

The Experience of working in a Digital Era

A study case where physical and virtual spaces overlap

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Characters: 143,147



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Abstract

New technologies in the Digital era have arisen to make our lives simple. One of these is the enhancement of workplaces through technologies that facilitate an individual experience. One example is computers, which have created new spaces for people to interact and inhabit. As a consequence, our society can be in more than one space, the physical but also the virtual. Thus, through this research, I am interested in exploring the experiences of individuals when both physical and virtual spaces are interrelated. Mostly to comprehend which aspects are present when these interrelations happen. I illustrate this interest with the study case of Go Autonomous, a company that is working on improving B2B transactions through the automation of its internal processes. This is an interesting case because the company is working in the field of Artificial Intelligence with a position that has been evolving through the years within the IT field, Data annotation.

Hence, the experiences of data annotators are studied by ethnographical methods supported by biometrical methods. This helps to understand how the interactions shape their experience from a post-phenomenological approach. With this in mind, I identify different aspects that are present when the annotator is experiencing both the virtual and physical space. Furthermore, I consider the importance of these aspects to understand, not only the interrelation of virtuality and physicality but also the nature of a worker in the digital era. Mostly to prove the importance that physical spaces still have within the experience.

Keywords: Data annotation, physical space, virtual space, overlapping spaces, experience, offices, corporeality, senses, atmosphere, emotion, interembodiment, attention, digital era, biometric methods.

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Disclosure: All the visualizations, diagrams, and photographs are done by the author

Introduction

a. When the human meets the machine

It is a rainy day; Samantha is biking to her work while thinking about her research project and the assignments she has to do for Monday. She arrives, takes a cup of coffee from the coffee machine, clocks in, and turns on the computer. Meanwhile, she adjusts the chair and desk to be more comfortable because Simon (who prefers them to be higher) was sitting there the day before. Finally, she signs in and starts working on what her supervisor asked her to do the day before through Slack (an application where the team communicates). She is planning on working until 16:00, but before she will have a 1:1 meeting with her supervisor; she knew about this because her iPhone calendar announced it this morning when she woke up.

This is a clear case of how an individual is daily involved with different kinds of technologies, to have —what is believed— a better and easier way of living. A way of thinking that has been present in our society for centuries. A search for constant practicality where technology facilitates our actions. Meaning that the elements developed by technology during the time, have been shaping the way people interact and relate to each other. As Stiegler (1998) refers: ‘From the conditions of the atmosphere that made life possible on earth, through to early tools that opened up a temporal horizon in which something like time could be apprehended, humans exist because of and alongside [technology], rather than against [technology]’ (cited in Ash and Simpson 2016, 13). Thus, it could be argued that technologies influence people’s interactions, and as a consequence, people’s behavior. Mostly because ‘technologies show an enabling-constraining structure that has a shaping impact on our behavior and actions’ (Kiran 2015, 131). The fact that technologies are present in our society to shape our behavior and interactions, also means that they influence the space that we inhabit. They have enabled and opened a window to virtuality, where an individual can interact with different kinds of spaces. Hence,

‘The world conveyed by the interactive has been dubbed “virtual” because its location or features cannot be pinpointed in

the tangible world. It exists within the relation between the machine and the user. We cannot place it inside the machine because it is not there unless we invoke it, and it is not wholly within our minds because we do not possess the hardware necessary to conjure it up. (...) In the computer (...) we can move throughout a constructed universe of our own making, on virtual paths invisible even as we tread upon them. (Rothenberg cited in Hillis 1999, xiii).

Thus, computers have created new spaces for people to interact and inhabit. As a consequence, nowadays our society can be in more than one space while having an everyday life, the physical but also the virtual. Moreover, technologies allow individuals to jump from a physical space to a virtual one effortlessly and without even noticing it. This research will be focused on the experiences of individuals when both physical and virtual spaces are interrelated. Mostly to comprehend which aspects are present when these interrelations happen.

In a time where virtuality is consuming the most of our attention. There have been some instances where society is trying to replace or even disregard some physical spaces that have prevailed over the years. One clear example is what is currently happening to offices. Some companies around the world had already identified that workers could do their job from home, but what exacerbated this situation was the COVID-19 pandemic. The isolation of people in their homes without stopping working, made them think about the possibility of reducing office space to avoid physical contact, relying merely on virtuality. To support this, the McKinsey global institute explains that,

'Some companies are already planning to shift to flexible workspaces after positive experiences with remote work during the pandemic, a move that will reduce the overall space they need and bring fewer workers into offices each day. A survey of 278 executives by McKinsey in August 2020 found that on average, they planned to reduce office space by 30 percent' (McKinsey, 2021).

Furthermore, most businesses and workers, conceive the practice of working from home (WFH) as normal, whereas before it was still a dubious subject. As Bick et al. claim,

'Before the pandemic, discussions on the future of work-life were unclear and often questioned. COVID-19 forced a decision upon people, and with the world having to adapt quickly, many businesses opted to try WFH. The WFH practices have been employed widely, as can be seen in the U.S., where studies show in May 2020, 35.2% of the workforce worked from home, an increase from 8.2% in February. Furthermore, 71.7% of workers that WFH found that they could work effectively' (cited in Vyas and Butakhieo 2021, 60)

These arguments serve to illustrate a future where offices—as a physical space—, could be endangered to disappear. Hence, the field of social studies has new challenges regarding what is currently happening about work and roles in our contemporary society. Mostly if these roles are evolving from home. Nevertheless, in the digital era, physical spaces still matter because ' "Virtual work" evokes images of disembodied workers in a nameless cyberspace (...). [But], it is very much embodied and anchored in physical space...' (Webster and Randle 2016, 3). Thus, while people work, they are still fixed to a physical space where interactions happen, and experiences are shaped. Through the comprehension of the interactions of physicality, virtuality, and workers within an office; I intend to explore significant aspects that arise during these relations. To then argue the importance of preserving offices as physical spaces. Mostly, because offices are where an important percentage of humanity spends most of their time, which is affecting how people relate to each other and in a broader way, impacting our current society. Thus, this research aims to contribute to the gap that exists regarding the interactions within virtual and physical space and their interrelation within the workspace.

Because a workplace is still broad, it is necessary to narrow down the interest to a specific field. This does not mean that the research cannot be used in other workplaces, but it could be a point of reference on how to study a physical space within a specific theme or area. My interest is to focus on work roles that have emerged in this digital era, which are still under construction and are moderately unknown. A reference is the role of a data annotator, which has emerged in the IT field, and that is important in the development of Artificial Intelligence (AI), because:

‘Computers cannot process visual information the way human brains do: A computer needs to be told what it is interpreting and [have a] provided context to make decisions. Data annotation makes those connections. It is the human-led task of labeling content such as text, audio, images, and video so it can be recognized by machine learning models and used to make predictions.’ (TELUS International, 2022)

Hence, in the IT field, there is a need for humans to train a machine in a virtual space. A data annotator could be seen as a teacher that is giving the computer relevant information, so it can understand our human reasoning. This information is the result of the data annotator, working in virtual spaces for a substantial quantity of time, until having enough data for the computer to process and entirely understand it. Thus, the pertinence of studying this case with an illustration of a person that interacts with both virtual and physical spaces. This serves to comprehend, not only the experience but also the behavioral implications that come from such a specific practice, teaching a machine how to reason like a human. The relevance of this position is not only because of what is done but also why is needed:

‘Data annotation is both a critical and impressive feat when you consider the current rate of data creation. By 2025, an estimated 463 exabytes of data will be created globally daily, according to The Visual Capitalist — and that research was done before the COVID-19 pandemic accelerated the role of data in daily interactions. Now, the global data annotation tools market is projected to grow nearly 30% annually over the next six years, according to GM Insights, especially in the automotive, retail, and healthcare sectors.’ (TELUS International, 2022)

Therefore, data is the most important aspect of AI technologies. But also, this means that more people will be doing basic and repetitive tasks. For instance, Lehdonvirta and Ernkvist (2011) denominated *click-work* as a ‘form of task subdivision that centers on basic, low-skilled tasks, such as data entry, text transcription, and image tagging, broken down into microtasks to be completed in minutes or seconds’ (cited in Webster and Randle 2016, 10). This type of work will be seen more often in this digital era, as an economic resource for a considerable

amount of people in different parts of the world. These *microtasks* are an opportunity to understand how repetitive work can create different and complex interactions — at the same time — between people, virtual, and physical spaces. Something that could be an aspect of influencing people's behavior and therefore, our current society. In other words, the interactions that occur within the physical and virtual space will be studied to understand how the experiences of workers are being affected, shaped, and conceived.

Space, Place, and environment- a distinction

Because this research relates to spatial matters. During the reading, you will find different terms when referring to spatiality. Therefore, it is relevant to clarify in this instance, which is my intention when I mention *space*, *place*, or *environment*. In this research *space* refers mostly to when I want to emphasize more in a micro-setting within a setting; thus, space will be used when referring either to the physical or virtual space within the office. Whereas *place* will be addressed as a context where the experiences of humans and non-human actors are held, in this case, the office. Finally, the term *environment* refers to a place where the multisensory and emotional aspects are considered. However, in the *Theoretical frame*, I discuss these terms further. Nevertheless, I believe this is a clarification needed before framing the research with the study case.

b. About Go Autonomous — Study case

The study case for this research is the data annotators' interactions and experiences in *Go Autonomous*. An IT start-up that is developing an automation platform (AI-powered) for B2B companies to facilitate all the selling processes. This platform 'takes unstructured data from emails, PDFs, images, etc., and injects it into systems like SAP, Microsoft, Salesforce and others' (Go Autonomous, 2022), to facilitate the companies' processes and accelerate their transition to autonomous commerce. This works by training the machine to do a recognition of the customers' intentions such as purchase orders, quotations, complaints, and service requests, among others (Ibid.). But also 'leverage AI to identify and extract request details for automated handling (product, addresses, unit of measure, document numbers, delivery dates, etc.)' (Ibid). To comprehend what Go Autonomous offers, I am portraying the following hypothetical case: Imagine that I have a company that sells pants to clothing shops all around Europe, and I receive

100 emails daily asking for quotations. My employees have to do this manually using basic tools to answer those customers (such as SAP, Microsoft, or Salesforce). And after a month I have repressed work, my employees have just answered 40% of the emails, and I have a lot of complaints about not answering on time. But the product that Go Autonomous offers would help me to automate all the processes of doing the quotes to my customers within a day. Thus, if I received 100 requests for quotation, the model would identify the type of pants they are asking for, the quantity, and the units to then create the quote by itself. As a business owner, I could automatize my processes and be more effective when answering and sending quotes to customers.

Currently, the start-up has three departments, including an in-house annotator department that teaches and gives all the data to the machine. The department is led by a team Data leader who is actively working with seven data annotators, including myself. The annotators analyze the information provided by the company to feed the system and for it to understand the intention of its customers. This means that they need to understand and decipher the customers' intentions to give accurate data to the machine. Later on, the machine learning department takes the data analyzed and designs ways to process the information for the model to do things automatically. However, the position of data annotation at Go Autonomous is currently designed as a flexible part-time job, where people can schedule a shift accordingly to their availability. Its flexibility constitutes an important aspect because the tasks could get repetitive if they are done by an individual constantly (for 37.5 hours per week). Thus, the company has designed this position to be paid for hours, so the annotator can decide how much time he/she is willing to spend annotating. Therefore, students are prone to be the most eligible candidates for this position.

The annotators and the virtual space

It is relevant to characterize the virtual spaces that the annotators inhabit while working at Go Autonomous. When referring to these spaces is important to mention that there are 2 ways where the virtual space is inhabited: through the presence of the screen and the phone. First of all, is important to comprehend that 'The screen is the window through which one sees a virtual world'(Sutherland cited in Hillis 1999, xxi). In this case, through the screen, the annotator sees different platforms to do some tasks within them. The tasks done by the annotators are

predetermined and created by the machine learning department. They provide the tools and spaces so the workers can do different tasks to feed the machine with recognizable language and terms (*see fig. 1*). The first is called *mail-intent*, a task developed through a platform (designed by the company) where labels have been previously determined for the workers to classify the given information. The platform designed by the company serves as a virtual space where annotators interact, analyze, and label the proper information in the system. The second task is to detect keywords from *free text*. In this case, the workers need to select the relevant information from an email so the system can identify words such as product name, quantities, dates, etc. This is done in a different virtual space called *Prodigy* (a platform that is provided by another company but allows it to be modified according to different needs). Finally, the third is to identify in *PDFs*, tables where orders, quotes, or invoices are given relevant information that could be automatized. In this case, the machine needs to learn basic associations like how to read and understand a column, a line, a header, or a footer. This is done on another platform called *Make-sense*, an external website that allows annotating images and PDFs. Clarifying and explaining the platforms from the beginning is relevant because in the research I link some behaviors, stimuli, and feelings that arise during the annotators' experience with these virtual spaces.

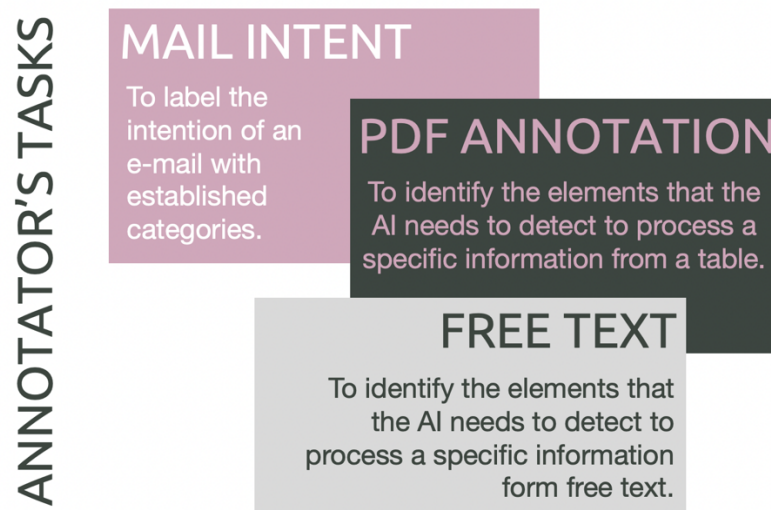


Figure 1. Annotators' tasks, definitions, and the virtual spaces

In addition, the phone is also an element that enables the occupancy of the annotator within virtual spaces. The mobile phone is used not only for channels of communication with the team and the company (in this case an app called Slack)

but also because the phone connects the annotator to other worlds and spheres. The personal, the study, and the social sphere are seen through the phone, facilitating this connection when the annotator is at the office. Nevertheless, I will develop further this relation in the section *Paying attention within a wholeness of multiple spaces- The power of attracting attention*. Nevertheless, at this instance, it is important to comprehend that the phone is also considered an element that enables the annotator to inhabit virtual spaces.

The annotators and the physical space

Currently Go Autonomous operates from a rented space where all the services are provided. Because it is a start-up, the physical space is narrow and shared by all 3 departments. There are 16 desks, a small living room (where people can work or have meetings) a toilet, a rack (where people can hang their coats), and drawers. What is important to consider, is that within the space there is a constant movement not only from the Go Autonomous colleagues but also from people that belong to the company that rents this space. The reason is that at the end of the office there is a big meeting room that is used for larger groups. Thus, there is always something going on at Go Autonomous. On the other hand, the annotators do not sit together, in *fig. 2* it is possible to see that 3 annotators sit close to the living room, whereas 2 sit close to members of other departments. This could affect the team when they need to have some discussions (when more than 3 annotators are at the office), but somehow, they manage to get to a common ground and work as a unit.

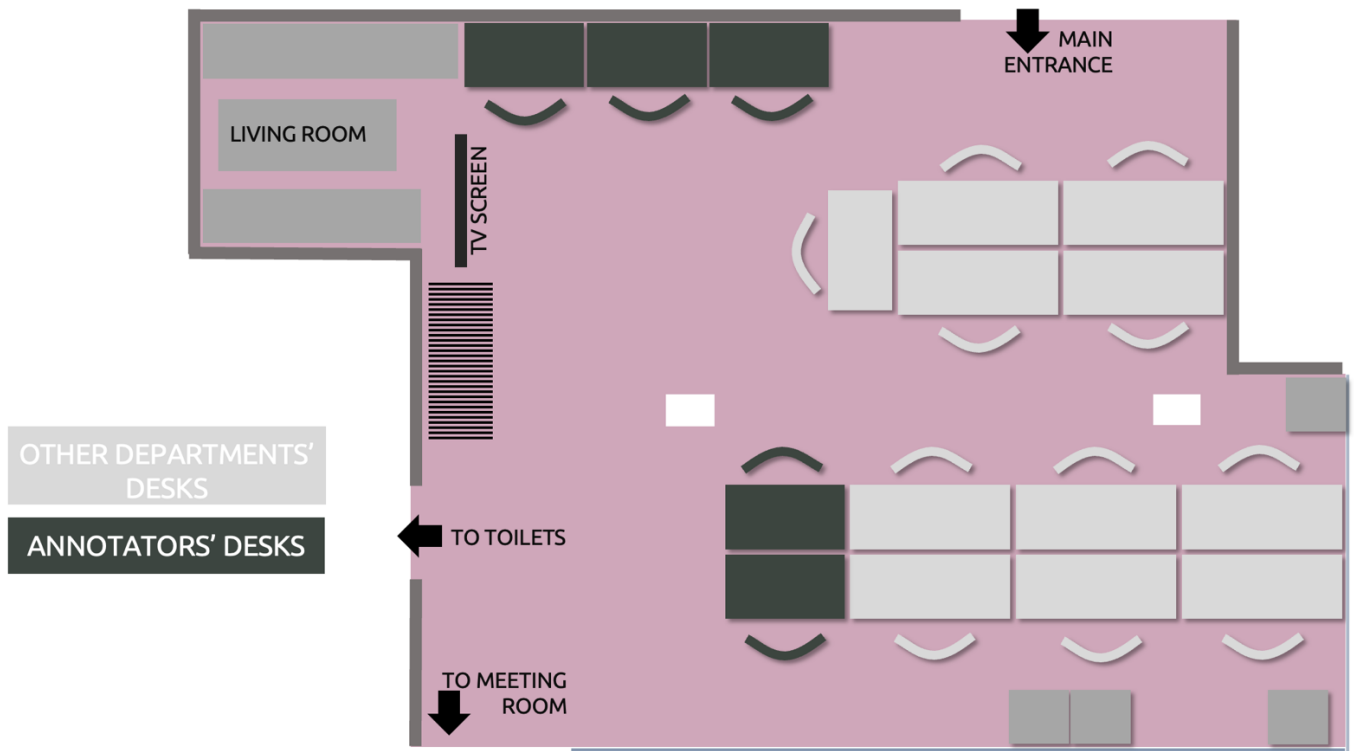


Figure 2. Physical space and annotators' location

Mostly because the annotators work together in a physical space. This has had a big impact as the CEO Bjarke Ruse claims:

'What you can do when you have an internal annotation department [in-house], is that you can continuously work on the annotation strategies. (...) [So], we are constantly monitoring the impacts of what we are doing. (...) Therefore, the annotators become an integrated part of actually developing the models. So if you come [to the office] you will see, there is [a] constantly discussion going back and forth.'

He explains that they have succeeded with the product and its processes because the annotators have been working in-house, responding to internal necessities. Something uncommon in the IT field. The reason is that companies normally hire people that could work remotely because it is a simple task that does not need to be done at the office. Instead, other companies hire freelancers that can do it in a specific amount of time from home, or they outsource the service to specialized companies. But In this case, Go Autonomous opted to unify people in the same

space. Thus, the physical space (and the discussion done within it) is an important aspect that needs to be addressed and observed in this kind of job. Because the interactions between colleagues and the objects around within a virtual and physical space are not only affecting the experience, but also the product that the company is developing, as I show throughout this research.

c. Research question

In light of the above, this research aims to understand,

How are the **annotators' experiences** shaped by **interactions** in physical and virtual spaces? And how do these spaces **interrelate** in the case of Go Autonomous?

With these questions, I intend to explore the relationship between physical and virtual space experienced by the annotators. In doing so, I focus on different aspects that are present during the interactions of human and non-human actors, such as *corporeality*, the *stimuli of senses*, *emotions*, and *attention*. Aspects that support the comprehension of how the experiences are shaped, and the relevance of having an interrelation between virtual and physical spaces. These questions will be developed in the following chapters of this research. The first is the *Study design*, which consists of the methodology used for gathering data based on nearly 2 months of fieldwork. Where *interviews*, *observation*, and *biometric methods* were held. After explaining the design of the research, I continue by framing the concepts used for the analysis. Thus, in the *Theoretical framing*, I develop concepts that are relevant to the research such as the jump from phenomenology to post-phenomenology, the types of mediations considered within post-phenomenology, sensorial and emotional aspects linked to atmospheres, and the power of attention within the experience. I then explore 4 different themes with the reflected concepts and the data analyzed in the *Analysis*. In the first section, I explore the corporeality when the annotators interact within both spaces; in the second one, I emphasize the physical elements that create stimuli and therefore a sensorial response from the annotators; whereas, in the third section, I focus more on the shared emotions that can occur within both spaces; finally, I finish the analysis chapter with a fourth section. In this one, my focal point is to address attention as an aspect present within the interactions and interrelations. I finish the research with *Conclusions* and further recommendations on what was discussed. I believe this research will give academic insights regarding the

interactions between virtual and physical space and its interrelations within the workspace. Its relevance remains in the comprehension of how important a physical space such as an office could be for our current society. Moreover, it contributes interesting insights to people looking forward to proposing well-designed spaces for different kinds of work. This could help companies and individuals to understand how spaces and objects could impact experiences and productivity. Anyways, an individual needs to get some meaning from their experience and be motivated to get the best for his/her personal experience at work.

Study design

In this chapter, I aim to explain the methodology used for gathering the relevant data obtained by three different methods. The main focus was to comprehend the annotators' experience by using different kinds of methodologies that could give unique and personal insights. Therefore, *Participant Observation*, *Semi-structured interviews*, and *Biometric methods* were implemented to obtain acute results. Moreover, these methods were conceived to complement each other. Thus, I develop a thorough explanation of each method, its implementation, and the limitations that I encounter. Finally, I finish this chapter by explaining how I interpreted the biometric data when working with both biometric methods simultaneously.

But first, it is important to define who were the participants during the research. Because I aimed to focus on the annotators' experience and the interrelation of both spaces (virtual and physical); firstly, I did a presentation showing all the workers at the data annotation department (6 people in total) what was the research about. The idea was to get volunteers to participate in the research and be able to obtain enough data through the methods mentioned above. From this meeting, I received 5 positive responses. Hence, 5 employers, who are students from 20-32 years, were the target of the study. The group was formed by 2 females and 3 males with different backgrounds and nationalities. However, this information is not going to be revealed throughout this research due to anonymity matters. Instead, the information exposed would be vaguely generalized focusing merely on what was said and observed but avoiding any identification with specific details. Therefore, I created fictional names to illustrate the data better (*see fig. 3*). On the other hand, because the annotation position is a flexible job, the

participants were not all the time together, which made the process of gathering data longer and slower. The fieldwork was about almost 2 months because there were times that it was just one annotator per day.

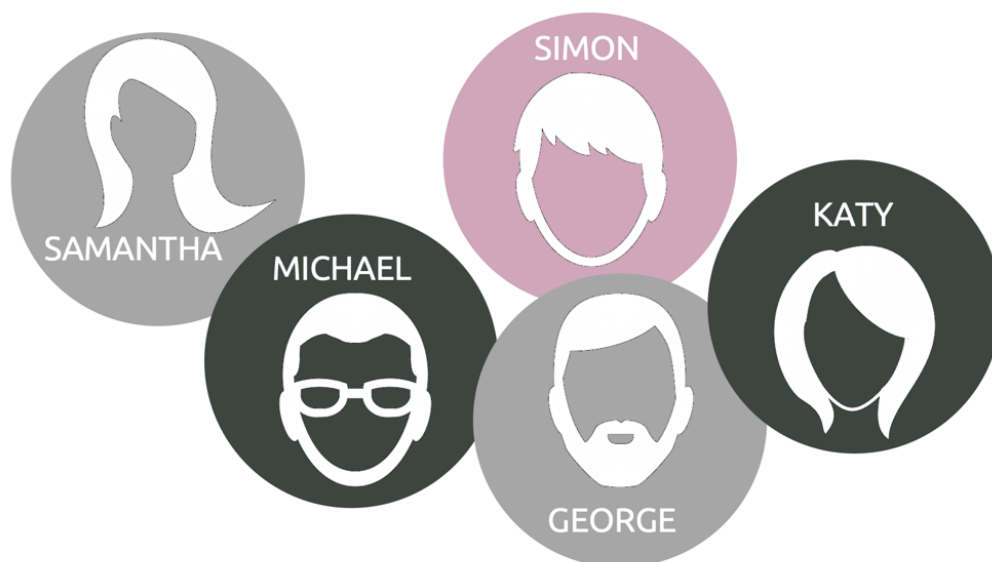


Figure 3. Participants' overview

It is important to add that being an annotator myself helped me to smoothly do and apply all the methods discussed below. Because I am a colleague, the annotators were collaborative all the time that was needed. During the participant observation, I had to continue observing while being the colleague so they would not feel I was evaluating them as an external researcher. Whereas during doing the interviews it was easier for me when they were referring to some known situations or concepts. Also during the Biometric methods, they felt comfortable expressing their concerns when it was necessary because they already knew me. Nevertheless, I believe that being an annotator while doing this research gave me the parameters to be more critical when I was designing the methods and also when I was applying them. I believe that my positionality instead of biasing the research, gave me more insights to consider while developing it.

a. Participant observation

Participant observation is relevant as a method to gather data because it gives initial aspects of the task that the subjects of the study were doing. As Pink (2009) suggests 'The idea that ethnographers might become sensorially engaged through their participation in the environments and practices they share with others is increasingly acknowledged in discussions of ethnographic methods (2).

Thus, the exercise consisted of observing the annotators' work and identifying specific aspects of their experiences, and the constant interactions that they create with other human/non-human actors in their environment. How had they reacted to interactions with virtual spaces while working? How did they see the virtual space through the screen and how did they display their screen? How was their position at their desk (sitting, standing)? What other elements were involved in the experience? Which non-human and human actors attracted the annotators' attention while being at the office? These aspects were observed and registered in field notes and pictures, to use them as a resource for posterior analysis. At the same time, as a researcher, I did the work of an annotator by myself. Being within the space, alternating it with the virtual space, and interacting with the other annotators in discussions or simple conversations. This helped me to understand other people's behaviors through my own embodied experience and be more aware of other people's practices, subjectivities, and explanations (Pink 2009, 3). By being part of the group, insights and motives were easily understood. Mundane aspects that could be ignored daily were grasped and written down as field notes to subsequently analyze.



Figure 4. Participant Observation

During gathering data by just observing (and not participating), some of the annotators seem uncomfortable and tried to act *properly* because it seems they felt like I was evaluating their performance. This was misleading the true-to-nature aspect of the research because some of them were imposing a behavior that was not credible. For instance, some of them were not taking enough pauses or

pushing themselves to perform a task as fast as they could. Thus, I decided to observe while working. The fact that I was an annotator and a colleague for them, gave me some first-hand information regarding the annotators' experience without them feeling observed by an external actor who was "evaluating" them. Therefore, I decided to take notes where they were not aware at the end of the day. This helped me to acknowledge information about my daily life as an annotator and also gave some relevant insights into my peer's behaviors and expectations during a mundane day. Because this approach not only helped me to seek ways to share others' experiences but also taught me how to recognize my emplacement in other people's worlds (Pink 2009, 3). In other words, gave me some reflections on how I interact with them as an annotator, and how I can influence their experience by being there.

This exercise was done for a month, five days per week. During this period I managed to go to the office every working day. This allowed me to analyze and be more present. Also to have a broader overview of the individuals' feelings, emotions, thoughts, and processes within the office and the different interactions that they could have with the non-human and human actors. As Pink argues,

'[To be able] both to follow through the sensory routines and rhythms of life as lived on a daily, monthly, and even annual basis and to follow through a sensory hint, hunch, or moment of realization by waiting to see how, over time, this occurrence or experience fits in and thus might be comprehended about other elements of knowing, yet to be experienced or understood.' (2009, 4)

Nevertheless, this method supported specific data used in the analysis, but also the semi-structured interviews. This means that observations were the first method done to have better insights to formulate questions for the first interviews done with the annotators and other team members.

b. Semi-structured interviews

The semi-structured interviews were applied in 2 instances. First interviews with founders, team members, and relevant people from the company. The idea was to obtain more context and a general understanding of the annotators' role in the process of creating the product that the company offers. Here semi-structured interviews were held to obtain relevant data that was useful during

observations and in the interviews with annotators. The idea was to maintain the open phenomenological approach to learning from the interviewee's point of view (Brinkman and Kvale 2015, 150) without a stiff and specific script. In other words, it was an open conversation where different points of view were obtained.

The interviewees were: the CEO of the company, Bjarke Ruse. Who gave a general insight into the company, and how annotators were the core part because they are the ones producing the data that is used to create the models. The annotators' leader, Greta Attard. Who knows all the processes of the annotation position and interacts the most with them over the weeks. She was important because she understands the annotators' mindset while analyzing data, but she also has a close relationship with each one of them. She has ways of how to read them, how to assign them new tasks, and how to approach and discuss topics with them accordingly to their ways of thinking. Finally, the users' experience leader, Alexandra Mourier. She contributed to understanding the intentions behind the design of the Go Autonomous platform (such as colors, forms, and distribution), considering that the annotators are using the same platform to label *mail intent*. Thus, the annotators are the first users the company gets to know and can give useful feedback regarding the platform.

The second occasion that the semi-structured interviews were used, was to get insights from the annotators. The interviews were focused to obtain data regarding their experience, their feelings, and their interactions with other objects and colleagues. As Brinkman and Kvale (2015) argue, 'the semi-structured life world interview seeks to obtain descriptions of the life world of the interviewee, (...) to interpreting the meaning of the described phenomena' (150). This means that the questions formulated in the interview were done with the purpose to obtain more information regarding how the participants felt and thought about the tasks they are doing as annotators, but also about the interactions that they have within the office and the virtual space while they are working. Moreover, the interviews helped to go deeper into the meanings of some aspects that were detected during the *participant observation*. But what happens when embodied responses are not acknowledged by the participants when conversing? This was sorted out by doing *biometric methods* after the first interviews. The idea was to complement the information of the whole experience of being an annotator. Subsequently, the data obtained and analyzed was used in a second semi-

structured interview, as an elicitation element to complement the data gathered and have a better understanding of some of the results obtained.

Overall, the semi-structured interviews were done in 2 rounds (*see fig. 5*). In the first round were 8 interviews that included other team members and the annotators. These were recorded conversations, that were transcribed to be later coded and analyzed by themes. Whereas in the second round were 5 non-recorded conversations. Here the moments of arousals identified in the eye-tracking recordings were used as an elicitation tool to ask specific questions that the annotator answered. Then the answers were introduced manually in a chart for better comprehension and posterior analysis.

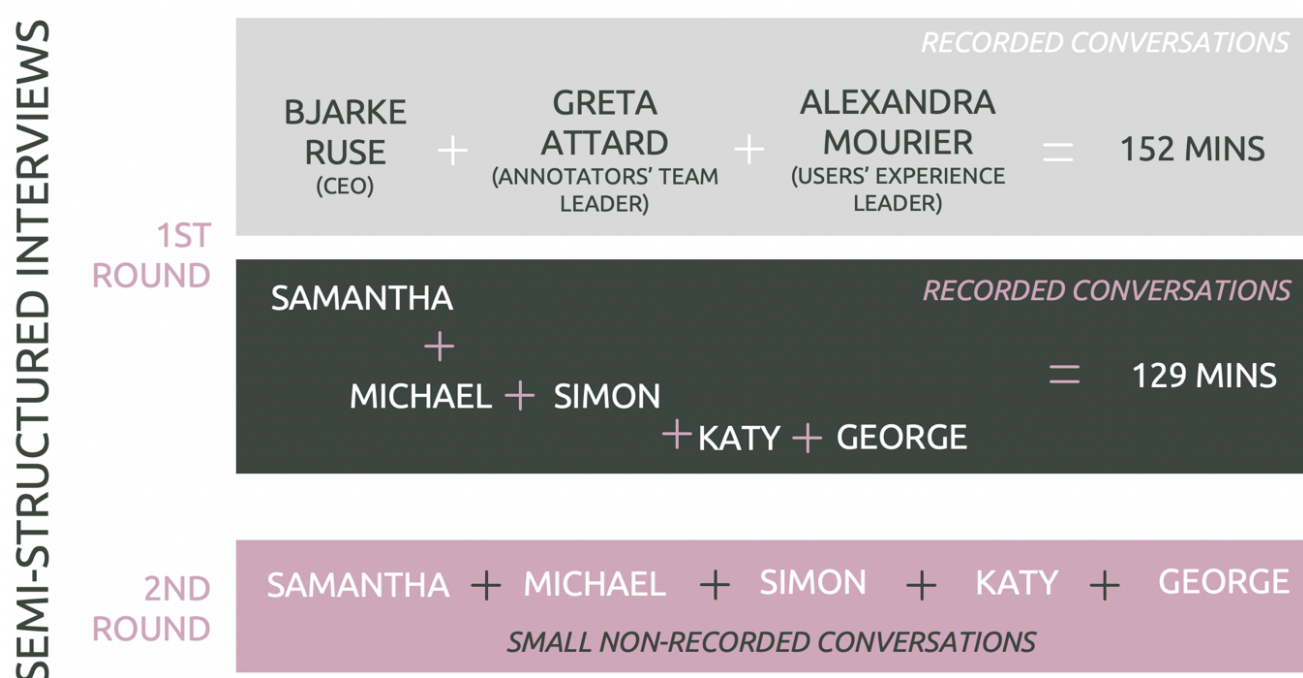


Figure 5. General overview, Semi-structured interviews

c. Biometric Methods

As a complement to the above, the implementation of biometric methods was relevant to contrast and validate what was said by the annotators in the *semi-structured interviews*, and what was observed during my *participant observation*. 'Various studies have shown that biometric data such as heart rate (HR), heart rate variability (HRV), electro-dermal activity (EDA), eye tracking, skin temperature, or electroencephalography (EEG) can be used to assess mental effort and cognitive load, task difficulty, emotions, or stress' (Züger et. Al 2018, 2). This denotes, that

biometric data is helpful to give insights regarding aspects that might be difficult to detect by interviews or mere observation. Mostly because it is data that highlights untold information that is given by the corporeality of the body. Therefore, in this research, the *eye-tracking method*, complemented by the *Galvanic skin response (GSR)*, was used to gather data while the annotators were working on different tasks. These helped me to get a better overview of how an external experience could create an immediate response from the annotators' bodies. Thus, I will explain each one of them to then build on how I worked with the two methods together at the same time when analyzing the data.

Eye-tracking method

The eye-tracking method is a relevant tool to measure the human's visual perception patterns in response to elements (Sayegh et al. 2015, 42). In this case, responses to elements that were part of the whole experience of working in a virtual space while being within a physical space. Therefore, *pupil vision technology* was used in this case to record the annotators' experience and check the visual behavior while doing everyday tasks. This was helpful to have an overview of the objects that are seen continuously by the annotators while working, which probably they are not aware of. At the same time — by contrasting it with the GSR — to understand which elements (or moments) of the virtual and physical space create a stimulus to the annotators' bodies and therefore a response.

The pupil vision consists of a technology based on glasses that record what the person wearing them is looking at, but also where the pupil is fixating specifically and how much time it takes for the person to fixate in a specific spot. This happens because 'on the bottom right and left there are infrared (IR) "eye cameras" with IR illumination, which record the eye to calculate the eye positions' (Tonsen et al. 2020). In this study case, two instances were used. The glasses that allowed people to move and that did not give a lot of detail to the elements that were seen (because are more focused on the movement of the person) are known as *Invisible glasses*. The ones that people needed to be more static to give accurate information in fixation and blinking are known as *Core glasses*. The reason to use both was to contrast the data given and find which were the proper glasses for this case. One would think that because it is a static job the *Core glasses* were optimal for this case. But it is important to consider that part of being an annotator

is also having a pause, standing, going for a coffee, or having small talk with a colleague. For this reason, the *Invisible glasses* were also pertinent.

The difference between both glasses was regarding the limitations and technicalities. For instance, with the *Core glasses*, I had problems adjusting the angles of the internal camera (the ones that record the eye). Because people have different shapes of eyes and sizes of heads, it was difficult to adjust the camera properly to obtain the best data possible. Furthermore, I had to deal with a stressful situation when one of the pupils was not recognized due to the camera having a strange angle. Therefore, in some instances, the data collected was sometimes with one eye instead of the two of them. Another constraint was the fact that the *Core glasses* do not record sound. This was not useful when analyzing the data because was more difficult to detect what was happening in the surroundings (i.e. if someone was talking to the annotator). Thus, when seeing the recordings, sometimes it was difficult to detect what was happening in the environment, which is a vital point in the experience. Finally, another limitation with the core glasses was for people wearing glasses with a high formula. Fortunately, the annotators that were in that situation had eye lenses, but I had to ask them and remind them to wear them on the agreed day to obtain trustful data. Therefore, I believe that for this type of research the *Invisible glasses* are more accurate because they detected the pupil automatically and one does not have to adjust the angle manually. Moreover, because with the *Invisible glasses* it is possible to record sound and there is a possibility to put glasses with a formula for the people that wear glasses to work daily. Nevertheless, the eye-tracking method was a way to define and detect how visuality as a sense could give insights into the annotators' experience. Mostly, to detect what are they paying attention to and how they look at it. Hence, the fixations and blinking were additional data that were not relevant to this matter.



Figure 6. Annotator wearing Core glasses

However, generalities in the constraints of this method were considered during the process of gathering data. First of all, the amount of time that took me to do the test, was small compared to the amount of time the annotators work. This is because the *Core glasses* did not allow a lot of movement. Thus, 20 minutes per annotator was enough to avoid their tiredness and for them to be available to move or stand up. Regarding the *Invisible glasses*, the amount of time was one hour per person. This was because the phone and the glasses warm up quickly, so having the phone in a pocket was unbearable. And the battery was not enough for having more time with it. Also, although the *Invisible glasses* could be moved, the participants expressed they were uncomfortable because they were wired to something. Somehow the participants felt the *Invisible glasses* were invasive to the experience although were more comfortable than the *Core glasses*. They could not do some activities (such as going to the toilet), and some also felt ashamed if they had to go for a coffee because other people (that did not belong to the company) were seeing them. The fact that they knew that they will be observed later through the videos, also was a constraint. Some of them still had imposed behavior while working and did not act normally. For example, some did not look at their phones or did not have a pause because it could be something negative to their image as a worker.

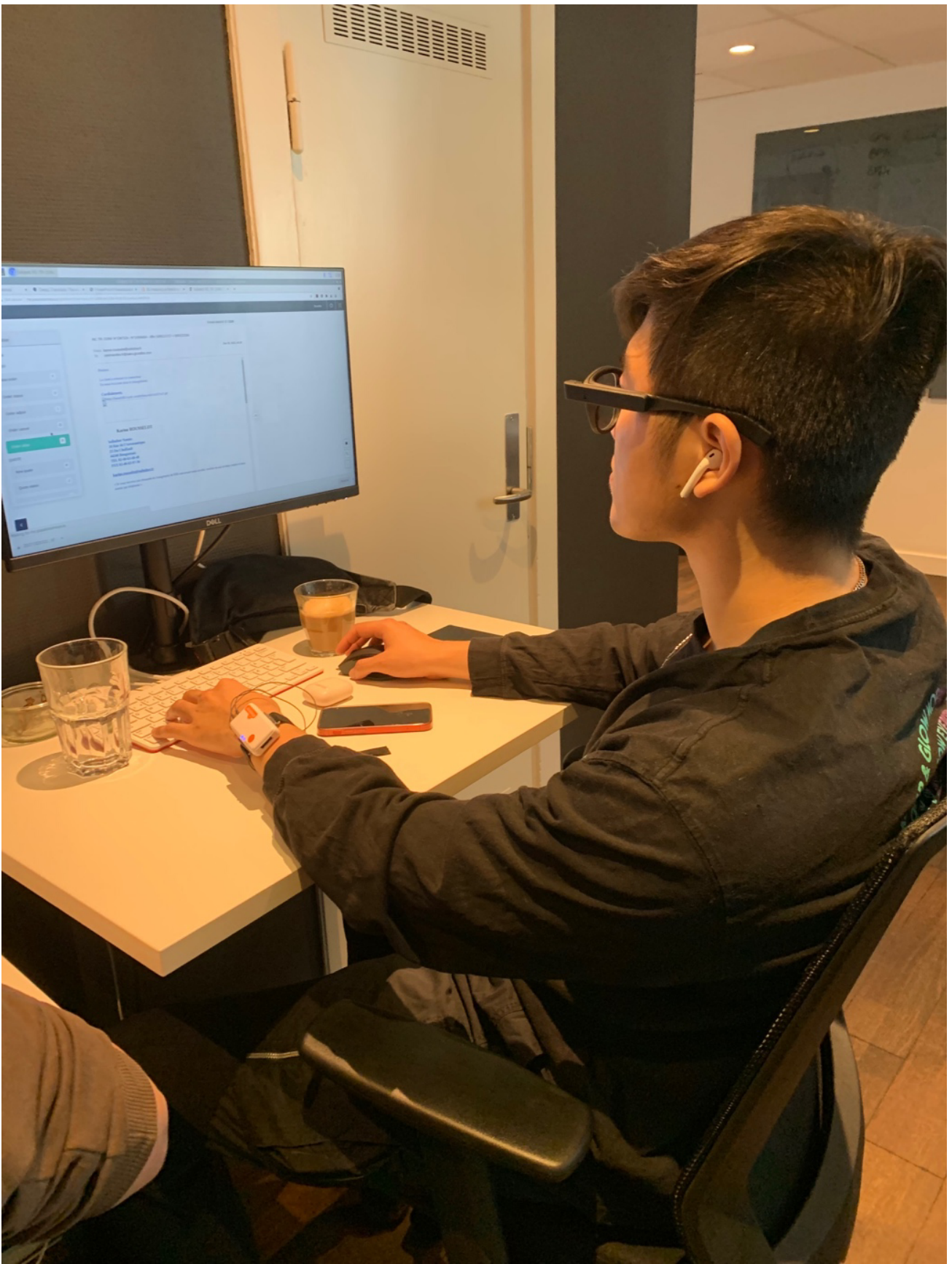


Figure 7. Annotator wearing Invisible Glasses

Galvanic Skin Response (GSR)

Considering what was explained in the eye-tracking section, I continue with how I used the GSR for this research. I opted to use this biometric method to understand emotional arousals that could happen during the annotators' experience, and to identify which objects within both spaces could cause these arousals. Therefore, it is important to comprehend that the GSR 'is a continuous measurement of electrical parameters of human skin' (Dzedzickis 2020, 9). Building on this, Ayata et. al claim that 'emotional changes induce sweat reactions, which are most noticeable on the surface of the hand's fingers and the soles. Sweat reaction causes a variation in the amount of salt in the human skin and this leads to a change in the electrical resistance of the skin. (cited in Dzedzickis 2020, 9). Moreover, and to be more specific regarding emotional-bodily responses:

'Skin conductance (also referred to as electrodermal activity) refers to the varying electrical properties of the skin in response to sweat secretion by sweat glands. There are three types of sweat glands: eccrine, apocrine, and apoeccrine. Eccrine sweat glands are mostly involved in emotional responses as these sweat glands are innervated by sympathetic nerves which accompany psychological processes including emotional arousal .' (Boucsein, Dawson, Schell, Filion, Benedek, Kaernbach, Figner, and Murphy cited in Van Dooren et. al 2012, 298)

Thus, the amount of sweat detected in the hand and its electrodermal activity, were identified through sensors connected to the palms by a device called Shimmer. This helped to determine arousals while having the experience of working with virtual spaces within a physical space. For instance, Lang et. al (1993) argue that 'GSR signal amplitude is associated with stress, excitement, engagement, frustration, and anger, and the obtained measurement results correlate with the self-reported evaluation of arousal' (cited in Dzedzickis 2020, 9). Whereas Duda et. al (2014) defend that 'attention-grabbing stimuli and attention-demanding tasks lead to the simultaneous increase of the frequency and magnitude of GSR. So, GSR allows not only to recognize emotions but also to automatically detect decision-making process' (Ibid). By this, the data obtained in graphs would let me determine arousals, so I could contrast it with the eye-tracking and detect the moment, the reason why this happened, and the possible response or emotion that the annotator was having. That is why a second interview

with annotators was needed because in the case the former aspects could not be detected, the idea was to get it from them to go deeper with their insights by discussing them. Unfortunately, this second interview was not possible immediately because of the time it took to process the information. Anyways, the eye-tracking video worked as an elicitation tool to grasp what was happening at that specific moment. This denoted a great complement to the research because not only arousals (occurred by the human and non-human interactions) were detected, but also the emotional aspects were recognized to be addressed in the semi-structured interviews programmed after obtaining this data. Thus, this is a reflexive exercise not only for me as a researcher but also for the participants. Nevertheless, the detection of arousals was interesting data to understand from a non-spoken perspective how the annotators' experience is shaped by the interactions and how both virtual and physical spaces interrelate.

However, this method had some technical limitations. The shimmer worked via Bluetooth through a computer. Thus, as soon as the annotators went for a coffee, the device could not work at that amount of distance. Hence, the arousals could only be read within a specific radio. Anyways, as soon as the annotators came back from the small pause, the device continued working. This means that some of the experiences during the pause could not be measured by GSR. A void that I would not be capable of filling with data. Another constraint was that the device was also invasive. Although the sensors were put in the hand the annotators used the least, there were moments they seemed uncomfortable with it. Even if the small device was tied to their wrist (*see fig. 8*), their experience was again disrupted by a new element. Finally, it is important to consider that this test was done in a real office environment and not in a lab. Therefore, computers, phones, and people talking could alter the data by adding a lot of noise to it. However, before reading the data I filtered it with the shimmer's program, to clean with the software, possible noise in the data and identify better the arousals.



Figure 8. Annotator wearing the shimmer (left hand)

Interpretation of Biometric data

At this point, it is relevant to explain how was the process of gathering the biometric data and its posterior analysis. Thus, a clarifying point is that I did the process of gathering data simultaneously. This means that the tested participants had to wear the glasses and the shimmer device at the same time. The duration depended on the limitations of the glasses explained before — 20 minutes for the *core glasses* and 60 minutes for the *invisible* ones—. Firstly, basic questions were held for each annotator to have a general understanding of the annotator's mood at that time. I also did some general observations while the devices were connected to the annotators while working (*see fig. 9*). After the biometric data was gathered, I also asked them how they felt and what did they think about the process. All of this was done with the main idea to have a diary to complement the data but also to remember intangible aspects that could be lost in the process.

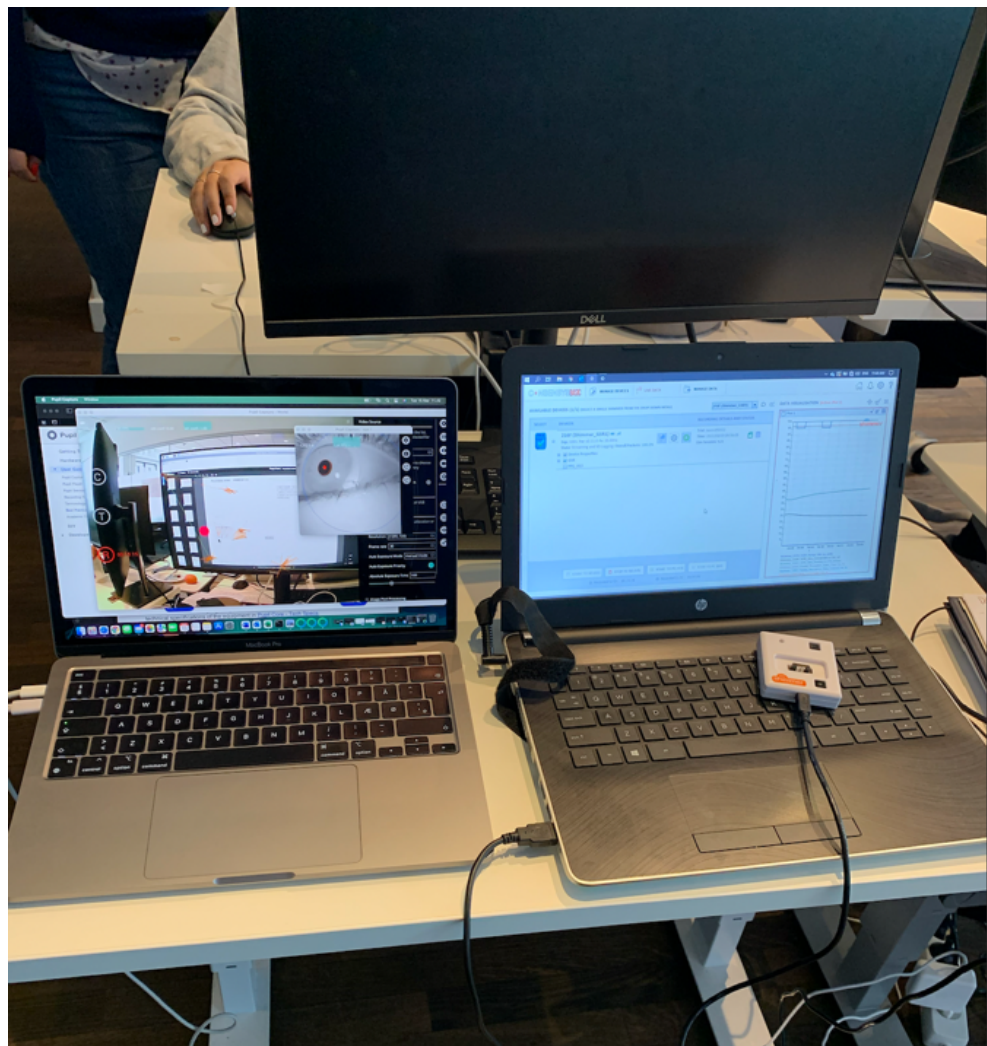


Figure 9. Biometric data gathered simultaneously

Then, I made the graphs with the information taken from the GSR device. These graphs gave me information on the relevant moments of arousal, which were later contrasted with the video of the eye-tracking recordings. These two elements (graphs and video) were helpful to identify the motive of the arousal (*see fig. 10*). It was an interesting exercise to do because there was always something happening at the peaks of the graph. Nevertheless, I focused on the arousals related to the task and to the interactions that were happening with colleagues, the computer, or the phone. Moreover, when doing the second interviews, the annotators felt more comfortable saying what was happening at the moment (by looking at the recording) and how some aspects of the experience, were affecting their responses and emotions. Hence, the importance of mixing both methods because some results would not be possible to identify by just a semi-structured interview or an eye-tracking recording.

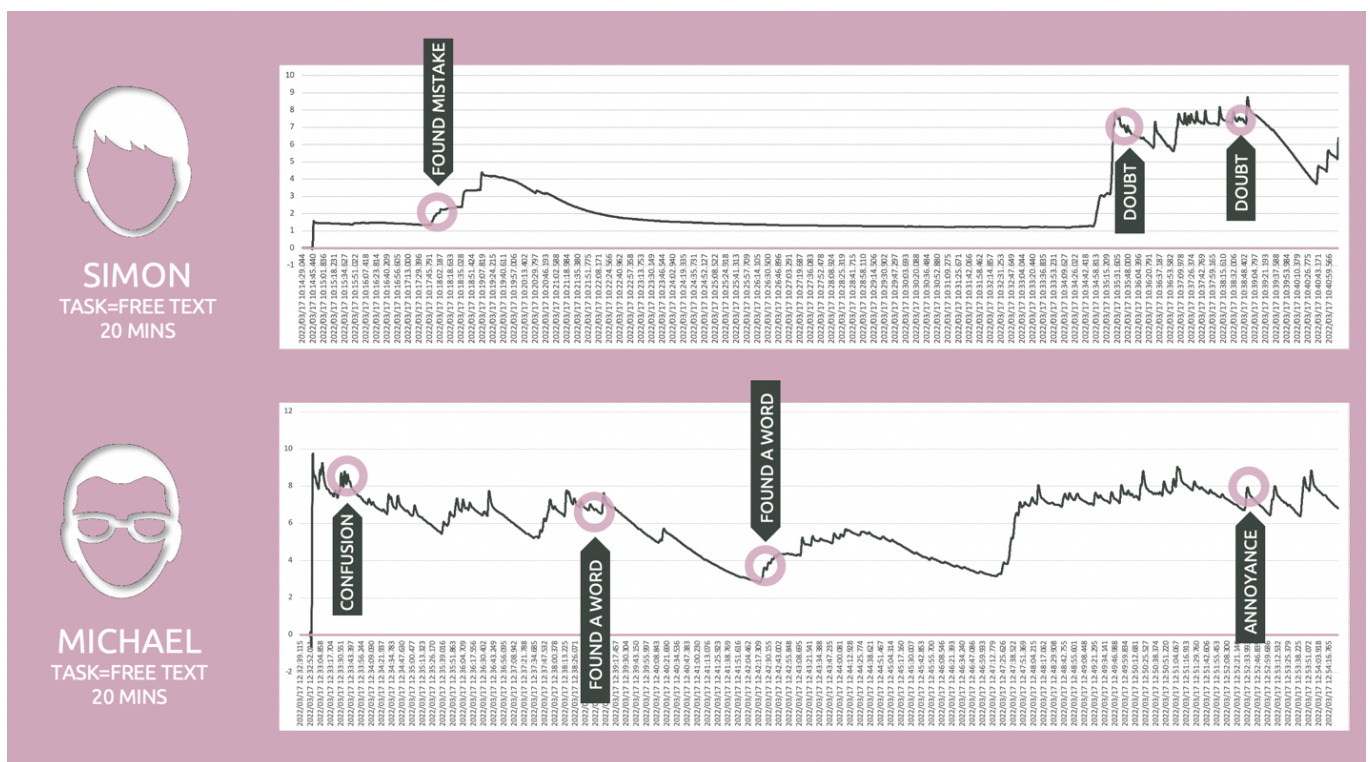


Figure 10. Example of how the moments of arousal were detected.

In general, the combination of all of these methods mentioned above, was fruitful because each one of them complemented the other to get better insights into how a person experiences the task of being an annotator. Also, how different non-human and human actors created interactions that could affect this experience

with a positive or negative impact. Nevertheless, I had a general limitation while applying these methods in parallel. The job is flexible and part-time. This extended my plans regarding gathering data because I could not do it in a limited amount of time as I wanted. Instead, I had to adapt to the annotators' schedules so I can get the proper data from each individual. This is why some annotators could not do the same number of hours as others. In addition, some annotators could not participate in the methods with different tasks, because the flow of the office demanded to work on some at the moment. Thus, the data is not solely about a task, instead is variegated. In the following diagram (*see fig. 11*), there is an overview of the tasks obtained for each participant during the weeks the biometric methods were obtained. Overall, the mixed methods were tools to comprehend how the annotators' experience is shaped by the interactions and how both virtual and physical spaces interact.

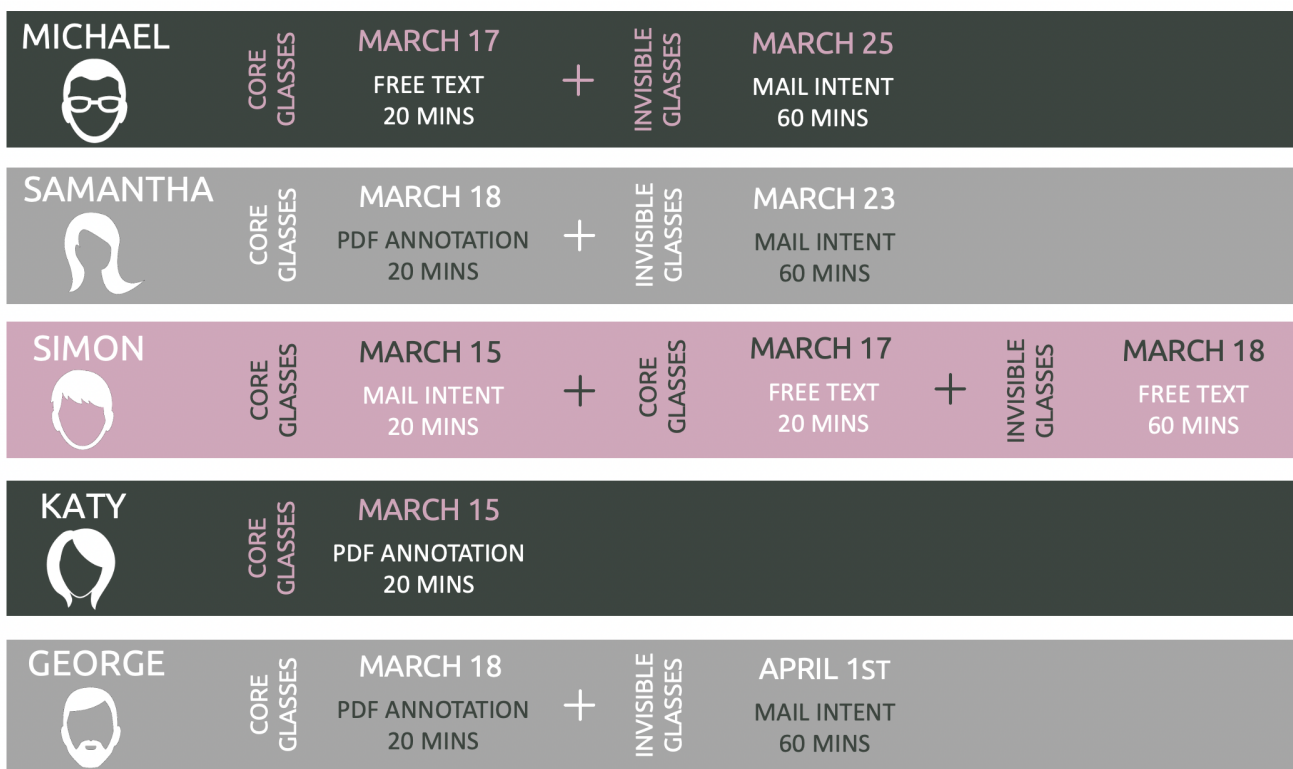


Figure 11. Tasks and biometric methods overview. The participation of annotators.

Theoretical framing

In this chapter, I explain the theoretical concepts necessary for the discussion of this study. The fact that experiences are the central aspect of the research, leads to consider post-phenomenology as a central approach to understanding the relations between humans and non-humans. But first I explain *phenomenology* to comprehend *post-phenomenology* as an approach. This transition is explained in the first section called *From Phenomenology to Post-phenomenology*. Here I link the interpretations of Ihde (2009) and Rosenberger and Verbeek (2015) over Merleau Ponty, interpreted by Carman and Landes (2011). To then continue in *Post-phenomenology, relations in the context of place*, where I explain concepts— defined by Rosenberger and Verbeek (2015)— about interactions where technology acts as a *mediator* within a place. Moreover, when virtuality and physicality play a role in the annotator's interaction, where the subject and non-human elements occupy both spaces that also interrelate with each other (*see fig. 12*). This is complemented by the concept of *place*, seeing it as a context of these relations. An idea supported by Talebian and Uraz (2018). Then in *The sensorial and emotional interaction in Place*, I add to the post-phenomenological approach, the *sensorial experience* developed by Pallasmaa (2014), the mood *in/of* a room exposed by Dreyfus (2012), and the *shared emotions* defined by Casey (2022). These 3 authors have a common concept, which is *atmosphere*, an aspect that is present during the interrelations of both physical and virtual spaces. Finally, in the final section, *Attention within a set of environments*, I bring up the importance of *attention*. A concept developed by Hannah (2013) and Pedersen et al. (2021) but contextualized in a post- phenomenological perspective.

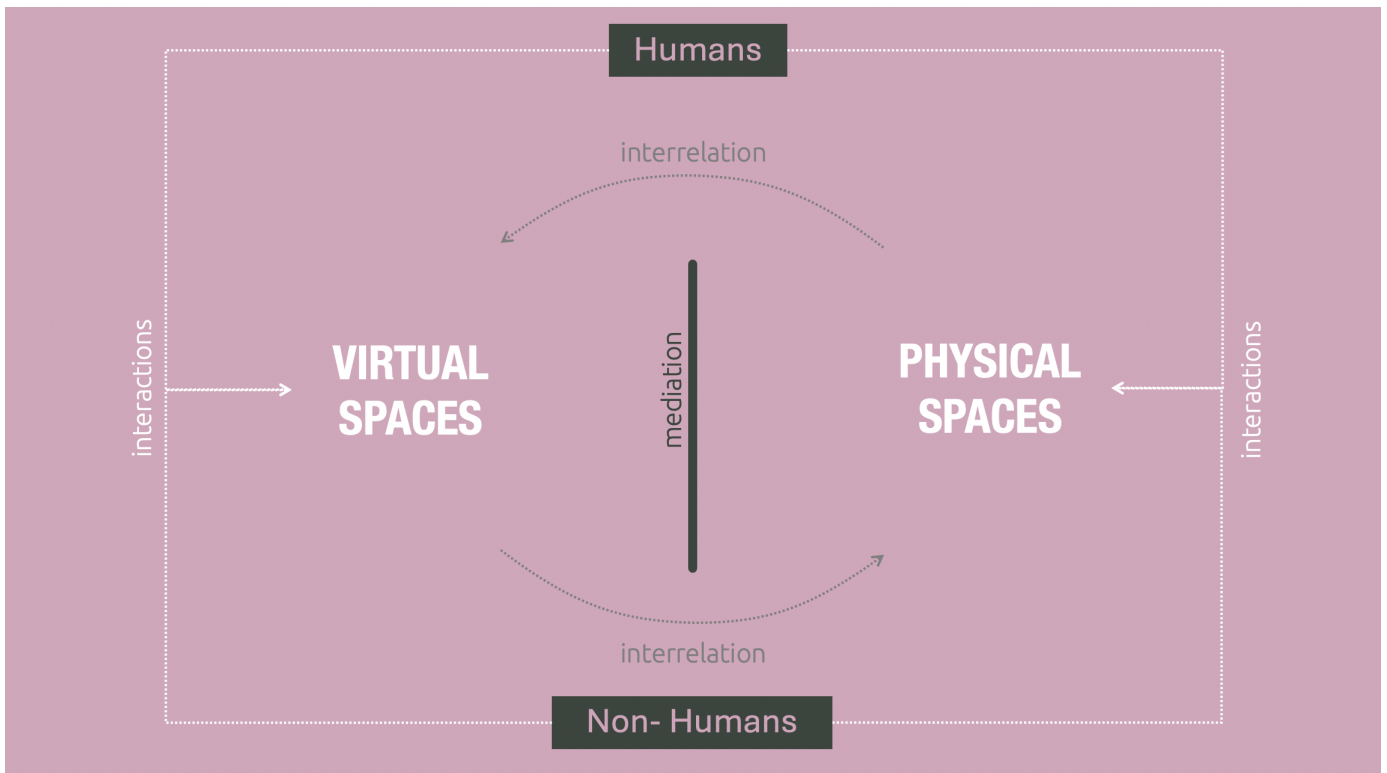


Figure 12. Diagram Illustrating the conceptual approach

a. From Phenomenology to Post-phenomenology

To understand what post-phenomenology is, first is important to comprehend what phenomenology means:

‘Phenomenology is an attempt to describe the basic structures of human experience and understanding from a first-person point of view, in contrast to the reflective, third-person perspective that tends to dominate scientific knowledge and common sense. (...) Phenomenology is thus a descriptive, not an explanatory or deductive enterprise, for it aims to reveal experience as such, rather than frame hypotheses or speculate beyond its bounds.’ (Carman 2011, viii)

This first-person point of view is possible by considering the term *embodiment*. For Merleau Ponty (1945), ‘we have a pre-reflective grasp of our own experiences, not as causally or conceptually linked to our bodies, but as coinciding with them in relations of mutual motivation’ (Carman 2011, xiv). Furthermore, he explains that ‘the structure of perception (...) is the structure of the body [by saying]: my body, *is my point of view upon the world*’ (Idem, xv). This means that the body plays an

important role in the experience. Because it allows us to perceive and interpret the world while taking an action. Landes complements this by saying,

‘Merleau-Ponty explores a series of dimensions of our experience that cannot be separated from our lived embodiment, cannot be accounted for so long as an interpretive distance removes the observer from the spectacle, and cannot be viewed from above through a high-altitude thinking (*pensée de survol*) that forgets the “*exceptional relation between the subject and its body and its world.*”’ (Landes 2011, xxx)

By understanding that a phenomenological approach is based merely on a subjective experience of the body, I direct this research towards a post-phenomenological view. The intention is to focus the experience of the individual on the use of technology as a mediation of it. According to Rosenberger and Verbeek (2015),

‘Post-phenomenologists study the relationships that develop between users and technologies. This perspective addresses questions such as: How do technologies shape our choices, our actions, and our experience of the world? How are technologies at once objects that we use for our (...) purposes, and at the same time objects that influence us? How do technologies inform our politics, ethics, and our understanding of the basic features of our everyday experience?’ (1)

But what is most important, is that ‘post-phenomenological claims are posed from an embodied and situated perspective, refer to practical problems, and are empirically oriented. To both phenomenology and pragmatism, post-phenomenology adds a focus upon case studies of human-technology relations’ (Ibid). Thus, post-phenomenology consists of a posterior concept of phenomenology, in which the experience is still relevant but, considers technology as significant in the experience of humans. As Ihde (2009) argues, ‘while a post-phenomenology clearly owes its roots to phenomenology, it is a deliberate adaptation or change in phenomenology that reflects historical changes in the twenty-first century’ (5). Thus, it the importance to extend the approach to a technological point of view because it also considers non-human objects that also are part of the interactions that shape the experience of the human. In other

words, technology — and all the objects that are considered part of that technology — act as a mediator of the experience. As Rosenberger and Verbeek (2015) argue, ‘rather than thinking in terms of alienation, [post-phenomenology] thinks in terms of mediation. Science and technology help to shape our relations to the world, rather than merely distancing us from it’ (11). Moreover, technology is considered a non-human aspect that is interfering with the experience by affecting objects and people from itself. Mostly, because humans are also shaping their embodiment because of the existence of technology. Thus, ‘Ihde’s correction to phenomenology, (...) is to [analyze] how the body interacts with the world through technology. (...) He argues that we are not merely making the world, for as we embody technology, we are making the self—or, more precisely, technology and humanity are co-constituting’ (cited in Lally 2021, 3). In other words, while we as a society shape technology, the latter is also shaping us in our ways of moving in the world. Furthermore, ‘post-phenomenology has always cut across the transcendental-empirical divide and is able to cultivate a deep respect for technologies in their otherness without denying their relation to humanity’ (Idem, 2).

The acknowledgment of the technological aspect will be relevant to understanding the role it plays in the experience of annotators and how its *otherness* brings new perspectives to the table. By this, I am emphasizing the importance of broadening the perspective in the experience and considering *other* objects that co-create the experience by just interacting with an individual. Moreover, this approach helps to understand that the annotator is not the central element of the whole experience but instead is part of a *network* where sometimes some instances take the lead within the space. This means that ‘as bodies in technology, we no longer live in this purely phenomenological world’ (Lally 2021, 3). Instead, we need to make accountable some elements that are shaping the way we behave and as a result, shaping the spaces that we inhabit. By mentioning the word network, is impossible not to think about the Actor-network Theory (ANT). As Jóhannesson and Bærenholdt (2020) explain,

‘ANT approaches the world as consisting of heterogeneous relations and practices through which humans and non-humans alike are treated as possible actors. This means that we cannot take order, structure, or actor as given, as everything is an effect of

relational practices. Actors are assembled and structures are arranged in a recursive process of networking or translation' (33).

Hence, it could be argued that the relations that are being studied in this research are also part of a network where non-human and human actors belong. The difference with post-phenomenology is that 'ANT studies complicated networks of relations (...) from a third-person perspective; [whereas] post-phenomenology studies engaged human-world relations, and their technologically mediated character, from a first-person perspective' (Rosenberger and Verbeek 2015, 20). Although both post-phenomenology and ANT are complementary than combative (Ihde 2015, xvi). 'ANT draws from [the] semiotics of which the base is linguistic-textual. [While] post-phenomenology draws from an embodiment analysis of human action and perception' (Idem, xv). Therefore, the pertinence of this research resonates more with a post-phenomenological approach rather than the ANT. Nevertheless, it is important to acknowledge the ANT's existence and the possibilities of linking it with the concepts that were developed in this section.

Overall, in this section, I presented ideas of phenomenology that are still relevant in post-phenomenology. The main concept that is central to the research is *embodiment*. However, post-phenomenology adds to the table the importance of technology with its *otherness*, but also as a mediator of the experience. This *mediation* is addressed in the following section, to develop further the different types of mediations that are detected in (this case) the experience of being an annotator. Moreover, *mediation* is a term present throughout the analysis. After all, this research is studying the interactions of the annotators as humans with the non-human actors present at Go Autonomous.

b. Post-phenomenology, relations in the context of place

As mentioned before, post-phenomenology focus on the relations between humans and technology and how the latter could be a mediator of the experience. As Ihde (2009) claims, '...embodiment of bodily intentionality extends through the artifact into the enviroing world in a unique technological mediation' (36). Furthermore, 'human beings can interact with technologies, incorporate them, [and] read them. All of these relations organize how human beings experience their environment, and how they are practically engaged with it. Technologies, to be short, are not opposed to human existence; they are its very medium' (Rosenberger and Verbeek 2015, 13). Therefore, it is important to also mention

the types of relations that exist to later analyze how the non-human elements present at Go Autonomous, mediate the experience of the annotators.

‘At the center of post-phenomenological thinking is technological mediation. Don Ihde’s typology of human-world relations—embodiment, hermeneutic, alterity, and background—provides a methodologically suggestive repertoire of concepts dealing with how technologies shape and reshape both “humans” and [the] “world” through specific mediating effects’ (Kiran 2015, 123)

Hence, there are 4 types of relations where technology acts as a mediator. The *embodiment*, *hermeneutic*, *alterity*, and *background relation* (Rosenberger and Verbeek 2015,14-19). Each one of these relations reflects a different positionality in which humans, technologies, and the world interact. This could be seen in the following diagram (see fig. 13). Nevertheless, in this research, the *background relation* is left aside because the data gathered reflects more on the other 3.

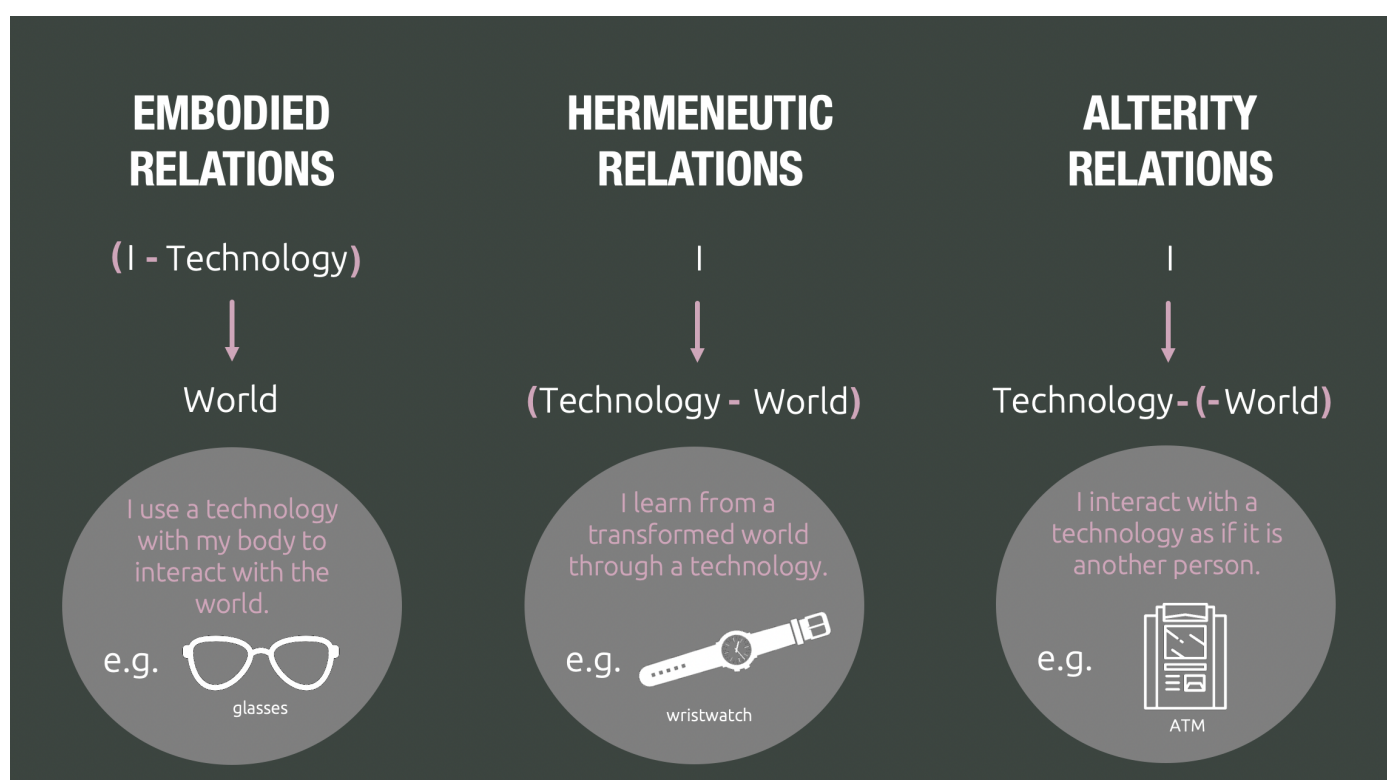


Figure 13. Types of relations where technology acts as a mediator (diagram explained according to Rosenberg and Verbeek (2015,14-19))

But these relations need to be framed in a context. Therefore, *place* is another concept of relevance regarding the Post-phenomenology approach. I see it as a context where the experiences of humans and non-human actors are held. Therefore, *place* and its relevance lie in the fact that objects, humans, and both spaces (virtual and physical) always need context. As Larsen and Johnson (2012) suggest, 'The insight is that existence is placed: Anything that "is" first requires a situation to provide both context and horizon for its availability as an object. *Place* is how the world presents itself; that is to say, being inevitably requires a place, a situation, for its disclosure' (633). In other words, the interactions are always contained within a physical situation. Thus, the link between post-phenomenology and place is distinguished by Talebian and Uraz (2018) by recognizing that the 'human [and] non-human (...) are involved in the process of subject formation, placemaking, and inhabiting the world' (15). Furthermore, 'Post-phenomenology of place moves further from the reduction of place to mere social construct by de-centering human beings' intentionality and putting [emphasis] on the role of technology, [objects], artifacts and activating "materiality" in the process of place experience' (Talebian and Uraz 2018, 20). Somehow, the place is seen as another aspect, as the media where relations can happen. Where there is a continuous interaction depending on the objects, humans, and practices that are within the space. In other words, 'Post-phenomenological reading of intersubjectivity will activate objects (...) and places in the process of experience formation' (Idem, 17).

In light of the above, in this section different *types of mediation* that belong to the post-phenomenology approach, were mentioned. These are developed further in the analysis with specific examples detected during the fieldwork and the data analysis. On the other hand, in this section was necessary to link the post-phenomenological approach to the concept of *place*. This helps to consider that all the interactions that occur between human and non-human actors are possible within a context. In this case the office of Go Autonomous.

c. The sensorial and emotional interaction in Place

I believe that the experience of a place through senses developed by Pallasmaa (2014), complements the post-phenomenological approach explained above. It brings to the table important concepts that build the comprehension of the beforementioned interactions. Although Pallasmaa has a phenomenological approach, it is important to acknowledge the senses that non-human elements create within the space to affect the embodiment, interactions, and relations of

the annotators. Nevertheless, I intend to focus more on the senses created within the built space physically and virtually, considering both of them are sensed at the same time. As he argues ‘... the immediate judgment of the character of space calls upon our entire embodied and existential sense...’ (Pallasmaa 2014, 19). Thus, when the co-existence of virtuality and physicality occurs, the space and its objects, condition the senses in which the interactions of the non-human and human actors happen. In other words, the body is stimulated by material properties that influence people’s senses and as a consequence responses. ‘Each space and place is an invitation to and a suggestion of distinct acts and activities’ (Ibid.). For instance, Merleau-Ponty (1945) expresses the importance of material properties by making an example of how a color can generate a possible action from the body: ‘blue is what solicits a certain way of looking from me, it is what allows itself to be palpated by a specific movement of my gaze. It is a certain field, or a certain atmosphere offered to the power of my eyes and of my entire body’ (Landes 2011, xliii). Hence, a specific property such as color, texture, or form can influence people’s corporeality and therefore their experience. A thought to consider when addressing the spatial aspect because it is important to acknowledge that both physical and virtual spaces already have an identity and non-material experiential character closely related to *atmosphere* (Pallasmaa 2014, 20).

Therefore, *atmosphere* is a concept that comes to relevance in this research. Mostly because it refers to a specific character of a space that is fed by the senses of the person who is experiencing it. Pallasmaa refers to it as ‘a mental “thing”, an experiential property or characteristic that is suspended between the object and the subject’ (2014, 21). Furthermore, he links it to an emotional aspect following the traces or pre-conceptions that a place could have,

‘Atmosphere or ambiance is an epic experiential dimension or prediction, as we automatically read behavioral and social aspects – existent, potential, or imaginary – into the atmospheric image. We also read a temporal layering, or narrative into the setting, and we have an emotional appreciation of the layering of temporal cues and traces, as well as images of past life in our settings. (Idem, 30)

When referring to the emotional appreciation of traces. These thoughts about *atmosphere* can be complemented by what Dreyfus understood about the mood *in/of* a room. It is important to clarify that emotion and mood are linked because the first one 'is a response of the organism to a particular stimulus (person, situation or event)' (Dzedzickis 2020, 2). Whereas the second one 'tends to be [a] subtler [emotion], longer-lasting, less intensive, more in the background, but it can affect the (...) state of a person in positive or negative direction' (Ibid). Considering this, Dreyfus defended that a particular place can be influenced by a person's mood but also the space could influence an individual with a mood. As he says:

'The mood *in* a room is wide open and can change rapidly from being gay to being sad, from being anxious to being tranquil, etc. Normally, the mood *of* a room is built-in. The mood *of* a room can be warm, frightening, restful, reverential, oppressive, cheerful, creepy, soothing, depressing, etc. but it can [not] change. Besides a space open to all moods, and one devoted to supporting one fixed mood, there is the possibility of designing and building spaces that support and encourage a specific range of moods' (Dreyfus 2012, 34).

Hence, when rereferring to the mood *of* a room. This could be linked with the senses and stimuli that Pallasmaa claims to influence the experience. 'Every significant experience of [a built environment] is multisensory; qualities of matter, space, and scale are measured by the eye, ear, nose, skin, tongue, skeleton, and muscle' (Pallasmaa 2014, 34). While the mood *in* a room is linked to the emotions that the individuals could share within a space. Therefore, I introduce here Casey (2022) with his notion of emotion. He suggests, that 'the word "emotion" points in the direction in which a peripatetic account of emotion takes us: a movement outward, as "e-motion" (literally, moving out) signifies' (7). This means that is something traveling from place to place, a contagious element that is charged not only by the people but by the places where it happens. Because Casey sees emotion as something intangible in the ambiance, this is linked to the concept of *atmosphere*.

'Emotions have a capacity to be not only transported across different sensory media (...) but are sometimes suspended in a medium so broadly pervasive that we can only call it an

“atmosphere.” Not only is there an affinity between atmospheres and certain emotions—most conspicuously in the case of pervasive moods—but some emotions come forward to us as situated in, and even indistinguishable from, the atmosphere in which they appear. (Casey 2022, 186)

Thus, Casey argues that we share emotions, but we do not only create them from the inside, as he maintains, ‘[we] do not experience emotion primarily, (...) within ourselves—in a strictly subjective domain—but somewhere beside or beyond me, in a charged space that is at once expressive and demanding’ (Idem, 9). This does not mean that the emotions are merely created on the exterior, but that they possess the properties of being transmitted and transferred, as he explains: ‘Certain emotions may well be associated with me as characteristic or typical of myself, but in periphanous space, they do not belong to me alone. We enter here a transmissive emotional arena whose operations and configurations call out to be described’ (Idem, 7). This transmissive emotional arena is called *Social solidarity*, where common sentiments ‘act as an intensely bonding force between humans. In social solidarity (...) there is a consciousness that is “common to [the] group as a whole, which, consequently, is not ourselves [as isolated persons] but society living and acting within us”’ (Idem, 156). Therefore, in *social solidarity*, a group of people acts according to what could be easily perceived from the *atmosphere*, to then be part of the *environment*. I introduce here *environment* with a different connotation. It is still referred to as the spatial aspect, but it has an emotional meaning as well. For Casey, ‘environment understood as what includes and surrounds us thus characterizes our emotional lives far more extensively than we realize when we consider ourselves as separate individuals—and certainly far more so than early modern accounts of emotion permit or envision’ (2022, 195). In other words, we not only exist in environments, but we are also our environments, and our environments are us bodily and emotionally (Idem, 196). By this, not just the embodiment defended in the section *From Phenomenology to Post-phenomenology* comes to a matter. But also the comprehension that by sharing emotions, there is a possibility that a group of people shares their embodiment. This is what Casey calls *interembodiment*, which means the various ways that bodies relate to each other on a corporeal basis (Idem, 151).

As a consequence, *atmosphere* could be conceived as an intangible element perceived by the senses but built by the experiences and the emotions that can

arise in a place. This is what Pallasmaa calls an *experiential atmosphere*, by saying that ‘as we enter a space, the space enters us, and the experience is essentially an exchange and fusion of the object and the subject’ (Idem, 20). But this experience is mediated by an emotional aspect moderated by feelings, a set of moods, and stimuli. Moreover, the interactions between humans, non-human elements, and the virtual and physical space are also charged by emotions transmitted from subject to subject. Therefore, all these concepts work as a complement to understanding and discussing the sensorial and emotional experiences identified in the data obtained from the fieldwork.

In general, I have presented in this section aspects that elaborate on the concept of *experiential atmosphere*. Firstly, I have introduced the stimuli of *senses* done by the physical characteristics of a space (even if it is virtual or physical). To then explore how these senses are linked to *emotion* and *mood*. This served not only to expose the difference between the mood *of* a room and the mood *in* a room of Dreyfus; but also to link both concepts with the theories of Pallasmaa and Casey. In doing so, the mood *of* a room was linked to Pallasmaa’s way of thinking. Whereas the mood *in* the room was connected with the shared emotions of Casey, mostly with *social solidarity* and *environment*. By this, it was also possible to present and explain the concept of *interembodiment*, developed by Casey. An aspect that is also connected with the concept of *embodiment* mentioned in the first section of the *Theoretical frame*. However, this section is the basis to comprehend how *atmosphere* plays a crucial point during the analysis and discussion. Because it supports the sensorial and emotional aspects identified in the annotators’ experience and the physical and virtual space interrelation. After all, experiences are dictated by stimuli, emotions, moods, feelings, and thoughts.

d. Attention within a set of environments

Considering I am perusing this research with a post-phenomenological approach, where interactions and relations do exist regarding an experience, a pertinent concept is *attention*. It comes to relevance because is an embodied action that people do while being in the world, somehow it is inherent to our existence. As Hannah (2013) argues, ‘to explore the ways in which a phenomenology of embodied being-in-the-world can strengthen our sense of the selectivity of attention as a ubiquitous and important mediating factor in social life...’(236). This means that the fact that objects and people co-exist within a

physical and virtual space by having relations and interactions, creates the act to be attentive to something. Moreover,

‘... attention is a form of action (a “doing”) rather than a property (a “having”) or a state (a “being”) of mind—captures our errand here. Irrespective of the ethnographic context studied, anthropologists have tended to explore attention as an activity, something that does something to people—as a particular mode of action, that is to say, which is either the result of an explicit agenda or motivation or happens more tacitly and less deliberately’ (Pedersen et al. 2021, 318)

Hence, this concept is understood within this research as an action, a response to something or someone. As mentioned before, humans and non-human actors exist within a place in an equal manner, but the focus here is that all the possible interactions and relations depend on what is the individual (who is having the experience) paying attention to. Thus, attention has a direct relation with power as Hannah claims, ‘the event of power stands in close relation to the event of attention, where something becomes noticeable to me and not rather something else. This unavoidably selective “rather” repeats itself in [the act of] drawing attention’ (2013, 240). Although power has a straight relation with politics, I do not involve this matter in this study. However, I bring into consideration the fact that technologies have a strong impact on our attention. For instance, Kiran (2015) says that technologies show an enabling-constraining structure that has a shaping impact on our behavior and actions. While enabling us to do specific things, technologies simultaneously shape how we do these things, and thereby divert our attention from other possible ways of doing it. (131). Furthermore, ‘digitization and datafication of everyday life across the world (...) is transforming attentional practices, forcing researchers to see beyond smartphones and computers not only as mere media devices, but also as part of infrastructural networks that attract and capture attention for political, economic, or social ends’ (Pedersen et al. 2021, 315). Therefore, the influence of technology on the experience of an individual could be considered as a motive for action or reaction, but always by paying attention to something. Mostly because

‘attention as techne [(action)] plays a crucial role in the socio-cognitive and intersubjective processes through which

human beings are made into certain kinds of persons and subjects. Even if it does not have the power to determine to what end and what effect, attention has the capacity to make us turn our minds and bodies to something and thus away from something else' (Pedersen et al. 2021, 319).

By this statement, is important to acknowledge that attention as an action, is always present during the interactions of human and non-human actors. Therefore, is always present in the experience. The attention could be attracted by different motives. Maybe a stimulus of a sense, a presence of something or someone in the place, or even physical features within a virtual or physical space. What is important to comprehend is that the individual has the power to decide what to pay attention to. As a consequence, this research aims to identify what attracts the annotators' attention while working at Go Autonomous.

In light of the above, the concept of *attention* was characterized under the parameters of Hannah and Pedersen et al. The intention is to bring the concept of *attention* to the analysis and get insights into the relations and interactions that occur within the office. Moreover, to identify the objects, people, and spaces that withdraw more attention and which of them are neglected. This is to consider the importance that both objects and people constitute in the annotators' experience and the interrelation of both physical and virtual spaces.

Analysis

In this chapter, I discuss the data gathered with the methods exposed in the chapter *Study design* and contrast it with the concepts presented in the *Theoretical framing*. I intend to present aspects that were identified when analyzing the data, and that were relevant to determine how the experience of being an annotator is shaped by the interactions that occur in Go Autonomous. Also to detect the aspects that are present when the virtual and physical space interrelate. Therefore, I start discussing in the first section *Body coordination — Embodiment and movement within space*, about the corporeality of the annotators while working at the office. I make a distinction between the *embodiments* that occur in the physical and virtual space. Then, I follow the discussion by introducing in *The subliminal stimulation —visuality and light within space* physical characteristics from virtual and physical spaces that stimulate the annotators'

senses. Here I also exemplify in each space elements of relevance for the experience. I continue with the discussion by bringing to the table aspects related to shared emotions. In *Sharing Emotional experiences - a collective way of being at Go Autonomous*, I intend to explain the perspective of considering *interembodiment* as a present aspect while the annotators are inhabiting both virtual and physical spaces. Finally in *Paying attention within a wholeness of multiple spaces- The power of attracting attention*, I expose the importance of considering attention as an aspect that determines how both physical and virtual spaces interrelate. As a result, I have a 4-themed discussion where I expose the annotators' insights, their corporal data, and my observations, to merge them with relevant concepts that could fill the gap of understanding in this digital era why physical spaces are still important for companies.

a. Body coordination —*Embodiment and movement within space*

Simon arrives at the office at 8:00 am. He sits down and clocks in. While thinking of what is he going to work on all day long, he turns on the computer. Then he types on the keyboard his username to check his email before starting. Suddenly he has the urge to change the chair and the desk. They are low, he feels he is bending the knees too much and he feels uncomfortable working like that. Fortunately, both the chair and desk can be adjustable to his needs. Then he starts working, he moves the mouse on the table to select some words that he sees on the screen. He is now immersed in his job...

In this section, I discuss aspects of embodiment and movement that make possible some interactions with the annotators merely from the point of view of corporeality. This means that after understanding the *embodiment relations* in each space, I illustrate how the physical and virtual spaces interrelate while the annotators are using their bodies within them. Thus, the pertinence of their embodiment as an aspect of interaction with the non-human actors. During observations, I noticed that the annotators while working have a characteristic type of interaction with the physical and virtual space. Therefore, I am explaining particularities in each one of them; to finally argue how corporeality and embodiment are present during the interrelation of both spaces while the annotators are experiencing working at Go Autonomous.

Within the physical space, there is a whole presence of the body. This means that the annotator's body moves around, uses some objects, and adjusts some others to be comfortable within the space. Somehow, there is a previous agreement between body and space to be occupied and modified. One example is adjusting the table, chair, or screen to get to a specific height according to their physical features and preferences. These adjustments are done because the desks and chairs are used by different annotators during the week. In doing so, there is a need to feel comfortable when interacting with the objects within the physical space, because their body has specific requirements that the material world is able to accomplish for it. What is relevant is that they know the specific reason why they do it. For instance, I asked one of them why he had the screen so tilted while working (*see fig. 14*). He replied that the specific angle allowed him to see the screen in a way that he prefers to have if he had to be seated for long period. On the other hand, some of them also use these features to break the day or to feel a better connection with their own body. This means that some of them heightens the desk to stand while working, which helps them to change their position and take care of their knees or back (*see fig. 14*). This shows how the annotators are doing adjustments to engage with the space that they are inhabiting by using the chair, the screen, or the desk. As Ihde (2009) suggests, '*embodiment* is, in practice, the way in which we engage our environment or "world", and while we may not often explicitly attend to it, many of these actions incorporate the use of artifacts or technologies' (42). Therefore, in this case, the fact that the chair, the desk, or the screen are adjustable is a technological feature that allows the annotator to be engaged and comfortable in the office.

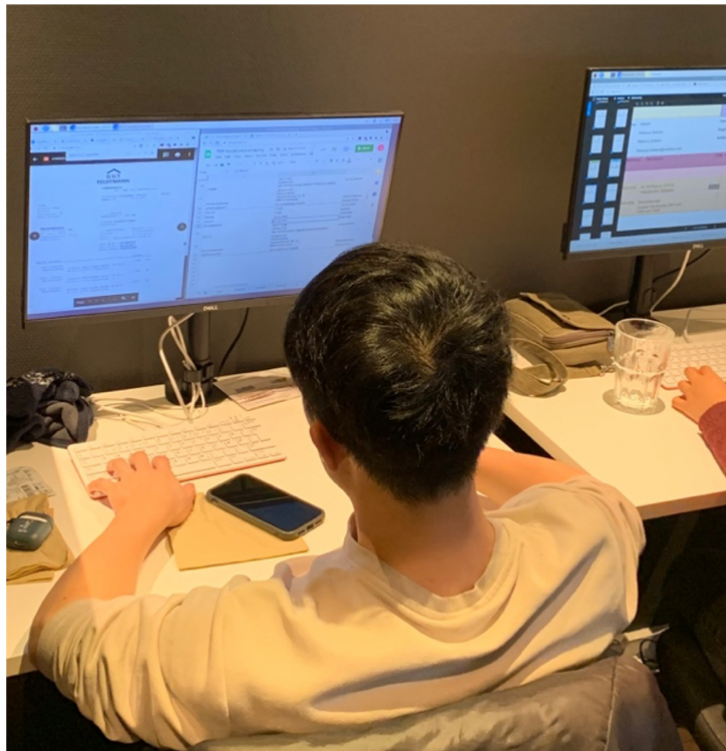


Figure 14. Different ways of how the annotators relate within the Physical and Virtual space

Moreover, the physical embodiment is also present by moving the objects around them for a collective purpose. Here, I refer to the moments that the annotators are not acting with an individual intention, but when there are interactions that include other people within their experience. Hence, there is a sort of awareness when they need to move the objects around them to have a better result in the activity that they want to achieve collectively. In other words, they are modifying the physical space by moving non-human elements to interact with other people according to their preferences and possible situations. For instance, Samantha is aware of how she disposes of the objects while having informal group discussions:

I suppose (...) I would have to move the chair [to have group discussions](...) because the space is not cramped, but one still needs to take care of the space. Like if someone comes in, then you'd have to move the orientation of the chair. And the monitor angle, I guess. To see, push it forward, or backward.

This recognition denotes a relevant physical experience of harmony between the non-human and human actors within the space. Where there is evident coordination that works all together to obtain a specific result. There is a kind of negotiation with the actors that are within the space to therefore be part of it. Thus, I argue that the interactions mentioned above, both individual and collective, are reflected in the *embodied relations* exposed by Ihde (2009). As the 'relations that incorporate material technologies or artifacts that we *experience as taken into our very bodily experience*' (42). Furthermore,

'With the notion of "embodiment relations," (...) points to the mediation of those technologies which transform a user's actional and perceptual engagement with the world. When a technology is "embodied," a user's experience is reshaped through the device, with the device itself in some ways taken into the user's bodily awareness' (Rosenberger and Verbeek 2015, 14)

By this, I emphasize that these *embodied relations* are one of the mediations that shape the annotators' experience at Go Autonomous. The way the body moves, its presence, and the interaction with the material world; creates an engagement and a positionality regarding the space that the annotators are occupying. In other words, their entire body is the one who creates all the possibilities that could happen at the office by interacting with the non-human actors present.

Meanwhile, the hand and the eye are the ones that play an important role in the annotators' interaction within the virtual space. Observations of the eye-tracking records showed that the mouse's arrow and the eye normally operate together in all the participants. Somehow, both are glued to each other and where the arrow (Mouse + Hand) goes the eye does it (*see fig. 15*). In this case, there is not a proper awareness of it. It is not mentioned nor acknowledged by anyone but still, it happens. Somehow, it is a way to navigate through the virtual space that the annotator is within. What is important to consider, is how two different parts of the body are playing in such coordination to make a presence in the virtuality. The movement of the eye, the hand grabbing and sliding the mouse on the table, and the fingers touching gently the mouse's button (to select something) produce a subconscious choreography; where the virtual spatiality is experienced and mediated by technologies such as the mouse and screen. However, is the movement of the body that dictates this relation by using these devices. As Tuan (1974) claims, 'although the organization of human space is uniquely dependent on sight, space is experienced directly as having room to move, even as our spatializing faculties of sight and touch reveal it to us being at a distance (cited in Hillis 1999, 93). This means that movement (which happens in the eye, hand, and finger) is a relevant aspect to consider in the virtual spaces' experience. Moreover, 'In a Virtual Environment (VE), two dynamics are at play. The subject agrees to move conceptually into the virtual world or spatial display. In return, the technology provides him or her with a point of view...' (Hillis 1999, 100). By this, I intend to point out the importance of corporeal movement in the virtual space. What I mean is that our movements are not as conceptual as Hillis suggests. Instead, I argue that by seeing the movements in the eye-tracking, there is a clear physical connection to virtually. The eyes rolling constantly, the blinking, the hand manipulating the mouse on the table to move within the screen, and the finger pressing the mouse's button when needed; are clear examples that the body is in a constant movement. Clearly, interacting in a virtual space while being in a physical one, is different than being merely in a physical space, but my point is that the connection with virtuality is still physical and not conceptual. Nevertheless, these movements seem to be more precise and coordinated rather than just being in a physical space. This is probably because the movement is limited and framed by the screen and the size of the table. By this, I mean that there are boundaries where the movements are possible to happen. The screen has dimensional properties (2D) where the eye has a limit to roll (otherwise they would be seeing outside the virtual space), whereas the hand can just move the mouse over a

specific area on the table. Thus, the difference between both physical and virtual spaces regarding corporeal motion is the limitation.

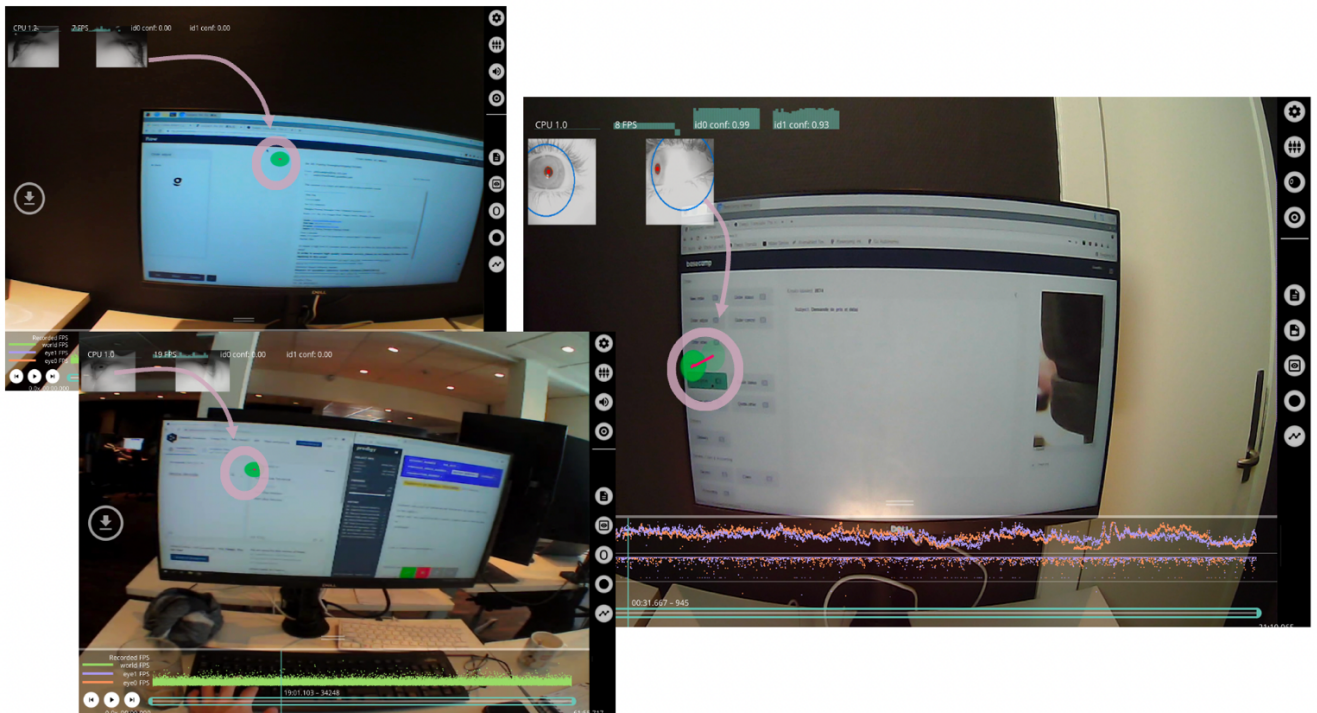


Figure 15. Where the sight goes the arrow goes.
Examples of different participants having the same behavior

However, the corporeal limitation mentioned above could be another reason why both physical and virtual spaces overlap continually. The fact that the screen has a frame that limits the sight, makes the annotator more aware of his/her surroundings by taking a peek at what is outside the virtual space (*see fig. 16*).

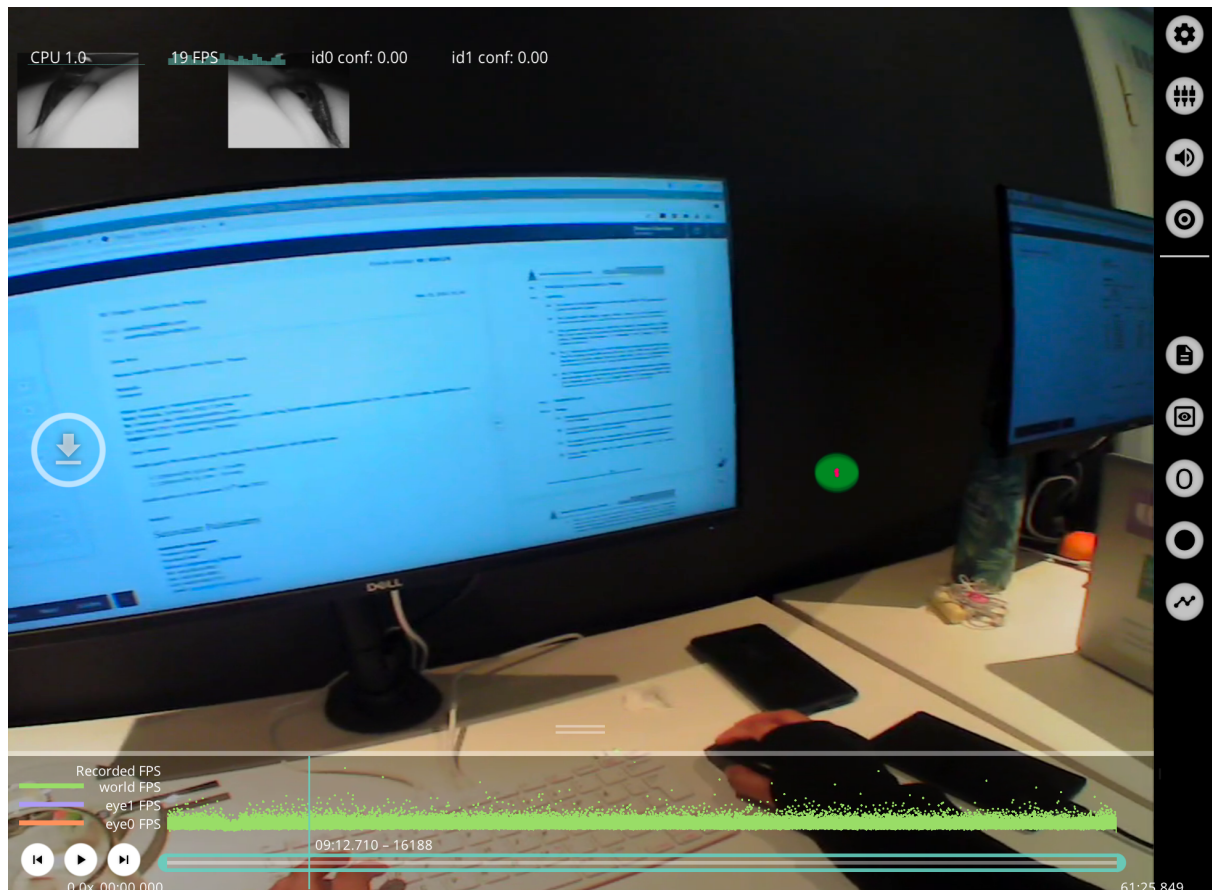


Figure 16. Annotator taking a peek at the physical space

Nevertheless, the body is a link that connects both worlds where the annotator can jump from the physical to the virtual space in a matter of seconds. Sometimes the annotator interacts more with one space than the other, but what is important to highlight here is that both spaces co-exist in terms of movement and corporeality. I mentioned before the case of the annotator moving the mouse on the table. This is a clear link of co-existence where the body in the physical space is moving the mouse to interact in the virtual space. Another example is during the group discussions, where the annotators are occupying the physical space and interacting with the others (by talking and seeing each other), but at the same time, they are seeing the screen to get a general understanding of what is being discussed. Katy acknowledges this situation when she answers what is used the most while having discussions in groups,

It sounds weird, but [people interact the most with] the chair and the mouse. I think people are very quick to just like, grab your computer and be like, let me see this. (...) And also the chair because, you know, [to] kind of lean on it.

The expression ‘grab your computer’, refers to when another person moves their body towards a screen to point something out or even grabs the mouse to do something in the virtual space while they are speaking. Thus, I believe that, in this case, the virtual space is the mediator of the annotators’ discussions, but at the same time all of them are continuously jumping from one space to the other by seeing the screen and then recognizing each other through the action of speaking, pointing out things and seeing each other (*see fig 17*). These examples illustrate how the *embodied relations* that occur with other objects, spaces, and colleagues are present daily in the annotators’ interactions, and therefore shape their experience. As a consequence, when the annotator moves his/her body within the space —both physical and virtual — the overlapping of spaces is possible. But what happens when the body is stimulated by external elements that affect the senses and therefore the responses of the body within a space? This is a topic that is developed in the next section.



Figure 17. Discussion in groups. An example when both spaces overlap.

b. The subliminal stimulation —*visuality and light within space*

Michael is working on labeling some mail intent. Today is just him working. It is a cloudy day, and the office feels darker and lonely. He starts labeling at a good pace but after 1 hour, he feels drained. He goes for a pause to the canteen for a cup of coffee. He sits outside on the terrace to receive more light and takes the first sip. The energy is coming back to his body, he can feel it...

In this section, I intend to focus merely on the senses and how these are stimulated. While analyzing the data, I noticed that the annotators are notably stimulated by some physical aspects that the built space —Virtual or Physical— has. But also by some intangible elements that are in the atmosphere and that can trigger their minds while being working within both spaces. Therefore, I discuss how characteristics and elements from the physical and virtual space influence the production of *atmosphere* and *senses*. Its importance comes when considering them as part of the annotators' experience at Go Autonomous. I argue that these intangible aspects contained within the space, influence the annotators' interactions with the non-human actors. Furthermore, these sensorial responses are also present when both virtual and physical spaces interrelate. Therefore, I am first illustrating some cases where physical aspects stimulate the annotators' minds and bodies, to then describe the *hermeneutics relations* that these interactions mediate and produce. Finally, I argue why I believe the senses are another aspect present when both physical and virtual spaces interrelate.

I am interested in firstly discussing aspects of the virtual space, mostly about colors. As pointed out by Merleau Ponty above in *The sensorial and emotional interaction in Place*, colors constitute an important part of the built space. Thus, I apply this logic also to virtuality. For instance, Go Autonomous has selected intentionally what they want to communicate by using specific colors. The user experience Director, Alexandra Mourier, mentions the purpose behind the colors in the mail intent platform:

(...) We have chosen dark blue, as one of our main colors [because] it seems professional (..) and [is] also a calm color. (...) And then we have edited the green color to make [it] stand out [as a] playful color. (...) we have also added the red color, which is a nice [contrast

to] the green ones. And [we have] added some different shades and stuff. So we can have more colors to play around with.

This statement can be contrasted with what Katy feels towards the stimuli that the colors give her while working,

I feel like especially colors are affecting me a lot. (...) My brain [is] being stimulated by [them]. For example, the platform of mail intent is a lot of grey and white, and blue. And it is just really harsh to look at because you are stimulated by the work you do and you're stimulated by the graphics. In opposite to, for example, the free text platform, where [there] is a lot of yellow and purple, which are two not so normal colors to having [in] a program and I think you underestimate daily, how much that engages a person and how much is stimulated the brain. (...) I can say that it affects my work because I can be more focused and engaged then than doing mail intent.

Although the platform (mail intent) is still in process of design, and the red color that Alexandra refers to is just for the customers. Katy's insight denotes the importance of colors to working in such a repetitive job. Here what seems a trivial aspect, is not achieving the level of stimulation that the annotators need to engage in such repetitive tasks, while processing the data. Despite she was the only one referring explicitly to the colors and the stimuli of the virtual space. Other participants referred to this platform in terms of lethargy. As Michael expressed,

I don't know how to describe this feeling. But it's what I said. I don't like it as much. I don't hate it as well. But in comparison with like, for example, the PDFs. I don't like it so much. And is also kind of boring. Reading, trying to figure out this, [is] more boring for me.

Whereas the task of labeling PDFs (which is the task that uses more colors) was chosen as the one that they prefer the most. Samantha supports this by saying,

I like the PDFs because I like the precision and I like seeing the colors.

This gives a hint of the relationship between elements that stimulate the senses and the responses of a subject that is within the virtual space. By this, I mean that the colors are directly linked to some feelings that project a final statement or position about a virtual space. As Pallasmaa (2014) suggests, 'atmosphere is an exchange between the material or existent properties of the place and our immaterial realm of projection and imagination' (20). Hence, I argue that the *atmosphere* of the Mail intent platform is related to the feeling of boredom or monotony, whereas the platform of labeling PDFs, is linked to the feeling of engagement. This could be applied to the mood *of* the room that Dreyfus (2012) defends, where a mood is built-in (34) to produce a specific feeling, in this case, the virtual platforms are generating specific moods that affect the annotators' experience.

On the other hand, in the physical space, the annotators are highly stimulated by elements present in the physicality, like the light or the lack of it. For instance, Samantha recognizes how different is the lighting in 2 areas where the desks are in the office. Linking it with her mood,

It really depends [where I sit]. My mood feels better and energized closer to the bathroom because we can see outside, but at the same time, I like the intimacy of having the corner as well, so it makes me feel cozy and homey, but also slower.

When she contrasts one spot with the other, it denotes the presence of natural light (in the spot close to the toilet) and the presence of artificial light in the other spot (*see fig. 18*). She describes both places with a mood that she feels the space produces in her. This illustrates what Dreyfus emphasizes by explaining that a mood *of* a room cannot change because built spaces support and encourage a specific range of moods (2012,34). In this case, different spots in the same physical space produce different feelings because of the characteristics that each spot has. In the case of Samantha, the lack of light makes her feel cozy but also slower in terms of being productive. In general, the office where the annotators are working is darker compared to other spaces in the building. This clearly also influences George's judgment about the physical space of the office. When I asked him how did he felt in general when he arrived at Go Autonomous, he said:

The office is dark, and it makes me feel without energy. Maybe the new office would make me feel happier.

Here he refers to the lack of light. It seems that the amount of light that Samantha appreciated in one spot is not sufficient for him. It seems that in contrast to other spaces of the building, he feels it is a dark place that makes him feel drained wherever he sits. Thus, in this case, his experience is affected by the lack of light, which creates a judgment of how he feels within the space.

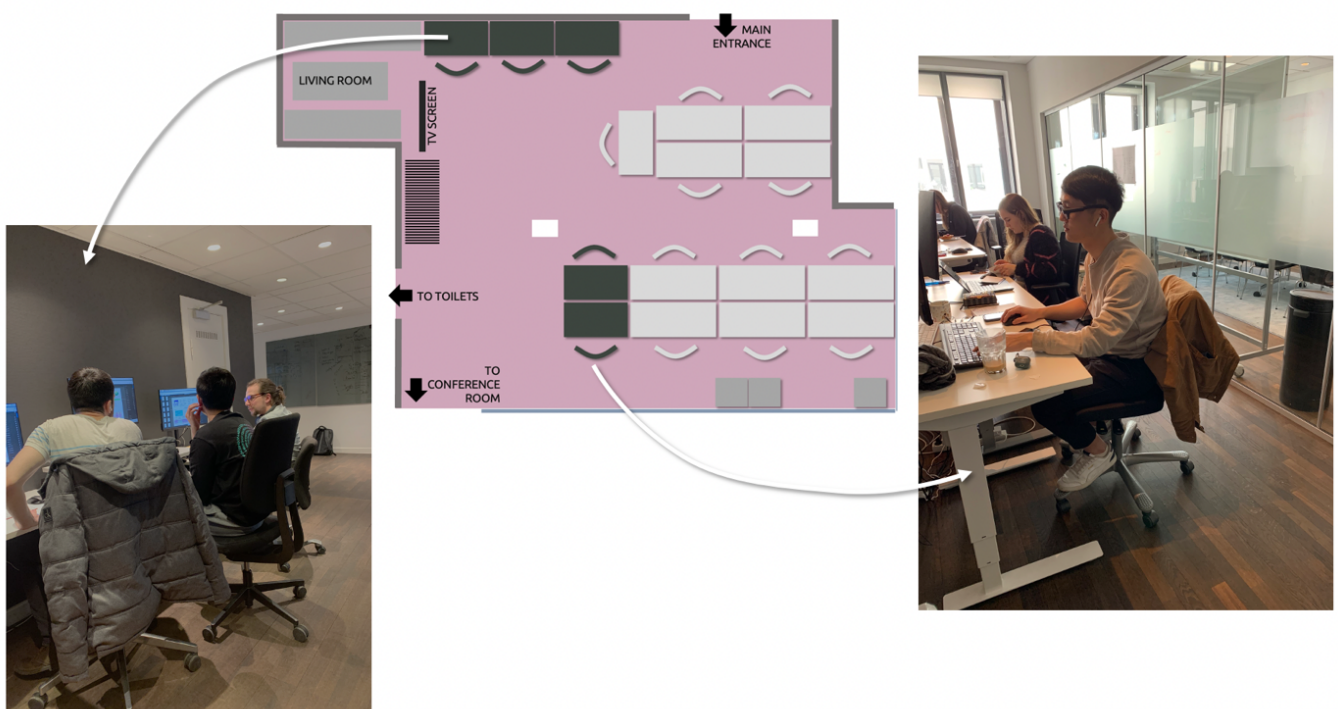


Figure 18. Lighting at the office.

All of these examples show attributes with different possibilities because of the objects and different kinds of technologies that are present within the space (virtual and physical). In the case of the virtual space, the colors are shown within the screen and in the case of the physical space, the light is balanced by the bulbs and the existence (or not) of windows. Nevertheless, there is a presence of non-human actors that mediate the relations of the annotators and the space by allowing the stimulation of their senses. Thus, I argue that these stimuli could be considered a product of *hermeneutic relations*, where 'the user experiences [are] a transformed encounter with the world via the direct experience and

interpretation of the technology itself' (Rosenberger and Verbeek 2015, 17). In other words, the annotators' experience is transformed and regulated by the screen, the bulbs, or the windows. These technological objects help to interpret through the annotators' senses, specific characteristics that create a myriad of sensual reactions (depending on the individual). Therefore, both spaces—characterized by different properties (in this case color and light)—stimulate the senses and interfere with how the annotator experience being at the office. Hence, it the importance to understand the *hermeneutic relations* at this point, because the office contains a big number of technologies that are regulating physical aspects that affect the annotators' senses and as a result their interpretation of the place. For instance, for George, the office is dark, and he feels drained by this specific feature. This leads me to suggest that there is a sort of *experiential atmosphere* where the annotators enter both spaces (to occupy and use them) but at the same time, the character of the spaces enters them through their senses. Overall, 'atmosphere is the overarching (...) sensor[rial] and emotive impression of a space' (Pallaasma 2014,20).

Considering the above, the sensual interactions within both spaces are occurring simultaneously. With this, I mean that the characteristics of different spaces are triggering the senses at the same time. For instance, the annotators are stimulated by the lack of natural light and the colors within the screen all at once. Hence, the senses simply deal with both regardless of where it comes from and what is the reason for the stimulation. Therefore, I argue that the stimulation of the senses is another aspect present in the overlapping of the virtual and physical space. As Pallaasma argues, every significant experience of [a built environment] is multisensory (2014,34). So why it cannot be also multi-spacial or multi-atmospheric? I suggest that in this case and considering the experience of being within 2 spaces at the same time, this is possible. As a consequence, here is where the overlapping takes place because although the senses are stimulated at the same time, the conscious reactions of the annotators could only find just one reason. For example, some identified that they are drained because of the lack of natural light, while others would blame it by claiming how boring is a task. Nevertheless, the sensorial responses exposed above, could be shown and materialized in an emotion, which was discussed beforehand as a response to a particular stimulus made by a person, a situation, or an event (Dzedzickis 2020, 2). But this is a topic that needs further development and is expanded in the following section.

c. Sharing Emotional experiences - *a collective way of being at Go Autonomous*

It is Thursday 10:30, George arrives to the office and there is a calm environment but still busy. No one is talking, it is quiet, and everyone has their headphones on. There is a general attitude of commitment and concentration in the environment. George immediately feels he needs to start working as well (to do the same thing as everyone is doing), there is no one to talk to.

This is an illustration of how the individuals at the office could share a common emotion, in this case, an attitude of commitment and focus. Furthermore, this exemplifies how the space is charged by different actions, subjects, and objects interacting altogether where there is a commonality, everyone is working. In this section, I emphasize the importance of the emotions in the annotators' experience. Because emotions are an intangible determinant that characterizes the environment where they work. Moreover, this section is a continuity of the above sections where the corporeality and the senses meet to then create an *emotion*. After all, As Li et al. argue, 'everything (...) seems to indicate that emotions arise as a result of people experiencing certain stimuli which generate a series of specific feelings and responses' (cited in Agustí et. al 2019,2). Moreover, 'emotions are considered to be intense feelings of affection caused by a specific stimulus (person, object, event or situation) which result in a specific behavioral response' (Prayag et al. cited in Agustí et. al 2019,2). But in this case, I expose how an emotion is shared and felt within the air. Thus, the *atmosphere*, in this case, is still a relevant concept but is seen from the perspective of emotions rather than senses. It is like another perspective that leads to exploring more the mood *in* the room rather than the mood *of* a room mentioned in the last section. Hence, I introduce *interembodiment* by exemplifying cases where emotions are shared within both spaces but also could transform them. By this, I intend to suggest that shared emotions are another aspect present in the interrelation of both virtual and physical spaces.

I have mentioned that emotions could charge a place because there are transmitted and shared by all the subjects that are within it. A clear example is when the annotators are having a discussion. By doing participant observation, I

noticed that when the group agrees on having a group discussion (because there is confusion about a concept or a task) there are certain unsaid aspects that come into evidence. There is a particular unspoken agreement materialized through a choreography, where all the bodies involved move within both spaces (physical and virtual), to make the discussion possible. Somehow, it seems to be a pre-agreement where objects need to be moved, people need to stand in a spot, and everyone is coordinated to see the screen to discuss and solve the question altogether. As mentioned before these interactions that involve the corporeality of individuals with other objects and technologies are the *embodied relations*. But when it comes to being a group, the concept of *interembodiment* should be added to the formula. As Casey (2022) explains, 'when it comes to crowd and group experiences, emotions are shared among actively embodied participants. Interembodiment is essential to the experiences of these participants. As such, it can be considered the basis of a closely linked interemotionality that is dynamically ingredient in many group settings' (163). Thus, corporeality is kind of linked to a shared emotion that is felt during group discussions. Here I introduce gestures as a good example of how corporeality is related to emotions and interembodiment. Considering that gestures are a physical response that shows emotion, they play a big part during a discussion because they show how people agree or disagree with what is being said. A simple nod shows the interlocutor that they agree with what is being said but shrugging shoulders might denote confusion. This leaves the environment uneasy, like a cloud of uncertainty is covering the place. This happens in a matter of a second, and if most of the annotators are not feeling sure about what they are annotating, their shared frustration causes a lot of discussion for a day until the cloud dissipates. As Casey puts it, gestures are a type of interembodiment 'These are expressive means that carry their own affective force, stopping short of articulated words but often being complementary to such words. In such charged settings, gestures can—as we say revealingly—“speak for themselves”' (2022,155). I believe that simple body gestures and expressions (presenting an emotion) are a determinant to charge the environment and as a result create different types of interactions with other annotators, non-human actors, the virtual, and the physical space. By this, I mean that as far as the whole group share, for instance, an emotion of confusion, the relations with all the elements around change. The computers are stopped being used individually, to be a mediator of the discussion. The physical space stops being occupied by one chair and by one quiet person to have more people chatting, making sounds, sharing personal bubbles, and moving chairs around. Therefore, a shared emotion

can transform the interactions, the spaces, and how both virtual and physical spaces overlap.



Figure 19. Gestures during discussions being in both spaces and using objects as mediators

Drawing more on confusion as an emotion that is shared by the annotators. I introduce here the evaluation of the arousals given by the GSR. This showed that when the annotator asked for help or had a discussion with a colleague or the team leader (because he/she has a doubt), the peaks were high and frequent (see fig. 20). Furthermore, the graphs showed that as soon as they started clarifying their doubts, the peaks started to dissipate. This is important to understand because these peaks illustrate how confusing an annotator could be while working. How frequently this sentiment happens, and how this shared emotion is present while the annotators are being within the virtual and physical space.

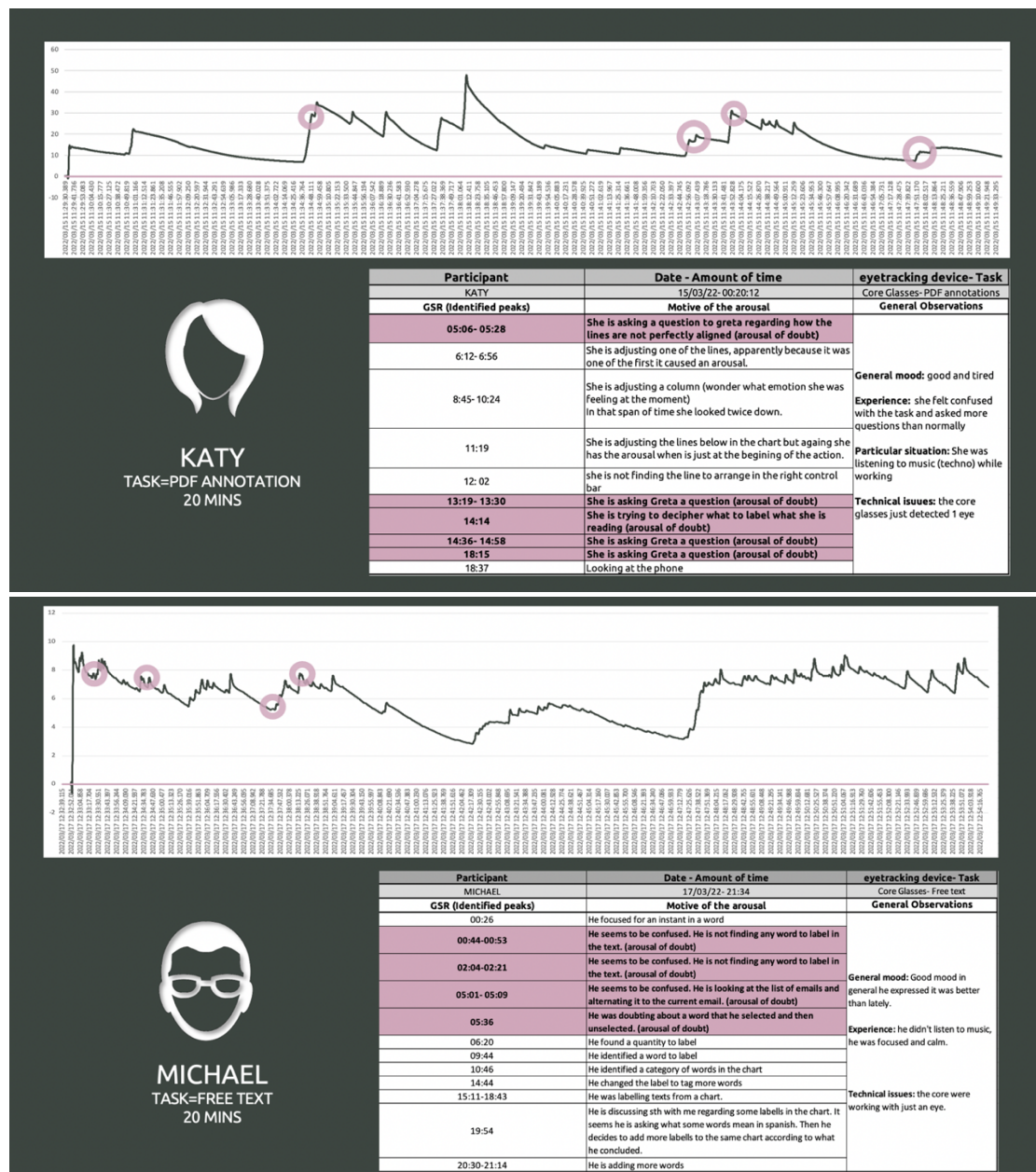


Figure 20. Arousals of confusion in both participants contrasted with charts

Nevertheless, the fact that they can talk until they agree, denotes that the space, in general, is charged with positive emotions. When I asked them how they felt about the office when entering it, most of them said that it was a good environment in general, as Michael recalls,

'I think it is a good environment. Sometimes they are busy, so you don't get a reaction when you arrive, but when they're not, it is flexible and nice, and it is not heavy and toxic. I enjoy it. It is pretty chill in a way and people are tolerant and nice. it is more regarding their attitude. It is a positive environment and not heavy.'

When he refers to the environment as *not heavy*, it means that the annotators understand indirectly the concept that a place is charged with emotions. In this case, the mood *in* a room, explained by Dreyfus as wide open where attitudes can change rapidly from being gay to being sad, from being anxious to being tranquil, etc. (2012,34). In this case, when Michael refers to the office as chill and not toxic, means that the emotions that are generally transferred at the office are linked to being happy and calm, therefore he enjoys being there. But it can also depend on the day. Simon makes it clear by saying,

'In general the word that characterizes the office is "happy" when annotators are at the office; and "lonely" when there are no annotators at all. It depends on time to time.'

What is interesting is that he associates happiness with being with more annotators. Probably because he perceives that by being at the office by himself, no one shares the same thoughts, feelings, or emotions and as a consequence experiences. For him sharing the space with someone else brings him happiness. George supports this statement by saying,

I think full [house] is better, because I feel people around me and sometimes, I get bored, and he get bored as well. We can just start a random conversation.

When he says the expression 'feel people around me', denotes an urge to feel part of a group, to be part of something. This is what Casey defines as *social solidarity*, where common sentiments 'act as an intensely bonding force between humans' (2022,156). And this force could be possible because they are sharing not only the same space (physical and virtual) but also sharing an experience that makes them act as a unit. Greta, the team leader of annotation expresses this sentiment by saying,

'And one thing that obviously bothers me is that if, for example, there are three [annotators], already seated, then that one other person needs to be on their own (...) [without] their team. So if, for example, there is a question, because that person is on the other side of the room, (...) [he or she] wouldn't be able to hear the question and add on more questions (...). I'd have to either tell them or [to] come out of their own well, to be able to get that information that we're discussing [at the moment]. So if [the annotators] had to do be all next to each other, that would definitely be better. (...) So the physical space, I think that is one of the things that I think it [currently] lacks.

Hence, my intention is to point out how important are the interactions between the members of the annotation team because sharing the same space helps to create a similar set of mind. During the interviews, it was impressive how the participants had common answers to the questions that I did. For example, when asking them which was their favorite task to work on, the common answer was labeling PDFs. The reasons could vary, but the answers were similar, as I have been talking with just one person for a while. Furthermore, the embodiment of the place is similar in all of them. This could be illustrated by how they move their eyes and arrow (with the mouse) along the screen, it is like they have learned it from someone, and that person has been influenced the other ones to do it unconsciously. Thus, Casey refers that, 'we get to such places by way of a dynamic interembodiment that takes us out of the cage of private consciousness and into

entire affective worlds that both surround and exceed us and that are replete with emotions that possess their own profiles as well as their own expressive energies' (2022,165). Therefore, I relate the former examples as a consequence of dynamic *interembodiment*, where the annotator stops being himself/herself and starts acting in unity, where an emotional profile is formed and interpreted by others.

Overall, I have argued that during the *embodied relations* produced by the interactions of the annotators as a group and the non-human objects, there are moments where *interembodiment* occurs. This allows the annotators to share emotions and therefore experiences. But also the interembodiment is influenced by the interactions within the space (virtual and physical). Here, both spaces could act as an intermediary of all the possible moods that inhabit the office. Therefore, interembodiment is another aspect present when both physical and virtual spaces overlap because the shared emotions and moods arise while the annotators are experiencing both spaces altogether. But what happens when in the shared emotions and experiences there is a need to pay attention to someone or something specific? What to give relevance or power? This is an aspect that is considered in the following section.

d. Paying attention within a wholeness of multiple spaces- *The power of attracting attention*

Katy is working on labeling PDFs; she is focused on her computer screen while listening to music with her headphones on. She likes this task because it is graphical and has a lot of colors. Suddenly her phone screen lights up, it is a classmate from college reminding her they need to submit their assignment on Friday. She looks at her phone for a couple of minutes while she answers. By this, she stopped paying attention to the task that she has been doing. Meanwhile, the Platform team is having a discussion 2 desks away from her, they are having an informal meeting and laughing. She listens nonchalantly to what they are saying and continues with her task.

This is an illustration of what normally happens on daily basis for the annotators while being at Go Autonomous. The annotator experience a complex interaction that needs to be developed further. This complexity comes when there is a myriad of aspects taking place at the same time. I have argued that the corporeality, the senses, and the shared emotions can be recognized during the

interrelation of both virtual and physical spaces, and therefore the annotators' experience. But in this section, I include to the list the *attention*. Thus, In this section, my purpose is to address with examples when the spaces overlap within each other by giving the power of *attention* to them. Moreover, I argue that the mediations present in the following cases are the *hermeneutic* and *alterity relations*. These, constitute the main aspect when understanding how the annotators relate to the elements within the space. For this reason, I describe and exemplify further both relations to then understand why *attention* is relevant to an annotator's experience.

First of all, it is important to highlight how within the office there are different types of spaces that the annotators inhabit. As mentioned throughout the research, the virtual space where the annotators work is an important environment, which is framed by the screen. There, the annotator can be on different platforms (or virtual spaces) completing tasks. Somehow, he/she is immersing in this virtuality, mediated through the screen. Thus, I argue that this relation between human-screen is considered a *hermeneutic relation* because the annotator's experience is transformed by the encounter with the screen itself. This means that through the screen the annotator is experiencing different virtual spaces and interpreting the world differently, depending on the task that is assigned to him/her. In other words, the annotator can have contact with the world through the different platforms he/she manages during the day. An example of this is when observing the biometric data, there was arousal when some of the annotators were translating information that was not in their language with *deepl* (a website to translate languages either for mail intent, PDF, or free text). Some explained they felt confusion or annoyance but, when asking Samantha why she believes she had arousals, she answered,

'I like to translate because I like to learn new languages, even if it is just some new words. Also I like the fact that the company has international employees so I can learn from them and ask them.'

Hence, the platform of *deepl*, through the screen is establishing this *hermeneutical relation* where there are elements in the virtual world (in this context words) that are presented to Samantha. Therefore, she can learn from the world throughout them. Moreover, she is developing her capabilities through the elements

presented by the screen. For instance, when talking to Greta (the team leader) she recognizes that the annotators can develop multiple skills like reading faster or having an eye for detail. With this, I suggest that the annotators are not just learning from the world through the screen but are also shaping themselves as human beings. As Kiran (2015) puts it, 'technological mediation shapes the world in a sense that is also a matter about shaping us, humans, as individuals and as societies. As such, this shaping has [an] impact on how we perceive and act in the world, and how we see ourselves as being in that world' (125). But I argue that this is not the only virtual space present in the annotators' day while working at the office. I introduce here the phone as an element of importance during the experience. A phone is an object that is always there, not only for annotators but also for every member that is at the office. Its presence is ubiquitous and necessary for every individual in our current society. As a consequence, is an object that cannot be neglected in this research. For instance, when I asked Samantha about the objects that she interacts with daily at the office she answered,

'Objects I interact with while working I would say then my phone. the mouse...., and the airphones, I guess. Because as I said, it's 50/50 that I listened [to music] And while taking pauses.... the phone (laughs)'

What is interesting about this answer, is that she conceives the phone as a tool to work but also to rest. An object that is necessary not only for having pauses to interact with people (who are not with her at the moment), or even to see social media, but also the phone affords her to listen to music while she is completing the tasks assigned. If I analyze the relationship between a human being and his/her phone, it is possible to identify it as an *alterity relation*. This consist of 'devices to which we relate in a manner somewhat similar to how we interact with other human beings. The idea is that some forms of interface are devised specifically to mimic the shape of person-to-person interaction and that sometimes we encounter a device as itself a presence with which we must interrelate' (Rosenberger and Verbeek 2015, 18). Thus, the presence of the phone is so important in the annotators' experience, that while checking the biometric data, some of the arousals identified in different moments of the test were related to it. Sometimes because the phone lighted up (*see fig. 21*), showing a notification, or other times because the annotator was reading a thread. Nevertheless, it is a

relationship that causes an emotional attachment and that is already part of an individual, as an extension of themselves. Somewhat, the phone produces the *otherness* (Ihde cited in Lally 2021, 3) to co-create the experience by just interacting with an individual. Where a piece of technology is equally relevant to the experience and acquires the same importance as a subject. Thus, recognizing the phone as another gives it the capacity of being an actor in the relationship as if it was a human being.

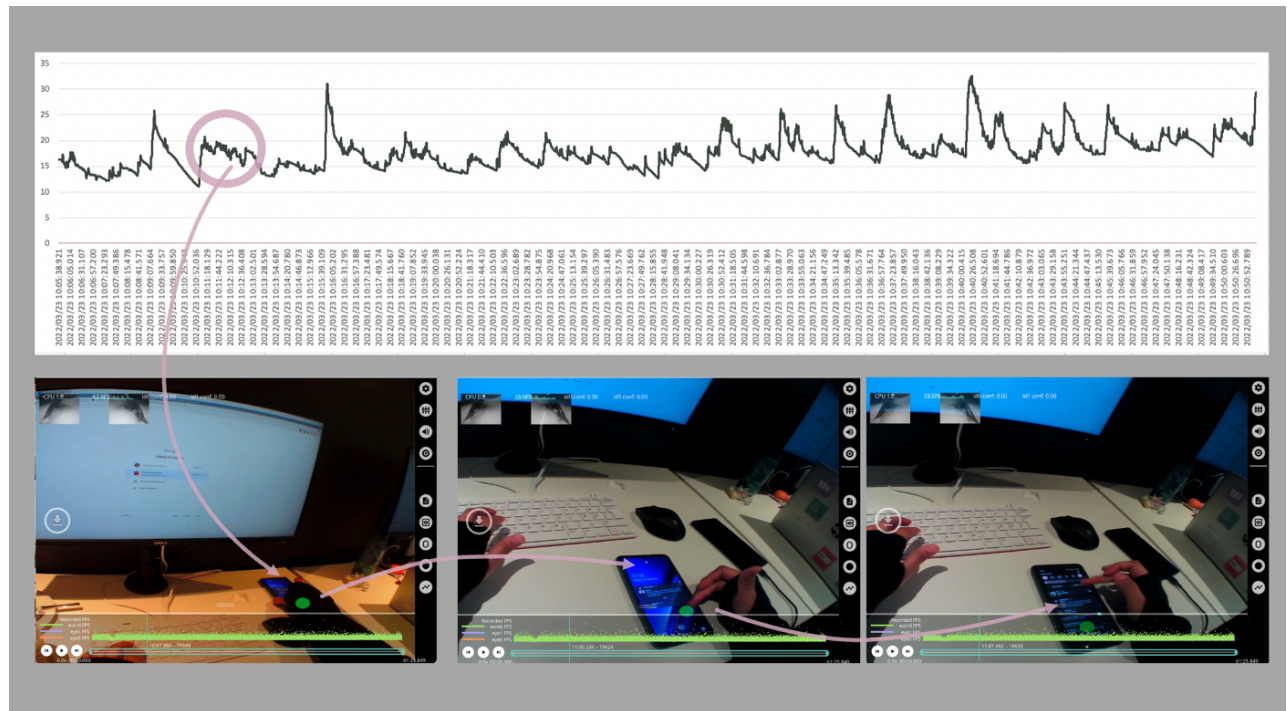


Figure 21. Annotator seeing at the phone vs. the arousals it produces

The physical space also holds interesting insights worth mentioning. Mostly because within it all the interactions mentioned occur, plus the ones between humans. By this, I want to point out that human relations also can influence the interactions that the annotators have while being on the screen or on their phones. For instance, during the observations of the biometric data, I noticed that Simon looked quickly outside the screen from time to time. When asked him why was he doing that, he said,

'I am affected by the surroundings. Especially when the task is not really interesting.'

Moreover, because I tested Simon twice at different desks, he also admitted that he did look a lot at the surroundings because he was unfocused. He added he was

sitting at a desk that does not have a background. What he meant was that the other 3 desks are in front of a wall, thus, he does not have in the background movement that distracts him when he is doing a repetitive task (see fig. 22). This is a clear example of how other people being at the office can alter the environment and influence the annotators' experience and work. People speaking indistinctively, passing by, laughing, or doing different actions affect the environment and the way the annotators experience it.

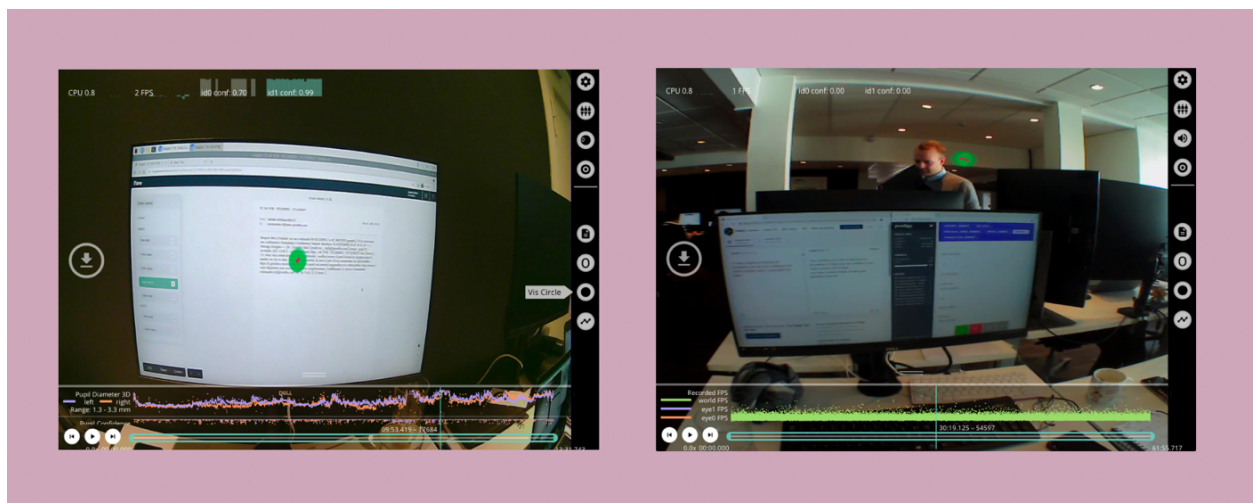


Figure 22. The contrast between a desk with a background and without a background

Therefore, is not only the emotional aspect (defended in the section above), but also the actions of people interacting with others, with the objects, or within the space; that are also shaping how the annotators experience their surroundings and respond to them. For instance, Michael says,

'In my case, I try to work as much as I can. I sit down, I start working concentrated. I may have some distractions here and there. Like when someone talks about something, and it catches my attention (...).'

When he refers that something *catches his attention*, is mostly when people are talking (or having an action within the space). Anyways the expression that he uses is important for this analysis because it shows that some elements within the space (human and non-human) attract the annotator's attention. But as mentioned before, attention has the capacity to make us turn our minds and bodies to something and thus away from something else' (Pedersen et al. 2021, 319). This is why it is important to understand that people at the office talking and moving are

catching the annotator's *attention*, which could be considered a distraction. This is because they are stopping paying attention to the screen to be present and having human-to-human relations. Or as Hanna (2013) claims, there are 'spatial- temporal- perceptual complexes that invite and encourage some attentional engagements and inhibit others, [shaping] our attentional performativity' (242).

However, by highlighting the 3 environments (screen, phone, and office) present during the experience, I claim that these interrelate with each other, but they come to importance merely when the annotator decides so. Somehow, the annotator holds the power of deciding in which space he/she wants to be. And it is here where the concept of *attention* comes to relevance again. Because spaces can also have the power of *catching somebody's attention*. For instance, coming back to the case of the phone, the data gathered showed the importance that the phone has in the annotators' experience. Not only because it is mentioned in the interviews or because it is part of the arousals. Also because it is a matter of higher hierarchy in our society. By this, I mean that the attention to phones is a topic that offices, in general, are fighting against with, as Broadbent claims, 'restrictions of access to certain websites and to mobile phones and other communication channels are therefore to be understood as attempts to preserve the boundaries between social spheres and as forms of organizational control on attention' (cited in Pedersen et al. 2021, 312-313). Because phones have the power to attract the attention of workers, there is going to be always resistance to that power. Mostly because the phones constitute an expression of autonomy and individualism. A small sphere that does not want to be shared with the collectivity of the office. As Pedersen et al. argue, 'viewed as a form of attention technology, phones and computers come to serve as instruments for individual subjects navigating hierarchies in workplaces and affirming their autonomy' (2021, 312-313). This is a reason that explains the necessity of being on their phone, even though they know is not well seen in the office. Samantha, by saying the following supports the latter,

'But I do have to go walking around sometimes. Like, just check on my phone, not within the environment, because I don't like people to see that I'm on my phone often. Like, going to the coffee area to check my phone. '

Thus, the phone is an environment that not only connects with people but also endorses the annotators' autonomy. Somehow the phone reflects them and

represents their existence in the world. It is a way of confirming in a short moment that they are still in their world. Hence, the need to be looking at it constantly, as Katy recalls,

'I'm very effective when I work. But because I'm very effective. I also have a lot of interruptions. I'm quick to look at my phone. But when I do it, I don't think I do it for a long time. I just need to get my focus away, like, make a text or change my podcast or something like that.'

Through this, she recognizes the need to alter her attention continually. For her, the fact that she is effective makes her believe that she can pay attention to other things (like her phone) to break the immersion of being within the virtual space. But also, some annotators acknowledge their capacity of interacting with something produced by their phones while they are deeply involved in their task. As Simon affirms:

I think [listening to podcasts] makes me [be] more focused because if you are not listening to any kind of music or podcasts, I would be influenced by other sounds (...) [such as] some people talking (...). But if I just listen to podcasts, I will focus on what they are talking but at the same time, I can focus on my task.

Thus, they also see the phone as a mediator that blocks interactions with other humans within the office. Although the phone possesses the power of attracting a lot of attention, it also seems that it also has the capability of alleviating the focus within the virtual space when there is a lot of movement or sound in the physical space. Hence, attention could be seen as an aspect that is stratified, as Waldenfels (2004) argues because there could be “primary” or “creative” and “secondary” or “repetitive” modes of attention’ (cited in Hannah 2013, 240). In this case, Simon is giving primary attention to working while listening to a podcast. But I argue that this could change quickly when the tasks get repetitive and tiring, or when there is something interesting happening in the podcast. Nevertheless, this categorization is not static instead, it is dynamic and varies in a matter of seconds or minutes. This is illustrated by George’s graph when listening to a podcast while working (*see fig. 23*). When I asked why he believed he had a lot of arousals he remembered how moved he was with the podcast that he was listening to because he felt identified with the story.

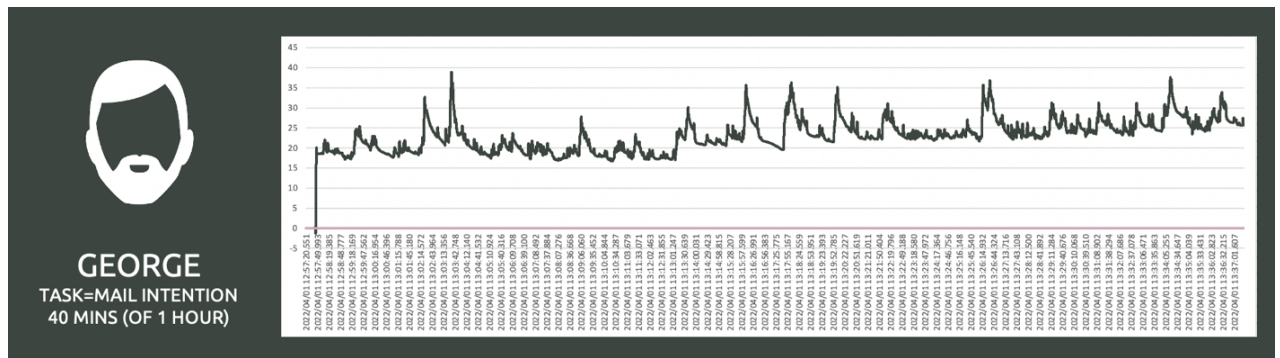


Figure 23. George's arousal when listening to a podcast while working.

In light of the above, I have argued that there are certain objects and spaces that produce *hermeneutic* and *alterity relations* with the annotators. But these come to an importance when comprehending the role of *attention* in the experience. What is important to understand is that *attention* is not unique and non-static, but it will always neglect other aspects if one is paying attention to something. As a consequence, I argue that attention plays an important role where both virtual and physical spaces overlap. Because it is the one that enables those spaces to be recognized during the experience of working at Go Autonomous. Moreover, is the one that determines how immersed an annotator can be within a space.

Conclusions

Throughout the research, I have presented different aspects that showed how are the annotators experiencing working at Go Autonomous, more specifically how are the interactions within both virtual and physical spaces. Furthermore, I have also discussed how the physical and virtual spaces overlap when the annotators interact. Hence, I developed different aspects that are present in the interrelation of these spaces. Firstly, I argued that corporeality is one of the aspects present when the spaces overlap. Because the annotators' embodiment with the objects within both spaces acts simultaneously although they are experiencing one of the spaces at a time. Secondly, I also claimed the stimuli of senses that some objects produce within both spaces, is also an aspect that is present when virtual and physical spaces overlap. I complemented this idea by adding the emotional aspect represented by the interembodiment, explaining that emotions are shared while both spaces co-exist. Finally, I introduced the importance of attention to the experience, exposing how the annotators have the power to overlap these spaces by deciding what to pay attention to. Therefore, this study has shown how are annotators' experiences shaped by the interactions

in physical and virtual space and how do these spaces interrelate in the case of Go Autonomous. Furthermore, I have emphasized the importance of technology as a mediator of the experience by illustrating it with different cases that exemplify the relation such as the embodiment, hermeneutic, and alterity relation. Nevertheless, the comprehension of these aspects denotes the importance that physical space has in workplaces. Not only because the physical space interrelates with virtuality, but also because all the elements present within an office shape a specific experience that could benefit companies in different manners. In the case of Go Autonomous, the relations forged within the space make the annotators better at understanding and annotating data, acting as a whole unit. Thus, I argue that offices should not be neglected nowadays, although the digital era makes it possible. Instead, the flexibility of working from home still can exist but with the acknowledgment that having a common space is necessary to have better results in production processes. After all, we are societal individuals who need to be part of something tangible. In this case, physical spaces.

On the other hand, this research showed how some methodologies could be aligned within a study design for gathering data to support relevant intangible aspects. By this, I mean that methods like semi-structured interviews and participant observation were supported by technologies that collected biometric data. With these, I obtained detailed information linked to affirmations that the annotators said during the interviews or the observations. Furthermore, the design of this study was an attempt to include relevant techniques that are used in laboratory settings and that could be brought to everyday spaces, to test them in real life. The aim is to have a better understanding of non-human and human relations by monitoring the human body. By these, non-evident aspects could arise to support (and explain in a better way) what is evident. As a consequence, this research could serve as an inspiration to future researchers interested in approaching phenomenological and post-phenomenological matters within the field of social studies.

Concerning Go Autonomous, this research aimed to give the company sufficient insights to continue working with the annotation team. Thus, these insights could serve as a starting point to obtain the best results in productivity, and also in the interactions produced within the office. Some arguments could arise about new methods, or even give hints about how they can manage the space at the office. Also to identify which objects could enhance the practices that the annotators

need to do daily. Moreover, due to the nature of the repetitive job, this research can also bring to the table valuable perspectives for managers to ponder on how things are being handled and how there can be some improvement within the office. But the fact that this research gives specific insights to Go Autonomous does not mean that it could not serve as an inspiration to other companies. The fact that the research was done within an office environment, could be applied to different kinds of jobs where the physical and virtual spaces overlap. Nevertheless, this could arise further developments and questions about how society designs the workforce in the following years. As mentioned at the beginning of this paper, the Coronavirus pandemic provoked and proved that most people could work from home. But this could be a direction that neglects elements that offices create in our society. The most important is the interaction of non-human and human elements that form an experience and a posterior legacy in individual development. Furthermore, this research exposes that although we are living in a digital era, social relations and the use of physical spaces are still relevant for people that are active parties in our society. Thus, the relevance of this study to contribute to the comprehension of which is the direction of the workforce within the digital era.

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