Causal Explanation, Intentionality, and Prediction: Evaluating the Criticism of "Deductivism"

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1 Introduction[1]

The recent development of critical realism is one of the most notable developments in contemporary philosophy of the social sciences. This philosophical tradition, which is also known as transcendental realism, originated in a number of books written by Roy Bhaskar (Lawson 1997; Cottrell 1998:347). In economics, the tradition has found considerable support, especially among members of theoretical traditions that are in opposition to "mainstream" economics. It has been especially influential among Post Keynesians. Some authors even claim that adherence to it is what makes it possible to talk about a Post Keynesian *School* at all (Lawson 1999:3).

Following the lead of Tony Lawson (e.g., 1996 and 1997), many critical realists believe that the alleged failings of mainstream economics are to a significant part due to its adherence to a methodology referred to as *deductivism* (e.g., Pratten 1996, 1997; Rotheim 1999). This methodology, it turns out, is nothing less than the most widely accepted view of scientific explanation, the causal model (Lawson 1997:17). The argument proceeds in two steps. Firstly, it is argued that the causal model is given to serious shortcomings (cf., e.g., Lawson 1992, 1996, 1997; Pratten 1996, 1997; Rotheim 1999). Secondly, it is claimed that mainstream economics actually proceeds along the lines of the causal model (Lawson 1997). The present paper is, inter alia, concerned with the first of these claims, which it seeks to refute. We shall, then, proceed to argue that the refutation of the first claim makes the second claim irrelevant.

One of the main weaknesses of the causal model, according to the criticism, is that it relies on so-called *event regularities*. An event regularity is a statement of the form

[1] The Author wishes to thank Klaus Nielsen and David Taylor for comments to an earlier version of this paper.

"whenever event x then event y" (Lawson 1997:17). In this paper, it is argued that the causal model *does not* rely on event regularities. If this claim is correct, then critical realism has not "unmasked" a major explanatory model of modern philosophy of science. It has, rather, set up a pathetic straw man that can easily be pushed over.

Nevertheless, the question of what constitutes acceptable laws in the social sciences is an important one. Three topics with some bearing on it are examined. Firstly, what it is that make laws "work" across different objects in the physical sciences. It is argued that what is vital is that the objects have some properties in common, not that they are (intrinsically) identical. Secondly, whether a universal law can be based on human intentionality. It is argued that, applying Popper's so-called rationality principle, it is possible to formulate intentional models of human behavior that fulfill his criterion for demarcation of science from metaphysics while simultaneously being universal. Thirdly, whether the existence of free will or "genuine" choice by necessity rules out the possibility of scientific prediction. Some concluding remarks follow.

2 The Causal Model of Scientific Explanation

In what follows, we shall frequently refer to the causal model of scientific explanation. This model, which is also referred to as the deductive-nomological, or covering-law model,[2] was explicitly developed by Popper (1934/1980) and Hempel & Oppenheim (1948). There are a number of differences in notations and formulations, and also a few differences of a more substantive character, between the two sources. The presentation here follows Popper, because his exposition seems to be superior to Hempel and Oppenheim's in its view of the relation between explanation and truth. Hempel and Oppenheim linked the conception of truth, or a high probability of truth, to the concept of explanation, whereas Popper's approach allows one to maintain a distinction between the form of an explanation, which is given in the quotation below, and its truth. Popper offered the following succinct statement of what a causal explanation is:

> "To give a *causal explanation* of an event means to deduce a statement which describes it, using as premises of the deduction one or more *universal laws*,

[2]The name covering-law model was given by one of the model's critics, William Dray (1959/1968).

together with certain singular statements, the initial conditions" (Popper 1934/1980:59).

A causal explanation is expressed in a set of statements, where the conclusion or explanandum follows logically (i.e., is a necessary condition of) from a set of premises, the explanans. The explanans is made up by the universal laws and initial conditions, and the explanandum is the event.

The covering law model of scientific explanation		
Logical terms	Colloquial terms	Elements of explanation
Explanans, premises	?	Universal law
	Cause	Initial conditions
Explanandum, conclusion	Effect	Event, effect

What constitutes an *event* should be understood broadly. It could be an apple, at a specific position in space-time, falling from a tree; it could be a particular company going broke at a specified date; it could be a revolution in a particular backward country. The emphasis put on particularity in the three examples is not a coincidence. The rationale for it is a wish to distinguish between two different types of explanation. The first type is concerned with explanations of the occurrence of particular, specified events. We may refer to these as event-explanation. The second form of explanations, relates to why a particular phenomenon (such as tidal waves) might occur at all. We may refer to the second kind as phenomenon-explanation.[3] The causal model is of the first kind.

The *initial conditions* together yield the (theoretically based) specification of the particular case in question. They are expressed in so-called singular statements. Taken together, the initial conditions constitute what is often referred to as the "cause" of the event (cf. Popper 1934/1980:60). It should be kept in mind that the purpose of the model is to explain actually occurring events. Therefore, the initial conditions must refer to an actual state of reality. And it should further be noted that the way the initial conditions enter the model renders the frequently invoked concept of multi-causality meaningless. This is because the way that the cause, i.e. the initial conditions, enters the model does not limit the number of co-determinants in the explanation. This goes against the colloquial use of the term, which is often thought of as singular.

The universal laws or statements referred to can be thought of as "... hypotheses of the character of general laws" (Popper 1934/1980:60). The "universality" of them signify that they refer to all elements in a set of elements. The statement "All capitalist firms attempt to maximize profit" is a universal statement. This is so because it refers to a property (attempting to maximize profit) which is supposed to be fulfilled by all members of a class (all firms in the set of capitalist firms). The characterization allows for "one or more universal laws", so that multiple laws may enter. The same goes for the model as formulated by Hempel & Oppenheim (1948:135-140).

According to the causal model of explanation, explaining why a particular event occurred involves four steps: (1) Identify the event in need of explanation. (2) Identify the initial conditions that relates to the event in question. (3) Identify the universal statement(s) or law(s) relating to the initial conditions. (4) Deduce the implications of using the universal statement(s) or law(s) in question in conjunction with the specific case as specified by the initial conditions.

It should be noted that, in order for universal laws to allow any explanation of reality, they, or at least some of them, must fulfill two properties.[4] Firstly, they must be what philosophers call synthetic statements, i.e. it must not be possible to determine their truth by purely analytic means. The statement that "all dogs are mammals" is not a synthetic statement because, given the meanings of the words, its truth follows analytically.[5] But they must also say something about reality which is, at least in principle, testable. As noted by Popper, this is equivalent to require that they are falsifiable (Popper 1934/1980). This is sometimes stated as the requirement that laws have potential falsifiers.

[3]This idea is inspired by Popper (1994).

[4]The first condition is, in fact, a necessary implication of the latter. In order to simplify the exposition, the condition has been xyz explicitly.

[5]If someone claims to have found a dog that is not a mammal, he has not made a major discovery. He is simply using the words in an unconventional way.

3 Lawson's criticism of deductivism

A central point of Lawson's criticism of economics is that it proceeds along the lines of a flawed methodology, which he refers to as *deductivism*:

> "The main 'culprit', I shall argue, is a mode of explanation that can be referred to as *deductivist*, or, more particularly, it is the conception of laws (or 'significant results' or 'theoretical formulations') upon which deductivist explanation depends.
>
> This conception of laws is formulated in terms of constant conjunctions of states or affairs...On this view, laws...express regularities of the form 'whenever event x then event y'." (Lawson 1997:16-17; emphasis in original; a note is omitted).

The same view can be found at various other places in Lawson's book, earlier papers by Lawson (e.g. Lawson 1996:407-412), and repeated by a number of followers (e.g. Pratten 1996, 1997). There would seem to be four major points of criticism against deductivism:

a) Event regularities typically only hold under experimental conditions, which make it counter-intuitive to see them as natural laws (Lawson 1992:151).
b) "[The] constant conjunction view [i.e., that laws are of the form "whenever event x then event y"] leaves the question of what governs events outside experimental situations not only unanswered but completely unaddressed" (Lawson 1997:28).
c) No universal laws have yet been found in the social sciences (Lawson xyz:xyz).[6]
d) In the social sciences, recognizing genuine choice or free will makes the formulation of universal laws impossible.

We may note in passing that a) is, when properly interpreted, a kind of (naïve) social constructivist argument,[7] at least when given a favorable reading. If not, it is just a question of choosing an appropriate label, which is unimportant from an epistemological point of view. In what follows, we shall primarily be concerned with b) and, indirectly, c) and d).

[6]Point c) and d) are formulated in terms of universal law rather than event regularities.

[7]I do not wish to imply that all social constructivist arguments are naïve, although some certainly are.

That Lawson consider deductivism as being tantamount to using what we termed the causal model in section 2 is quite evident:

> "We can note, paranthetically, that this theory of explanation is also variously known as the covering law model, the Popper-Hempel theory of explanation...the deductive-nomological model..." (Lawson 1997:17).[8]

Accepting this, any shortcomings of deductivism must also be shortcomings of the causel model, and shortcomings of the causal model must also be shortcomings of deductivism. Hence, we can analyze the validity of the criticism of deductivism by evaluating it with reference to the causal model. This is what we attempt to do in what follows.

Is there anything wrong, according to critical realists, with the causal model besides its alleged reliance on event regularities? We may take a clue from the following description of an alternative model of scientific explanation adhered to by many critical realists. This is the retroductive or abductive method, which

> "...compels the scientist to think "from a description of some phenomenon to a description of something which produces it or is a condition for it..." (Bhasker 1986:11; quoted in Rotheim 1999:75).

Now, the "something" of the quotation would seem to correspond to what is called initial conditions in relation to the causal model. It would seem, then, that the part of the quotation ("something which produces it or is a condition for it"), is consistent with the view that explanation requires a logical operation. Since these elements in an explanation are acknowledged, what is problematic must be the remaining element, the reliance on event regularities.

And it must be recognized that science is a product of social interaction.

[8] Cf. also Lawson 1997:305, n.8.

4 The Logic of Lawson's Argument

When evaluating Lawson's criticism of deductivism, two questions will have to be considered. Firstly, what, if anything, is wrong with event regularities as laws? Secondly, can the laws, referred to in the causal model, be interpreted as event regularities? We shall start by looking at why they are considered to be problematic, postponing our answer to the second question to section 4:

> "In addition to such problems, and at least as significant, the constant conjunction view of laws leaves the question of what governs events outside of experimental situations not only unanswered but completely unaddressed." (Lawson 1997:28).

A similar position is taken by Stephen Pratten:

> "If we ask what governs the behavior of phenomena outside experimental conditions, i.e., in open systems, we are forced to give the counter intuitive reply that either nothing does or that no laws yet have been discovered by science" (Pratten 1997:788).

As already noted, an event regularity is formulated along the lines: "Whenever event y then event x". An example of such a formulation would be: "All metal bars will expand when heated". There is nothing wrong with the logic of Lawson's argument. If the laws entering causal explanations were to be interpreted as strict event regularities, then the causal model of scientific explanation would indeed be susceptible to his criticism. In this sense, Lawson has a point. The interesting question is, however, whether that point is relevant for evaluating the causal model of explanation? This is the topic of the next section.

5 Evaluating Lawson's Criticism

But does the causal model rely on statements like "whenever event x then event y"? This is not something which can be answered by looking at the offered definitions of it, which differ between authors and are, anyway, normally rather imprecise (which also goes for the definition from Popper given in section 2).

If we go to physics, we find that many laws are not stated in terms of event regularities. As an example of this, consider Newton's law of gravitation. According to Newton's theory, the gravitational force acting upon two objects 1 and 2 with masses m_1 and m_2 is determined by the formulae $F = Gm_1m_2/r^2$, where G is the gravitational constant, and r is the distance between the two points of gravitation (Alonso & Finn 1980:373). The formulation of this law is not unique. If one goes through an elementary handbook of physics (I used Andersen et al 1972), one finds that the great majority of laws are of this kind. And for those few laws that are expressed as event regularities, there will be a number of causal explanations "behind" the event regularities that can be expressed in the same form as the laws mentioned above. The event regularities can, therefore, be considered as convenient "shorthand" for underlying laws. Shortly put, event regularities do not characterize at least physics.

Those laws that are given in the forms of event regularities must either be interpreted as given to a ceteris paribus clause, or be used in conjunction with some condition outlining the circumstances under which the law will strictly apply, if they are to be used by science. Lawson clearly operates with the latter kind of statements, and notes, rightly, that in order to explain what takes place outside what he call closures, strict event regularities cannot be upheld. What is dubious in his account is the claim that the universal laws of the causal model are to be interpreted as strict event regularities.

Many of the philosophers associated with the causal model of scientific explanation had a very thorough knowledge of modern natural science,[9] especially physics and astronomy, and some of them even contributed to it. This may be exemplified by three of the most important contributors to the causal model, Karl Popper, Carl Hempel and Paul Oppenheim (cf. Popper 1934/1980, Hempel & Oppenheim 1948). Popper studied philosophy, physics, mathematics, psychology and music (Jarvie 1998:533), and it is evident from his books that he had a considerable knowledge of modern science. Physical experiments are still carried out in order to investigate some of his positions on the problems of quantum physics, where he remained skeptic of some of the reigning interpretations (cf., e.g., Kim & Shih 1999 for one such experiment). Besides philosophy,

[9]It is not easy to put an exact date on the birth of modern science. As the term is used here, Galileo Galilei (1564-1642) is one of the pioneers, so that the period around the date of his birth may serve as a

Carl Hempel studied physics and mathematics (Jeffrey 1998:349), and Paul Oppenheim was a doctor in chemistry (Lübcke et al 1983:324). What Lawson will have us believe is that these people did not understand even the most elementary parts of modern science. It is not necessary to go far in order to find evidence to the contrary. In Lawson's own book, an example is provided with a freezing car radiator (Lawson 1997:17). This example is based on an earlier example by Carl Hempel, which is referred to in the notes to the main text (Lawson 1997:291,n.4). But Lawson overlooks that Hempel, in the part qouted, actually employs a causal law with explicit reference to some limiting conditions. Hempel writes: "Below 39.2°F, the pressure of a mass of water increases with decreasing temperature, *if the volume remains constant or decreases*" (quoted in Lawson 1997:291,n.4; emphasis added). Such modified (non-strict) event regularities are, according to Lawson himself, acceptable (Lawson 1997:27-28). It would seem, then, that at least Carl Hempel, who Lawson has referred to as "the most ardent defender" of the causal model (Lawson 1997:17), did not rely on strict event regularities in his interpretation of the model.

What is more striking, I think, is the following argument. Assume that the universal laws according to the causal model were in fact to be interpreted as strict event regularities. Then the whole methodology of falsificationism would be completely eliminated. It would be so because we could find falsifying instances to laws just by making simple combined experiments. The by now familiar $F = Gm_1m_2/r^2$ would be falsified by an experimental set-up where we added a magnetic effect. The same experiment would, of course, falsify the law describing the magnetic effect. Given this interpretation of causal laws, the only thing needed to provide for a falsification would be a countervailing effect.[10] It does not seem very likely that Popper and other followers of falsificationism should have made such a blunder.

A further, and perhaps stronger, argument can be given. As noted in section 2, both Popper and Hempel & Oppenheim explicitly allowed for the inclusion of more than one law. But if the laws included relate to the same property (e.g., the movement of a body), then a "strict" application of the laws (that is, interpretations without ceteris paribus

(somewhat arbitrary) proxy.

[10]Many of these falsifications would not need any experimental set-up. The gravitational law referred to several times in the above (as well as Einstein's more sophisticated law) would be falsified by the observation that boats do not sink when put into water, as well as many other observations.

clauses or some restraining conditions for use) will normally not allow any consistent deduction to be made at all. All one ends up with is a number of inconsistent statements. In order to illustrate this, consider the following physical experiment. A body, m_2, is simultaneously exposed to the gravitational force from another body, m_1, which is prevented from moving, and a spring force (cf. fig. 1).

Fig. 1 approximately here

The initial conditions are, then, given by r, m_1,m_2, k and x (but not G, which is a part of the law). The following universal laws would enter the explanans (I have substituted the relevant magnitudes):

The gravitational force:	$F_g = Gm_1m_2/r^2$	(1)
The spring force:	$F_s = -kx$	(2)
The body's resulting acceleration:	$F = mA_r$	(3)

Interpreting (1) and (2) as event regularities, we would have obtained the following statements:

Equation (1) and (3):	$a_g(r) = F_g(r)/m_2 = Gm_1/r^2$	(1A)
Equation (2) and (3):	$a_s(x) = F_s(x)/m_2 = -kx/m_2$	(2A)

Given the event regularity interpretation of universal laws, (1A) and (2A) must be true. But they are inconsistent statements. The body cannot accelerate by both Gm_1/r^2 and $-kx/m_2$.[11] What really happens is that the two forces operate simultaneously to create the effect. Because the two forces are concurrent, i.e. they work on the same point, their effect can be found by simply adding them up. The result of the experiment, the event, is $A_r = a_g(r) + a_s(x) = Gm_1/r^2 - kx/m_2$.

In this experiment, which incorporated two important laws from Newtonian physics, we noted a number of oddities from a point of view subscribing to the deductivist criticism. First of all, although it was a causal explanation of an experiment, it did not exclusively

[11]Because the two forces are concurrent, i.e. they work on the same point, their effect can be found by simply adding them up, which gives an resulting accelleration of $Gm_1/r^2 -kx/m_2$.

rely on unbreakable event regularities. Two of the laws was "broken" when interpreted as regularities, and one was upheld.

We noted above that a strict application of the laws will not normally allow for a consistent deduction to be made. There is an exception to this, however, the case where the laws concern causally independent properties (it is not enough that the properties are different[12]). Since this rules out interference between the two effects, the two event regularities will not "disturb" each other.

But there is one point where the causal model is, perhaps, underspecified. It is at least conceivable that, in some applications where more than one law is involved, there is a need for extra-logical principles for "adding" the effects of the laws involved. We may perhaps refer to these as principles of effect coordination. *If* such principles are called for, and they cannot be expressed in terms of universal statements (both conditions are crucial), *then* the causal model as outlined by the quotation of Popper in section 2 would seem to lack an important structural component. The reason for this is that applying ordinary logical principles will not be sufficient to allow the deduction of the explanandum. Only with the addition of principles of coordination will the deduction that is an integral part of the causal model be possible.

6 Some Reflections on Laws in the Social Sciences

Even accepting the view that the causal model of scientific explanation does not rely on event regularities, it may be asked whether parts of the criticism based on that position is nevertheless useful. One of several important themes relates to the character of the concept of a law. We shall take a closer look at this in what follows. Since the commentaries in section 4 were highly critical of earlier contributions, it may be added that the comments presented here are not intended to be much more than additions to earlier views exposed by others.

The laws employed in the causal model are universal statements. The natural sciences have been enormously successful in their pursuit of universal laws. Lawson asks

[12]To exemplify this, consider the temperature of a body and the wavelenght of its electromagnetic emission. Although these are different properties, they are not causally independent properties.

whether any event regularities have been found in the social sciences, and claims that very few have so far been identified (Lawson 1997:31). This question may be transformed into concerning whether there are universal laws in the social realm. And it is true, I think, to say that the social sciences do not have an abundant supply of universal laws.

A potential argument against the existence of universal laws in the social sciences might be that, unlike the natural sciences, the objects of social science (individuals, groups, institutions, societies, customs etc.) are so different as to make any law-like generalizations possible.

In the natural sciences, a number of objects have been identified which can be said to be "intrinsically" identical. Apart from their location in space-time, and similar "extrinsic" properties, the so-called elementary particles appear to be exact replica in the sense that they have identical properties, e.g., behave in a certain, or at least statistically determinate, way, when exposed to identical conditions. But some objects are clearly unique. As noted by Popper and others before him (Popper 1957), there is only one history. And, except perhaps for identical twins, not two human beings are alike. There are also enormous differences between countries. At first sight, this diversity may seem to support the case against universal laws.

All candidates for successful scientific laws of which I am aware relate, however, not to objects in their totality, but to the properties of objects. That a group of objects are not identical is, therefore, not a sufficient condition for the non-existence of causal laws applying to (all of) them.[13] That depends not only on the objective characteristics of the objects, but also on the point of interest, i.e. the property in question. This can easily be exemplified. The Brooklyn Bridge may be different from a piece of wood, but gravitation effects both of them. A bat and a blue whale do not look like each other, but the structure and basic biochemical functioning of their cells are almost identical. With these examples as supporting instances, one might propose the hypothesis that it is a necessary condition for a law to apply to two different objects that they have one or more properties in common (it cannot, I believe, be a sufficient condition).

[13]This may also be used to form an argument against the more vulgar forms of quests for "holistic" theories. I hasten to add that not all such claims are vulgar.

What this serves to demonstrate is not that there are, after all, universal laws in the social sciences. It simply serves to focus attention on the fact that an apparent diversity among a group of objects does not in itself seem to be an indication of the non-existence of universal laws applying to all of them.

7 The Intentional Model and Prediction

One argument for disposing of universal laws in the social realm is that they are incompatible with the possibility of genuine choice of action, of a free will (Lawson 1997). But insisting that people can somehow act, or do indeed act, at least partly according to their free will, would seem to be close to admitting the possibility of making a universal law with this as an integral part. We find a related idea in the so-called intentional model of individual behavior (for elementary expositions of this model, cf. Elster 1983, 1986). Intentional models explain the behavior of actors with reference to the intentions they seek to fulfill and to their beliefs of the situation in which they are placed. The latter includes their beliefs concerning the relations between the actions they take and the consequences thereof. Note that behavior can only be predicted when both intentions and beliefs are known.

Hence I suggest that it is possible to formulate a universal model of individual behavior based on intentional explanation. But I do not expect that it can be used to give anything but qualitative predictions, at least not in the general case. I do not wish to maintain that there is anything in the social realm corresponding to the constants of physics, such as the gravitational constant, G. It is certainly also possible that a law along the lines of the laws of physics cannot be developed.

What I do think can be developed may be illustrated by a methodology for the social sciences developed by Popper (Popper 1994; for expositions and discussions, cf. Chalmers 1985, Lagueux 1993, Bunge 1996, Bichlbauer 1998, Matzner & Jarvie 1998, Notturno 1998[14]). This scheme employs *models*, which "...represent something like typical initial conditions" (Popper 1994:164). Instead of using universal statements or

[14]Popper's paper was originally presented at a lecture at Harvard in 1967. Following that, it circulated in various versions in the scientific community. Hence, Popper's ideas, although unpublished, were frequently

laws, such explanations make use of "animating principles". More specifically, Popper developed the so-called situational-logic model of individual behavior, which is animated by *the rationality principle*. This model can be seen as a specification of the intentional model of individual behavior. The rationality principle is often expressed along the following lines:

> "...individuals act appropriately to the situation in which they find themselves" (Chalmers 1985:83).
>
> "Each person acts adequately to the situation" (Notturno 1998:403).

These formulations are not identical. The first allows for the possibility that actors have subjective (and possibly false) beliefs about the situation, whereas the second does not. Although Popper himself came closest to the second, support for both formulations can be found in his paper.

The rationality principle is, according to Popper, not itself a law, because it cannot be used to make predictions of particular events in the same sense as the laws from the physical sciences can.[15] Before taking a stand on this issue, it might be convenient to consider how an explanation incorporating the rationality principle would look like. We illustrate this in the following examples (one for each of the two interpretations of the principle):

Component of explanation	Version of rationality principle	
	Beliefs concerning situation may (but need not) be wrong	Beliefs concerning situation are true
	P is an intentional actor. P believes that the situation	P is an intentional actor. P believes that the situation

commented upon prior to the publication of the paper in 1994.

[15]Popper is, in my view, not entirely clear on this, but the idea might be that the timing of actions is imprecise.

Initial conditions	is S_B. P's intention is to achieve G.	is S_R. P's intention is to achieve G.
Universal law	Individuals act appropriately to the situation in which they find themselves	Each person acts adequately to the situation as it is
Event	P will do A, the appropriate action given S_B and G.	P will do A, the appropriate action given S_R and G.

Is the rationality principle a causal law or not? As noted, Popper believed that it is not. But principles of the above kind share an important property with "ordinary" laws. When used in conjunction with appropriate initial conditions, both versions clearly prohibits certain outcomes (whether the possibility of prediction of behavior is inconsistent with the existence of free will is discussed in section 8). They can also be used to predict. This is, of course, what is needed to fulfill Popper's famous criterion of demarcation between science and metaphysics (Popper 1934/1980:40-42). Hence, it might be suggested that we consider the intentional model embodied in the rationality principle as a universal law of the social realm. Accepting this, it would seem that the essence of causal explanation is upheld by the intentional model of explanation. Whether the rationality principle is true is an entirely different matter, one which I will not go into in this paper.

One might, of course, claim that (1) intentions ("G") are properties of mental states, (2) that mental states are unobservable, and therefore conclude that (3) no explanations along the lines of the causal model can be provided. Many positivists have maintained positions akin to (2). But that argument is, I believe, mistaken. Intentions are clearly observable, although only indirectly so. They can be revealed by action or by statements. Such observations are not unproblematic. But they are hardly different from those appearing in connection with other kinds of observation. Ultimately, they boil down to the problem of the theory-dependence of data familiar from standard philosophy of science (cf., e.g., Chalmers 1999 and Koch 2003). Likewise, many other properties of mental states, such as anxiety and fear, are observable.

8 Free Will and the Prediction of Behavior

One sometimes comes across the argument that if choice can be foreseen or predicted, then the person making it cannot be said to exercise free will (e.g., Lawson 1997:38, 295). This may well be true, although it is not universally recognized (cf. the exchange between Cottrell 1998 and Lawson 1998). I suggest that the following example, Hitler's decision to attack the USSR in June 1941, may be illustrative.

Assume that Stalin had been able to predict this, on the basis of at least rudimentary knowledge of Hitler's intentions and beliefs (it is inconsequential for the argument whether Stalin in fact did so or not). Note that we assume that Stalin made use of the intentional model (if he did not use intentional explanation, or another theoretically based method, the prediction was irrelevant in relation to our interest). Now, if Stalin had been able to make a successful prediction, using the procedure described, would that mean that Hitler did not have a free choice to make after all? Or is it a necessary condition for Hitler to have had a free choice that Stalin (and anybody else, of course) was unable to predict his behavior, using the intentional model? To maintain this is logically possible,[16] but it is obviously a very odd position. It would seem to be more reasonable to maintain that the possibility of free will is independent of anybody being able, or not, to forecast the decision, at least as long as they rely on the intentional model in doing so.

9 Conclusion

In this paper, a number of topics were discussed. The first was Lawson's criticism against the causal model of scientific explanation for relying on event regularities. It was argued that Lawson's criticism of a "constant conjunction" or "event regularity" view of laws is logically true (section 4), but that it does not apply to the causal model of scientific explanation (section 5). The reason is simply that laws are not interpreted as

[16]At the level of quantum events from the physical realm, experimental evidence suggests that the act of measurement alone is able to change the outcome of certain experiments (Rae 1986). But there is no reason whatsoever, and certainly no evidence from physics, to suggest that such effects exist outside the quantum realm.

strict event regularities according to that model. Hence, the claim that the deficiencies and problems of mainstream economics lie in its application of the causal model of scientific explanation can hardly be acknowledged. Based on the reasoning discussed in section 5, there is no need for a revised ideal model of scientific explanation.

Following this, three additional topics were very shortly addressed. The first related to what it is that have made in possible to formulate successful universal laws in some fields (section 6). It was argued that a necessary condition for the formulation of a universal law would seem to be, not that the objects to which it applies are identical or even similar to each other in some absolute sense, but that they possess identical properties (such as bodies having a positive mass when in rest). The second additional topic concerned whether it is possible to formulate an acceptable (but not necessarily true) universal law based on human intentionality, where the criterion for acceptance is that it has potential falsifiers. It was suggested Popper's so-called rationality principle fulfill this criterion (section 7). Finally, the question of whether the possibility of scientific prediction of action precludes the reality of free will was touched upon (section 8). An example was supplied which suggested that prediction and free will need not be in conflict, given that the prediction was based on the use of the intentional model.

References

Alonso, M. & E.J. Finn (1980): *Fundamental University Physics. Vol. 1: Mechanics and Thermodynamics.* 2. Edition. Addison-Wesley Publishing Company, Reading, Mass., 1980.

Andersen, F., O. Bostrup, E. Halkjær & K.G. Hansen (1972): *Håndbog i Fysik og Kemi.* 7th edition, Gyldendal, Copenhagen 1972 (in Danish).

Beiser, A. (1991): *Physics.* Fifth edition. Addison-Wesley Publishing Company, Reading, Mass., 1991.

Bichlbauer, D. (1998): "Some Considerations about the Further Development of Situational Analysis." *Philosophy of the Social Sciences*, Vol. 28, No. 3 1998, pp. 422-433.

Bunge, M. (1996): "The Seven Pillars of Popper's Social Philosophy". *Philosophy of the Social Sciences*, Vol. 26, No. 4 1996, pp. 528-556.

Chalmers, A.F. (1985): "Methodological Individualism: An Incongruity in Popper's Philosophy." In G. Currie & A. Musgrave (eds.): *Popper and the Human Sciences.* Martinus Nijhoff Publishers, Dordrecht/Boston/Lancaster, 1985, pp. 73-87.

Chalmers, A.F. (1999): *What is This Thing called Science?* Third edition. The Open University Press, Buckingham, 1999.

Cottrell, A. (1998): "Realism, Regularities and Prediction". Review of Social Economy, Vol. LVI, No. 3 Fall 1998, pp. 347-355.

Dray, W.H. (1959/1968): ""Explaining What" in History." Reprint in M. Brodbeck (ed.): *Readings in the Philosophy of the Social Sciences.* MacMillan Company, New York 1968, pp. 343-348.

Elster, J. (1983): *Explaining Technical Change.* Cambridge University Press, Cambridge, 1983.

Elster, J. (1986): "Introduction." In J. Elster (ed.): *Rational Choice.* Basil Blackwell, Oxford, 1986.

Hempel, C.G. & P. Oppenheim (1948): "Studies in the Logic of Explanation." *Philosophy of Science,* Vol. 15, 1948, pp. 135-175.

Jarvie, I.C. (1998): "Popper, Karl Raimund (1902-94)." *Routledge Encyclopaedia of Philosophy,* Vol. 7, 1998, pp. 533-540.

Jeffrey, R. (1998): "Hempel, Carl Gustav (1905-)." *Routledge Encyclopaedia of Philosophy,* Vol. 4, 1998, pp. 348-352.

Kim, Y.H. & Y. Shih (1999): "Experimental Realization of Popper's Experiment: Violation of the Uncertainty Principle?" *Foundations of Physics*, Vol. 29, No. 12 1999, pp. 1849-1861.

Lagueux, M. (1998): "Popper and the Rationality Principle." *Philosophy of the Social Sciences*, Vol. 23, No. 4 December 1993, pp. 468-480.

Lawson, T. (1992): "Realism, Closed Systems and Friedman." *Research in the History of Economic Thought and Methodology*, Vol. 10, 1992, pp. 149-169.

Lawson, T. (1996): "Developments in Economics as Realist Social Theory." *Review of Social Economy*, Vol. 54, No. 4 1996, pp. 405-422.

Lawson, T. (1997): *Economics and Reality*. Routledge, London and New York, 1997.

Lawson, T. (1998): "Clarifying and Developing the *Economics and Reality* Project: Closed and Open Systems, Deductivism, Prediction, and Teaching". *Review of Social Economy*, Vol. LVI, No. 3 Fall 1998, pp. 356-375.

Lawson, T. (1999): "Connections and Distinctions: Post Keynesianism and Critical Realism". *Journal of Post Keynesian Economics*, Vol. 22, No. 1 Fall 1999, pp. 3-14.

Lübcke, P. et al (1983): *Politikens Filosofi Leksikon*. Politikens Forlag, Copenhagen 1983 (in Danish).

Matzner, E. & I.C. Jarvie (1998): "Introduction to the Special Issues on Situational Analysis." *Philosophy of the Social Sciences*, Vol. 28, No. 3 1998, pp. 333-338.

Notturno, M.A. (1998): "Truth, Rationality, and the Situation." *Philosophy of the Social Sciences*, Vol. 28, No. 3 1998, pp. 400-421.

Pitt, V.H. (1988): *The Penguin Dictionary of Physics*. Penguin Books, 1988.

Popper, K.R. (1934/1980): *The Logic of Scientific Discovery*. Translation of German Original, 1934. Tenth Revised Impression. Hutchinson, London, 1980.

Popper, K.R. (1957): *The Poverty of Historicism*. Routledge & Kegan Paul, London, 1957.

Popper, K.R. (1982): *The Open Universe. An Argument for Indeterminism*. Rowan and Littlefield, Totowa, New Jersey, 1982.

Popper, K. R. (1994): "Models, Instruments, and Truth." In M.A. Notturno (ed.): *The Myth of the Framework*. Routledge, London, 1994, pp. 154-184.

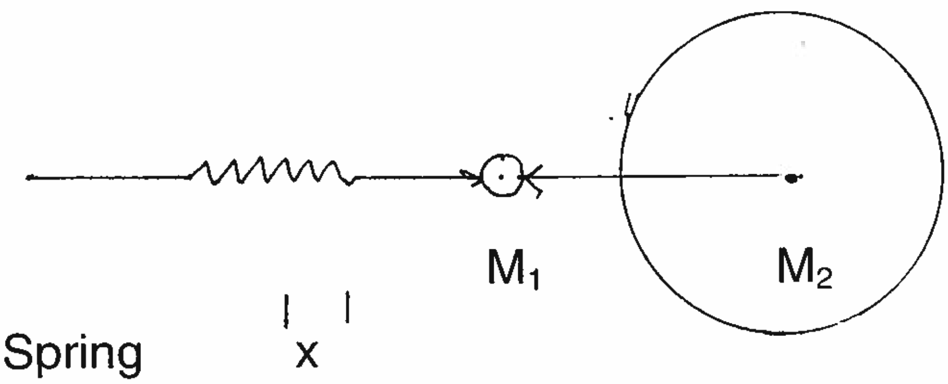
Pratten, S. (1996): "The "Closure" Assumption as a First Step: Neo-Ricardian Economics and Post-Keynesianism." *Review of Social Economy*, Vol. 31, no. 3, pp. 423-443.

Pratten, S. (1997): "The Nature of Transaction Cost Economics." *Journal of Economic Issues*, Vol. XXXI, No. 3 September 1997, pp. 781-803.

Rae, A. (1986): *Quantum Physics: Illusion or Reality*? Cambridge University Press.

Rotheim, R.J. (1999): "Post Keynesian Economics and Realist Philosophy." *Journal of Post Keynesian Economics*, Vol. 22, No. 1 1999, pp. 71-103.

Example: Gravitation and counteracting spring



The following universal laws would enter the explanans:

The gravitational force:	$F_g = Gm_1m_2/r^2$	(1)
The spring force:	$F_s = -kx$	(2)
The body's accelleration	$F = ma$	(3)