

# The Tendency Theory of Causation \*

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December 2003, deposited in open-access archive on 16 June, 2009

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**Abstract:** I propose a non-Humean theory of causation with “tendencies” as causal connections. Not, however, as “necessary connexions”: causes are not sufficient, they do not necessitate their effects. The theory is designed to be, not an analysis of the concept of causation, but a description of what is the case in typical cases of causation. I therefore call it a metaphysical theory of causation, as opposed to a semantic one.

Different authors who propose theories of causation mean different things by a “theory of causation”. Many theories of causation proposed today are theories, or analyses, of the *concept* of causation. They say whether the concept of causation is to be analyzed, whether causal statements can be reduced to statements of some other kind, and what “ontological commitment” there is in causal talk. For example, the simple regularity theory of the concept of causation claims that the statement “A caused B” can be replaced by the state-

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\* I wish to express my gratitude to the citizens of the Free state of Bavaria for the “Bayerischer Habilitationsförderpreis”, which made this work possible. For helpful comments and criticism I thank Ludger Jansen, Jonathan Lowe, and Richard Swinburne.

ment “A and B occurred, and events like A are always followed by events like B”. But other theories of causation (for example Armstrong 1997, ch. 14) are intended to be, not about the concept of causation, but about causation. They try to describe what is the case where one thing causes another, they try to describe the truthmakers of causal statements. For example, they say whether in every case of causation there is what Hume called “power, force, energy, or necessary connexion”. I call theories of the former kind semantic theories of causation and theories of the latter kind metaphysical theories of causation. Some philosophers believe that analysis of the concept of causation reveals, for example, whether there are causal connections. As I do not share this belief, I do not attempt to analyze the concept. In this article I shall propose a non-Humean metaphysical theory of causation. In order to clarify what the theory is designed to do I shall first briefly discuss the Humean line of thought.

### **The Humean line of thought**

What I call the Humean line of thought, leading to the denial of the existence of “causal connexions”,<sup>1</sup> runs as follows. All our concepts, at least the proper ones, are copies of sense impressions or are composed of such concepts. In order to explore whether we have a certain concept or what exactly it is we need to look for the sense impression of which it is a copy, or for the concepts of which it is composed and for the sense impressions of which they are copies. If you want to know whether a certain term has a meaning and what it is, then, in Hume’s words, you “need to enquire, *from what impression*

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<sup>1</sup> However, Galen Strawson (1989) claims that Hume himself did not deny the existence of causal connections.

*is that supposed idea derived?"* (*Enquiry*, 2.9). If you do not find that impression then say that the term is meaningless or define the term in terms of concepts that are copies of impressions.

Now consider causation. Do we ever have any impression of a “connexion of power, of force, of energy, and of efficacy” between a cause and its effect? Do we ever *see* a cause bringing something about? We do not, says the Humean. For example, when we see one billiard ball hitting another one we see the movement of the first ball and then the movement of the second ball, but we see no connection, no power, no bringing about. Therefore “cause” is to be defined other than in terms of a causal connection. Hume therefore defines a cause as “an object, followed by another, and where all the objects, similar to the first, are followed by objects similar to the second” (*Enquiry*, 7.29). Many other, more sophisticated definitions have been proposed which also avoid mentioning any kind of causal connection.

I have two objections against the Humean line of thought. First, the Humean uses the wrong method for finding out the meaning of a term. It is not the right method for finding out the meaning of statements like “A caused B” to look for the sense impressions of which the concept of causation, or its constituents, are copies. What one means with a certain expression is best discovered simply by thinking hard and by trying to spell out the thought more clearly using other words and examples. If one is not aware of the meaning of an expression, then one cannot even start to look for the corresponding sense impressions because one does not know what sort of impressions one should look for.

Some take the Humean line of thought to support the view that there are no causal connections. Here I object, secondly, that this is not the case. The Humean method is not the right one for finding out

whether there are causal connections. In order to find out whether there are Xs one does not need a theory about the origin of our concept of an X, and having such a theory does not help. To find out whether there is butter in the fridge we do not need a theory about what gave us the idea of butter in the first place. And construing a theory of how we acquired the idea of luminiferous ether does not help us for finding out whether there is such stuff. Similarly with causation. Of course, we should consider what we have in mind when we make claims of the form “A caused B”, but we do not find out whether there are causal connections by investigating how we developed the concept of a causal connection.

So how do we find out whether there are causal connections? How in general should we approach questions about the existence of something in metaphysics? We must consider what counts in favour of it and what counts against it. We must look for evidence. In order to find out whether there are Xs we must ask whether things are as we should expect them to be on the assumption that there are Xs, and how likely it is that things would be as they are on the assumption that there are no Xs. We must ask how the things we know are best explained, with or without Xs.<sup>2</sup> For example, under the assumption that there are no causal connections, should we expect the regular and predictable behaviour of at least some of the things in our universe? Does the assumption that there are causal connections explain the behaviour of these things, and how well can it be explained without that assumption?

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<sup>2</sup> For an account of how in metaphysics we correctly evaluate how strong evidence something is for the existence of some X, see (Swinburne 2004, ch. 3). Swinburne applies his account to the question whether there is a God.

The Humean pursues an entirely different method. He asks how the concept of a cause is to be defined, and if the definition mentions causal connections then he says that there are causal connections, and if it does not then he says that there are no causal connections or that we have no reason to believe in them. Similarly, many philosophers today answer questions about the existence of something by discussing “ontological commitments”. The existence of Xs is not assumed if in the statements expressing our beliefs all the terms used in certain ways (i.e. if we “quantify over” Xs) can be defined without mentioning Xs, or if the statements mentioning Xs can be transformed into other statements. In my view this is wrongheaded. We should believe in the existence of something if and only if we have evidence for it, and we find evidence not by analyzing the concept of X but by considering whether some of the things we know count for or against the existence of Xs.

Most contemporary texts about causation pay homage to the Humean line of thought. Many assume that Hume’s claim that we do not observe causal connections provides strong support for the view that there are no causal connections. Wesley Salmon, for example, says in this vein that “the concept of causality has [...] been philosophically suspect ever since David Hume’s devastating critique” (Salmon 1984, 136).<sup>3</sup> And although Hume’s associationist theory of concept formation has been widely abandoned, even many non-Humeans who believe in causal connections still think that a de-

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<sup>3</sup> Hume’s claim that we do not observe causal connexions was already put forward by the Arabic philosopher Al-Ghazali (1058-1111) and was well known in Hume’s days. Discussing the case of a cloth in a fire turning black and becoming ashes, Al-Ghazali argues that “observation proves only a simultaneity, not a causation” (Averroes, 1954, 317).

fender of causal connections needs to hold that we observe causal connections or that he needs to explain how we acquire the concept of causation.<sup>4</sup> Of course, observing causal connections is a good reason for believing in their existence, but one does not need to observe them in order to be justified in believing in them, and one does not need an explanation of the origin of the concept of a causal connection.

The metaphysical theory of causation I shall propose now is based on the assumption that we find out what causation is and whether there are causal connections not by conceptual analysis and by looking for ontological commitments but by considering evidence, such as the predictability of many events in our universe. It is not an analysis of the concept of causation, but an attempt to describe what is there where one event causes another one. The concept of a cause, unlike the concept of a bachelor, is, I assume (like Armstrong 1997, 202, and Swinburne 1997), simple, it is not to be analyzed. Therefore, when I say what causation is, I shall not call it a definition but a description, because “definition” usually means definition of a concept. One could also call it an ontological analysis, which is what Armstrong calls his (metaphysical) theory of causation.

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<sup>4</sup> For example, Richard Swinburne (1997, 86) writes: “Someone who holds this [that the notion of causation is unanalysable] must give an account of how we get epistemic access to the notion – how we learn what is meant by something being a cause, and how we learn to recognise instances of causation.” (Fales, 1990, 11) justifies his belief in causal connexions by arguing that “we experience causal relations”.

## The universe's carrying on

Imagine a universe  $U$  which is like ours but consists just of two rocks in space, slowly moving away from each other. The rocks have been there for quite a while, until time  $t$ . What will be the case a short time later, say at  $t_2$ . How will things carry on after  $t$ ?<sup>5</sup> There could be after  $t$  a universe which is like ours was in 1809 AD. The existence of such a universe is obviously possible, so there could be such a universe after  $t$ . The universe which until  $t$  contained just two rocks after  $t$  may be like ours was in 1809 and hence contain the Pleiades, a planet with bears and honey bees, a King of Bavaria, and much more.

Or there could be an empty universe after  $t$ . The rocks could disappear.

Or there may be no physical universe after  $t$ , not even space.

But it is very likely that neither of these possibilities will be realized. It is very likely that after  $t$  there will be no less and no more than two rocks, just as before  $t$ . There is something about  $U$  before  $t$  which makes it likely that after  $t$  there will be a universe quite like the one before  $t$ . What is the case at  $t$  lowers the probability of some possible futures and raises the probability of others (or perhaps of exactly one particular possible future). It seems that the universe before  $t$  is not neutral about how it will carry on after  $t$ . It is not, as David Lewis (1986, ix) holds, just a "mosaic of local patterns". Not all possible ways of carrying on are equally likely. It has a bias towards carrying on in one way rather than in one of the many other possible ways. There is what we may call a *tendency* in  $U$  to carry on in a certain

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<sup>5</sup> By "after  $t$ " I mean "in a period of time as short as you wish beginning at  $t$ "; by "before  $t$ ", or "until  $t$ ", I mean "in a period of time as short as you wish ending at  $t$ "; by "at  $t$ " I mean "before and after  $t$ ".

way. A tendency towards carrying on so that after  $t_1$  there are just two rocks being at certain positions at certain times later than  $t_1$ , rather than towards ceasing to exist or towards being as our universe was in 1809 AD.

Imagine there is in the universe also a window towards which rock A is moving with constant velocity. At  $t_1$  A is close to the window. There is then a tendency in that universe towards A breaking the window. The universe at  $t_1$  is biased towards carrying on in this way. If then rock A did carry on and broke the window we would say that the rock's moving so-and-so *caused* the breaking of the window. Tendencies, as I will explain, are the phenomenon that is constitutive for event causation. They make, under certain circumstances, causal claims true.

In the universe just described, rock B is not relevant for the tendency of that universe at  $t_1$  to carry on in such a way that the window will break shortly afterwards (if we neglect the gravitational force). So not everything at a time is relevant for every aspect of the tendency of that universe at that time. If a state of affairs S evolved out of the tendency of the universe, at  $t_1$ , towards S, then some states of affairs at  $t_1$  are relevant for there being that tendency, but there may be others that are not relevant. I call the state of affairs that is the whole of all states of affairs that are in this sense relevant for the tendency the *basis* of the tendency. One might want to say that the rock has a tendency to break the window, but I talk only of tendencies as being based on states of affairs because usually the factors relevant for a tendency are not all in one thing and not all properties of a thing are relevant for the tendency.

What reason do we have to believe in the existence of tendencies? If there were no tendencies, then there should be no successful predic-



tions. Any state of the universe would equally likely be followed by any other possible state. A state of the universe as it was one hour after the Big Bang would equally likely be followed by a state in which it is quite like ours was in 1809 AD than by any other possible state. There would be no way to predict an eclipse because the moon just before moving between sun and earth, would, at any time, be equally likely to stand still than to move on. Our universe is not like that. In many situations things behave predictably. We can predict solar eclipses, earthquakes, hurricanes, etc. This is best explained by assuming that what is the case at one time makes a difference to what is the case at later times; it makes the world heading in a certain direction. There are in the universe at each time tendencies towards carrying on in certain ways, and we can learn in what kinds of situations there are what kinds of tendencies.

One might object that the reason why we can make predictions is that there are laws of nature that are, or entail, regularities.<sup>6</sup> But that there are regularities is exactly what needs to be explained (cf. Foster 2004, ch. 4). If there were no tendencies it would be extremely improbable that the universe behaved as it does. Why, for example, whenever in the whole past some released a coin from his grasp (and nothing else acted on the coin), did it fall down until it reached some solid surface to give it support? If there were no tendencies, this would be extremely improbable because whenever someone releases a coin all possible ways of carrying on would be equally likely. Hume explains the fact that we make predictions (“we make no ... scruple of foretelling”) through the fact that things behave with regularity (*En-*

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<sup>6</sup> I owe this point to ... I myself hold, as I shall argue elsewhere, that laws of nature do not entail Humean regularities, but I grant this point here for the sake of the argument.

*quiry*, ch. 7). But what calls for an explanation is the fact that things behave with regularity at all. This fact Hume leaves unexplained. It is extremely improbable that it has no explanation, and I have suggested that it is best explained by assuming the existence of tendencies. What the state of the world is at one time gives it a bias towards carrying on in one way rather than in one of the many other possible ways and thus makes a difference to the state of the world at later times.

There is, however, an alternative to believing in tendencies. The Arabic philosopher Al-Ghazali (1058-1111) put forward an explanation of the order and predictability of many events in the universe that does not involve causal connections: he argued that as we do not observe causal connections we should assume that there are none and that God brings about every event directly. The rock's existence before  $t$  has no relevance for what there will be after  $t$  except insofar as God takes the existence of a rock before  $t$  as a reason and occasion for letting there be a rock after  $t$  too. Some events are predictable because God brings about events according to an order that we can discover. He does so because he likes order and because he wants to make events predictable for us. The existence of a God who brings about every event directly and has a reason to do so in a way that makes events predictable for us explains why so many events are predictable. This view is called occasionalism (see Averroes, 1954, 316-318). It is clearly preferable to Hume's view, which offers no explanation at all for the predictability of so many events. But here I want to spell out the tendency theory as an alternative to occasionalism.

## Terminology

Let us develop this theory and introduce some terminology. I refer to a bias of the world towards carrying on in a certain way, rather than in one of the many other possible ways, after a certain time  $t_1$  by saying that there was at  $t_1$  a *tendency*<sup>7</sup> T towards S at  $t_2$ , where S is a state of affairs that came about if things developed according to the tendency. By saying that *the world*, or the universe, at  $t_1$ , has a tendency towards S at  $t_2$  I mean that, although maybe not everything at  $t_1$  is relevant for the tendency, there is a tendency towards S and no tendency that counteracts that tendency. Taking together all tendencies there are there is a tendency towards S. In this case I also say that there is a *total tendency* towards S.

Usually for a tendency T at  $t_1$  towards S at  $t_2$  not everything at  $t_1$  is relevant for the obtaining of T. We specify what is relevant for the obtaining of a tendency by describing which properties of which things at which time are relevant. Such a description I call a description of a state of affairs. (In my view, one could equally well call it a description of an event.) By a state of affairs I mean a portion of reality which may consist of concrete entities, i.e. things with all their properties, or of abstract entities, i.e. things with only some of their properties. For example, a rock's having mass M is a state of affairs. A tendency is *based* on a state of affairs. I take this relation between a

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<sup>7</sup> Popper uses the term "propensity" (Popper 1974 and 1990), (Mellor 1995) uses "chance" for something similar to tendencies. (Freddoso 1986) speaks of natural propensities, tendencies, inclinations, and necessities, but none of these concepts is equivalent to my concept of tendency. Using the term "tendency" I follow John Stuart Mill (Mill 1872, Book III).

tendency and a state of affairs as a primitive.<sup>8</sup> Perhaps one can find out more about what “is based on” refers to, but I shall not attempt to do so here.

The canonical form of referring to a tendency is “tendency T, based on A at t1, towards B at t2”. It does not involve the ordinary language expression “... has a tendency to ...”. Expressions like “the ball had a tendency to fall” may be used informally for saying that there was a tendency towards the ball being at certain positions at certain later times. That tendency may also be referred to by saying that there was a tendency towards the ball moving downwards.

When I speak of tendencies I always mean singular tendencies, as opposed to general tendencies as in “Iron tends to expand when heated” or “Bees tend to be aggressive before a thunder storm”. Presumably sometimes singular tendencies are at least parts of the truthmakers of statements like “Iron when heated tends to expand”, but such statements play no role in my theory.

By saying that tendency T based on A at t1 towards B at t2 was *realized* I mean that things carried on according to the tendency so that B occurred. Further, I say in that case that B was the *result* of the tendency and that the tendency *led to* B.

Tendency T based on A at t1 towards B at t2 is also a tendency towards a certain state of affairs at a certain time between t1 and t2. For each time between t1 and t2 there is a state of affairs towards which T is a tendency. That is, a tendency is about the world’s carrying on after a certain time in a certain way, and that way can be specified by describing a state of affairs which would occur if nothing intervened

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<sup>8</sup> An alternative wording would be to say, instead of “Tendency T towards B(t2) is based on A(t1)”, “A tends towards B”. I owe this point to Randall Dipert.

before then. I individuate tendencies so that tendencies towards different states of affairs (at different times) count as “the same tendency” if they are based on the same state of affairs at the same time and point in the same direction.

By saying that tendency T based on A at t1 towards C at t3 was realized until B at t2 I mean that things carried on in accordance with the tendency until t2 when it had led to B. I say in this case also that the tendency was partially realized, or realized until t2.

There can be two tendencies at a time whose realizations are incompatible. There can be at t1 a tendency based on A towards B at t2 as well as a tendency based on P towards Q at t2 where B and Q are incompatible. The states of affairs meant by “P” and “Q”, e.g. the apple’s being at position r and the stone’s being at position r, cannot both come to be realized. In that case either one of the two tendencies overrides the other one so that one is realized and the other one not, or both tendencies together constitute a third one, a *resulting tendency*.

A resulting tendency is a special case of what I call a *complex tendency*. A complex tendency C is one whose basis has parts that are bases of tendencies that constitute C. A resulting tendency is a complex tendency that has constituent tendencies that are conflicting. A complex tendency that is not a resulting tendency has the following form. If A1(t1) is the basis of a tendency towards B1(t2), and A2(t1) is the basis of a tendency towards B2(t2) (where B1 and B2 are compatible), then A1 plus A2 is the basis of a complex tendency towards B1 plus B2.

If tendency T based on A at t1 towards B at t2 is realized then there is what I call a *direct process* leading from A to B, with A and B being stages of the process. A process is a kind of series of states of affairs,

which means that for each time between the beginning and the end of the process there is a state of affairs that is a stage of the process and the series, i.e. a state of affairs that includes everything that belongs to the process and the series at the time. *A direct process is a series of states of affairs each stage of which is the result of a tendency that is based on an earlier stage.* Each stage of it (except of course one with which the process ends) is the basis of a tendency the result of which every later stage is. Each stage is the basis of a tendency towards the later stages, and each stage before it is the basis of a tendency towards it.

An *indirect process* is a series of states of affairs each stage of which, or a part of the stage, and sometimes only a part of the stage, is the result of a tendency that is based on an earlier stage. By a part of a state of affairs I understand a state of affairs that, together with other states of affairs, constitutes it. Some stages of an indirect process have a part that is not the result of a tendency based on an earlier stage. Each stage of an indirect process (except one with which the process ends) is the basis of a tendency towards a later one or towards a part of it, and for each stage (except one with which the process begins) there is an earlier one that is the basis of a tendency towards it or towards a part of it. Consider, for example, a billiard ball rolling between  $t_1$  and  $t_3$  which you deflect from its straight line with your finger at  $t_2$ . There is an indirect process between  $t_1$  and  $t_3$  whose stage at  $t_1$  involves only the ball and parts of the table. The process is indirect because its stage at  $t_2$  has a part that involves your finger and that is therefore not the result of a tendency based on the stage at  $t_1$ .

About two states of affairs which are elements, or parts thereof, of the same process I say that they are *connected* (directly or indirectly) through a process.

Sometimes where there is an indirect process the situation can be re-described in terms of a direct process by taking in more states of affairs as parts of the initial stage of the process. Assume A1 and A2 are states of affairs at t1, B1 and B2 at t2, and C1 at t3. A1 is the basis of a tendency towards B1, B1 and B2 together are the basis of a tendency towards C1, A1 and A2 together are the basis of a tendency towards B1 and B2. In that case there is an indirect process with A1, B1 plus B2, and C1 as stages; and there is a direct process with A1 plus A2, B1 plus B2, and C1 as stages.

For two conflicting tendencies there is an earliest time at which the two tendencies point towards incompatible states of affairs. That is the point at which the processes following the tendencies form an *intersection*. So that two processes, following tendencies S and T, form an intersection at t is to say that S and T are towards states of affairs beginning at t which are incompatible, and all states of affairs earlier than t towards which S and T point are compatible.

When a tendency is being realized until some event occurs which is incompatible with an event at the same time towards which the tendency was directed, then I say that the tendency, or the process, was *interfered with*, or that something *intervened*. An intervention may occur because of a conflicting tendency, but also because a poltergeist, or whatever free agents you believe in, makes it occur.

## Causation

We can try to describe the mechanism that is at work in typical cases of causation. In certain cases where there are tendencies it is true to say that  $x$  caused  $y$ . Roughly,  $x$  was a cause of  $y$  if  $x$  was, or was a part of, a state of affairs which was the basis of a tendency towards  $y$  or towards a state of affairs of which  $y$  was a part, and the tendency was realized.

A state of affairs  $A$  at  $t_1$  was a *complete direct cause* (*indirect cause* respectively) of a state of affairs  $B$  at  $t_2$  if  $A$  was an element of a direct process (*indirect process* respectively) of which  $B$  was a later element. State of affairs  $A$  was a *partial*, as opposed to a *complete*, cause of state of affairs  $B$  if  $A$  was a part of a state of affairs  $F$  which was a part of a process of which  $B$  was a later element. By a cause I understand either a direct or an indirect, complete or partial cause. Speaking loosely one can also call a tendency that led to  $B$  “cause of  $B$ ”. Sometimes it is easier to identify a tendency rather than its basis because it is difficult to know which state of affairs exactly is the basis of the tendency.

One might object that my definition of causation is *circular* because I define causation in terms of a tendency being realized.<sup>9</sup> I reply first that as I assume that the concept of causation is simple I do not call the sentence with which I say what causation is a definition or a conceptual analysis but a description of causation. Second, even if it is taken as a definition it is not circular because in the definiens the concept of causation or the idea of bringing about does not occur. Neither the idea of a tendency nor the idea of a tendency being realized involves the idea of bringing about. Of course, I do not define

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<sup>9</sup> I owe this point to ...



causation in terms of actual events only. The tendency theory does what a non-Humean metaphysical theory of causation should do: it says something about the connection that exists in typical cases of causation. It identifies the phenomenon that underlies causation, namely tendencies, and specifies which occurrences of that phenomenon count as cases of causation, namely ones where a tendency is realized.

I only call particular states of affairs causes. In ordinary discourse as well as in science we sometimes also say things like “Smoking causes cancer”. Such generalisations have to be distinguished from claims about what a particular event was caused by. John’s cancer was not caused by smoking in general, it was caused by his smoking. Presumably “Smoking causes cancer” is true if some people’s smoking causes them to have cancer. However, I am concerned only with singular causation, i.e. causation between particular states of affairs.

There might exist tendencies of different strengths. A tendency can be deterministic or probabilistic. I understand by a *deterministic tendency* a tendency for which it is impossible that it is not realized, unless something interferes with it. That is, a deterministic tendency is one that necessarily will be realized if nothing interferes with it. The only possibility how it may fail to be realized is that something interferes. An *indeterministic*, or “probabilistic”, tendency is one where it is possible that it is not realized even if nothing interferes with it. For an indeterministic tendency it is possible that it is not realized without there being any intervention; it can fail to be realized just by chance. Indeterministic tendencies can be disjunctive, that is, they can be towards either A or, instead, B occurring at t<sub>2</sub>. A deterministic tendency can be said to have strength 1. The strength of indeterministic tendencies can be described with numbers be-

tween 0 and 1 corresponding to the probability of outcomes in situations where nothing intervenes.<sup>10</sup>

A process is a deterministic process if and only if all tendencies that are constitutive of it (i.e. the tendencies leading from one stage of the process to another) are deterministic tendencies. A process is a probabilistic process if and only if some of the tendencies that are constitutive of it are probabilistic.

A is a *deterministic cause* of B if and only if A is a cause of B and A and B are connected through a deterministic process. I call A a *probabilistic cause* of B if and only if A is cause of B and A and B are connected through a probabilistic process.

An *uncaused event* is an event that occurs not as the result of a tendency nor as the result of the free choice of an agent. Presumably an uncaused event cannot occur where it would conflict with a tendency. It can occur only in an area of reality where there are no tendencies. So where an uncaused event U occurs there was no tendency towards U nor towards an event which is incompatible with U. There may well be no uncaused events, but we can make sense of the idea.

## **Dispositions, powers, liabilities**

There has been a revival of the Aristotelian view that things have among their intrinsic properties *powers and liabilities* (or disposi-

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<sup>10</sup> Tendencies differ here from Popper's "propensities" (Popper 1959, 1974). Popper describes the strength of a propensity with a number between 0 and 1 which describes the relative frequency of how often the propensity is realized. I object that this is inadequate because of the possibility of intervention. The strength of a tendency corresponds to the limiting relative frequency only for a reference containing only cases where nothing intervenes.

tions, as they are also called). (Harré & Madden 1975) as well as (Swinburne 1997) have argued that causes are not events but individual things that have powers and liabilities. Similarly (Mumford 1998) and (Molnar 2003) have argued that powers of things belong to the basic constituents of the world.<sup>11</sup>

The main difference between these theories and the tendency theory is that tendencies are based not on things (substances) but on states of affairs. I do not say, in the example mentioned above, that the rock has a tendency to break the window, but that there is a tendency, based on a state of affairs involving the rock but other things as well, towards the breaking of the window. Because usually the factors relevant for a tendency are not all in one thing and not all properties of a thing are relevant for the tendency.<sup>12</sup>

However, we can accommodate dispositions in the tendency theory. By saying that a concrete object *x* has a certain disposition I mean that *x* is such that under certain circumstances there would be a certain tendency whose basis is a state of affairs that involves *x*. Thus, a portion of dynamite has a disposition to explode because under certain circumstances, e.g. if brought close to fire, it would explode, i.e. there would be a tendency towards an explosion (increased air pressure etc.) whose basis is a state of affairs involving the dynamite.

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<sup>11</sup> A helpful discussion of dispositions is (Lowe 2001). (Katzav 2005) argues that dispositions are incompatible with all contemporary conceptions of laws of nature.

<sup>12</sup> Tendencies are ascribed to things for example by (Johansson 2004, ch. 11) and (Champlin 1990). Another theory of causation with states of affairs as causes is (Armstrong 1997, ch. 14). My own ontology does not have substance as a basic category (see [author's article and book]).

## Forces are a kind of tendency

One may object that one does not understand what a tendency is or that we know nothing about them. Fortunately there is a kind of tendency about which we know quite a lot: Newtonian forces. A force acting upon an object is the same as there being a tendency towards that object being at certain positions at certain later times. If the tendency is realized, then the object actually moves according to the tendency. But the tendency may remain unrealized, for example because of other forces acting upon the object. So forces are a kind of tendency. They are tendencies that concern the position of an object. Other tendencies concern other changes (or non-changes) than changes of position.

The tendency theory of causation also gives us a theory of causal laws of nature (which I shall develop in detail elsewhere). Causal laws of nature say what tendencies there are in what kinds of situations. The law of gravity, for example, tells us that there is a certain force when two things having certain masses are at a certain distance from each other. There is a debate what laws involve besides regularities, but there is a wide agreement that they do involve regularities, i.e. that they say what kind of event is *always* followed by what kind of event.<sup>13</sup> They say something of the type “All Fs are G” or “All Fs are followed by G”. But this is not true, because what actually happens depends on what other factors there are in the situation. All sorts of things may intervene and counteract, e.g. other forces or, say, ghosts.

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<sup>13</sup> E.g. David Armstrong, although he strongly rejects the regularity theory of laws, assumes in his *What is a Law of Nature?* that laws have the form “It is a law that Fs are Gs” (Armstrong 1983, 77). However, later in the book he considers the possibility of “oaken” laws. If  $N(F,G)$  is an oaken law, then it does not entail that all Fs are G, but only that ‘all uninterfered with Fs’ (149) are G.

John Stuart Mill, wrote therefore in 1872: “All laws of causation, in consequence of their liability to be counteracted, require to be stated in words affirmative of tendencies only, and not of actual results.”<sup>14</sup> It is time to abandon theories that do not take this into account.

### **Causes are not sufficient for their effect**

This possibility of being “counteracted” is also the reason why causes are not sufficient for their effects. Many authors hold that a deterministic cause taken together with the “circumstances” and the laws of nature is sufficient for its effect.<sup>15</sup> But that is not true. If one billiard ball rolls at time t1 towards another one, then it will hit the other one at t2 unless something intervenes, but it is possible that something intervenes between t1 and t2. Other billiard balls, cats, ghosts or who knows what may intervene. If A at t1 was the complete cause of B at t2, then it could have happened that A occurs and B fails to occur; that is, the occurrence of A does not exclude the non-occurrence of B. B “could have” failed to occur not just in the sense of logical possibility but also in any ordinary sense of “could have”. “A caused B” entails that A and B occurred, but this does not mean that a cause necessitates its effect. Packing more circumstances into “A” does not help the believer in causal sufficiency: the world could have gone exactly as it did till some time after t1 and before t2, and still B could

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<sup>14</sup> (Mill 1872, p. 445), quoted in (Cartwright 1989, 177). Cf. (Cartwright 1980) and (Champlin 1990, 120).

<sup>15</sup> Mellor, for example, thinks that there are causes which are in this sense ‘sufficient’ for their effects. He writes: ‘By causes that determine their effects I shall mean ones that are in the circumstances both sufficient and necessary for them.’ (Mellor 1995, 133) Similarly (Hausman 1998, 33). Cf. also (Swinburne 1994, 52) and (Bigelow and Pargetter 1990, 290).

have failed to occur because something intervened before  $t_2$ . Even keeping the laws fixed does not help: B could have failed to occur even though A occurred and the laws never changed. What is impossible is that B does not occur even though A occurs, the laws do not change, and nothing intervenes. Whether something intervenes depends on whether there are things around that can and do intervene, for example non-living things, animals, ghosts, gods, etc. That nothing intervenes is therefore not a fact about the nature of the cause, and therefore it is in no sense true to say about a cause that it is sufficient for its effect.

You may reply that I am using the wrong sort of modality here and that a complete cause is “causally sufficient” for the effect. But it would be arbitrary to use “sufficient” in this sense. One may use “causally sufficient” for what is sufficient given that the laws of nature do not change, but if A caused B, then B could have failed to occur even though A occurred and the laws of nature did not change. We should stop saying that causes are sufficient for (or “necessitate”) their effects.

### **“Cause” is a success term**

According to the tendency theory tendencies are in a certain sense ontologically more fundamental than causation. Tendencies are that which is at work in every case of causation. The realisation of tendencies is the mechanism through which an effect is brought about by its cause. But not every tendency is a case of causation; not every tendency can make a causal claim true. If A is a deterministic tendency towards B but something prevents B from occurring, then A is the basis of a tendency towards B but A is not a cause of B. There can be tendencies that are not realized, not even partially. We use the

term “cause” to refer to cases where a tendency is realized. It is what we may call a *success term*. When we say “A caused B”, part of what we claim is that A and B occurred. “Cause” is a success term because it refers to a certain phenomenon and singles out only some cases where the phenomenon occurs, cases where there is “success”.<sup>16</sup> An adequate metaphysical theory of causation will identify this phenomenon and describe it. According to the tendency theory, this phenomenon that underlies causation are tendencies. As I have argued above, the fact that by “A caused B” we imply that A and B occurred should not mislead us to think that somehow a cause is sufficient for its effect.

### **Active versus permissive causes**

The tendency theory of causation allows for an adequate distinction between active and permissive causes. Sometimes we say things like “Ball A fell into the pocket because ball B, which was close to hitting A, just missed A”. According to the definition of a cause that I have given above B’s not hitting A is not a cause of A’s falling into the pocket, because no state of affairs involving ball B is part of a state of affairs that is the basis of a tendency towards A falling into the pocket. What I have defined above as a cause can also be called an “active cause”. We can call B’s not hitting A a “permissive” (or

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<sup>16</sup> In the same sense it is sometimes said that “perceive” is a success term. Someone who says “John perceived that p” implies that p. But Peter may be in a mental state exactly similar to John’s although p is false. We may say then that Peter and John have the same “perceptual experience”. “Perceive” is a success term because it refers to perceptual experiences and singles out only some cases of them, namely cases where things are as represented in the perceptual experience and where the object of the perception caused the experience.

“negative”) cause of A’s falling into the pocket. To say that x was y’s permissive cause is to say that, had things been in a certain way different, then, instead of y, some other state of affairs would have been caused. So the tendency theory of causation does justice to the intuition that there is a difference between active and permissive causation.

## Processes

According to the tendency theory two events are causally related if they are different stages of the same process. And a process is not to be defined as a series of events that are connected through causal relations – it is not defined as a “causal chain” – but in terms of tendency. One can in this sense say that, according to the tendency theory, processes are more basic than causal relations. There cannot be causally related events that are not connected through a process. Tendencies are about how things carry on. Where a tendency is realized there is a process. A stage of a process, then, can be called cause of a later stage. For it to be true that A caused B things must have carried on after A in a certain way, following the tendency of which A was the basis. So I agree with John Venn who said in 1866: “Substitute for the time honoured ‘chain of causation’, so often introduced into discussions upon this subject, the phrase a ‘rope of causation’, and see what a very different aspect the question will wear.”<sup>17 18</sup>

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<sup>17</sup> John Venn, *The Logic of Chance* (London, 1866), 320, quoted in (Salmon 1980, 171).

<sup>18</sup> Let me mention the contemporary approaches that are closest to the tendency theory and how they differ from it. Alfred Freddoso’s theory of “natural necessity” (Freddoso 1986) has much in common with my view. However, one difference is



## Counterfactual theories

Let us now confront the tendency theory with two contemporary approaches to causation which both attempt to reduce causation to something else, the counterfactual analysis and the probabilistic analysis. Rather than raise objections against these theories I want to argue that they do not support the view that there are no causal connections.

David Lewis's counterfactual analysis of causation follows Hume's suggestion that "we may define a cause to be an object followed by another, and where [...], if the first object had not been, the second never had existed". Simplified, it says for two events A and B where A immediately precedes B: A is a cause of B if and only if A and B occur and  $\sim A \boxtimes \rightarrow \sim B$ . (Lewis 1973) ' $\sim A \boxtimes \rightarrow \sim B$ ' is spelled out in terms of possible worlds as: some world in which neither A nor B

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that he says of the world that it has a certain tendency but not of events or states of affairs (p. 225). Another difference is that he thinks that a deterministic tendency can only be impeded by "free causes" (p.225), not by other processes. A third difference is that he says of an event that occurred as the result of a deterministic tendency that it occurred "by natural necessity". I reject the view that a cause necessitates its effect. Karl Popper, in his *World of Propensities* (1990), proposes to understand causation in terms of propensities. Causation, for him, is "just a special case of propensity: the case of a propensity equal to 1, a *determining* demand, or force, for realization" (p. 22). For Hugh Mellor (1995) a cause raises the "chance" of the effect. Both Popper and Mellor assume that a propensity of the strongest sort, one with strength 1, entails or necessitates the effect; it cannot fail to be realized. "The existence of the cause ensures [...] that its effects also exist." (Mellor 1995, 13). I have argued that there are no such propensities and no such causes. Every causal process can be stopped if there is something strong enough to stop it. This I object also to Richard Swinburne's (Swinburne 1994, ch. 3) theory, which is (like Harré and Madden 1975) is based on powers of substances. He understands "by a full cause one whose active causal operation is sufficient for the production of the effect" (p. 52).

occur is closer to the actual world (in which A and B occur) than any world in which B but not A occur. How close one world is to another is a matter of the over-all similarity between them.

Much has been written about possible counterexamples to Lewis's analysis.<sup>19</sup> Instead of looking at these I want to consider whether the counterfactual analysis entails, or supports the view, that there are no causal connections. Lewis assumes it does: he takes it to be in line with his metaphysical doctrine of "Humean supervenience", i.e. the view that "all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another" (Lewis 1986, ix-x) and that hence there are no causal connections and no tendencies.

Why does Lewis think that his analysis supports Humean supervenience? He assumes that in metaphysics one finds out what exists through investigating, by conceptual analysis and transforming statements, what "existential quantifications" and hence "ontological commitments" certain statements contain. If causal beliefs commit one to causal connections one should believe in them, but if one can transform causal statements or replace them by other statements, then one should not believe in them. Lewis's analysis mentions only arrangements of qualities in worlds and similarities between worlds, and no causal connections, hence according to the analysis beliefs about causings do not commit one to believing in causal connections. Therefore Lewis takes his analysis to support Humean supervenience.

To this I object that Lewis uses the wrong method for finding out whether there are causal connections. In order to support Humean supervenience one would have to defeat the evidence for causal con-

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<sup>19</sup> For the most refined version of the counterfactual analysis see (Lewis 2000).

nections; for example, one would have to provide an explanation for the success of predictions and for the regularities. Further I shall argue now that the existence of causation according to Lewis's analysis is compatible with the existence of causal connections, such as tendencies. It even requires it and is hence incompatible with Humean Supervenience. Let me explain.

According to Lewis's theory, if A caused B, and A immediately precedes B, then some non-A-world in which B does not occur is closer to the actual world than any non-A-world in which B does occur is. But if Humean supervenience is true then, plausibly, the closest non-A-world is the world that is just like the actual world except that A does not occur in it (call this world "Actual-Minus-A"). In that world B occurs. Therefore, if Humean Supervenience is true, then, according to the counterfactual analysis, there are no cases of causation.

Lewis wants to avoid this conclusion by saying that in Actual-Minus-A there are different laws of nature and that "similarities in matters of particular fact trade off against similarities of law" (Lewis 1973, 163). But according to Humean Supervenience laws are nothing over and above the occurrence of certain events. It is therefore more plausible to assume that they also do not make a difference to the order of similarity between worlds other than through the occurrence of the events that fall under the law. Lewis needs to assume that there exists something, over and above "local matters of particular fact", which makes a non-A-world in which B does not occur more similar to the actual world than Actual-Minus-A. He needs truthmakers for causal counterfactuals.

Tendencies are a good candidate for being these truthmakers. If the actual world contains tendencies and A caused B, then there is no possible world that is just like ours except without A; because if you

take away A from the actual world you also take away the tendency towards B and therefore B does not occur in the non-A world (except in cases of overdetermination or preemption). I conclude that the counterfactual analysis is compatible with the tendency theory and even requires tendencies as truthmakers for causal counterfactuals. Approaching the question whether there are causal connections through the ontological commitment method, Lewis takes the counterfactual analysis to be in line with Humean supervenience. Rejecting this method I have argued that the counterfactual analysis not only does not support Humean Supervenience but even, together with the assumption that there are cases of causation, is incompatible with Humean Supervenience.

### **Probabilistic theories**

According to probabilistic theories of causation a cause raises the probability of its effect. The statement “A caused B” is analyzed as “ $P(B|A) > P(B|\text{not-}A)$ ” with some further complicated clauses added to take some counterexamples into account.<sup>20</sup> Causal talk is reduced to talk about probabilities. Would the success of such a theory support the view that there are no causal connections? I think not. A successful probabilistic definition of a cause would pick out correctly the pairs of events which can be truly said to be cause and effect by describing how they fit into the pattern of the world, i.e. by describing how often and under which circumstances events of the one type are followed in a certain way by events of the other type. But then the question arises whether these pairs of events have something in common over and above the fact that they fit in a certain way into

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<sup>20</sup> For a refined version of such a theory see (Eells 1991) and (Kvart 2004).

the pattern of the world. Should we assume that there is an explanation why events of type A in certain circumstances are often followed by events of type B? It is very unlikely that there would be such regularities if there were no causal connections and if occasionalism were false. The tendency theory offers an explanation that is an alternative to occasionalism. Of the pairs of events which a successful probabilistic theory would pick out one is the basis (or a part thereof) of a tendency towards the other, and similar events are the basis of similar tendencies. That explains why the relative frequencies in some cases are as described in the probabilistic definition. If there are pairs of events that are according to the probabilistic definition cause and effect, then we have reason to believe that there are tendencies. Rather than showing that there are no tendencies, the probabilistic definition describes what would constitute evidence for the existence of tendencies.

Both, the counterfactual analysis and the probabilistic analysis, on the basis of the method of ontological commitment, are supposed to support the view that there are no causal connections. Rejecting this method, however, I have argued in both cases that if the definitions ever apply then there is evidence for the existence of tendencies.

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