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The Agency Theory of Causality, Anthropomorphism, and Simultaneity

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The purpose of this article is to examine two important issues concerning the agency theory of causality: the charge of anthropomorphism and the relation of simultaneous causation. After a brief outline of the agency theory, sections 2–4 contain the refutation of the three main forms in which the charge of anthropomorphism is to be found in the literature. It will appear that it is necessary to distinguish between the subjective and the objective aspect of the concept of causation. This will lead, in section 5, to contrast two kinds of anthropomorphism, one which has been rightly rejected by modern science and one which is fully compatible with the objective reality of the causal processes. Finally, section 6 will apply the preceding considerations to simultaneous causation. On the one hand, in a basic sense, there can be no simultaneous causal relations. On the other hand, simultaneous causation arises when we consider the natural change by abstracting from the agent and from her/his projects of intervention in reality.

1. The Experimentalist Theory of Causality and the Charge of Anthropomorphism

If we exclude intuitions and isolated remarks found in many authors, Dingler (1938) and Collingwood (1940) were probably the first to methodically develop the idea that the concepts of 'cause' and 'causal explanation' depend on our capacity to intervene practically in reality. They argued that if we relied only on passively received sensations reporting successions of events, we would be unable to grasp causal relations and formulate causal explanations.

This idea was taken up again by Gasking (1955), von Wright (1971, 1989), and, more recently, by a number of authors such as, for example, Price (1991, 1992, 2007), Menzies and Price (1993), Hausman (1998, 86–98 and 271–275), Keil (2000), Pearl (2000), Woodward (2003, 2009, 2011, forthcoming), and Gillies (2005). This idea is now known by different names, such as agency, interventionist,

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or manipulability theory of causality (and explanation), but von Wright, perhaps even more aptly, spoke of an 'experimentalist idea of causation':

> It is *established* that there is a causal connection between *p* and *q* when we have satisfied ourselves that, by manipulating the one factor, we can achieve or bring it about that the other is, or is not, there. We usually satisfy ourselves as to this by making experiments. (von Wright 1971, 72; cf. von Wright 1989)[1]

Von Wright—perhaps referring to Russell's observation that 'the case where one event *A* is said to "cause" another event *B* . . . is . . . the most simplified instance of a practically isolated system' (Russell [1912–1913] 1917, 198)—rightly noted that the experimentalist concept of causality is the basis of the concept of an isolated system:

> Any claim that there is a closed system with initial state *p* or a closed system with initial state *q* can only be substantiated provided there is some agent, outside these systems, who can operate them, put them in motion, by initiating their initial states in situations when he feels sure that they would not originate if it were not for his intervention. The same holds for every claim that a given system is closed. (von Wright 1971, 79–80)

According to von Wright, the close link between intervention and causality cannot be understood without reference to human agency. The capacity of interfering with the natural course of events is distinctively human and the causal relation is dependent upon the concept of human intentional action:

> To say that causation presupposes freedom would be misleading. . . . But to say that the concept of causation presupposes the concept of freedom seems to me to be right, in the sense that it is only through the idea of doing things that we come to grasp the ideas of cause and effect. (von Wright 1971, 81–82)

In a similar vein, Menzies and Price write: 'an event *A* is a cause of a distinct event *B* just in case bringing about the occurrence of *A* would be an effective means by which a *free* agent could bring about the occurrence of *B*' (Menzies and Price 1993, 187; italics added).

In today's predominantly naturalistic situation, this has been perceived as excessively anthropomorphic. Hausman asks:

> Does the asymmetry of causation depend only on human perspectives? Would there be no causal asymmetries if there were no agents? Could agents call anything they liked causes and effects? What is it 'in the world' that our perspective as agents 'grabs on to'? (Hausman 1997, S17)

As a matter of fact, in contrast to Price and Menzies's agency theory, different varieties of the interventionist theory of causality and explanation have been developed, among which the most remarkable is that of Woodward.

According to Woodward, the concept of agency is not independent of (or prior to) the notions of causality, causation, and causal explanation. While connected with counterfactual manipulation, the notions are totally free from anthropomorphic elements because they have no special connection with the notion of human agency. Causes are, as Collingwood said, 'levers' that can be used to manipulate the connected effects, but according to Woodward

> there is nothing logically special about human action or agency: human interventions are regarded as events in the natural world like any other and they qualify or fail to qualify as interventions because of their causal characteristics and not in virtue of being (or failing to be) activities carried out by human beings. (Woodward 2003, 104)

In spite of the unquestionable merits of Woodward's theory,[2] I cannot agree with its separating the notion of causality from that of *human* intervention. On this point, I side with von Wright, Price, and Menzies: the close link between intervention and causality cannot be understood without reference to the free agency of human beings.[3]

In my opinion, von Wright's experimentalist theory of causation implicitly contains the main positive argument for the thesis that the concepts of causality and explanation, as based on the capacity of experimenting, presuppose the concept of free action—namely, action which is not determined by empirical, real, or efficient causes, but by aims or final causes, that is, by meanings or concepts that are, strictly speaking, not real but that will be realized as a result of the appropriate actions. Following Kant's suggestion, experiments may be considered as 'questions' put to nature (Kant, *KrV*, B xiii–xiv; Akademie-Ausgabe, vol. 3, 10, lines 17 and 27). The answer to the experimental question must be discovered by applying the method of deliberate and systematic variation, which requires an active intervention in natural processes. Scientists in principle perform *free* repeatable actions and they *intentionally* modify independent variables in a way that is reproducible in order to determine the consequences of these modifications on one or more dependent variables. More precisely, on one hand experimenting involves an 'external' realization—the construction of an 'experimental machine'—which extends the original operativity of our organic body, and, thereafter, develops independently of the subject and 'impersonally'. On the other hand, in an experiment, an initial *free* action is necessarily presupposed, guided by the conception of a (cognitive) end. Apart from teleology, apart from the intentional and conscious planning of an experimental set-up and apart from the human actions that freely start or 'set in motion' the experimental machine, it would be impossible to identify causal relations in nature. In a word, there is no scientific knowledge without experimenting and there is no experimenting without our free agency, that is, without the free interaction between our body and the surrounding empirical reality according to some cognitive purposes.

More generally, human beings cannot be entirely reduced to a mere member of the event causation chain, *because they are the indispensable factor in establishing causal chains*. Neither classical, nor relativistic, nor quantum physics can be an absolute or inevitable point of departure for experiencing the world. There is, in fact, no such thing as classical physics or quantum theory, in separation from the experiments that support them and these experiments presuppose the free use of the human body.

To sum up, the manipulative theory of causality presupposes a tacit teleology, namely, our free intervening in the surrounding world according to some intentional goal. If we want to explain something scientifically, we have to describe it as if it would or could be the result of our intentional agency.

But that is exactly what gives rise to the charge of anthropomorphism, probably the most common objection raised against the agency theory. Is not this a disturbing anthropomorphism? Echoing other criticisms, Woodward writes:

> First, it flies in the face of any plausible version of naturalism: it makes agency out to be a fundamental, irreducible feature of the world and not just one variety of causal transaction among others. Second, it leads us toward an undesirable kind of anthropomorphism or subjectivism regarding causation, just as critics of traditional manipulability theories have charged. If the only way we understand causation is by means of our prior grasp of the experience (or notion) of agency, then we face an obvious problem about the extension of causal notions to circumstances in which manipulation by human beings is not possible, for these will be circumstances in which the relevant experience of agency is unavailable. (Woodward 2003, 123)

I have previously advanced an argument in favour of the conclusion that the close link between intervention and causality cannot be understood without reference to the free agency of human beings. Nevertheless, the charge of anthropomorphism stands and it must still be rebutted. For purposes of simplification, we may distinguish three main forms in which the charge of anthropomorphism is to be found in the literature. The agency theory would lead us towards an undesirable kind of anthropomorphism regarding causation because, firstly, it cannot explain causal connections which are outside our control (such as black holes); because, secondly, it undermines the idea that scientific knowledge is objective; and because, thirdly, it denies the existence *in re* of mind-independent causal ties and makes them dependent on the particular cognitive constitution of human beings.

In the three following sections, I shall discuss the three forms separately, even though they are three sides of the same thing.

2. Unmanipulable Causes?

The first version of the charge of anthropomorphism objects that, contrary to the experimentalist or manipulability conception of causality, we are in fact able to explain phenomena on which we have no possibility of acting operationally and on which we cannot perform experiments. For example, it is obviously impossible to perform experiments on phenomena such as stars, galaxies, and black holes. If it were necessary to be able to act on a phenomenon in order to know it or to situate it in a causal connection, we would be unable to account for our knowledge of phenomena such as the aforementioned (for this objection, see e.g. Leplin 1993, 437–438; Hausman 1997, S17; Woodward 2003, 123; Kistler 2004, 162).

The most common answer to this objection is the following. In cases where it is impossible to control the connection between a cause and an effect by acting directly on the relevant processes (as, for example, in astronomy), the experimentalist model of causality requires that we construct models which simulate the behaviour of the inaccessible real processes, and on which we can act directly; this enables us to draw conclusions about the real processes by means of analogical arguments (e.g. Gasking 1955,

483; von Wright 1971, 70; Hacking 1989; Janich 1992, 130; Menzies and Price 1993, 195–202. cf. Price forthcoming, who adds a *tu quoque* argument: 'is that if there were a problem here for MP [Menzies and Price 1993], it would equally be a problem for Woodward's own view.').

One might object that this approach has evident limits. The analogy between the model built in a laboratory and the real phenomenon is seriously problematic for two reasons. Firstly, we have complete control over the model but not over the real phenomenon. Secondly, more in general, it is difficult to establish the significance of the differences between the model and the real phenomenon. One can never be certain that the phenomenon re-enacted in the laboratory and the one that occurs in nature are the same from all relevant points of view. These considerations sometimes lead to the distinction between two different types of experiment: one—the usual type—consists in laboratory procedures that isolate certain phenomena and investigate their properties; the other is based on laboratory models constructed with the intent of 'imitating' the phenomenon in its observable aspects ('imitative experiments').[4]

Now, it is true that the limits of the analogy between a natural phenomenon and its artificial model are not knowable a priori. However, situations in which we can act directly on reality and situations in which we have to rely on models to know reality are different in degree, not in kind. *When we make use of models, we do nothing fundamentally different than when we experiment in the more usual sense*. There are at least three reasons for this.

Firstly, a constructed model substitutes the experimental apparatus in 'usual' experiments too, *where there is also a selection—and more precisely an idealization and an implicit modelling—of certain aspects of reality*. The extension of the results of a 'usual' experiment beyond the laboratory walls presents *in principle*, if not *in fact*, the same uncertainties as predictions made by means of a model relative to natural phenomena that cannot be directly manipulated.

Secondly, when we experiment on objects such as astronomical objects, whose actual conditions we are unable to modify for technical reasons, models allow us to identify causal connections between our interventions in the model and what subsequently occurs in the model. If the model reproduces the relevant aspects of the phenomenon, these connections should hold for the natural phenomenon as well; more precisely, they should also hold in cases where the experimental input comes from other natural phenomena rather than from human beings. These natural phenomena, which are certainly accidental in the sense that they are out of our control, are logically on the same plane as those intentionally produced by the experimenter. If the phenomenon displays the same behaviour as the model, this corroborates the relevance of the relationships of similarity that provided the basis for the construction of the model. Otherwise, it will be necessary either to identify a natural phenomenon that 'disturbed' the real phenomenon, or to modify the model by introducing a previously neglected similarity (e.g. relative to the temperature at which the phenomenon must occur in order to be predictable by the model). Therefore, the fact that we cannot, so to speak, get our hands on galaxies prevents us neither

from proposing causal connections about them, nor (consequently) from making ontological claims about them. Accordingly, the distinction between 'usual' and 'imitative' or 'mimetic' experiments is acceptable only as a distinction in degree, but not in kind.

According to Woodward, 'when we ask what it is for a model or simulation that contains manipulable causes to "resemble" phenomena involving unmanipulable causes, the relevant notion of resemblance seems to require that the same *causal* processes are operative in both.' However, this notion of resemblance must be characterized in non-causal terms and therefore 'cannot be explained in terms of our experience of agency' (Woodward 2003, 125). But the fact that this notion of resemblance is to be justified by recourse to our experimenting and intervening on the world does not generate a vicious circle. It only expresses the fact that human agents, through their bodies, find themselves always already not only, but also in operational or technical interaction with the surrounding world. From this point of view, the simplest perception of similarity is as experimental as the more sophisticated science. There is, strictly speaking, only a difference in degree between complex experiments and simple, apparently direct observations. The knowledge of a phenomenon derived from its reconstruction in the laboratory is inferior, as to its certainty, to the knowledge derived from many direct observations (say, that my desk is white as the sheet of paper on which I am writing).

This leads us to a third reason for maintaining that, when we make use of models, we do nothing fundamentally different than when we experiment in the more usual sense. As already said, there is only a difference in degree between experiments and simple, apparently direct observations. In this connection, the most important point of likeness lies in the fact that in principle the simplest observation is reliable only in so far as it is reproducible. The interesting question is not whether we can make existential claims based on sight alone (the answer to this depends on the particular context), but whether there could be sight at all without our organism's capacity to act on reality by means of the intelligent use of our sense organs (i.e. by means of the use of our sense organs mediated by hypotheses) and by means of analogical extensions of our sense organs, including models built in the laboratory. Since the answer to this question is no, we have a third reason to claim that the de facto impossibility of manipulating galaxies and black holes does not prevent scientific-experimental knowledge of these objects: in this case too we devise experiments that can be confirmed or falsified, since these objects can be situated in continuous causal chains that connect them, for example, to the image that we see through a telescope's eyepiece. Even though we cannot directly modify celestial bodies, we can modify the conditions under which we observe them by using different instruments, by observing them from different places or at different times. Even though we cannot intervene in the emission processes, we can intervene in the light emitted by celestial bodies, for example by subjecting it to spectroscopic analysis. In this case too, if we do not want to forfeit the scientific investigation of the cosmos, we must, as far as possible, rely on the same method that we use for ordinary objects, namely the experimental method.

3. Protagorean Subjectivism?

Now we turn to the second major form in which the charge of anthropomorphism is to be found in the literature. The agency theory of causation has been criticized on the grounds that it is subjectivist, in a way similar to that of any pragmatic theory of scientific explanation: it ignores the requirements of objectivity and/or invariance which a scientific discourse should fulfil because what counts as a good causal explanation for one person may not count as a good causal explanation for another (e.g. Dowe 1996, 233–234; Kistler 2004, 162–163).

In fact, a pragmatic theory of causal explanation, according to which causality is relative to our theoretical or practical interests, was at first upheld by Dingler, and then renewed, among others, by Hanson and van Fraassen (Dingler 1938; Collingwood 1940; Gardiner 1952; Hanson 1958, 54; Gorovitz 1965, 695; von Wright 1971, 93; van Fraassen 1980; Putnam 1992, chap. 5; Woodward 2003, especially 118–120, and 2009; Price 2007). Does Jane's moderate smoking cause her lung cancer? As Hitchcock notes, it depends upon the specific alternatives one considers:

> The solution to this puzzle is to deny that there is any such thing as *the* causal relevance of moderate smoking for lung cancer ... Relative to heavy smoking, it is a negative cause of (prevents) lung cancer; relative to abstaining, moderate smoking is a positive cause of (causes) lung cancer ... Relations of positive or negative causal relevance only hold relative to specific alternatives. (Hitchcock 1996, 402; see also Schaffer 2005)

However, it would be wrong to think that the relativity of causal imputations and explanations to our practical interests and values excludes objectivity and invariance. This relativity is fully compatible with a specific objective or, in Salmon's terms, 'ontic' interpretation of causality.

It was already well known to Mill that any given phenomenon is preceded by an infinite number of events or conditions, each one of which can be said to be its cause. To take a well-known example in the literature, all the conditions connected to the lighting of a match are, properly speaking, concauses of that event: the match must not be wet; one must apply the right pressure; the rough surface on which one rubs the match must be in good condition and not too worn; the external temperature must not be under a certain threshold; etc. Similarly, a cold is caused not only by the virus alone, but also by factors such as the climate, the state of the patient's immune system, the patient's previous history, an environment that is not lethal for the virus, etc. (e.g. Gardiner 1952, part 1, chap. 2).

This is sometimes called 'parity argument' and it is generally considered as a fundamental problem for the interventionist theory of causation. As, for example, Waters maintains, there would be a 'lacuna' in this theory, unable to dispose of the 'fallacy' involved in the 'parity argument' (Waters 2007). But there is no actual fallacy involved in Mill's argument, and there is no lacuna in the interventionist theory, if they are not separated from human agency. Actually, the agency theory has no difficulty in distinguishing causes from concomitant conditions. As Woodward himself says, 'our practical interests as agents serve ... to pick out the

kind of (independently existing) relationship between *X* and *Y* that we are interested in when we worry about whether that relation is causal.' (Woodward 2003, 120; see also Hart and Honoré 1985, especially 11–12; Schaffer 2005; Price 2007, especially 279–288).

What is or is not considered the cause of an event depends on the agent's adopted point of view, which is closely connected to his values *and* practical possibilities. Without values and concepts that guide our actions and confer meaning to them, we would be unable to make any causal imputations in the vast sea of reality where everything interacts with everything else, and consequently we would be unable to formulate any laws of nature. Not all of an event's infinite causes have an equal claim to being its cause: we usually take into consideration only one or some of its causes, namely *those that are relevant to our purposes and we believe they are, in principle, changeable*. Which one of an event's conditions appears as its cause depends on the changing cognitive interests and practical possibilities that determine our point of view. For the camper who wants to light a fire, the fact that the match is damp is regarded as more important than the chemical composition of the match's head, because it is more easily changeable. For this reason, humidity, rather than chemistry, is normally held to be the contextually decisive cause of the failure to light camp fires. The same holds for the selection of causes in particular scientific disciplines. For instance, from a medical (clinical or epidemiological) point of view, potential causes are all those factors that have a role in prevention and/or therapy (in a broad sense so as to include rehabilitation, hygienic precautions and education, routine check-ups, programmes for population screening, etc.).

The choice between the various conditions of an event is not haphazard or arbitrary. It is governed by rules or reasons that, in principle, can be reconstructed and appropriated in the first person by any owner of a body and a reason. On the one hand, cause and effect are certainly *our* concepts, that is, human constructs dependent on our cognitive interests. On the other hand, they are made in order to grasp and dominate reality. The fact that we make these concepts in view of our theoretical interests and practical possibilities does not exclude the objective reality of the causal processes that they serve to bring to light, and that for two reasons: firstly, because the pragmatic context in which an agent, guided by her/his practical interests and by his/her knowledge about the situation in which she/he finds her/himself is an objective and independently existing reality; secondly, because the objectivity of scientific explanations and the independence of reality (including causal relations) from the epistemic subject are closely connected with the concepts and values through which the subject regards reality: *once these have been fixed, what is known is independent of us just because it is an aspect, a part of reality*.

Particular interests and practical possibilities of intervening in the situation in which the camper finds himself may lead him/her to consider humidity, rather than chemistry, as the cause of the failure to light camp fires, but there is no desire or preference or choice which can change the causal laws of nature connecting the phenomena of humidity and combustion.

The relativity of causal imputations to human purposes is similar to that which takes place in the case of our descriptions of empirical reality. Even though the properties of nature we represent depend on theoretical perspectives (and therefore ultimately on us) for their meaning, they do not depend on us for their existence. The properties of a body (say, the transparency of a crystal glass) have an empirical meaning only in so far as they are linked to the in principle reproducible actions that make the object interact with other objects and are necessary to ascertain the properties in question (say, the act of looking through the glass with respect to the property of transparency). Further properties of the object (such as its hardness, solidity, and fragility) can be translated into technical-operational terms by means of other actions (scratching with other materials, touching, throwing onto the ground, etc.). It is clear that, in a sense, an object's properties, asserted in a proposition, depend on these concepts (and corresponding actions) without which they would have no cognitive value for us. However, these properties remain, as to their content, independent of the concepts (and actions) that have been employed to discover them.

4. Dependence on the Cognitive Constitution of Human Beings?

We are now in a position to examine a particular version of the objection of anthropomorphism just discussed, according to which the experimentalist theory of causality denies the existence *in re* of objective causal ties, because it makes them dependent on the cognitive constitution of human beings (in the sense in which the word 'cognitive' is used by the neuroscientist). If the cognitive constitution of human beings were different, would causal links in nature be different too? Many critics conclude that because experimentalists must answer this question in the affirmative, they thereby must endorse an unacceptably anthropomorphic view of causality.

The crux of the matter is that the affirmative answer to this question needs to be qualified by specifying what is meant by the *possibility* of humans being different from what they de facto are. There is no doubt, of course, that causality, understood as an 'invariant that guides human reasoning and learning about events', 'is part of the fundamental cognitive machinery' (Sloman and Lagnado 2004, 288). But in *this* sense a difference in the cognitive machinery makes no difference to the causal processes involved, *at least so far as their contents are concerned*. Other creatures with different sense organs and different interests might readily *perceive* things that are imperceptible to the naked eye. But causal processes are plainly *not* different for us and for bats, even though bats use sound waves to find out the position of objects in the dark. In fact, we can build instruments such as radars and sonars which work on the principle of echolocation, that is, are based on the same causal processes that bats rely on; we are even able to investigate the particular (e.g. colourless) way in which insects perceive the world, for example.

However, causal connections would not be the same for human beings different from us in a much more radical sense, that is, as far as the possession of a mind *and* a body is concerned. Or, to put it more exactly, causal connections, in this case, would be devoid of meaning. It may be advisable here to repeat that 'cause' has two

sides: it refers to something that is really there, but it is also a human concept because we can bring to light causal processes if and only if we 'have' the capacity of conceptualizing as such. There can be no concept of cause, *in any sense that we could reconstruct or reproduce in our thoughts*, for beings that do not have any body as well as for beings that are not capable of conceptually mediating the real interaction between their body and the surrounding world. In both cases, an essential ingredient of the concept of causality would be lacking: in the first case, the objective interaction between our body and so-called 'external' reality; in the second, the conceptual/linguistic mediation (that which McDowell would call the 'space of reasons') of this real interaction: even though the same real processes make our lives and those of bats possible (or impossible), bats do not appear to possess the same concept of cause and effect as we do; more precisely, *in this sense* there is no cause and effect for bats, even though they causally interact with reality.

On the contrary, for any being endowed with body and reason, the concept of causality would be in principle the same as ours, even though the particular causal processes which they would bring to light could be (contingently) different.

As already mentioned (note 2), Price has recently changed his mind. At first sight, it might seem that he has reached a position similar to the point of view here adopted. He writes:

> I have argued that the concept of causation is more anthropocentric than either Woodward or MP [Menzies and Price 1993] themselves realize—there are more contingencies, more opportunities for variation, at least in principle. This may be surprising, but that's a feature, not a fault: the first-order anthropological investigation of our concept of causation reveals to us a contingency that isn't obvious 'from the inside'. Objecting that this makes causation unacceptably anthropocentric is like objecting that Copernicus makes our ordinary description of the heavens unacceptably anthropocentric. (Price forthcoming)

However, we cannot be aware of the perspectival character of causation unless we are aware of our capacity in general to change, abandon, or invent different and novel points of view from which reality can be seen and causally explained. This capacity is tantamount to having an embodied reason. But this capacity to know reality from a potentially infinite (not determinable a priori) number of perspectives or theoretical points of view, or conversely this capacity to understand that every real object cannot be representatively exhausted even if we multiplied these points of view indefinitely, cannot itself be identified with (or reduced to) one particular perspective.[5]

Owing to neglect of this distinction, Price is led to a subjectivism that Woodward would have the right to reject. He had pointed out earlier that '[s]ome perspectives simply cannot be transcended' (Price 2007, 290), and now he writes:

> Agents with different epistemic 'situations' to our own will make different judgements about what could be manipulated by manipulating what, and there's no objective sense in which we are right and they are wrong—to think otherwise is to accord our own viewpoint a god-like priority that, as Woodward says, it plainly does not possess. (Price forthcoming)

Here the distinction that we made earlier is implicitly denied. It is true that '[a]gents with different epistemic "situations" to our own will make different judgements about what could be manipulated by manipulating what'. But it does not follow that 'there's no objective sense in which we are right and they are wrong'. To the extent that beings different from us possess an embodied reason, we are entitled to make the assumption that some settlement of different perspectives is in principle always possible because things are as they are, quite independently of our opinion on the subject. What is true and what is false depend on what we call reality, whose relative independence of our thought is as necessary as our theoretical, that is partial and perspectival, human point of view, in order to have causal knowledge.

While in a sense it is true that, as Price claims, we should challenge the idea that 'science always aims for the perspective-free standpoint, the view from nowhere' (Price 2007, 253), in another sense, and a sense equally fundamental for epistemology and philosophy of science, it would not be advisable to throw away such an idea altogether. Perspectivalism is true in the sense that language can never produce a copy of reality because—as should be obvious after Weber, though it is often forgotten—reality can only be explored from particular points of view, which cast light only on particular aspects of it. But in opposition to Price, I believe that perspectivalism is a tenable position only if it is made consistent with the fact that we aim to refer the different perspectives to the one and the same reality.

5. Two Kinds of Anthropomorphism

What the previous discussion of the charge of anthropomorphism strongly suggests is that we must be very careful to distinguish two kinds of 'anthropomorphism', which are very liable to be confused. The first has been rightly rejected by modern science, but the second is inescapable for *all* theories of causality, because it can be eliminated only by assuming the point of view of God's eye, in Putnam's sense. The possibility of intervening (or not intervening) in reality, and hence—according to the experimentalist theory—the possibility of distinguishing causes from effects, is closely connected with the possibility of conceiving mental projects on the basis of which human beings can guide their actions. Even though it is impossible to be absolutely certain, animal behaviour strongly suggests that human beings alone are capable of conceiving actions as *possible* without necessarily carrying them out. As far as we know, a cat attaches no importance to the possibility of running per se, except when it runs, say, to catch a mouse. A bee does not need to formulate, let alone develop, a project of a hive before actually building one. On the contrary, thanks to the word concept 'run', human beings know that they *can* run, that they have the *possibility* of running, even when they are quite still and nothing at the moment is suggesting to them that they should run.

In general terms, human beings live in the three dimensions of past, present, and future because they have language (or reason) *and* a living body. Without both reason (or language) and a living body, human beings could neither conceive projects that are *in principle* to be realized in the future, nor transform mental plans into reality.

In other words, without reference to human beings, that is to say without reference to their reason (or language) and living bodies, there could be no concept of causality. In this sense, anthropomorphism is indeed inescapable and cannot be eliminated without depriving of meaning science and the world that it investigates.

In this sense, naïve naturalism and naive anthropomorphism are two sides of the same mistake. The condition of possibility of objective, real causes and effects is the non-natural, that is, conceptual-linguistic, aspect of causality. A child of three or four already knows that a windowpane will break not just because of his/her intention to break it by throwing a stone at it, but because there is an objective connection between the throwing of the stone and the breaking of the windowpane. More precisely, children outgrow anthropomorphism in the measure in which they become familiar with this fundamental distinction.

What applies to children, *mutatis mutandis*, applies equally to our problem. To overcome naive anthropomorphism is the same as to understand that causality, *as a mental point of view*, can never be an empirical or objective element in the natural world or, in other words, that causality is a coin with two sides, one of which—the subjective, conceptual one—is *freely made by agents in order to understand, predict, and modify the other—the objective, real one*. If we do not accommodate this teleology and this anthropomorphism, which is connected with language and reason, *our notion of causality will be, explicitly or implicitly, anthropomorphic in the naive sense, which was definitively rejected by Galilean science.* In other words, this teleology and this anthropomorphism can be eliminated neither from the experimentalist nor from any other theory of causality *because they are a necessary condition for conceptualizing and selecting natural causal processes objectively.*[6]

In the last part of this article, it only remains to show, very briefly, how the distinctions here sketched out are helpful in dealing with the problem of simultaneous causation.

6. Human Agency and Simultaneous Causality

I come now to our second question: how can we explain, from the point of view of an interventionist theory of causality, the cases in which cause and effect seem to be simultaneous? Simultaneous causation is an interesting test case for the standard interventionist theories of causation, and yet has received little attention.[7]

One of the most widely acknowledged merits of the experimentalist theory of causality is that it offers a very simple explanation of the asymmetrical character of causal relations, that is, of the fact that the cause occurs before the effect. We can obtain an effect by intervening on the cause, but not vice versa. This causal asymmetry is intimately connected with the temporal asymmetry between the past, which we cannot conceivably modify, and the future, which we can (von Wright 1971, 74–75; Price 1992; Keil 2000, 439–440).

However, a critical difficulty for the interventionist theory arises in the relationship between causality and simultaneity. The existence of cases in which cause and effect are simultaneous is more problematic for this than for any other theory of causality.

Interventionist theories of causality seem unable to account for such cases exactly because human agency works by means (i.e. causes) which are such in the light of goals to be attained as future effects. Now, the experimentalist conception of causality would be seriously defective if it were incapable of accounting for simultaneity. The following considerations aim to provide such an account.

It is *prima facie* very plausible to assume that there are instances of simultaneous causation. Kant, discussing the temporal priority of the cause over the effect in the Second Analogy of Experience, states that the 'great majority of efficient natural causes are simultaneous with their effects'. He gives the example of a heated stove, which is simultaneous with its effect, the heat of the room:

> At this point a difficulty arises with which we must at once deal. The principle of the causal connection among appearances is limited in our formula to their serial succession, whereas it applies also to their coexistence, when cause and effect are simultaneous. For instance, a room is warm while the outer air is cool. I look around for the cause, and find a heated stove. Now the stove, as cause, is simultaneous with its effect, the heat of the room. Here there is no serial succession in time between cause and effect. They are simultaneous, and yet the law is valid. (Kant, *KrV*, B 247–248; Akademie-Ausgabe, vol. 3, 175, lines 21–30; transl. Kemp Smith)

It might be objected that the heated stove comes before the heat of the room because this is the correct methodical or pragmatic sequence in which we must perform the actions in order to heat a room.[8] However, there is no moment at which we may say that there is a fire, but no heat. It is true that we can imagine such a fire abstractly and counterfactually, but we cannot think a fire, such as common sense would approve, without heat. This suggests that Kant's claim is not so easily refutable as it might appear to be at first sight and that, therefore, one owes an account of the genesis of the idea of simultaneous causation.

Now, an account of simultaneous causation is problematic in Kantian as well as in experimentalist terms. The difficulty in Kant depends on the fact that he constrains the causal connection between phenomena within the framework of a temporal succession. In order to solve this difficulty, Kant notes (at least in part following the experimentalist line of thought) that we can always distinguish the cause from the effect 'through the time-relation of their dynamical connection':

> Now we must not fail to note that it is the *order* of time, not the *lapse* of time, with which we have to reckon; the relation remains even if no time has elapsed. The time between the causality of the cause and its immediate effect may be [a] *vanishing* [quantity], and they may thus be simultaneous; but the relation of the one to the other will always still remain determinable in time. If I view as a cause a ball which impresses a hollow as it lies on a stuffed cushion, the cause is simultaneous with the effect. But I still distinguish the two through the time-relation of their dynamical connection. For if I lay the ball on the cushion, a hollow follows upon the previous flat smooth shape; but if (for any reason) there previously exists a hollow in the cushion, a leaden ball does not follow upon it. (Kant, *KrV*, B 248–249; Akademie-Ausgabe, vol. 3, 175–176, lines 36–37 and 1–11; transl. Kemp Smith)

This example is interesting both as a plausible account of the simultaneity between cause and effect and especially because of the experimentalist or operational point

of view adopted by Kant, who connects the asymmetry of the causal relation with agency and with the methodical order which must be followed in order to attain specific goals. Kant connects causality and human agency by making agency at least epistemologically prior to causality and temporality (a point very important for any neo-Kantian approach in a broad sense).

As a matter of fact, this position conforms to Vico's principle that one can really gain insight into anything only if one is capable of making it. In the *Critique of Judgment*, Kant writes that 'we have complete insight only into what we can make and accomplish according to our concepts' (Kant, *KdU*, Akademie-Ausgabe, vol. 5, 384, lines 4–5; transl. Creed Meredith). This is in accord with the very idea of knowledge as a priori synthesis of the *Critique of Pure Reason*, that is, as active determination of the manifold by the transcendental act of the imagination. Kant accepts Vico's principle also in the famous passage on experiments as 'questions' put to nature:

> When Galileo caused balls, the weights of which he had himself previously determined, to roll down an inclined plane; when Torricelli made the air carry a weight which he had calculated beforehand to be equal to that of a definite column of water; or in more recent times .... They learned that *reason has insight only into that which it produces after a plan of its own*, and that it must not allow itself to be kept, as it were, in nature's leading-strings, but must itself show the way with principles of judgment based upon fixed laws, constraining nature to give answer to questions of reason's own determining. ... Even physics, therefore, owes the beneficent revolution in its point of view entirely to the happy thought, that while reason must seek in nature, not fictitiously ascribe to it, whatever as not being knowable through reason's own resources has to be learnt, if learnt at all, only from nature, it must adopt as its guide, in so seeking, that which it has itself put into nature. (Kant, *KrV*, B xiii–xiv; Akademie-Ausgabe, vol. 3, 10, lines 9–16 and 28–34; transl. Kemp Smith, italics added)

However, even though on the one hand some fundamental tenets of Kant's philosophy suggest he was sympathetic to an agency theory of causation, on the other hand he almost necessarily failed to develop this line of thought and accepted the ensuing universal necessity of the causal relation, because this approach clashed with some other basic aspects of Kant's philosophy—especially with his hypostasized notion of the a priori (Buzzoni 2011).

As we saw earlier, Kant believed that the 'great majority of efficient natural causes are simultaneous with their effects'. But we may easily escape this conclusion by carefully grasping the connection, made up of both unity and distinction, between the subjective and the objective side of causation. As already stated, if causality and human agency are inextricably united, cause and effect are relative to the interests and aims which we pursue as agents as well as they are real features of our universe.

Consider Kant's example. On the one hand, it can be easily interpreted in the light of our previous considerations. It is easy to imagine different circumstances, dependent on different theoretical and practical interests, under which what Kant considers as causes might be thought of effects. Imagine that someone has thrown a metal ball in the air and that it is now going to fall to the ground, and suppose that you have a cushion with which you wish to stop the ball. In this case it makes sense to say

that what caused the metal ball to stop is the specific hollow in the cushion (one has only to think of the action and reaction principle). The movement of the ball (from its beginning to its end), which under usual circumstances appears as a cause, is here—as long as the ball has actually been stopped—an effect. We have learned by experience that the cushion maintains its shape unless something falls on it. But we also know by experience that the ball would continue its fall towards the centre of the earth (until the next obstacle) if one took away the cushion that stops its movement.

From this point of view, Kant's example reaffirms one of the most important points that I have endeavoured to establish in this article. Which is the cause and which is the effect depend in a sense on the purposes, interests, and aims which steer and confer meaning to our acting in the world and to the methodical order of the actions which are viewed as necessary and sufficient to bring about a desired effect. However, this does not exclude all objectivity from causal relations. Nobody would say that our freedom to choose this or that description and, by doing so, this or that causal connection, is the cause of the hollow in the cushion or of the ball coming to a stop. Once the theoretical and practical goals and interests have been fixed, which is the cause and which is the effect become independent of us.

However, there is another point of view from which Kant's example may be considered. If we ignore the hand that drops the ball and the hand that stops the ball, the ball and the hollow in the stuffed cushion appear as simultaneous because there is no way to order them in time. In an abstract and general sense, the movement of the ball can be seen as the cause of the hollow in the cushion as much as the hollow in the cushion as the cause of the ball stopping. More precisely, if we abstract from human projects of intervention in reality, we can speak of causal relations only in abstract terms: we can imagine a simultaneous reciprocal action in general, which is insufficient to determine univocally a concrete relation between a particular cause and a particular effect. The idea of a universal and simultaneous interaction or interdependence between all events emerges from this bracketing of the agent, which is, strictly speaking, a thought experiment. The resulting relation is a mere possibility or potentiality with respect to various concrete relations of cause and effect.

The same applies to the other example we have taken from Kant. If we abstract from the fact that we can heat the room by the stove, but not vice versa, we experience simultaneous causation because the causal relation now holds between processes which occur simultaneously and the asymmetry of causation vanishes: now the stove, as cause, is simultaneous with its effect, the heat of the room.

Accordingly we arrive at the following conclusion. On the one hand, there is a basic sense in which there can be no simultaneous causal relations because, as agents capable of acting self-consciously on the world, the cause always comes before the effect. On the other hand, we may consider reality by abstracting *from the agent; in this case, cause and effect become simultaneous in the sense that relations between cause and effect become timeless functions between logical and mathematical variables*.

From this point of view, one can now easily see both the validity and limits of Mach's and Russell's replacement of the concept of cause with the concept of function or functional dependence. What Russell claimed in 'On Causality' must be in a certain

sense inverted. As far as empirical knowledge is concerned, it is the concept of function that depends on the concept of causality, and not vice versa. In general one can say that there is a functional dependence between two variables (events, states of affairs, etc.) only if, under reproducible circumstances, the modification of a variable leads to the modification of another according to a rule (perhaps a statistical one).[9] It is impossible to make a list of measured values in order to find the mathematical function that better approximates the relation between two variables, except in connection with an active intervention by the experimenter, who modifies one of the variables.

But there is an important element of truth in Mach's and Russell's contention. In so far as theoretical physics strives to formulate relations between variables that are objective in the sense of being universally valid, it brackets concrete agents and their time. And the same applies to the symmetry of explanation and prediction (or between causes as initial conditions and effects as *explananda*), which is assumed in the first formulations of the deductive-nomological model.

There is a close link between Russell's reduction of causality to functional dependence and the nomological-deductive model. On the one hand, it can be alleged in defence of Hempel that he was aware that the deducibility of the *explanandum* from initial conditions and general laws does not entail that the initial conditions are its causes. For Hempel, this is plain from the so-called laws of coexistence (e.g. the law of the simple pendulum: $T = 2\pi\sqrt{l/g}$) where neither of two variables (e.g. period T and length l) causes the other because they are simultaneous, whereas causation takes time (Hempel 1965, 352). On the other hand, to repeat a point already made by other agency theorists against the Popper–Hempel model of explanation, if you wish to test the functional relation between a pendulum's length l and period T, the former appears as the cause of the latter, because (I would add: at least under normal circumstances) we can modify the period by intervening on the length, but not *vice versa* (for a different analysis of this paradigmatic case, see e.g. Byerly 1990 and Gillies 2005).

To sum up, the symmetry between explanation and prediction results from bracketing concrete agents and their time. But as soon as concrete agents and the time of their action are considered, the logical symmetry between explanation and prediction breaks down, as is shown by well-known counterexamples, the best-known being perhaps the 'flagpole counterexample', which is, mistakenly in part, usually attributed to Bromberger (1966, 92–93).[10] We speak, legitimately enough for some purposes, about there being no causal connection between two or more phenomena which are only functionally related, as in the case of the law of the simple pendulum; but it is important to bear in mind that, by doing so, we are bracketing concrete agents, who pursue specific goals and are always already in operational or technical interaction with the world. This bracketing reduces physical-causal laws to functional dependencies among quantities that are essentially mathematical in their nature. As soon as one decides to ground a law in past experience alone and take no future experience into account, the problem of induction dissolves and causal laws can be treated as mathematical functional laws, which can be neither confirmed nor refuted by experience. As a consequence, physics, which can be seen as applied mathematics, becomes

pure mathematics and is shielded against any retroaction from new experimental data.[11] However, as soon as a mathematical truth is applied to reality and exposed to empirical testing, the asymmetry between cause and effect re-emerges, since that asymmetry is presupposed by human agency, which is needed for empirical testing and experimentation. In *this* sense, there is no physical law that is a pure law of coexistence.

Finally, from this point of view it is possible to interpret operationally both Mill's remark that everything that exists should be thought of as conditioned or 'caused' by an unlimited number of other entities, so that we have no right to name only a few of them as causes, and Kant's Third Analogy of Experience, according to which 'All substances, in so far as they can be perceived to coexist in space, are in thoroughgoing reciprocity' (Kant, *KrV*, B 256; Akademie-Ausgabe, vol. 3, 180, lines 25–26; transl. Kemp Smith).

On the one hand, Mill's claim that each condition of a given event is entitled to be called its cause makes sense, as long as it is considered as a consequence of the pragmatic and operational relativity of causal judgements. On the other hand, contrary to Kant's phenomenalism, the 'thoroughgoing reciprocity' of all substances is a potentiality that inheres in reality. An abstract potentiality has no operational value, and this is why the conditions of an event (in Mill's sense) are simultaneous. In order to intervene in the world, the unlimited number of *simultaneous* possibilities open to our agency must be curbed by opting for this or that possible causal relation.

7. Conclusion

In this article I have discussed two important issues concerning the agency theory of causality: the charge of anthropomorphism and the relation of simultaneous causation. Concerning the first question, the following three main forms in which the charge of anthropomorphism is to be found in the literature are distinguished and refuted: the agency theory leads us towards an undesirable kind of anthropomorphism regarding causation because (1) it cannot explain causal connections which are outside our control (such as earthquakes and black holes); (2) it undermines the idea that scientific knowledge is objective and invariant; (3) it denies the existence *in re* of mind-independent causal ties and makes them dependent on the particular cognitive constitution of human beings (sections 2–4).

It emerged, from the discussion of these objections, that it is necessary to distinguish between the subjective and the objective aspect of the concept of causation. This leads, in section 5, to contrast two kinds of anthropomorphism, one which has been rightly rejected by modern science because it naïvely projects our interests and values onto the outer world, and one which is fully compatible with the objective reality of the causal nexus. In this last sense, anthropomorphism can be eliminated neither from the experimentalist nor from any other theory of causality because it is a necessary condition for conceiving natural causal processes objectively and not in a naive anthropomorphic sense.

Concerning the second question, the solution sketched in section 6 hinges on the fundamental distinction between the subjective and the objective aspect of the concept of causation I drew when discussing the charge of anthropomorphism. There is a basic sense in which there can be no simultaneous causation because the cause always comes before the effect. However, in another sense causes or conditions are always simultaneous with their effects. If we abstract from human projects of intervention in reality (which is, strictly speaking, a thought experiment), we can speak of causal relations only in abstract terms: we can imagine a simultaneous reciprocal action in general, which is insufficient to determine univocally a concrete relation between a particular cause and a particular effect. If we bracket the agent, relations between cause and effect become a 'thoroughgoing reciprocity' of all substances (with no operational value), or timeless functional dependencies between logical and mathematical variables.

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Notes

[1] For the expression, 'experimentalist idea of causation', see von Wright (1971), xiii, 37, 86. With some oversimplification, it is now customary to distinguish two types of interventionist theory of causation: the agency theory, which is usually attributed to Peter Menzies and Huw Price, and the manipulability theory, usually ascribed to Daniel Hausman and James Woodward. For reasons that will appear hereafter, the account of causation defended here—which is above all a development of von Wright's experimentalist point of view—may be considered a variant of the agency theory.

[2] Among these merits I place first Woodward's interpretation of counterfactuals, which nevertheless is one of the most criticised features of his manipulability theory of causation: see for example Psillos (2004), Reutlinger (2012), Kistler (2013).

[3] In Price's latest paper devoted to causality, in which he offers 'an updated, Pricean version of the Menzies and Price view', he has changed his mind about this. On the one hand, he has offered a revised and more naturalistic formulation of the agency theory. On the other hand, he has come to an anthropomorphism which is connected with our cognitive constitution and, as I shall argue later, has led him to a subjectivist and relativistic viewpoint, which is different from the position defended here.

[4] Hackmann (1989), 48. The second type of experiment basically coincides with what Galison and Assmus call 'mimetic experimentation', namely the attempt 'to *reproduce* natural physical phenomena, with all their complexity, in the laboratory' (Galison and Assmus 1989, 226–227).

[5] For more on this and related matters, I refer the reader to Buzzoni (2008, 2013).

[6] The more we fail to recognize this distinction, the more we are unable to break the spell of the dilemma between reductive and non-reductive analysis of causation: the first (usually ascribed to Collingwood, Gasking, von Wright, or Menzies and Price) reduces the notion of causation to an allegedly non-causal notion of intervention or manipulation, while according to non-reductive accounts (usually ascribed to Pearl and Woodward) such a reduction is not possible (e.g. Hausman and Woodward 1999, 847–848; Baumgartner

2009, 175). There is no space in the present paper to examine this issue at the length that it deserves, and I shall content myself with a brief indication which shows where the main difficulty lies. On the one hand, if the subjective and objective sides of causality are not grasped in their necessary relationship of unity and distinction, the agency theory runs the risk of reducing causation to human intervention, and hence, at least implicitly, of becoming a naïve anthropomorphic account. On the other hand, if causality and 'intervention' are not closely connected to the agent's values and practical possibilities, every non-reductive analysis runs the risk of becoming circular: in speaking of 'interventions' (which are able to causally affect the surrounding world), it introduces the very notion of cause which was to be understood and defined (for this last objection, see e.g. Hausman 1997; Glynn 2013). The notion of a (objective) causation and that of an intervention (which may be called 'subjective' in the sense that it is dependent upon a human agent) are the two sides, separable only through abstraction, of one and the same reality. They must be grasped in their necessary relationship of unity and distinction.

[7] The reason the problem of simultaneous causation has received little attention lies, I suppose, in the widespread opinion that simultaneity belongs to the field of scientific investigation. However, since the problem of simultaneity depends upon the fact that human agency works by means (i.e. causes) which are such in the light of goals to be attained as future effects, it would be beside the point to remark (as has been done) that this problem can be solved by physics or neuroscience alone. Einstein's theory of relativity, for example, provides a good solution to the empirical-technical problem of ascertaining simultaneity. This solution has to be accepted in so far as it works. Whether it does or does not is a matter for working scientists, not philosophers. Undoubtedly, a divorce between philosophy and science is damaging to both philosophy and science. And it must be admitted that, de facto, the distinction between science and philosophy cannot be drawn once and for all, but it is a continual process. However, to obliterate or even blur the distinction between science and philosophy would be no less misleading. On backward causation, for example, Price's naturalism does not allow for a clear-cut distinction between a physical and a philosophical point of view on simultaneity and of backward causation, which he naively accepts as ontic possibilities. He writes for example, 'My own view is that we have no trouble making sense of simultaneous causation; that we have little trouble in making sense of "entropy reducing" and "backward" ... causation' (Price 2007, 265). The possibility of backward causation is a terrain of debate which does not at present command general agreement and is likely to remain controversial (see, for example, the important contribution of Faye 1989 to this debate). However, from the point of view based on agency, there is an obvious impossibility of causing effects which are in the past: even in the cases, studied by physics, in which it may be theoretically possible to change the past, this could only occur by intervening from our current temporal standpoint. This would qualify the intervention as starting in the present and going towards the future. In other words, we can envisage a change of the past only as a change that we are planning to make in the future (this is well expressed in the title of Zemecki's science fiction film, *Back to the Future*).

[8] In a similar vein, Gillies writes: 'In such cases of simultaneous causation, ... [a]lthough the causal relation now holds between processes which occur simultaneously, the asymmetry of causation still applies. The stove causes the elevated temperature of the room, but not vice versa.' (Gillies 2005, 835).

[9] The question whether causal relata must be seen as 'events', 'situations', 'facts', etc., cannot be settled a priori or by referring to contingent properties of one or more languages, but depends on the context of agency. This point might be fittingly expressed by slightly modifying the principle of Occam's razor: *distinctiones non sunt multiplicandae praeter necessitatem*. It is surprising that Menzies, who is an upholder of the agency theory of causality, tried so hard to establish this point: cf. especially Menzies (1989).

[10] Even though Bromberger offers many good counterexamples to the logical symmetry between explanation and prediction, he does not mention the shadow of a flagpole, as usually cited, but a sun ray reflected from the top of the Empire State Building.

[11] This is just an instance of a more general set of questions about the distinction between experimental and logico-mathematical knowledge. For some more details on this point, see Buzzoni (2008), 124–128.

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