

# De Facto and De Jure Dependence

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## Abstract

A prominent philosopher of science finds inspiration in Plato for a new theory of causal dependence, which he calls “de facto dependence”. He reminds us that Socrates distinguishes between a cause and that without which a cause would not be a cause, and he argues that the that without which, to use a shorter locution, is a cause maker. I wish to argue that the that without which enables us only to distinguish causal dependence of two kinds, which I call “de facto dependence” and “de jure dependence.” With an application of Mill’s methods, I nonetheless show that there are de facto and de jure cause makers, and that de facto cause makers can be of two kinds.

## 1. Introduction

Analytic philosophy is no longer as chauvinistic or isolationist as it once was! A prominent philosopher of science now takes inspiration from Plato for a new theory of causal dependence, which he calls “de facto dependence.”<sup>1</sup> Unfortunately, this new theory, despite its initial persuasiveness and obvious sophistication, runs counter to some ordinary intuitions of ours, less sophisticated perhaps but equally persuasive.<sup>2</sup> I wish to suggest with the present essay that the inspiration is well taken, but that the theory in question overlooks a crucial distinction about causal dependence. Causal dependence, we shall see, is of two varieties. These varieties I hereby dub “de facto dependence” and “de jure dependence.”

I wish to argue, more specifically, that Plato has indeed hit upon an important fact about causality, but that this fact is not what one might initially think it to be. Socrates in the *Phaedo* famously distinguishes on the last day of his ill-fated career between a cause and that without which a cause would

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<sup>1</sup> Yablo (2002), where he broaches the topic; and Yablo (2004), where he expands on the topic.

<sup>2</sup> Francis Longworth offers numerous counterexamples. See Longworth (2005).

not be a cause.<sup>3</sup> The that without which, to use a shorter locution not uncommon in the Greek, cannot be a cause maker de facto or de jure in any usual sense. The that without which enables us only to distinguish de facto from de jure dependence.<sup>4</sup> But with an application of Mill's methods, I shall show that there are de facto and de jure cause makers, and that de facto cause makers can be either of two kinds. These two kinds, I would urge, we must take care not to confuse with the that without which and not to conflate with each other.

## 2. The That Without Which

Let us begin our analysis with a closer look at the passage in the *Phaedo*. I intend to use the passage to explicate, albeit briefly, Plato's concept of causality and to show how his concept, despite its antiquity, can shed a new and interesting light on the modern concept of causality, which we are more accustomed to employ. I shall then be able to advance our understanding of causal dependence, both de facto and de jure.

We might best see how Socrates conceives of a cause if we consider an example that he himself uses to explain what a cause is. The primary example that he offers is his own action, or rather his inaction, in his prison cell on the day of his execution. He introduces the very distinction between a cause and that without which to explain why he does not make an attempt to escape from his cell but chooses instead to remain on death row and to accept his fate.<sup>5</sup>

To explain why he remains, Socrates distinguishes true causes from causes apparently false. The true causes of his remaining in his cell are, he informs us, that the Athenians believe to condemn him to be better, and that he believes to accept their condemnation to be better.<sup>6</sup> The false cause of his staying is his body with its bones and sinews and its muscles and skin. With their contractions and extensions, his sinews might, he concedes, seem to bring about his posture of sitting on his bed with his legs hanging down.<sup>7</sup>

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<sup>3</sup> Plato (1914b, p. 99b). For present purposes I assume no relevant philosophical differences between Plato and Socrates in the dialogues.

<sup>4</sup> Compare Yablo (2002, pp. 131-132); also Yablo (2004, pp. 119-120).

<sup>5</sup> Socrates offers a second example, which is his discussion of philosophy in his cell with his friends (*Phaedo* 98d-e). But I omit it because it is amenable to the same analysis.

<sup>6</sup> Plato (1914b, p. 98e).

<sup>7</sup> Plato (1914b, p. 98c-d).

Socrates explains to his companions that one must distinguish what a cause is from that without which a cause, presumably a true one, would not be a cause.<sup>8</sup> The causes of doing what he does, he rather clearly implies, are his understanding and his choice of what is best.<sup>9</sup> The that without which is his body and its organs. He could not do what he does without his bones and sinews, he admits. But, he argues, these organs cannot be the causes of his actions. If they were, they would long ago have carried him off to Megara or Boeotia because of their opinion of what is best.<sup>10</sup>

What does he mean? We might perhaps best view the distinction between a cause and the that without which as a distinction between form and matter, to use more traditional terminology. After all, what Socrates chooses is a form that, through his own efforts, he can impose on his body. His intention is, before he acts on it, a form that his body can have, and his remaining seated, after he acts, is a form that his body does have. His intention thus becomes embodied or, one might say, enmattered. The that without which, then, is the matter within which a form can come to exist. In this instance the matter is a human body with its various organs.<sup>11</sup>

I would point out, however, that a cause becomes fully a cause only if and when it has its effect. True, a cause can be actual in one sense without having an effect. It does exist. Socrates may formulate an intention and choose to stay in his cell. But is a cause fully a cause if it has not had an effect? I think not. A cause is more fully actual and actual in another sense only if and when it brings about its effect. It then exists as a cause *bona fide*, we might say. Socrates must not only choose to act on his intention but also be able to act on it.<sup>12</sup>

Perhaps we might more obviously distinguish between a potential cause and an actual cause. A potential cause, actual in the first sense, has not yet had an effect, but an actual cause, actual in the second sense, has had an effect. In other words, a potential cause has a that without which, but its effect does not yet have a that without which. An actual cause and its actual

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<sup>8</sup> Plato (1914b, p. 99b).

<sup>9</sup> Plato (1914b, p. 99a-b).

<sup>10</sup> Plato (1914b, p. 98e-99a).

<sup>11</sup> Form and matter are relative terms, of course. Our body with its organs is also a form imposed upon matter less organized, such as tissues of various kinds, and these tissues in turn are forms for matter in other varieties, such as cells and their organelles, and so on down.

<sup>12</sup> Philosophers have traditionally distinguished actuality in these two senses as first and second actuality.

effect both have a that without which. A cause and effect, when both are actual, are, in other words, both enmattered.

I concede that Socrates presents a concept of causality that has fallen out of favor and seems antiquated even to some Plato scholars. His concept is what we would today call a teleological cause. Socrates explains that he understands what is better in his unfortunate situation, and that he chooses to act for what he takes to be better. The concept even appears anthropomorphic when applied to events other than human actions. His suggestion, perhaps humorous, that his bones and sinews might have their own opinion about what is best, would surely carry the implication that it is.<sup>13</sup>

A teleological cause we most often think of as an explanation for a change in substance. That is, a teleology purports to explain why a thing comes into existence and why it goes out of existence. Indeed, Socrates relates that he read Anaxagoras with great eagerness because he had the mistaken impression that Anaxagoras in his theory employed understanding as a cause to explain the existence of all things.<sup>14</sup> He in fact advances his own concept of teleology, in part at least, to explain changes of this kind.<sup>15</sup>

But Socrates also uses his concept of a cause, though teleological, to explain a change that is not a change of substance. His very example of staying in his cell concerns a change of place or, more explicitly, motion and rest. His understanding and his choice are, he asserts, the causes that explain why he remains and accepts his execution. His understanding forms his intention, and his intention is his end of staying and dying. His choice obviously brings about his intended end.

That this ancient concept of causality is teleological is not particularly relevant for our purposes, however. Especially when applied to motion and rest, this teleological concept very much resembles our modern mechanical concept. There is an antecedent or cause, and there is a consequent or effect. The antecedent for Socrates is the choice to act on his intention to remain in his cell and to accept a death penalty, and the consequent for him is to stay

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<sup>13</sup> Wiggins agrees that the concept is teleological. He argues that Socrates uses understanding and choice as a model to explain physical motion. See Wiggins (1986, esp. p. 10).

<sup>14</sup> Plato (1914b, p. 97b-98b).

<sup>15</sup> Plato (1914b, p. 95e-96a).

and ultimately to drink the hemlock. His choice keeps him where he is and eventually results in his death, despite the efforts of his friends.<sup>16</sup>

We might think of the antecedent merely as a vector. That is, we may view the antecedent as a form that is potential and the consequent as a form that is actual. Socrates' example can serve once more. His belief that to stay and to accept a death penalty is better, is a potential cause. His belief is merely an intention or a concept only. But his choice to remain in his cell and to die is a cause become actual when he stays and drinks the poison. His concept of remaining and dying becomes enmattered in his body.

We might say, then, that Plato's distinction between a cause and that without which is a distinction between a form and its matter. A cause is actual in one sense when it has a that without which. It has a potentiality that is actual. But a cause cannot be actual in another sense unless and until its effect also has a that without which. It then has a potentiality that is actual in its effect.

### **3. Causality De Jure and De Facto**

We are now prepared to distinguish de facto and de jure causation. To do so, let us consider an example recurrent in the literature involving two characters named Suzy and Billy. These characters are apparently juveniles with a delinquent tendency. They like to break windows by throwing rocks at them. To simplify for the moment, we shall consider only Suzy, who appears to have a quicker arm than Billy. Though they both throw, she always throws her rock slightly before he throws his.

What happens in the example? Simply put, Suzy picks up a rock and throws it at a window. Her rock strikes the window, and the window breaks. What is the cause of the broken window? The cause is obviously the thrown rock.<sup>17</sup> If the rock had not been thrown, the window would not have been broken. What is the that without which? The that without which is both the

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<sup>16</sup> The consequent in this example is more obvious when we make the death penalty explicit, because to stay in his cell is inaction, but to drink hemlock is action. But by extending it we have also transformed our example from one of remaining at rest into one of destroying a substance. By his action Socrates ceases to exist.

<sup>17</sup> Or, at least, the cause most proximate is the thrown rock. A dare, perhaps, the intention to throw, a glance at the rock on the ground, or the rock in hand would be less proximate causes. Similar analyses would apply to these more remote antecedents, but these analyses would present needless complications for our purpose.

rock and ultimately the window.<sup>18</sup> If there were no window, the rock would have ever remained a potential cause and would never have become an actual cause. Why? Its effect would not have been embodied. The rock becomes an actual cause only if and when the window breaks.<sup>19</sup>

I should point out that this example of breaking a window does exhibit an undeniable, but inessential, difference from the example of staying in place. In the present example the cause and the effect occur in different objects. The rock is one thing, and the window another. The rock has its effect not on itself but on the window. In the previous example the cause and effect occur in the same object. They both are in the same person. Socrates chooses to stay in his cell, and stay he does.

De jure causation is, I wish to contend, that an antecedent precedes a consequent as a general law. A general law, familiar to all since childhood, is that a rock, if thrown with sufficient accuracy, causes a broken window. This law is admittedly not terribly general, not even as general as the laws of physics found in high school textbooks. The antecedent of this law applies to all throwable rocks of sufficient heft. These rocks would include Suzy's rock as well as Billy's. The consequent applies to all ordinary, frangible, windows successfully thrown at. These windows would be all those broken.

De facto causation is that a given antecedent precedes a given consequent as a particular fact. Suzy's rock causes the broken window in question. Billy's rock, though thrown, does not. What is the difference between Suzy's rock and Billy's rock? Suzy's rock has an effect that is enmattered. Its matter is the that without which. Without an enmattered effect, Suzy's rock would be only a potential cause de facto. But Suzy's rock is an actual cause de facto as soon as its effect materializes. Billy's rock remains a de facto potential cause.

We now see how de jure causation differs from de facto causation. De jure causation is an abstract connection, which can be more or less general. But causation de facto is a here-and-now connection, which can be only particular. Consider a neoclassical example. A de jure causal relationship

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<sup>18</sup> Again, the window is the most proximate that without which. A less proximate that without which would be the glass pane or simply glass.

<sup>19</sup> Recall our distinction between first and second actuality. The rock, when thrown, is an actual cause in the first sense, and it becomes an actual cause in the second sense when it breaks the window.

would be the law that bread nourishes human beings. That this loaf nourishes me is a de facto causal relationship.<sup>20</sup>

We might also note that a de jure connection can hold with unexceptional necessity, at least as far as we presently know. It simply does not appear to admit of a single exception. But a de jure connection can also hold with probability, which can be greater or lesser. It appears to have exceptions, which can be few or many.<sup>21</sup>

A de facto causal connection can be only probable, however. But are not some de jure connections necessary? you may ask. How can their de facto counterparts be only probable? Any particular causal connection, I would answer, can always encounter other particular causal connections. These various connections can intervene, they can contravene, or they can subvene, as we shall see.

#### **4. Dependency De Jure and De Facto**

But does our distinction between de facto and de jure causation enable us to distinguish de facto from de jure causal dependence and eventually to explain de facto dependence? I am about to argue that it does. As is de jure causality, so is de jure dependence abstract and general. De jure dependence is merely our conception of the necessity or the probability in a connection between a cause and an effect. In other words, its cause and effect are not actual because they have no that without which. The dependence of an effect on its cause is not enmattered. The dependence is a general matter of fact, we might say, which holds in our concept of it.

As is de facto causality, so, too, de facto dependence is particular and concrete. De facto dependence is our perception of the necessity or the probability in a given connection between a given cause and effect. In other words, its cause and effect are actual because each does have a that without which. The dependence of an effect on its cause is enmattered. The dependence is a particular matter of fact, which holds in our percept of it.<sup>22</sup>

Consider the example of Suzy again. Thrown rocks are de jure causes of broken windows. Broken windows depend de jure on thrown rocks, though

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<sup>20</sup> Compare, e.g., Hume (1975, pp. 32-34). In this passage Hume is concerned to show that this very distinction gives rise to the problem of induction.

<sup>21</sup> See, e.g., Hume (1975, pp. 57-59).

<sup>22</sup> The distinction between general and particular matters of fact I borrow from Hume. He uses it to differentiate the moral sciences. See Hume (1975, pp. 164-165).

not on this cause alone.<sup>23</sup> But de jure dependence does not tell us whether a de facto cause exists or whether a de facto effect exists. True, a thrown rock can break a window. But did anyone throw a rock? Was any window struck? We have no way of knowing de jure.

But Suzy's rock at a given time and place is the de facto cause of a broken window at a given time and place. This broken window de facto depends on her thrown rock. If she had not thrown her rock then and there, Suzy would not have broken this window when and where she did.<sup>24</sup>

I would now compare this concept of de facto dependence with the concept recently presented in the new theory inspired by Plato. In the theory Stephen Yablo uses the example of Suzy and Billy to explain de facto causal dependency. He agrees that Suzy's rock is the de facto cause of the broken window, and that Billy's rock, though thrown, is not the de facto cause. He argues that the broken window depends solely on Suzy's rock. If Suzy had not thrown, the window would not have been broken. But why is her rock the cause? He states that her rock is the cause because Billy's rock does not hit the window. We must hold fixed, he claims, the fact that Billy's rock does not hit its mark.<sup>25</sup>

Citing the *Phaedo*, he explains why he takes the broken window to depend on Suzy's thrown rock alone. Billy's rock, he argues, is not a cause but a that without which. His rock does not contribute to breaking the window, but it does make something else the cause of the broken window. His rock is a cause maker, he claims. It makes the broken window depend on Suzy's rock. The fact that Billy's rock does not strike the window puts the broken window in need of Suzy's rock.<sup>26</sup>

Obviously, the crucial difference between this analysis of de facto dependence and our analysis lies in the concept of the that without which. On our analysis the that without which is the that within which a cause exists. A de jure cause becomes a cause de facto only if and when it is enmattered.

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<sup>23</sup> I assume for the sake of simplicity no other causes of broken windows. But other missiles, for example, can easily break windows. Errant baseballs and BB's spring immediately to mind.

<sup>24</sup> We might put these conceptions of de jure and de facto dependence more formally. Let upper-case letters represent a de jure cause and effect, and lower-case letters a de facto cause and effect. Then, (DJ)  $C$  is a cause of  $E$  iff  $E$  depends on  $C$ ; and (DF)  $c$  is a cause of  $e$  iff  $e$  depends on  $c$ . Compare Yablo (2002, p. 138); or Yablo (2004, pp. 126-127).

<sup>25</sup> Yablo (2002, p. 130).

<sup>26</sup> Yablo (2002, p. 131).

Socrates, for example, cannot remain seated on his prison bed and accept his sentence without his body and its organs.<sup>27</sup>

The intention to acquiesce in a court sentence, I would argue, and the choice to do so are merely causes de jure unless and until someone accepts the intention and makes the choice. The intention and choice are then causes de facto. Any person who has been condemned can embody these de jure causes and make them causes de facto, though apparently not all do so with equanimity.<sup>28</sup>

Socrates himself implies that intentions and choices are causes de jure. In his defense at his trial he is good enough to caution his fellow citizens that they cannot do away with his philosophical career as a de jure cause. However much they may wish, they will find themselves unable to escape the philosophical questions that he is accustomed to ask of them. Why? He explains to them that, even if they execute him, others will soon arrive to take his place and to perform his philosophical function.<sup>29</sup>

Socrates would thus suggest that a de jure cause, such as a philosophical function, is an immortal cause, if you will allow the linguistic license. Indeed, his cause lives on to this very day. But, unfortunately, his plea falls on deaf ears. His accusers and jury apparently think that they can rid themselves of his de jure cause merely by doing away with its that without which. They were quite pleased to dispense with him as a de facto cause when they condemned him and executed him.

Similarly, I would argue that no juvenile can throw a rock at a window without a body and its organs and without a rock to throw. The intention to throw a rock and to break a window and the choice to do so are again causes de jure unless and until someone accepts the intention and makes the choice. The intention and choice then become causes de facto. They become causes de facto whoever picks up a rock and breaks a window with it. Any person, juvenile or not, can succumb to the temptation, though adults usually do not. The perpetrator can be either Suzy or Billy.<sup>30</sup>

On the other analysis a cause would appear to be a cause de facto only if and when another cause fails. The that without which is apparently a cause

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<sup>27</sup> Plato (1914b, p. 99a).

<sup>28</sup> Plato (1914b, pp. 116e-117a).

<sup>29</sup> Plato (1914a, p. 39c-d).

<sup>30</sup> I assume intentionality in at least the second degree, to use a legal term. This assumption has the advantage of a more ready comparison of Socrates with Suzy. But a similar analysis would still apply to Suzy, *mutatis mutandis*, if she threw without intention, say in anger.

that has no effect. How might this concept of a that without which apply to Socrates? I am not entirely sure. Socrates clearly implies that he considers the that without which to be his body.<sup>31</sup> But he also clearly asserts that his body is not the cause of this action. He informs us that, if they were the causes, his bones and sinews would have been long gone for Megara or Boetia.<sup>32</sup> His body apparently would desire nothing more than to save its skin.

Could he mean that his body is not be the cause of his action because it is a cause that failed? If so, the that without which would indeed appear to be a failed cause. But Socrates rules out this possibility, too. The that without which is ultimately not a cause at all, he contends. His disappointment with Anaxagoras and his colleagues arises because they think not that a power, which he thinks to be good, places things where they are, but that matter does. They think that a whirlwind or an air layer keeps the earth below the heavens, for example.<sup>33</sup>

Admittedly, Socrates has a geocentric rather than a heliocentric view of our planetary system. But this detail aside, his etiological point is clear enough. I take him to argue that a cause, or power, is a form that can have an effect on matter. Consider, for example, a modern physical cause. Gravity is a field, I understand, and a field is a cause that has an effect one cannot account for with mechanical causes. Gravity is thus a formal power that keeps the earth and the other planets in their elliptical orbits. That it does so is probably a good thing, I would add.

Or consider Suzy and her rock again. Could Suzy's rock be the cause of the broken window? Not all by itself. The cause of the broken window is rather a form that Suzy imparts with her intention and choice to throw the rock. The rock, left by itself, would have remained inert upon the ground. It is merely a that without which. Suzy makes her intention and choice the de facto causes of the broken window when she picks up the rock and throws it. Her intention and choice become enmattered. But she would find that any rock, if of sufficient weight and proximity, would suit her purpose equally well.

Perhaps the other analysis might require that Socrates cannot sit in his cell and await his execution unless and until someone else does not. But this interpretation is far-fetched and unlikely. I would ask, Must one de facto

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<sup>31</sup> Plato (1914b, p. 99a-b).

<sup>32</sup> Plato (1914b, p. 98e-99a).

<sup>33</sup> Plato (1914b, p. 98b-c, 99b-c).

cause succeed only if another de facto cause fails? Could Socrates choose to remain in prison only if another prisoner fails to remain? Cannot someone accept a court judgment without another defendant being acquitted or another prisoner escaping? Surely, Socrates could choose to remain in prison even if there were no other prisoners. As far as we know, he in fact did.

Could not Suzy, too, have acted on her own? Cannot Suzy pick up a rock and throw it and break a window without someone else attempting and failing to do so? Simply put, Suzy could have thrown a rock and broken the window even if Billy had not thrown. She could have broken the window if he had merely bent down and had not yet picked up a rock. Or if he had stood idly by, or if he was not even present.

More remains to be said, obviously. Why might one think that Suzy's rock is the de facto cause of the broken window because Billy's rock passes through the empty window frame? To see why this proposition might seem plausible, we shall have to delve deeper into an analysis of de facto and de jure causality with a look at Mill's methods.

## 5. De Jure and de Facto Cause Makers

I shall now show that we run the risk of misconceiving de facto dependence if we fail to recognize both de facto and de jure dependence. One can apply inductive methods appropriate for de jure causality to de facto causality. An inductive method employed to discover a conceptual dependency can serve to uncover a perceptual dependency, in other words. But one can also very easily misapply a de jure inductive analysis to de facto causality. That one might mistake a de jure epistemological supposition for a de facto ontological supposition, is my position.

Let us briefly recall Mill's methods. For our purpose we need consider only the method of agreement and the method of difference. The method of agreement compares different instances of an effect, say, to determine what antecedent they might have in common. Its presupposition is that, if the instances have an antecedent in common, the common antecedent is the cause of the effect under scrutiny.<sup>34</sup> To take Mill's schematic example, let a be an effect. If we compare consequents a b c and a d e, and if we discover that A B C and A D E are their antecedents, we can then conclude that A is the cause of a. Neither B and C nor D and E can be causes, because these antecedents were not present in both instances.<sup>35</sup>

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<sup>34</sup> Mill (1973, p. 390).

<sup>35</sup> Mill (1973, p. 389).

The method of difference rests on the presupposition that, if an instance with an effect, say, does not have an antecedent in common with another instance without the effect, the antecedent in which the instances differ is the cause of the effect in question. This method thus seeks to compare an instance with an effect with an instance without the effect. Consider Mill's schematic example again, and let *a* again be an effect. If we compare the consequents *a b c* and *b c*, and if we discover that *A B C* and *B C* are their antecedents, we can conclude that *A* is the cause of *a*. Neither *b* nor *c* can be the cause because these antecedents were present when the effect was not.<sup>36</sup>

How do these methods apply to *de facto* and *de jure* causal dependence? Consider the case of our juveniles and their delinquent activity. We all know that thrown rocks are *de jure* causes of broken windows. But how do we know? If at all experienced in the ways of delinquency, we have inductive evidence readily available for our analysis. We can use the method of agreement. We need only compare known instances of broken windows and their antecedent circumstances. We will quickly discover that their antecedents all agree on the fact that a rock was thrown and struck the window.<sup>37</sup>

We can also use the method of difference. We need simply compare an instance of a broken window and its antecedent circumstances with an instance of an unbroken window and its antecedents. We shall soon discover that the antecedents of the broken window differ from those of the window not broken. They differ in that a rock was thrown at and struck the broken window. But no rock, though perhaps thrown, struck the unbroken window.

Of course, we might, if so inclined, indulge ourselves with an experiment or two. We would find the method of difference of use for this purpose. We need only look for unbroken windows, preferably in a building abandoned and condemned, and we could then throw rocks at them. I am confident that we would discover that our rocks, if thrown with sufficient accuracy, would break the windows. These rocks would constitute the salient difference between the instances of unbroken windows and those of broken windows.

What about *de facto* causes? We agree that Suzy's rock is the *de facto* cause of the broken window. But how do we know that it is? We can use the method of difference again. We may compare the preceding instance in

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<sup>36</sup> Mill (1973, p. 391).

<sup>37</sup> For the sake of simplicity I again ignore other causes of broken windows. Mill recognizes this complication as the plurality of causes, and he discusses its consequences for induction, especially for the method of agreement. See Mill (1973, pp. 434-439).

which the window is unbroken with the succeeding instance in which the window is broken. If we do, we can see that these two instances agree on all salient circumstances save one. They differ in the obvious fact that Suzy's rock was thrown at and struck the window. In the first instance this fact was not present, but in the second instance it was present.<sup>38</sup>

What, then, do Mill's methods tell us about causal dependence? His methods tell us that by eliminating other possible causes we can discover both de jure causal dependencies and de facto causal dependencies. We can learn, for example, that thrown rocks are de jure causes of broken windows. That is, broken windows depend on thrown rocks. We can also learn that Suzy's rock is the de facto cause of the broken window in question. This broken window depends on her thrown rock.

I would now draw your attention to a crucial fact. Only epistemologically do Mill's methods allow us to determine which antecedent circumstances are causes. With an induction we can discover causal dependencies both de jure and de facto. In other words, we can make known causal connections both conceptual and perceptual. But these inductive methods do not permit us to determine ontologically which antecedents are causes. An induction would obviously vitiate its conclusion if it were somehow to make an antecedent bring about or not bring about a consequent.<sup>39</sup>

I would also note that Mill's methods only determine which antecedent circumstances are causes. With an induction we can discover de jure and de facto causal dependencies between antecedents and consequents. But an induction does not uncover conceptual or perceptual connections among the antecedents in question. An addition induction would be necessary to make known any connection de facto or de jure among them.

We can now begin to see why Yablo might contend that Suzy's rock is the de facto cause of the broken window because Billy's rock makes it the cause.

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<sup>38</sup> Mill uses a similar example to illustrate the method of difference. We know in this way that a healthy man was killed by a gunshot through the heart. The instances before and after his death agree on all circumstances except one, and this one circumstance is the gunshot wound. See Mill (1973, p. 391).

<sup>39</sup> True, we can and do manipulate antecedents to set up an experiment for an induction. But any induction, once we set up our experiment, has the purpose of allowing us merely to conceive or to perceive a causal connection. Besides, we can also perform an induction through observation alone when we have no control at all over antecedents. Mill notes that the method of difference is best for experimentation, but that the method of agreement is best for observation. See Mill (1973, pp. 392-394).

This contention rests, I think, on a misapplication of inductive methods. One could say that the methods employ cause makers. The methods of agreement and of difference work by the elimination of antecedents, and the antecedents eliminated make another antecedent the cause. But the eliminated antecedents make the remaining antecedent the cause in an epistemological sense only. They are epistemological cause makers in the sense that they make known which antecedent is the cause.

Consider our juveniles again. We know by induction that Suzy's rock is the de facto cause of the broken window, and we know that Billy's rock is not. But do we know that Suzy's rock is the de facto cause because Billy's rock is not? We do not. Our induction establishes only that there is a de facto connection between one antecedent and the consequent, and that there is no de facto connection between another antecedent and the consequent. It shows that Suzy's rock broke the window, and that Billy's rock did not.

Our induction does not establish a de facto connection between one antecedent and another. It does not show that there is a causal dependency of Suzy's rock on Billy's rock. But how else could Billy's rock be a cause maker in an ontological sense? The antecedents eliminated with our induction have no known effect on the antecedent not eliminated. We would need at least one more induction to make known a causal dependency of one antecedent on another.

One can easily mistake a de jure cause maker for a de facto cause maker. A resemblance and an ambiguity are in play. A de jure induction and a de facto induction are similar in that they both eliminate antecedents. But the antecedents eliminated are dissimilar with regard to their causal status. A de jure antecedent that is eliminated differs in kind from the antecedent discovered to be the cause, but a de facto antecedent that is eliminated differs in number from the antecedent that is the cause. That is, an eliminated de jure antecedent can be only of a kind that cannot cause the effect in question, but an eliminated de facto antecedent can be of a kind that can cause the effect but simply does not cause it.<sup>40</sup>

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<sup>40</sup> Actually, I am simplifying again. An eliminated de jure antecedent differs both in kind and in number from other antecedents. But the difference in kind is primary because a de jure induction seeks to establish a general law. An eliminated de facto antecedent can also differ from other antecedents both in kind and in number. To take Mill's example, a detective might wish ascertain whether a murder victim was shot through the heart with this rifle or this pistol. But the difference in number is primary because a de facto induction seeks to establish a particular fact.

## De Facto and De Jure Dependence

A de jure cause cannot ontologically cause an effect, in other words. But a de facto cause can ontologically cause an effect. To mistake a difference in kind for a difference in number would seem to make one cause different in number ontologically different in kind from another cause. In other words, the mistake would simply seem to make ontologically incapable a cause capable of an effect.

We can now see how one might mistake for a de jure cause maker a de facto cause maker. Neither a de jure antecedent eliminated epistemologically nor a de facto antecedent eliminated epistemologically brings about the effect in question. But the de jure antecedent is a cause maker because it cannot bring about the effect in question, and the de facto antecedent is a cause maker because it simply does not bring about the effect. Hence, one might think mistakenly that a de facto antecedent cannot bring about the effect simply because it does not bring it about.

One might thus think that there is an ontological difference between one de facto antecedent and another de facto antecedent. The fact that the one antecedent brings about the consequent might seem to require that the other antecedent cannot bring it about. Why? The eliminated de jure antecedent does not have the potential to bring about the consequent, and so the eliminated de facto antecedent might not seem to have the potential to bring about the effect, either.

I would conclude, then, that the eliminated de facto antecedent is only an epistemological cause maker. It is not an ontological cause maker. The antecedent eliminated only makes known the de facto cause of an effect. It does not in actual fact make another antecedent the cause.

One might similarly mistake an eliminated de facto antecedent for a that without which. A resemblance and an ambiguity are again present. Neither an eliminated antecedent nor a that without which brings about a consequent. But an eliminated antecedent and a that without which have potentialities that are different. The antecedent is a potential cause of the consequent in question, but the that without which is not a potential cause of the consequent. The that without which does not have a form of an antecedent, but it does have a potentiality to have a form. Only after receiving a form does it become a potential cause. Before receiving a form it has a potentiality to be a potential cause, we might say.<sup>41</sup>

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<sup>41</sup> Philosophers have traditionally distinguished between first and second potentiality as they have between first and second actuality. Incidentally, Mill also recognizes that a de facto cause has a that without which, though he does not use the term. He tells us only that philosophers

We can now see why the new theory must hold fixed the fact that Billy's rock does not strike the window. To hold fixed the fact that Billy's rock does not strike the window would be tantamount to assuming that Suzy's rock and Billy's rock are causes that differ in kind as well as in number. If we hold fixed the fact that it does not strike the window, we deprive Billy's rock of its de facto causal status vis-à-vis the broken window. That is, we assume that his rock does not have a potentiality of the kind needed to break the window. But it does have a potentiality of this kind.

## **6. Interventions, Contraventions, and Subventions**

We might now ask, How can one de facto cause interact with another de facto cause? Obviously, a de facto cause can fail to bring about an effect because it is not of the kind to bring about the effect in question. But if it is specific to the effect, why does one de facto cause bring about the effect, and another de facto cause not bring it about? Or, to return to our example, why does Suzy's rock break the window, but Billy's rock does not?

Our distinction between de facto and de jure causes can help us answer this question as well. Causes de jure are infallible, one might say. Conceptual causes inhabit a tidy world pristine and serene. Their singular connections with their effects hold with an unexceptionable necessity. At least, in theory they do. We think laws truly causal to be necessary precisely because they do not admit of any known exceptions. Fire always burns, water always suffocates, gravity always attracts. And thrown rocks, if thrown accurately, always break windows.

But causes de facto are rather fallible. Perceptual causes are habitués of an untidy world crowded, perhaps overcrowded, with other causes. Their connections with their effects can be at best probable only. Why? The several causes jostle one another, and they can and do interfere with one another. Their connections consequently admit of many exceptions. In fact, fire does not always burn. Or, more precisely, this fire did not burn down this house. Why? Because the fire department put it out.<sup>42</sup>

What I shall call intervention, sometimes called preemption, presents causal interference in what may be its simplest variety. Causal intervention occurs when one de facto cause attains an effect in question before another de

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have called this circumstance a material cause, but he adds the caveat that to call it a cause is tautology. I would take his caveat to mean that this circumstance is merely a condition of a de facto cause. But see Mill (1973, pp. 327-330).

<sup>42</sup> Compare Hume (1975, pp. 57-59 or 86-88).

facto cause. The two de facto causes are both potential causes of the same effect. But the one cause becomes an actual cause because it attains the effect before the other can. Suzy's rock and Billy's rock, for example, are both potential de facto causes of the broken window in question. But Suzy's rock broke the window, and Billy's rock did not. Why is her rock so privileged? Her rock intervened and deprived his rock of the effect. Her rock struck the window before his could.

Recall that a de jure cause becomes a de facto cause when it has a that without which. But a de facto cause remains a potential cause unless and until it attains its effect. Only then does it become an actual cause. Recall, too, that a cause and its effect can each have a different that without which. We might say that, until a rock strikes a window, the broken window is only a potential effect. But the broken window becomes an actual effect when it has its own that without which. Its that without which is the glass. Suzy's rock thus has an actual effect because its effect has a that without which. But Billy's rock has only a potential effect because its effect has no that without which. There is no longer a window for it to break.

But one might confuse causal interference of this kind with interference of another kind. We can easily mistake for causal intervention what I shall call causal contravention. Causal contravention occurs when one de facto cause defeats or destroys another de facto cause. Consider another recurrent example involving Suzy and Billy. This example is a matter no longer of juvenile delinquency but of a serious and felonious crime. Billy plants a bomb under the chair that Suzy will use on her way to a medical examination. Fortunately, Suzy discovers the bomb and flees before it can explode and cause her any harm. She subsequently passes her exam.<sup>43</sup>

Billy's bomb is what I am calling a contravening cause. With his intention and choice to plant a bomb, Billy threatens to disable the causes that maintain Suzy's good health, to put the matter mildly.<sup>44</sup> Suzy has formed an intention and made a choice to be healthy and to pass a medical examination. Her intention and choice cannot be even potential causes without a that without which. Obviously, their that without which is her body.<sup>45</sup> But with his bomb Billy will deprive her causes of their de facto potentiality by removing their that without which. He will in fact murder or maim her. His

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<sup>43</sup> Compare Yablo (2004, pp. 119-120).

<sup>44</sup> In this example I assume intentionality in the first degree.

<sup>45</sup> And also other instruments, such as a nutritious diet and perhaps exercise equipment.

bomb would thus render her causes ineffective by destroying or damaging her body.

But this example is complex. Suzy devises contravening causes of her own. She formulates an intention to flee, and she chooses to do so. In haste, no doubt. Her intention and choice thus disable the bomb by removing the that without which of its effect. The bomb remains a potential cause because it will not be able to have any effect on her body. Of course, the bomb squad would contravene in another way. They would probably disable the bomb by defusing it. They would thus deprive the bomb of its causal potential by removing a component of its that without which.

We can now see how one might confuse an intervening cause with a contravening cause. There are present a similarity and a dissimilarity. Both a cause that intervenes and a cause that contravenes prevent another cause from attaining its effect. But an intervening cause does so by attaining the effect before the other cause, and a contravening cause does so by hindering the other cause from attaining the effect. Suzy's rock breaks the window before Billy's rock can break it, but Billy's bomb, if it had been successful, would have stopped Suzy from passing her medical exam.

I would now draw your attention to another fact of significance. Neither Billy's rock nor Billy's bomb is a *de facto* cause maker. Why not? Both causes are merely cause breakers, one might say. They are causes with a *de facto* potential, which was defeated, to interfere with another *de facto* cause. Billy's rock might have intervened and broken the window if he had thrown before Suzy did, and Billy's bomb might have contravened and harmed Suzy if she had not noticed it and fled.

In both examples Suzy's intention and choice would be, without any troublemaking from Billy, *de facto* causes. Her intention and choice in each example are embodied in a that without which. They are so embodied when she is intent on breaking the window and when she is intent on passing the medical exam. Suzy's rock and Suzy's body are each a that without which in its own right.<sup>46</sup>

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<sup>46</sup> To explain what a cause maker is, Yablo compares causes that are more natural and less natural. He implicitly sets out a definition for a more natural cause when he defines what he calls an artificial cause. A cause is artificial, he argues, if in an actual scenario the cause neither meets nor cancels a causal need in an alternative scenario. A cause meets a need in one scenario if it meets the need that another cause would have met in another scenario, and a cause cancels a need in one scenario if it meets a need that no actual cause meets but would have met in another scenario. Yablo (2002, pp. 138-39); Yablo (2004, pp. 127-28).

There is also interference of an intermediate kind, which I shall term subvention. Interference of this kind occurs when one cause attains its effect with assistance from another cause. For example, suppose that Suzy throws her rock inaccurately, and it is going to miss the window. It is off course, in other words. But suppose further that Suzy's rock caroms off Billy's rock in mid-air and strikes the window. Suzy's rock is thus redirected by Billy's rock. Her rock strikes the window because his rock put her rock on course.

We can now say that Billy's rock is a cause maker in an ontological sense. Suzy's rock did not have the potential to break the window because it was thrown inaccurately. But Billy's rock changed its potential by changing its direction. Billy's rock thus causes, no doubt unintentionally, Suzy's rock to strike and to break the window pane. His rock makes her rock the actual cause of the broken window. Otherwise, her rock would have remained only a potential cause without any actual effect. Its effect would have had no that without which.

Subvention thus differs from intervention and contravention. An intervening and a contravening cause disable another cause. The one does so by removing the that without which of the effect, the other by removing the that without which of the cause. But a subvening cause enables another cause to attain its effect. A cause of this kind, as does any cause, imparts a form to its effect. But its effect has its that without which in another cause. In our example, Billy's rock gives Suzy's rock a new trajectory.<sup>47</sup>

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With his definition of an artificial cause, he thus suggests that a more natural cause is the same in kind but different in number than a cause in an alternative scenario. How so? A natural cause, he implies, would be a cause that both meets a need and cancels a need in an alternative scenario. But a cause is the same in kind as another cause, I would argue, if it meets the same causal need that another cause would have meet in another scenario, and a cause is different in number if it meets a need that no actual cause meets but would have met in an another scenario.

Yablo thus in effect sets out an epistemological presupposition of a de facto induction. A de facto induction presupposes that an antecedent is the same in kind as another antecedent but different in number from another antecedent. The method of difference, for example, relies on the presupposition that Suzy's rock meets the same need of the broken window that Billy's rock would have met, and that Suzy's rock meets the same need that Billy's rock would have met but did not meet.

Of course, a de facto induction can rest on other presuppositions, perhaps that an antecedent is different both in kind and in number. But this and other presuppositions are not essential to the issue at hand.

<sup>47</sup> Yablo uses a similar example of two bowling balls and a bowling pin. The two balls collide as they go down the alley, and the one ball is knocked into the pin by the other. But he takes this

Subvention is clearly an ontological phenomenon. With Mill's methods we could discover epistemologically causal connections between one antecedent and another. I am confident that one could use the method of agreement or of difference to do so. We would surely ascertain that one thrown rock, if it strikes another rock in mid-air, has its course altered by the other rock. Events of this sort, though unlikely, do occur. Indeed, they are part of the fun of throwing rocks at windows. Or so I hear.

## 7. Conclusion

There is yet more to be said, I assure you. But I have probably said more than enough for the present occasion. I shall close simply by bequeathing to my reader the distinctions herein broached with the hope is that they might prove useful for addressing other problems concerning causation. These distinctions would include causality, causal dependency, and cause makers, all de facto and de jure; causes different in kind and in number; and causal intervention, contravention, and subvention.

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example to illustrate not subvention but intervention, which he calls preemption. He argues not that the one ball knocks the pin over because its direction is changed by the other, but that the one knocks over the pin because the other fails to do so. See Yablo (2004, pp. 120-21).

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