that are used in the design process, and the dynamic interplay between the social functions of virtual designs.

9.3. Further research directions

As I have outlined throughout the dissertation, my aim has been to build interdisciplinary theoretical and methodological frameworks for the study of the co-design activities in VWs as mediated social actions. For this purpose, I explored a variety of design contexts and produce the data by using different sources. This final section will conclude the discussions through an overview of the intended contributions and further directions for research on virtual places.

Overview of the theoretical and methodological contributions

The social semiotic perspective on multimodal sign-making contributes to the understanding of co-design in two significant ways. First, the *multimodal analysis* provides categories and models on socio-semiotic orchestration of the modes in designed places and artifacts as socially functional sign systems. When combined with the ethno-methodological perspective on contextual factors, the overall analysis reveals how purposeful orchestration of modes presents experiential, interpersonal and textual meaning potentials. Applying the rhetorical perspective to collaborative design of the virtual places and artifacts requires consideration of the social actors, available tools and resources, environments, processes and products of designing as central resource to analyze how signs (the virtual places and artifacts) are made. The systemic functional model considers not only usability or aesthetics as design functions, but covers their experiential, interpersonal, and textual meaning potentials. Drawing on Poynton (1993), it is important to both *read (interpretively reflect on)* the meaning potentials of the analytical objects, and investigate their social histories, the co-designers' perspectives on *framing* the meaning-making in context, semiotic transformations of meaning resources and the (intended) outcomes of designerly activity. From a design research point of view, I contribute to the field by explaining the social situations in which technologies and practices of digital communication and collaborative design converge. The analysis supports the overarching social semiotic framing of design as a social process, which is based on assessment and transformation of various modalities as design elements.

Further directions for research

The analysis primarily focused on creative activities and designers' interpretations of meaning potentials, as well as their experiences with and feedback gained from the visitors. One limitation of the rhetorical perspective – as applied in this research – is the limitation of including the other voices that construct the social framing of communication, particularly the emergent discourses of the visitors (as sign-users). A promising next step would be to observe how designers' rhetorical intentions and presentation of meta-functions meet/match with user behaviors. The question of how other platforms afford and/or constrain collaborative design activities remains. Future research studies can use and emphasize the potentials of emerging technologies such as mobile devices, mixed or augmented reality applications and open-source co-creation platforms. In doing so, prospective research approaches can explain how technological characteristics of media platforms and devices affect the collaborative activities and the forms of signification in virtual designs. One particularly interesting research question would be '*what happens to 3D content when it gets natively embedded in Web browsers*[3] *and widely used by WWW communities*?' Such questions require the considerations of a wider and more complex media landscape, and emphasize the importance of conditions and contexts in which collaborative activities take place. In general, the user-driven co-production of places and artifacts in VWs can refer to numerous relevant perspectives on multimodality in digital media. Another similar approach can focus on the role of immersive technologies - such as *virtual reality* - and location specific mixed-reality applications - such as *augmented reality* – on collaborative design practices. These research frameworks can consider professional designers (i.e. architects, product designers, urban designers) and their collaborative design practices, prospective users in participatory design cases, or students in their learning environments. Either target group would provide different sets of insights on how the meaningful relations with virtual places and artifacts are constructed in relation to the affordances and constraints; thus contribute to the further development of the framework I present in this study. This PhD dissertation is an attempt to capture the semiotic complexity of virtual places and artifacts, and offer a new– a meaning and design oriented - perspective on user-generated content to understand the social life of meaning in VWs. These potentials will only be revealed in the hands of innovative designers, entrepreneurs and researchers.

[3] By being 'natively embedded' I refer to emerging 3D visualization technologies such as Khronos Group's WebGL. WebL and other open standards aim to enable Web browsers to render and present 3D content without the need for downloading and installing an external plug-in. Currently, WebGL is supported by several browsers such as Google Chrome, Opera and Mozilla Firefox, while Microsoft's Internet Explorer does not. Other formats that enable 3D visualization in browsers include Unity Web plug-in and other Flash-based applications.

References

Adams D., and Carwadine M. (1990). *Last chance to see*. Ballantine Book, New York.

Alexander C. (1999) The Origins of Pattern Theory: The Future of the Theory, and the Generation of a Living World, *IEEE Software*, 16:5.

Archer, B., (2004). *Designerly Activity and Higher Degrees: seminar papers from a staff development short course*, DATA and Loughborough University.

Arias, E., Eden, H., Fischer, G., Gorman, A., Scharff, E., (2000) Transcending the individual human mind—Creating shared understanding through collaborative design, *ACM Transactions on Computer-Human Interaction*, 7(1), 84–113.

Ashmore, M. (1989) *The reflexive thesis: Wrighting sociology of scientific knowledge*. London:The University of Chicago Press.

Au, W.G., (2008). *The making of Second Life: Notes from the new world*. HarperCollins, NY.

Bailenson, J.N. (2006) Transformed social interaction in collaborative virtual environments. In P. Messaris and L. Humphreys (Eds.), *Digital Media: Transformations in Human Communication* (pp. 255-264). New York: Peter Lang.

Bailenson, J. and Yee, N.(2005) Digital Chameleons: Automatic Assimilation of Nonverbal Gestures in Immersive Virtual Environments. *Psychological Science*,16(10) pp.814-819.

Bailenson, J.N., Beall, A.C., Blascovich,J., Loomis,J., and Turk, M. (2004) Transformed social interaction: Decoupling representation from behavior and form in collaborative virtual environments, *Presence: Teleoperators and Virtual Environments*, 13(4), pp. 428-441.

Bailenson, J.N., Beall, A.C., Blascovich, J., Loomis, J., and Turk, M., (2005). Transformed social interaction, augmented gaze, and social influence in immersive virtual environments, *Human Communication Research*, 31, pp. 511-537.

Bailenson, J.N., and Beall, A.C., (2006). Transformed social interaction: Exploring the digital plasticity of avatars, In R. Schroeder and A.-S. Axelson (Eds.) *Avatars at Work and Play: Collaboration and Interaction in Shared Virtual Environments*, (pp. 1-16), London: Springer.

Bakhtin, M.M., (1981). *The Dialogic Imagination: Four Essays*. Austin: University of Texas Press.

Bakhtin, M.M. (1986). *Speech, genres and other late essays*, Austin:University of Texas Press.

Baldwin, C., Hienerth, C., von Hippel, E., (2006). How user innovations become commercial products: a theoretical investigation and case study, (*Working Paper available at:* http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.87.1633&rep=rep1&type=pdf, retrieved in 05.10.2010.)

Barthes, R., (1967). *Elements of semiology*, London: Jonathan Cape.

Barthes, R., (1977). *Image, Music, Text*. London: Fontana Press.

Barthes, R., (2009 [1957]). *Mythologies*. London: Vintage Books.

Bartle, R.A., (2004). *Designing virtual worlds*. California: New Riders.

Bartle, R. (2008). Making places. In F. von Borries et al. (Eds.), Space Time Play: computer games, architecture and urbanism: the next level. Basel: Birkhauser. 158-163.

Baudrillard, J., (1988). Simulacra and Simulations, in (ed.) Mark Poster *Jean Baudrillard, Selected Writings*, Stanford, Stanford University Press, pp.166-184.

Baudrillard, J., (2005 [1996]). *The system of objects*. London: Verso.

Baxter, P., and Jack, S., (2008). Qualitative case study methodology: Study design and implementation for novice researchers, *The Qualitative Report*13(4), pp. 544-559.

Blascovich, J., and Bailenson, J. (2011*). Infinite reality: Avatars, eternal life, new worlds, and the dawn of the virtual revolution*. New York: HarperCollins.

Boellstorff, T., (2008). *Coming of age in second life: an anthropologist explores the virtually human*. Princeton: Princeton University Press.

Bolter, J.D. and Grusin, R. (2000). *Remediation: understanding new media*. The MIT Press, Cambridge.

Bonsu, S.K., and Darmody, A., (2008). Co-Creating second life: Market-consumer cooperation in contemporary economy. *Journal of Macromarketing*, 28, 355.

Book, B., (2004). Moving beyond the game: Social virtual worlds. *State of Play 2 Conference*, Cultures of Play Panel, October 2004, retrieved 13 Dec. 2009 from http://www.virtualworldsreview.com.

Boostrom , R.E., (2008). The social construction of virtual reality and the stigmatized identity of the newbie, *Journal of Virtual Worlds Research*, 1(2), pp. 2-19.

Bortoluzzi, M., Trevisan, P., (2009). Identities in "non-places": The Geosemiotics of computer-mediated learning environments in Second Life, *Textus*, 22, pp. 199-224.

Bridges, A., and Charitos D. (1997). On architectural design in virtual environments. *Design Studies*, 18, pp. 143-154.

Bruns, A., (2008). *Blogs, Wikipedia, Second Life and beyond: from production to produsage*. New York:Peter Lang.

Bryant, A. and Charmaz, K., (2007). Grounded theory research: Methods and practices, in eds. Bryant A. and Charmaz, *Handbook of Grounded Theory*, , K., pp. 1-28, London: Sage.

Buchanan, R., (1992). Wicked problems in design thinking. *Design Issues*, 8(2), pp. 5-21

Buchanan, R. (2001a). Design Research and the New Learning, *Design Issues*, 17(4)

Buchanan, R., (2001b). Design and the New Rhetoric: Productive Arts in the Philosophy of Culture, *Philosophy and Rhetoric*, 34:3.

Callon M. and Law J. (1997) After the individual in society: lessons on collectivity from science, technology and society. *Canadian Journal of Sociology* 22:2, p.165-82.

Castells, M. (2009). *Communication power*, Oxford: Oxford University Press.

Castells, M., (2010). *The information age: Economy, society and culture, Volume 1: The rise of the network society (second edition),* West Sussex: Wiley-Blackwell.

Castronova, E. (2005). Synthetic worlds: the business and culture of online games, Chicago The University of Chicago Press.

Castronova E, Cummings J.J., Emigh W., Fatten M., Mishler N., Ross T. and Ryan W. (2007). What is a synthetic world? In(eds.) von Borries F., Birkhauser *Space Time Play: Computer Games, Architecture and Urbanism -the Next Level*, Basel: Vorlag AG.

Castronova, E., Williams, D., Shen, C Ratan, R, Xiog, L., Huang, Y,. Keegan, B., (2009). As real as real? Macroeconomic behaviors in a large-scale virtual world. *New Media and Society*, 11 (5), 685-707.

Chandler, D., (2007). *Semiotics: The Basics,* London: Routledge.

Charmaz, K., (2002). Qualitative interviewing and Grounded Theory Analysis, in Holstein, G. (ed.), *Handbook of interview research: Context and method*, pp- 675-694, Thousand Oaks:Sage.

Charmaz, K., (2005). Grounded theory in the 21st century: Applications for advancing social justice studies, in Denzin, N.K., and Lincoln, Y.S. (eds.) *The Sage handbook of qualitative research*, pp.109-126, Thousand Oaks:Sage.

Charmaz, K., (2006). *Constructing grounded theory: a practical guide through qualitative analysis*, London: Sage.

Chemero, A. (2003). An outline of a theory of affordances, *Ecological Psychology*, 15 (2), pp.181-195.

Constantinous, O., (2005). Review article: Multimodal discourse analysis: Media, modes and technologies, *Journal of Sociolinguistics*, 9(4),pp- 602-618.

Corbit, M., (2002). Building Virtual Worlds for Informal Science Learning (SciCentr and SciFair) in the Active Worlds Educational Universe (AWEDU), *Presence: Teleoperators & Virtual Environments*, 11(1), Pages 55-67.

Craig, R. T. and Muller, H. L. (2007). *Theorizing communication: Reading across traditions*, Thousand Oaks: Sage Publications.

Creswell, J.W., (2007). *Qualitative inquiry and research design: Choosing among five approaches*, Thousand Oaks: Sage.

Cross, N. (2007). *Designerly ways of knowing*, Basel: Birkhäuser Verlag AG.

Csikszentmihalyi, M., (1998). Design and order in everyday life, in (eds). Margolin, V., and Buchanan, R., *The Idea of Design: A Design Issues Reader*, pp. 118-126, Massachusetts: MIT Press.

Damer, B. (1998). *Avatars: Exploring and building virtual worlds on the internet*, Berkeley: Peachpit Press.

Damer, B. (2009). Meeting in the ether: A brief history of virtual worlds as a medium for user-created events, *Artifact*, 2(3).

Deacon, D., Pickering, M., Golding, P. and Murdock, G. (2007). *Researching Communications: A practical guide to methods in media and cultural analysis*, London: Bloomsbury.

De Certau, M., 1984. The Practice of Everyday Life, University of California Press, Berkeley.

Defillippi, R.J., Arthur,M.B., and Lindsay, V.L. (2006). *Knowledge at work: Creative collaboration in the global economy*. Malden: Blackwell Publishing.

De Moor, K., Berte, K., De Marez, L., Joseph, W., Deryckere, T., Martens, L., (2010). User-driven innovation? Challenges of user involvement in future technology analysis. *Science and Public Policy*,37 (1), 51-61.

Dennhardt, S., and Kohler, T. (2010). User-generated brands: what real-world companies can learn from virtual world brands, *Extended Abstract for research workshop "Making sense of Virtual Worlds and user Driven Innovation", Denmark*, June 2010.

Denzin, N.K. and Lincoln, Y.S. (2005). Introduction: The discipline and practice of qualitative research. In (Eds.) Denzin, N.K. and Lincoln, Y.S. ,*The Sage Handbook of qualitative research* , pp. 1-33, Thousand Oaks :Sage.

Dev, P and D. F. Walker. (1999). From Virtual Frog to Frog Island: design studies in a development project. *Journal of Curriculum Studies*, 31(6), pp. 635 - 660.

Dey, I., (2007). Grounding Categories, in (eds.) Bryant A. and Charmaz, K. *Handbook of Grounded Theory*, pp. 167-190, London:Sage.

Dickey, M.D. (2005). Brave new (interactive) worlds: A review of the design affordances and constraints of two 3D virtual worlds as interactive learning environments, *Interactive Learning Environments*, 13(1-2), pp. 121-137.

Drotner, K. (2008). Informal learning and digital media: perceptions, practices and perspectives, In (Eds.) Drotner, K., Jensen, H.S. and Schrøder, K.C. *Informal learning and digital media*, pp.10-28. Cambridge: Scholars Publishing.

Eco, U. (1984). *Semiotics and the philosophy of language*, Bloomington: Indiana University Press.

Eisenhardt, K.M., (1989) Building Theories from Case Study Research, *The Academy of Management Review*, 14(4), pp. 532-550.

Finlay, L. (2002). Negotiating the swamp: the opportunity and challenge of reflexivity in research practice, *Qualitative Research*, 2(2), pp. 209-230.

Firth, J.R. (1935). The technique of semantics, *Transactions of the Philological Society*, 34(1), pp. 36–73.

Fischer, G. and Giaccardi, E., (2007). Sustaining social creativity, *Communications of the ACM*, 50(12), pp. 28-29.

Fischer,G., Giaccardi, E., Eden, H., Sugimoto, M. and Ye, Y. (2005). Beyond Binary Choices: Integrating Individual and Social Creativity, *International Journal of Human-Computer Studies* Volume 63(4-5) pp. 82-512.

Flyvbjerg, B., (2006). Five misunderstandings about case-study research, *Qualitative Inquiry*, 12(2), pp: 219-245.

Foucault, M. (1982*). The archeology of knowledge and discourse on language*. London: Tavistock Press.

Frølunde, L.,(2009). *Animated symbols: A study of how young people design animated films and transform meanings* (ph.d dissertation), Danish School of Education, Aarhus University, Copenhagen.

Frølunde, L. (2012). Machinima Filmmaking as Culture in Practice: Dialogical Processes of Remix. In Fromme, J., & Unger, A. (eds.), *Computer Games and New Media Cultures: A Handbook of Digital Games Studies* Kapitel 31:Springer.

Fuchs, C. (2011a, May 31). Against Henry Jenkins. Remarks on Henry Jenkins' ICA Talk "Spreadable Media" [blog-post]. Retrieved at 26 September 2011 from http://fuchs.uti.at.

Fuchs, C. (2011b). Web 2.0, Prosumption, and Surveillance. *Surveillance & Society*, 8(3), pp 288-309.

Fuller, B., (1963). *Ideas and Integrities: A Spontaneous Autobiographical Disclosure*. Collier-Macmillan, Toronto.

Gaffney, P. (2010) Introduction. In (Ed) P. Gaffney, *The force of the virtual*, pp. 1-66, Minneapolis: University of Minnesota Press.

Gauntlett, D. (2011) *Making is Connecting: The social meaning of creativity, from DIY and knitting to YouTube and Web 2.0*, Cambridge: Polity Press.

Gaver, W.W., (1991). *Technology affordances*. CHI'91 Conference Proceedings. 79-84.

Giaccardi, E., (2005). Metadesign as an emergent design culture, *Leonardo*, 38:2.

Gibson, J.J., (1986). The *ecological approach to visual perception*. New York: Psychology Press, Taylor & Francis.

Gilje, Ø., (2008). Googling movies: digital media production and the ”Culture of Appropriation” , in (eds.) Drotner, K., Jensen, H.S. and Schrøder, K.C. *Informal learning and digital media*, pp. 29-49, Cambridge: Scholars Publishing.

Glaser, G.G., (1993). *Examples of Grounded Theory: A reader.* Mill Valley: Sociology Press.

Gordon, E. (2008).The Geography of Virtual Worlds: An Introduction**,** *Space and Culture* (11), pp.200.

Graham, S.S., and Whalen, B., (2008). Mode, medium, and genre: A case study of decisions in new-media design, *Journal of Business and Technical Communication,* 22(1), pp. 165-91.

Griffin, E. (2009). *A first look at communication theory*. New York: McGraw-Hill.

Grossen, M., (2008) Methods for studying collaborative creativity: An original and adventurous blend, *Thinking Skills and Creativity*, 3, 246-249.

Grossen, M. (2010) Interaction analysis and psychology: A dialogical perspective. *Integrative phsychological and behavioral sciences,* 44(1), 1-22.

Gu N., Kim M. J., Maher M. L. (2011). Technological advancements in synchronous collaboration: The effect of 3D virtual worlds and tangible user interfaces on architectural design, *Automation in Construction,* 20, p. 270–278.

Gül, L. F. and Maher, M. L. (2006). *Studying design collaboration in designworld: An augmented 3d virtual world.* In 3rd International Conference on Computer Graphics, Imaging and Visualisation, University Technology of Sydney, Sydney, Australia.

Haddon, L. (2005). Research Questions for the Evolving Communications Landscape, in (eds.) Ling, R. and Pedersen, P.E., *Mobile Communications: Re-negotiation of the social sphere,* London: Springer.

Halkier,B. (2003). The challenge of qualitative generalizations in communication research. *Nordicom Review*, 24(1), pp. 115 – 124.

Hall, E.T. (1966). Proxemics. *Current anthropology*, 9(2-3) pp. 83.

Halliday, M.A.K. (1978). *Language as social semiotic: The social interpretation of language and meaning*. London: Edward Arnold.

Halliday, M.A.K. (2007). *Language and society*. London: Continuum.

Halliday, M.A.K. and Hasan, R. (1985). *Language, context, and text: Aspects of Language in a social-semiotic perspective*. Victoria Deakin: University Press.

Hargadon, A.B., and Becky, B.A. (2006).When Collections of Creatives Become Creative Collectives: A Field Study of Problem Solving at Work, *OrganizationScienc*e 17(4), pp. 484–500.

Harrison S. and Dourish, P. (1996). Re-placing space: The roles of place and space in collaborative systems, in: Proceedings of the Computer Supported Cooperative Work'96, Cambridge, MA

Hartson, H.R. (2003). Cognitive, physical, sensory, and functional affordances in interaction design, *Behaviour & Information Technology*, 22(5), pp. 315–338.

Heskett, J., (2002). *Design: A very short introduction*, Oxford: Oxford University Press.

Hine, C., (2000). *Virtual Ethnography*, London: Sage.

Hine, C., (2005). Virtual methods and the sociology of Cyber-Social-Scientific Knowledge, in (ed.) Hine, C., *Virtual Methods: Issues in social research on the Internet*, pp. 1-17, Oxford:Berg.

Hodge, R. and Kress, G. (1988). *Social Semiotics*, Cambridge: Polity Press.

Holton, J.A. (2007). The coding process and its challenges. In (eds.) Bryant A. and Charmaz K., *Handbook of Grounded Theory*. pp. 265-289, London: Sage.

Iedema, R.(2003). Multimodality, resemiotization: extending the analysis of discourse as multi-semiotic practic practice. *Visual Communication*, 2 (1), pp.29-57.

Ip, B. and Jacobs, G. (2004), Quantifying game design, Design Studies, 25 (6), 607-624.

Ivarsson, J., Linderoth, J. and Säljö, R. (2009). Representations in practices: a socio-cultural approach to multimodality in reasoning. In C. Jewitt (Ed.) T*he Routledge Handbook of multimodal analysis*. Oxon: Routledge.

Jammer, M. (1970). *Concepts of space: The history of theories of space in physics*. Cambridge: Harvard University Press.

Jenkins, H., (2006). *Convergence culture: where old and new media collide*. New York: New York University Press.

Jenkins, H., Purushotma, R., Weigel, M., Clinton, K. and Robison, A.J., (2009). Confronting the challenges of participatory culture: Media education for the 21st century, Cambridge: MIT Press.

Jensen, K.B. (2002). *A handbook of media and communication research: Qualitative and quantitative methodologies*. Oxon:Routledge.

Jensen, K.B. (2010). *Media convergence: The three degrees of network, mass and interpersonal communication*. Oxon: Routledge.

Jensen, K.B. (2008a). Acting and learning with avatars: Sense-making strategies of reflection in the virtual world of a Massively Multi-User Online Role Playing Game, in (eds.) Drotner, K., Jensen, H.S. and Schrøder K.C., *Informal learning and digital media*, pp. 49-70, Cambridge Scholars Publishing.

Jensen, S. S. (2008b). *Co-design and cacophony: Case studies of the Library Hangouts and the Metanomics Second Life projects*. Paper presented at European Communication Conference, Barcelona, Spain.

Jensen, S. S. (2008c). *Meaningful Places?: A case-study of user-driven innovation in a Danish Second Life project: the Library Hangouts*. Paper presented at The AoIR Conference 9.0: Rethinking Community, Rethinking Place, Copenhagen, Danmark.

Jensen, S. S. (2009). Actors and Their Use of Avatars as Personal Mediators: An Empirical Study of Avatar-Based Sense-Makings and Communication Practices in the Virtual Worlds of EverQuest and Second Life. *MedieKultur*, 47, 29-44.

Jensen, S. S. (2011). User-Driven Content Creation in Second Life: a Source of Innovation?: Three Case Studies of Business and Public Service. In Zagalo, N., Morgado , L., & Boa-Ventura , A. (eds.), *Virtual Worlds and Metaverse Platforms: New Communication and Identity Paradigms*, pp. 1-15, Hershey, London, Melbourne, Singapore: Idea Group Publishing.

Jensen, S.S. (2012). *Ways of virtual world-making: Actors and avatars*. Roskilde: Roskilde University Press (forthcoming).

Jeppesen, L.B., Molin, M.J. (2003). Consumers as co-developers: Learning and Innovation outside the firm. *Technology Analysis & Strategic Management*, 15, (3)

Jewitt, C. (2009). An introduction to multimodality. In C. Jewitt (Ed.) *The Routledge handbook of multimodal analysis*. Oxon: Routledge.

Jones, J.C., (2009). What is designing? In eds. Clark, H. And Brody, D., *Design Studies: A Reader*, Oxford: Berg.

Jones, R.H. and Norris, S., (2005). Discourse as action / discourse in action. In Norris S. and Jones, R.H. (Eds.), *Discourse in action: introducing mediated discourse analysis*, pp. 3-15, Oxon: Routledge.

Julier, G. (2006). From Visual Culture to Design Culture. *Design Issues*, 22(1), pp. 64-76.

Julier, G., (2008). *The culture of design*. London: Sage Publications.

Keating E. and Sunakawa C. (2012) Participation cues: Coordinating activity and collaboration in complex online gaming worlds Language in Society, 39, p. 331–356.

Keck, F.(2005). The Virtual, the Symbolic, and the Actual in Bergsonian Philosophy and Durkheimian Sociology. *MLN*, Vol. 120(5), pp. 1133-1145.

Kemmis, S. and McTaggart, R. (2005). Participatory action research: Communicative action and the public sphere. In Denzin, N. K. and Lincoln, Y. S. (Eds.) *The Sage handbook of qualitative research (3rd edition*), pp. 559-604, Thousand Oaks: Sage.

Kivits, J. (2005). Online interviewing and the research relationship. In (ed.) C. Hine, in *Virtual Methods: Issues in social research on the Internet,* pp. 35-50, Oxford: Berg.

Kohler, T., Matzler, K., Füller, J. (2009). Avatar-based innovation: using virtual worlds for real-world innovation, *Technovation*, 29 (2009), pp.395-407.

Koutsabasis, P., Vosinakis, S., Malisova, K. and Paparounas, N. (2012). On the value of Virtual Worlds for collaborative design, *Design Studies*. 33 p. 357-390.

Kreijns, K. and Kirschner, P.A., (2001). *The social affordances of computer-supported Collaborative learning environments,* Paper presented at 31th ASEE/IEEE Frontiers in Education Conference, October 10 – 13, 2001 Reno, NV.

Kress, G. (2010). *Multimodality: A social semiotic approach to contemporary communication.* London and New York: Routledge.

Kress, G., van Leeuwen, T. (2006 [1996]), *Reading images: The grammar of visual design, 2nd edition.* Oxon: Routledge.

Kress, G., van Leeuwen, T. (2001). *Multimodal discourse: The modes and media of contemporary communication*. London: Arnold.

Krippendorff, K. (1990). Product Semantics: A Triangulation and Four Design Theories." In Seppo Väkevä (Ed.) *Product Semantic* '89. Helsinki: Finland University of Industrial Arts.

Krippendorff, K. (1998). On the essential contexts of artifacts or on the proposition that "design is making sense of things", in eds. Margolin, V., and Buchanan, R. *The Idea of Design: A Design Issues Reader*, pp. 156-186, MIT Press.

Krippendorff, K. (2006). *The semantic turn: a new foundation for design*. New York: Taylor & Francis.

Kvale, S. and Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing (2nd edition)*. Thousand Oaks: Sage.

Larsson, A. (2003).Making sense of collaboration: the challenge of thinking together in global design teams. In Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work (GROUP '03). ACM, New York, NY, USA, 153-160.

Latour, B. (2005). Reassembling the social: An introduction to actor-network theory, New York: Oxford University Press.

Latour, B. (1997) *On actor-network theory A few clarifications*. Soziale Welt, CSI-Paris

Law J. (1992) Notes on the Theory of the Actor-Network: Ordering, Strategy and Heterogeneity, *Systems Practice*, 5, p. 379-93.

Law, J. (2009). Actor Network Theory and Material Semiotics, in (Eds.) Bryan S. *Turner The New Blackwell Companion to Social Theory*, Blackwell Publishing Ltd.

Leadbeater, C. and Miller, P. (2004). The Pro-Am revolution: how enthusiasts are changing our economy and society, Demos.

Lefebvre, H. (1991). *The production of space*. Malden: Blackwell Publishing.

Lehtonen, M. (2001[1999]). On No Man's Land: Theses on Intermediality, *Nordicom Review, retrieved on 17.12.2011 from* www.nordicom.gu.se/common/publ_pdf/28_lehtonen.pdf

Lemke, J. L. (2000). Material sign processes and ecosocial organization. In P. B. Andersen, C. Emmeche, & N. O. Finnemann-Nielsen (Eds.), *Downward causation: Self-organization in biology, psychology, and society* (pp. 181–213). Aarhus, Denmark: Aarhus University Press.

Lemke, J.L. (2002). Travels in Hypermodality, *Visual Communication*, 1(3), pp. 299–325.

Lemke, J.L. (2005). Place, pace and meaning: Multimedia chronotopes. In Norris, S. and Jones, R.H. (Eds *Discourse in action: introducing mediated discourse analysis*,.), pp. 110-122., Oxon: Routledge.

Lemke, J.L. (2009a). Multimodality, identity, and time, in Jewitt, C. (ed.), *The Routledge Handbook of Multimodal Analysis*, pp. 140-150, London: Routledge.

Lemke, J.L. (2009b). Multimodal genres and transmedia traversals: Social semiotics and the political economy of the sign. *Semiotica*, 173(1/4), pp. 283–297.

Leone, M. (2011): The semiotics of religious space in Second Life, *Social Semiotics*, 21(3), pp. 337-357.

Lévy, P. (1997). *Collective intelligence: mankind's emerging world in cyberspace*. Cambridge: Perseus.

Li, W. D., Lu, Y. Q., Lu, W. F., Fuh, J. Y. H. and Wong, Y. S. (2005). Collaborative Computer-Aided Design – Research and Development Status, *Computer-Aided Design*, 37(9), pp. 931–940.

Liewrouw, L., (2006). New Media Design and Development: Diffusion of Innovations v Social Shaping of Technology, in (eds.) Liewrouw, L. and Livingstone, S. *The Handbook of New Media*, London: Sage.

Lymer, G., Lindwall, O. and Ivarsson, J. (2011). Space and discourse interleaved: intertextuality and interpretation in the education of architects. *Social Semiotics*, 21(2), pp. 97-217.

Maher, M.L., Liew, P., Gu, N., and Ding, L. (2005). An agent approach to supporting collaborative design in 3D virtual worlds., *Automation in Construction*, 14 (2005), 189– 195.

Maher, M.L., Simoff, S. (2000). *Collaboratively designing within the design,* Proceedings of Co-Designing, pp. 391–399.

Maher M.L., Rosenman M., Merrick K., and Macindoe O.. (2006). DesignWorld: An Augmented 3D Virtual World for Multidisciplinary Collaborative Design. In Caadria 2006. Osaka, Japan.

Malinowski, B. (1923). The problem of meaning in primitive languages. Supplement I in CK Ogden IA Richards (Eds.), The meaning of meaning (International Library of Philosophy, Psychology and Scientific Method). London: Kegan Paul.

Malinowski, B. (1935). *Coral gardens and their magic, Volume 2*, London: Allen.

Mann, C., and Stewart, F. (2000). *Internet Communication and Qualitative Research: A handbook for researching online*. London: Sage Publications.

Mansell, R. (1996). Communication by design?, in (eds.) Mansell, R., and Silverstone, R., *Communication by design: The politics of information and communication technologies*, pp. 15-44, NY: Oxford University Press.

May, T. (2002). *Qualitative Research in Action*. London: Sage.

McDonnell, J. (2009). Collaborative negotiation in design: A study of design conversations between architect and building users. *CoDesign*, 5(1), pp. 35–50.

McGrenere, J. and Ho, W. (2000). Affordances: Clarifying and Evolving a Concept, in *Proceedings of Graphics Interface 2000*, Montreal, May 2000.

McIlvenny, P. and Noy, C. (2011). Multimodal discourse in mediated spaces, *Social Semiotics*, 21(2), pp. 147-154.

Mead, G.H. (2007) The social foundations and functions of thought and communication. In In (Eds.) R. T. Craig and H. L. Muller, *Theorizing communication: Reading across traditions*, Thousand Oaks: Sage Publications.

Merleau-Ponty, M. (2004) [1948]. *The world of perception*. London/New York: Routledge.

Messeter, J. (2009). Place-specific computing: A place-centric perspective for digital designs. *International Journal of Design*, 3(1), 29-41.

Moore, R.J., Gathman, E.C.H. and Ducheneaut, N. (2009). From 3D Space to Third Place: The Social Life of Small Virtual Spaces, *Human Organization*, Vol. 68(2)

Morse, J.M. (2007). Sampling in Grounded Theory. In eds. Bryant A. and Charmaz, K., *Handbook of Grounded Theory*, pp. 229-244, London: Sage.

Najafi M., Shariff M.K.B.M. (2011) The Concept of Place and Sense of Place In Architectural Studies. *International Journal of Human and Social Sciences* 6:3.

Norman, D.A. (1988). *The psychology of everyday things*. New York: Basic Books.

Norman, D.A. (1998). *The invisible computer: Why good products can fail, the personal computer is so complex, and information appliances are the solution*. Cambridge: The MIT Press.

Norman, D.A. (1999). Affordance, Conventions and Design. *Interactions*, Vol3, pp.38-42.

Norman, D.A. (2008). The way I see it: Signifiers, not affordances. *Interactions,* 15 (6), 18-19.

Norris, S. & Jones, R.H. (2005) Introducing mediated action, in Norris, S. and Jones, R.H. (Eds.) *Discourse in action: introducing mediated discourse analysis*, pp. 17-19, Oxon: Routledge.

Nöth, W. (1990) *Handbook of semiotics. Bloomington: Indiana University Press.*

O'Halloran K. (2004) Visual semiosis in film. In K. O'Halloran (Ed.), *Multimodal discourse: A systemic functional approach* ,pp. 109 -130, London:Continuum.

O'Halloran, K. L. (in press). Multimodal analysis and digital technology. In A. Baldry and E. Montagna (Eds.), *Interdisciplinary Perspectives on Multimodality: Theory and Practice.* Campobasso: Palladino.

O'Reilly, T. (2005) What is Web 2.0? retrieved 07.04.2011 fro mO'Reilly Networks: http://oreilly. com/web2/archive/what-is-web-20.html

O'Toole, M.,(1980). Dimensions of semiotic space in narrative, *Poetics Today*, 1(4), pp. 135-149

O'Toole, M. (1994). *The language of displayed art*. Cranbury: Associated University Presses.

O'Toole, M. (2004). Opera ludentes: the Sydney Opera House at work and play. In O'Halloran, K.L. (Ed.), *Multimodal discourse analysis: systemic functional perspectives*, pp. 11-27, London: Continuum.

Ondrejka, C.R. (2005). Changing realities: User creation, communication, and innovation in digital worlds Available at SSRN: http://ssrn.com/abstract=799468, retrieved: 05.10.2010.

Oliver, M., (2005). The Problem with Affordance, E–Learning, Volume 2(4), pp: 402-413.

Ostrander, M. (2008). Talking, looking, flying, searching: information seeking behaviour in Second Life, *Library Hi Tech*, Vol. 26 (4), pp.512 – 524.

Papanek, V., (1984). *Design for the real world: Human ecology and social change*, London: Thames & Hudson.

Pearce, C.,(2006). Productive Play: Game Culture From The Bottom Up. *Games and Culture*; 1; 17.

Peirce, C.S., (1998) [1894]. What is a sign?, in Peirce Edition Project (Ed), *The Essential Peirce, Selected philosophical writings vol.2 (1893-1913)*, Bloomington and Indianapolis : Indiana University Press.

Pfeil, U. , Ang, C.S. and Zaphiris, P. (2009). Issues and challenges of teaching and learning in 3D virtual worlds: real life case studies, *Educational Media International*, 46:(3), pp.223 — 238.

Phillips, P. And Rodden, T., (2001). Multi-authoring virtual worlds via the world wide web. *Interacting with Computers*, 13, pp.401-426.

Piller, F., Schubert, P., Koch, M., Möslein, K. (2005). Overcoming mass confusion: Collaborative customer co-design in online communities, *Journal of Computer-Mediated Communication*, 10(4).

Pink, S., (2011). Multimodality, multisensoriality and ethnographic knowing: Social semiotics and the phenomenology of perception, *Qualitative Research*, 11 (3), pp. 261-276.

Poster, M. (2007). The Mode of Information and Postmodernity. In (Eds.) R. T. Craig and H. L. Muller, *Theorizing communication: Reading across traditions*, Thousand Oaks: Sage Publications.

Poynton, C., (1993). Grammar, language and the social: Poststructuralism and systemic-functional linguistics, *Social Semiotics*, 3(1), pp. 1-21

Prasolova-Førland, E., (2008). Analyzıng Space Metaphors In 3d Educational Collaboratıve Virtual Environments. *Computers in Human Behaviour*, 24, pp-185-204.

Qvortruop, L. (2002). Cyberspace as representation of space experience: In defence of a Phenomenological Approach, in Qvortruop, L. (ed.) *Virtual Space: Spatiality in virtual Inhabited 3D Worlds*, pp. 5 – 25, London: Springer-Verlag.

Rasmussen, S.E., (1959). *Experiencing Architecture.* The MIT Press, Cambridge.

Reeves and Read (2009). *Total engagement: Using games and virtual worlds to change the way people work and businesses compete.* Harvard Business Press, Boston.

Reffat, R.M., Khaeruzzaman, Y., El-Sebakhy, E. and Raharja, P. (2008). Augmentation of real-time 3D virtual environments for architectural design at the conceptual stage, ITcon Vol. 13 (2008), Reffat et al, pg. 553.

Reichertz, J. (2007). Abduction: The logic of discovery of Grounded Theory, in Bryant A. and Charmaz, K. (Eds.) *Handbook of Grounded Theory*, pp. 214-229, London: Sage.

Reinhard, C. D., & Dervin, B. (2010). *Situations of media engagings: Comparing the new and the old through sense-making*. Paper presented at 11th Annual Conference of the Association of Internet Researchers (AoIR): Internet Research 11.0 Conference, Gothenburg, Sweden.

Relph, E, (2007) Spirit of Place and Sense of Place in Virtual Realities *Technè* 10:3 Spring

Rosenman, M.A., Smith, G., Maher, M.L., Ding, L. And Marchant, D., (2007). Multidisciplinary collaborative design in virtual environments, *Automation in Construction*, 16 , p. 37 – 44.

Rosenman, M., Merrick, K., Maher, M.L. and Marchant, D. (2006). DESIGNWORLD: A Multidisciplinary Collaborative Design Environment Using Agents in a Virtual World, in JS Gero (ed), *Design Computing and Cognition'06*, pp 695-710, Springer, Dordrecht, The Netherlands.

Sanchez, J. (2009). A Social History of Virtual Worlds. *Library Technology Reports*, 45(2), pp.: 9-12.

Sánchez-Jankowski, M. (2002). Representation, Responsibility, and Reliability in Participant-Observation, In May, T. (ed.), *Qualitative Research in Action*, pp. 144-159, London:Sage.

Santos, R.P. (2009). Second Life Physics: Virtual, Real Or Surreal? *Journal of Virtual Worlds Research*, 2 (1).

Schroeder, R. (1995). Virtual Environments and the Varieties of Interactive Experience in Information and Communication Technologies: An Analysis of Legend Quest, *Convergence* 1: 45.

Schroeder, R. (2011). *Being there together: Social interaction in virtual environments*. New York: Oxford University Press.

Schroeder, R. (2006). Being there together and the future of connected presence, *Presence*, 15 (4), pp. 438-454.

Schroeder, R., Huxor, A., and Smith, A. (2001). Activeworlds: geography and social interaction in virtual reality, *Futures*, 33 (7), Pp. 569-587.

Scollon, R. (2001). *Mediated discourse: the nexus of practice*. New York: Routledge.

Scollon, R. (2005). The rhythmic integration of action and discourse: Work, the body and the earth, in Norris, S. and Jones, R.H. (Eds.), *Discourse in action: introducing mediated discourse analysis*, pp. 20-31, Oxon: Routledge.

Scollon, R. and Scollon, S.W. (2003). *Discourses in place: Language in the material world.* London: Routledge.

Scollon, R. and Scollon, S.W. (2004). *Nexus analysis: discourse and the emerging internet*, New York: Routledge.

Schütz, A. and Luckmann, T. (1984 [1974]). *Structure of the Life-World*. London: Heinemann.

Simon, H., 2009. Understanding the natural and artificial worlds, in *Design Studies: A Reader*, eds. Clark, H. And Brody, D., Berg, Oxford, UK.

Simonsen, J., Bærenholdt, J.O., Büscher, M., and Scheuer, J.D. (2010). *Design research: Synergies from interdisciplinary perspectives*, Oxon: Routledge.

Stake, R. (2005). Qualitative case studies, in Denzin, N. K. and Lincoln, Y. S. (Eds.), *The Sage handbook of qualitative research (3rd edition*), pp. 433-466, Thousand Oaks: Sage, Thousand Oaks.

Stenglin, M. (2008). Binding: a resource for exploring interpersonal meaning in three-dimensional space, *Social Semiotics,* 18 (4), pp. 425-447.

Stenglin, M., (2009). Space and communication in exhibitions: Unraveling the nexus, in C. Jewit (ed.) *The Routledge handbook of multimodal analysis,* Oxon: Routledge.

Stern, P.N. (2007). On Solid Ground: Essential Properties of Growing Grounded Theory, in (eds.) Bryant A. and Charmaz, K.*Handbook of Grounded Theory*, pp. 114-126, London: Sage.

Steuer, J. (1992). Defining virtual reality: dimensions determining telepresence, *Journal of Communication, 4*(24) ,pp. 73-93.

Stewart, D. and Mickunas, A. (1974). *Exploring phenomenology: A guide to the field and its literature*, Chicago: American Library Association.

Strauss, A. (1987). *Qualitative Analysis for Social Scientists*. Cambridge: Cambridge University Press.

Strauss, A. and Corbin. J., (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques.* Newbury Park: Sage Publications.

Taylor P. G. (2009). Can we move beyond visual metaphors? Virtual world provocations and Second Life Journal of Virtual Worlds Research Vol. 2. No.1.

Thackara, J. (2005). *In the bubble: Designing in a complex world*. Cambridge: MIT Press.

Thomas, G. (2011). *How to do your Case Study: A guide for students and researchers*. London: Sage.

Thomas, D., and Hollander, J.B. (2010). The city at play: *Second Life* and the virtual urban planning studio, *Learning, Media and Technology*, 35 (2), pp.227-242.

Tonkiss, F. (2004). Using focus groups. In Seale, C. (ed.) *Researching society and culture (2nd edition)*, pp. 193-206,London: Sage.

Tuan, Y (1977). *Space and place: The perspective of experience*. Minneapolis: University of Minnesota Press.

Van de Ven, A.,H., and Poole, M.S. (1990). Methods for studying innovation development in Minnesota Innovation Research Program, *Organization Science*, 1 (3), pp.313-335.

Van Leeuwen, T. (2005a). *Introducing Social Semiotics*. London and New York :Routledge.

Van Leeuwen, T. (2005b). Multimodality, genre and design. In Norris, S. and Jones, R.H. (Eds.), *Discourse in action: introducing mediated discourse analysis*, pp. 73-94., Oxon:Routledge.

Van Leeuwen, T., and Jewitt, C. (eds.) (2001). *Handbook of visual analysis*, London: Sage Publications.

Voloshinov, V.N. (1973) [1929]). *Marxism and the philosophy of language*. Cambridge: Harvard University Press.

Von Hippel, E. (1976). The dominant role of users in the scientific instrument innovation process, *Research Policy*, 5,pp. 212-239.

Von Hippel, E. (2001). Perspective: User Toolkits for innovation, *The Journal of Product Innovation Management*, 18 (2001), 247-257.

Von Hippel, E., and von Krogh, G. (2003). Open Source software and the 'Private-Collective' innovation model: issues for organization science, *Organization Science*, 14(2), pp.209-223.

Wade, A. (2008). Space pilot: an introduction to amateur flight simulation, *Social Semiotics*, 18(3), pp.277-288.

Wadley, G. and Ducheneaut, N. (2009). The 'Out-Of-Avatar Experience': Object-focused collaboration in Second Life. Proceedings of 11th European Conference on Computer Supported Collaborative Work, Sep. 2009, Austria.

Walker, J.,(2009 [1989]). Defining the object of study, in Clark, H. And Brody, D.,(Eds.) *Design Studies: A Reader*, Oxford:Berg.

Wang, Q. and Heath, T. (2011). Towards a universal language of the built environment, *Social Semiotics*, 21(3), pp. 399-416.

Weber, A., Rufer-Bach, K., and Platel, R. (2008). *Creating your world: the official guide to content creation for Second Life.* Indianapolis :Wiley Publishing Inc.

Weiley, V. and Pisan, Y. (2008). The Distributed Studio: Towards a Theory of Virtual Place for Creative Collaboration, OZCHI 2008 Proceedings, December 8-12, 2008, Cairns, QLD, Australia.

Wieviorka, M. (1992). Case studies: History or sociology? In Ragin, C.C. and Becker, H.S. (Eds.)*What is a case? Exploring the foundations of social Inquiry*, pp. 159-172, Cambridge: University Press Cambridge.

Wisser, W. (2006). *The cognitive artifacts of designing*. New Jersey: Lawrence Erlbaum Associates Publishers.

Yin, R.K. (2003). *Case study research*: design and methods, Thousand Oaks: Sage Publications.

Summary in English

Computer-generated virtual worlds (VWs) present their users various places for navigating, exploring and interacting with digital content in a spatially constructed communicative environment. In these virtual places, experiences of (co-)presence and collaboration are mediated by avatars representing and performing for their users. However, not every VW platform affords its users to co-design and co-produce the places and the artifacts that constitute the world to the extent that Linden Lab's Second Life does. In doing so, SL generates a wide and potentially innovative field for user-driven meaning-generation and multimodal experimentations with collaborative place-making. Therefore, the meaning and action potentials of SL's tools and resources, as well as the places and artifacts that are created by their use, are determined contextually and temporally by its affordances and constraints for collaborative content-generation purposes in social situations. The aim of this research is to study how the VW users work together in order to generate design ideas, develop concepts, solve problems, build and test their ideas to co-produce virtual places and artifacts in SL as socially meaningful sign systems. I use the multimodal approach to the social semiotic theory of communication in order to emphasize three important aspects of place-making: the *semiotics resources* that are socially available for making meaning, their *meaning potentials* for individuals (designers and users) in particular *contexts of situation* that frames their social functions. The multimodal approach (Kress 2010) also brings forth the inquiry of non-linguistic semiotic resources (in addition to the linguistic signs) as fundamental elements of design, and frames the analysis as a multi-sensory socio-cultural consideration of the social functions of design. For this purpose, I appropriate the systemic functional framework of Michael Halliday's (1978, 2007) socio-linguistic approach to the context of multimodal virtual places and artifacts. I employ Michael O'Toole's (1994, 2004) systemic functional framework for architecture, while critically discussing how the *experiential*, interpersonal and *textual* meta-functions should be re-interpreted for virtual places. To support the multimodal analysis of designed places and artifacts, I also employ the socio-cultural perspectives to mediated communication within the systemic functional approach, and expand the frame of analysis to include the social contexts and interaction orders of collaborative design processes, mainly by referring to theories on mediated discourse analysis (MDA) (Norris and Jones 2005) and nexus analysis (Scollon 2001, Scollon and Scollon 2004).

Between 2009 and 2011, I conducted three case studies in SL, in which I have worked with, observed and interviewed the VW designers, the clients and other contributors of collaborative design projects in order to reveal the similarities and differences in their sense-makings. My overarching research question was:

How are places and artifacts for avatar interaction co-designed and co-produced by the users of virtual worlds, as exemplified by a multimodal and social semiotic analysis of three case studies in SL?

The main focus is on their reflections on the (perceived) affordances and constraints of SL for their context-specific collaborative design purposes, and the ways in which they define the materialization of affordances and constraints as meaning and action potentials in their designs. Therefore, the analytical objectives are two-fold: first, I aim to inquire the social actors and the (virtual and physical) places of collaborative design projects. Then, I analyze the interaction orders within the design processes, and how the social actors' (co-designers') conditions of engaging shapes the ways in which they experience the collaborative practices. Finally, a central analytical dimension is the *multimodal analysis* of virtual places and artifacts, where I discuss the experiential, interpersonal and textual meaning potentials of the designs in reference to the (co-)designers' interpretations.

The conclusions in general refer to a dynamic nexus of actors, places and practices in co-production of virtual places and artifacts. The designs reflect their (co-)designers' rhetorical intentions, and various negotiations on the meaning potentials. Not only the actors and their social histories (i.e. motivations, skills, and resources) may differ, but also do their ways of understanding what a VW is and what can be done by their use. I use the multimodal analysis perspective to produce a hyper-textual matrix of semiotic modes, and the dynamic interplay between their experiential, interpersonal and textual functions as various design elements. I inquire their motivations, competences and conditions of engaging through the MDA perspective, which reveals underlying social contexts of the divergences and convergences in (co-)designers' sense-makings. My conclusions also refer to the emergence of meaning potentials through creative use of modal affordances in the designs, and their manifestations in the practical functions, structural organizations and visual forms of collaboratively designed places and artifacts.

The analysis aims to contribute primarily to the communication research field, but also to several relevant fields including design research, perspectives on digital creativity, and user-generated content in VWs. My goal is to propose a genuine systemic functional model to study virtual places and artifacts as multimodal sign systems, and their co-production as a social semiotic process of designing meaningful arrangements of function, form and structure. In terms of methodology, I aim to contribute to the discussions on the shortcomings of the systemic functional framework, and present a socio-culturally conscious and ethno-methodologically supported empirical account of sign-making in social contexts within the field of VWs.

Dansk resumé af afhandlingen

Computer genererede virtuelle verdener (VWS) præsenterer brugerne for et rumligt konstrueret kommunikativt miljø med forskellige muligheder for at navigere, udforske og interagere med et digitalt indhold. I disse virtuelle verdener bliver oplevelser af (co-)tilstedeværelse og samarbejde medieret af avatarer, der repræsenterer og udfører handlinger for deres brugere. Men ikke alle VW-platformen giver brugerne mulighed for at co-designe og co-producere de steder og de artefakter, der udgør de virtuelle verdener, i det omfang, Linden Labs Second Life (SL) gør. SL genererer dermed et bredt og potentielt nyskabende område for brugerdrevet mening-skabelse og multimodale eksperimenter med kollaborativ stedsliggørelse. De menings- og handlingspotentialer, som findes i SL's værktøjer og ressourcer samt i de steder og artefakter der er skabt hermed, bliver tidsmæssigt og kontekstuelt bestemt af de affordances og begrænsninger for kollaborativ indholdsskabelse i sociale situationer.

Afhandlingens formål er at undersøge, hvordan VW brugere arbejder sammen for at skabe design ideer, udvikle koncepter, løse problemer, bygge og afprøve deres idéer til at co-producere virtuelle steder og artefakter i SL som socialt meningsfulde tegnsystemer. Den multimodale tilgang til socialsemiotisk teori om kommunikation bliver anvendt for at undersøge tre vigtige aspekter af stedsliggørelse: De *semiotiske ressourcer*, der er socialt tilgængelige meningsskabelse redskaber, deres *betydningspotentialer* for enkeltpersoner (designere og brugere) i bestemte situationelle kontekster som danner rammen om deres sociale funktioner. Den multimodale tilgang (Kress 2010) er også anvendt for at undersøge ikke-sproglige semiotiske ressourcer som grundlæggende elementer i design. Til dette formål, inddrages den systemisk funktionelle ramme af Michael Halliday's (1978, 2007) socio-sproglig tilgang til konteksten af multimodale virtuelle steder og artefakter. Michael O'Toole 's (1994, 2004) systemisk funktionelle ramme for arkitektur bliver ligeledes anvendt, og det diskuteres kritisk, hvordan det eksperientielle, interpersonelle og tekstuelle meta-funktioner skal genfortolkes i forhold til virtuelle steder. Som støtte for den multimodale analyse af designede steder og artefakter, inddrages tillige socio-kulturelle perspektiver på medieret kommunikation inden for den systemisk funktionelle tilgang. Derved udvides rammen for analysen til også at omfatte de sociale sammenhænge og interaktions ordenen i kollaborative designprocesser. Teorier om medieret diskursanalyse (MDA) (Norris og Jones 2005) og Nexus analyse (Scollon 2001, Scollon og Scollon 2004) indgår.

Mellem 2009 og 2011 gennemførtes tre casestudier i SL: VW designere, kunder og andre bidragydere til samarbejdsbaseret design projekter blev observeret og interviewet med henblik på det overordnede forskningsspørgsmål:

Hvordan er steder og artefakter bestemt til avatar-baseret interaktion co-designet og co-produceret af brugere af virtuelle verdener? Spørgsmålet belyses i og med en multimodal og social-semiotisk analyse af tre case studier i Second Life.

Det primære fokus er på overvejelser over affordances og begrænsninger i SL i forhold til kontekst-specifikke kollaborative design formål, og de måder, hvorpå materialisering af affordances og begrænsninger, betydning og handling potentialer defineres i og med deres design. Det analytiske formål er derfor dobbelt: For det første har jeg undersøgt de sociale aktører og de virtuelle og fysiske steder for samarbejdsbaserede designprojekter. Derefter analyseres samspilsordenen inden for designprocesserne, og hvordan de sociale aktørers (co-designeres) betingelser for at engagere sig former de måder, hvorpå de oplever de kollaborative praksisser. Sidst men ikke mindst, er en central analytisk dimension den multimodal analyse af virtuelle steder og artefakter, hvor jeg diskuterer de eksperientielle, interpersonelle og tekstuelle betydningspotentialer i design i forhold til (co-) designernes fortolkninger.

Generelt viser konklusionerne hen til et dynamisk samlingspunkt for aktører, steder og praksisser i co-produktionen af virtuelle steder og artefakter. De undersøgte design afspejler (co-) designernes retoriske intentioner, og forskellige forhandlinger om betydningspotentialer. Ikke kun aktørerne og deres sociale historier (dvs. motivationer, færdigheder og ressourcer) varierer, men det gør også deres forståelse af hvad en VW er, og hvad brugen af dem kan indebære og betyde. Det multimodale analyseperspektiv producerer en hyper-tekstuel matrix af semiotiske modes, og det dynamiske samspil mellem deres eksperientielle, interpersonelle og tekstuelle funktioner som forskellige design elementer. Motivationer, kompetencer og vilkår for at engagere sig undersøges gennem et MDA perspektiv, som viser de underliggende sociale sammenhænge af forskelle og ligheder i (co-) designeres betydningsdannelse og fortolkning. Konklusionen eksemplificerer tillige fremkomsten af betydningspotentialer gennem en kreativ brug af modale affordances og deres manifestationer i de praktiske funktioner, strukturelle organisationer og visuelle former for kollaborativt designede steder og artefakter.

Analysen har på denne måde bidraget til at skabe ny viden inden for forskningsfelter, der vedrører vores forståelse af kommunikatiionsformer, men også til andre relevante felter, såsom design research, digital kreativitet og bruger-genereret indhold i virtuelle verdener. Gennem afhandlingens case-analyser er der udviklet en systemisk funktionel model, som kan anvendes i studiet af virtuelle steder og artefakter, når de anskues som multimodale tegnsystemer, og når deres co-produktion betragtes som en social semiotisk proces der skaber meningsfulde arrangementer af funktion, form og struktur.

Interview Guide (Metrotopia and PAL)

Personal information and context of participation

- Personal info and demographics (age, occupation, nationality)
- Prior involvement in Second Life
- Prior involvement in gaming, 3D modeling or collaborative design projects
- Learning how to build (motivations, methods, practices)

The design project

- Description of the project in their point of view
    - Initiation, idea-generation
    - Configurations of the design teams, their involvement in it
    - Initial purposes and rhetorical intentions
- Affordances of SL that lead the designers to choose the platform
- Development of the design concept from initial purposes
    - Concept development
    - Changes and transformations in design during th eprocess
- Their personal involvement/role in the process (reasons)
- Design and building methods (Why were these specific methods preferred?)
- The most problematic aspects/stages of the design process and how they resolved the situations
- Were the initial expectations met by the final design?
- Feedback from the visitors/users, challenges brought by the visitor involvement

Second Life & Virtual Worlds

- Overall impression of SL's viewer and building interfaces (usability, attractiveness,
- Evaluation of SL as a tool for:
    - Idea-generation
    - Collaborative design and building
    - Access to audiences/dissemination of design
- Potentials for user-driven innovation in Second Life (examples)
- Requirements of development for facilitating collaborative design and user-driven innovation

The analytical matrix for initial coding

	Habitus of Social Actors	Place Semiotics	Interaction Order	Multimodal Semiotics
	ACTORS	**PLACES**	**PRACTICES**	**DESIGNS**
Experiential (ideational)	(Co-)designers as (socially situated and motivated) sign-makers	Affordances and constraints for mediated presence and content generation in SL	Chronotope (movements/traversals between and/or within places) and Heterochrony (managing time-scales) in content creation	Use and Reach of Modes - Layout and spatial linking of information - Presence and navigation
Logical (ideational)	(Their) cultural resources as semiotic resources (actors as agents of semiotic change)	(Virtual) places and platforms as semiotic resources for code preference, inscription and emplacement of signs	Communication and evolution of ideas: Collaborative design as socal semiotic work	Virtual places and artifacts as processes of multimodal semiosis (of meaning and form) - Metaphoricity and signs of realism
Interpersonal	Interest-based participation: Design teams as compositions of (individual) styles, skills and motivations	Affordances and constraints for co-presence and collaborative design in SL	Working and building together in virtual space - feedback (designer/user interaction)	Designing for and managing social presence
Textual	Managing plurality of resources: Networks, avatars and agents as actors	Managing plurality of platforms: SL as a place to make places within places ('place of places' in context)	Semiotic Aggregates: Managing plurality of discourses - Orchestration of collaborative practices in in time and space	Managing plurality of 'sense-makings': Virtual places as 'open texts': Imagining avatar-mediated (model-) user experience (in designed places)
Reflections	**Habitus of Social Actors**	**Place Semiotics**	**Interaction Order**	**Multimodal Semiotics**
Theoretical	(1) Actors and their semiotic (meaning) potentials (2) avatars and mediation of collaboration between spaces	(1) SL as a place to make places between places (2) Balance of usability/complexity and freedom to crate	(1) from affordances and constraints to potentialities and specificities (signifiers)	(1) spatiality,interactivity and virtuality as modes (2) affordances as signification (meaning/action potentials) (3) design and multimodal cohesion in virtual place-making
Methodological		How discourses are embedded in and transformed within places?		post-structruralist perspective on multimodal sign-making in response to the systemic functional theory: why it is hard to analyze place-making in terms if systems and functions, but easier to talk in terms of affordances as meaning/action potentials