

# Proportionality, Contrast and Explanation\*

Brad Weslake<sup>†</sup>

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## Abstract

If counterfactual dependence is sufficient for causation and if omissions can be causes, then all events have many more causes than common sense tends to recognise. This problem is standardly addressed by appeal to pragmatics. However, Carolina Sartorio (2010) has recently raised a more interesting problem concerning omissions for counterfactual theories of causation—more interesting because it demands a more subtle pragmatic solution, or so I argue. Along the way, I discuss the relationship between the idea that causes are proportional to their effects, the idea that causation is contrastive, and the question of the dimensions along which causal explanations should be evaluated with respect to one another.

## Keywords

counterfactuals, causation, omissions, contrast, proportionality, explanation

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<sup>†</sup>Department of Philosophy  
University of Rochester  
Box 270078  
Rochester, NY 14627-0078  
[bradley.weslake@rochester.edu](mailto:bradley.weslake@rochester.edu)  
<http://bweslake.org/>

## I Introduction

It has been widely recognised that if counterfactual dependence is sufficient for causation and if omissions can be causes, then all events have many more causes than common sense tends to recognise<sup>1</sup>. The standard response to this problem has been to appeal to pragmatics—some omissions are much more salient, in a given context, than others<sup>2</sup>. However, Carolina Sartorio (2010) has recently raised a more interesting problem concerning omissions for counterfactual theories of causation. Sartorio’s problem is more interesting because it demands a more subtle pragmatic solution, or so I will argue. Along the way, I discuss the relationship between the idea that causes are proportional to their effects, the idea that causation is contrastive, and the question of the dimensions along which causal explanations should be evaluated with respect to one another. Ultimately I will draw the following conclusions: i) *contra* Stephen Yablo (1992a), and Christian List and Peter Menzies (2009), proportionality may belong in the theory of explanation rather than the theory of causation; ii) the contrastive semantics for causal claims involving omissions defended by Jonathan Schaffer (2005) is false; and iii) an account of the value of explanatory generality must respect the fact that omissions often make for the right kind of generality.

## 2 The Prince of Wales Problem

Sartorio calls her problem the *Prince of Wales problem*. It can be illustrated with the following examples adapted from Sartorio. Suppose the Prince of Wales has promised to water the Queen of England’s plant while she is away. Instead, the Prince eats a biscuit, the plant dies, and the Prince acquires a stomach ache. In *Example 1*, if the Prince had not eaten the biscuit he would have watered the plant and not acquired a stomach ache. In *Example 2*, if the Prince had not eaten the biscuit he would have gone for a walk in the cold and acquired a stomach ache nonetheless, but if he had gone to the theatre or watered the plant he would not have acquired a stomach ache.

Consider the following causal claims regarding these examples:

- i) In *Example 1*, the failure of the Prince to water the plant caused the plant to die.
- ii) In *Example 1*, the Prince’s eating a biscuit caused the plant to die.

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<sup>1</sup>This is what Sartorio (2004) calls “the Queen of England problem” and what Menzies (2004) calls “the problem of profligate causes”, on which see also Schaffer (2000), Thomson (2003), Beebe (2004) and McGrath (2005).

<sup>2</sup>See for example Schaffer (2000) and Sartorio (2010).

- iii) In *Example 2*, the Prince's eating a biscuit caused the stomach ache.
- iv) In *Example 2*, the failure of the Prince to water the plant caused the stomach ache.

According to Sartorio, (i) and (iii) are true and (ii) and (iv) are false. In §6 I will consider whether this is correct, but for the sake of argument, let us for now agree. As Sartorio points out, this is incompatible with the following principle:

(cc) If there is counterfactual dependence of the ordinary (non-backtracking) kind between C and E, and if C and E are fully distinct (e.g., they are not logically or mereologically related), then C is a cause of E.

(cc) implies that (ii) and (iv) are true. In *Example 1*, if the Prince had not eaten a biscuit the plant would not have died, and hence according to (cc) the eating was a cause of death. Sartorio calls this *the problem of unwanted positive causes*. Likewise, in *Example 2*, if the Prince had watered the plant he would not have had a stomach ache, and hence according to (cc) the failure to water was a cause of the stomach ache. Sartorio calls this *the problem of unwanted negative causes*. Together, the problems of unwanted positive and negative causes constitute what Sartorio calls *the Prince of Wales problem* for counterfactual theories of causation. Of course, so far we have only identified a problem for (cc), so we only have a problem for counterfactual theories of causation in general if there is no such theory capable of avoiding the problems of unwanted positive and negative causes.

A complete solution to the Prince of Wales problem should meet two requirements. First, it should include an informative condition specifying when counterfactual dependence is sufficient for causation. I will call this the *metaphysical* part of a solution. Second, it should include an explanation for our tendency to make the judgements Sartorio reports concerning (i–iv). I will call this the *psychological* part of a solution.

A natural response to the problem starts with the following observation. Eating the biscuit is only one of many events in virtue of which a failure to water the plant could have occurred<sup>3</sup>. In *Example 1*, whichever of these events occurred, the plant would still have died. So to focus on the eating as such is to focus on an event that is *too specific* with respect to the effect. In contrast, in *Example 2*, it is not the case that whichever of these events occurred, the Prince would still have had a stomach ache. So

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<sup>3</sup>To facilitate discussion, I will talk as if omissions are events distinct from the more specific events in virtue of which they occur. For present purposes I am setting aside general worries concerning causation by omission, on which see for example Schaffer (2004) and Dowe (2004).

to focus on the failure as such is to focus on an event that is *too inspecific* with respect to the effect. Following Yablo (1992a), let us say that an event is *proportional* to another *iff* it is not too specific or inspecific in this way. The natural response to the Prince of Wales problem is to amend (CC) so that only counterfactual dependence between proportional events is sufficient for causation. Of course, this response requires an account of what makes for appropriate specificity.

The account Sartorio considers can be formulated as follows. When an event or an omission occurs wholly in virtue of another event or omission occurring, let us adopt some notation from Yablo (1992a) and label them  $X^-$  and  $X^+$  respectively, and let us say that  $X^+$  is *more specific* than  $X^-$ . Sartorio's account (implicitly) employs the following definitions:

(SUFF<sub>A</sub>)  $X^-$  is *sufficient<sub>A</sub>* for E *iff* for every  $X^+$ , if  $X^-$  had occurred without  $X^+$ , E would still have occurred.

(NEED<sub>A</sub>)  $X^+$  is *needed<sub>A</sub>* for E *iff* for every  $X^-$ , if  $X^-$  had occurred without  $X^+$ , E would not have occurred.

Sartorio then employs these definitions to provide the following replacement for (CC):

(CC<sub>A</sub>) If there is (ordinary) counterfactual dependence between C and E (where C and E are fully distinct), and if nothing less specific than C is sufficient<sub>A</sub> for E and nothing more specific than C is needed<sub>A</sub> for E, then C is a cause of E.

(CC<sub>A</sub>) seems to deliver the desired truth value for (ii). While there is counterfactual dependence between eating the biscuit and the plant dying, the failure of the Prince to water the plant is less specific than the eating and, it seems, sufficient<sub>A</sub> for the dying. So (CC<sub>A</sub>) does not say that the eating is a cause of the dying. However, as Sartorio points out, (CC<sub>A</sub>) does not deliver the desired truth value for (iv). For there is counterfactual dependence between the failure of the Prince to water the plant and the stomach ache, and the more specific eating is not needed<sub>A</sub> for the stomach ache. This is because if the eating had not occurred, the walk would have occurred instead and so the stomach ache would still have occurred. So (CC<sub>A</sub>), like (CC), says that the failure to water was a cause of the stomach ache. Sartorio concludes that proportionality does not provide an adequate response to the Prince of Wales problem.

### 3 Proportionality Reformulated

The notions of (SUFF<sub>A</sub>) and (NEED<sub>A</sub>) employed in Sartorio's formulation of the idea that causes must be proportional to their effects are taken from Yablo (1992a).

And while Yablo uses different terminology in later formulations of proportionality, the counterfactual formulations of (SUFF<sub>A</sub>) and (NEED<sub>A</sub>) reappear in every version<sup>4</sup>. Notice, however, that these formulations do not properly capture the observations in the preceding section that initially motivated the appeal to proportionality. Those observations did not appeal to the question of which more specific events *would* have occurred in lieu of those that did, but rather the question of whether *there are* any more specific alternatives that, had they occurred, would have made a difference to the effect.

This suggests the following reformulation of proportionality. For events or omissions  $X^-$  and  $X^+$ , call the set of other events or omissions in virtue of which  $X^-$  could have occurred the *alternatives* to  $X^+$ . And call the alternatives it is appropriate to treat as serious possibilities the *relevant alternatives* to  $X^+$ <sup>5</sup>. We replace our earlier definitions as follows:

(SUFF<sub>B</sub>)  $X^-$  is *sufficient<sub>B</sub>* for E *iff* for every  $X^+$ , every relevant alternative to  $X^+$  is such that had  $X^-$  and the relevant alternative occurred, E would still have occurred.

(NEED<sub>B</sub>)  $X^+$  is *needed<sub>B</sub>* for E *iff* for every  $X^-$ , some relevant alternative to  $X^+$  is such that had  $X^-$  and the relevant alternative occurred, E would not have occurred.

We then provide the following replacement for (CC<sub>A</sub>):

(CC<sub>B</sub>) If there is (ordinary) counterfactual dependence between C and E (where C and E are fully distinct), and if nothing less specific than C is sufficient<sub>B</sub> for E and nothing more specific than C is needed<sub>B</sub> for E, then C is a cause of E.

(CC<sub>B</sub>) seems to deliver the desired results for the earlier problem cases. For (ii), while there is counterfactual dependence between eating the biscuit and the plant dying, the less specific failure of the Prince to water the plant is, it seems, sufficient<sub>B</sub> for the dying. So (CC<sub>B</sub>) does not say that the eating is a cause of the dying<sup>6</sup>. For (iv), while

<sup>4</sup>See Yablo (1992b, 1997, 2003, 2005). The latter two papers formulate proportionality as a relation between properties rather than events, but invoke, *mutatis mutandis*, the same counterfactuals.

<sup>5</sup>I will not defend the propriety of the appeal to relevant alternatives beyond noting that they are widely believed to be an essential part of an adequate counterfactual theory of causation. See for example Collins (2000), Lewis (2000), McDermott (2002), Woodward (2003, §2.8), Schaffer (2005, *forthcoming*), Northcott (2008) and Weslake (*ms*). I thank Carolina Sartorio for help here.

<sup>6</sup>This argument requires the natural assumption that all possibilities in which the Prince does not water the plant but otherwise causes the plant to be watered are irrelevant.

there is counterfactual dependence between the failure of the Prince to water the plant and the stomach ache, the more specific eating is needed<sub>B</sub> for the stomach ache. This is because going to the theatre is a relevant alternative to the eating which would not have led to a stomach ache. So (CC<sub>B</sub>) does not say that the failure is a cause of the ache.

## 4 Cheap Sufficiency

However, while (CC<sub>B</sub>) improves upon (CC) and (CC<sub>A</sub>), it shares with (CC<sub>A</sub>) a different problem that I will call the problem of *cheap sufficiency*. Consider claim (iii). While there is counterfactual dependence between the Prince's eating a biscuit and the stomach ache, the less specific event defined as the disjunction of the eating and the walking is both sufficient<sub>A</sub> and sufficient<sub>B</sub> for the ache. So (CC<sub>A</sub>) and (CC<sub>B</sub>) do not say that the eating is a cause of the ache. As Dowe (2010) notes, similar reasoning shows that the failure of the Prince to water the plant is less specific than the failure of *anyone* to water the plant, which is also both sufficient<sub>A</sub> and sufficient<sub>B</sub> for the death. More generally, for any effect we can define an event consisting of the disjunction of all possible events sufficient for it (DCSE) (Yablo, 2003, p. 318; 2005, p. 460). Any DCSE is less specific than all other sufficient conditions for the effect, and hence will be the only event judged a cause by (CC<sub>A</sub>) and (CC<sub>B</sub>). Since (CC<sub>B</sub>) only expresses a sufficient condition for causation, the fundamental problem raised by cheap sufficiency is not that (CC<sub>B</sub>) is *false* (though we might well have our doubts about whether a DCSE is always, or indeed ever, a cause). Rather, the problem is that it is *uninformative*.

Here are some possible ways to address the problem of cheap sufficiency. First, we might simply deny that there are such events or omissions, perhaps on grounds that they are overly extrinsic or disjunctive<sup>7</sup>. Second, we might accept that such events and omissions exist, but maintain they are highly unnatural. We may then take proportionality to trade off with naturalness<sup>8</sup>. Third, we might require in addition to sufficiency<sub>B</sub> that all alternatives would be part of a single type of causal process<sup>9</sup>. Fourth, we might require in addition to sufficiency<sub>B</sub> that all alternatives are contiguous in a similarity space defined over all possible fundamental level causal processes<sup>10</sup>. And there are other, more elaborate, possibilities.

I will not here take a stand on which of these options is preferable. Instead,

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<sup>7</sup>See Lewis (1986, §§VII–VIII).

<sup>8</sup>See Yablo (2003, 2005).

<sup>9</sup>See Sober (1983) and Strevens (2004).

<sup>10</sup>See Strevens (2008, §3.63).

what I wish to point out is that if the solution to cheap sufficiency must provide an informative response to the Prince of Wales problem, it must apply equally well to events and omissions. This in turn imposes non-trivial constraints on the forms such a solution can take. How can an omission be more or less extrinsic or disjunctive than another? Perhaps we can make sense of this if we take omissions to consist in the instantiation of a negative property by an object at a time, and take some purported omissions to involve overly extrinsic or disjunctive objects or properties. How can an omission be more or less natural than another? Again, perhaps we can make sense of negative properties that are more or less natural than one another. How can an omission be part of a causal process? Perhaps we can make sense of a spatiotemporally continuous chain of omissions<sup>11</sup>. None of these possibilities are easy to make sense of—so even with a better formulation of proportionality, much of the work required in order to use it as a response to the Prince of Wales problem remains to be done.

## 5 Omissions and Contrast

The difficulties involved in solving the Prince of Wales problem by appealing to proportionality motivate considering an alternative. In this section I argue that a contrastive account of causation provides a viable candidate for the metaphysical part of a solution to the Prince of Wales problem, but does not provide a viable candidate for the psychological part<sup>12</sup>.

It is helpful to think of a contrastive theory of causation as itself involving two components. The first component is the *metaphysical* claim that the causal relation has a contrastive structure. In the version I will employ, there is contrast on both cause and effect, so the causal relation has the form<sup>13</sup>:

(CONT) C rather than C' is a cause of E rather than E'

On this version of a contrastive theory, a natural principle expressing the idea that counterfactual dependence is sufficient for causation is the following. Let us say that there is ordinary counterfactual dependence between C rather than C' and E rather than E' when:

- C and E are fully distinct actual events;

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<sup>11</sup>See Schaffer (2000, pp. 294–295), Hall (2002, 2004) and Frisch (2010).

<sup>12</sup>By a viable candidate, I mean a candidate that is not disconfirmed by Sartorio's examples.

<sup>13</sup>This is slightly different from the formulation in Schaffer (2005), which involves sets of contrast events. The differences will not matter for what follows.

- $C'$  and  $E'$  are fully distinct non-actual events not compossible with  $C$  and  $E$  respectively; and
- If  $C'$  had occurred  $E'$  would have occurred (where this is a non-backtracking counterfactual).

Our natural principle is then:

( $CC_c$ ) If there is ordinary counterfactual dependence between  $C$  rather than  $C'$  and  $E$  rather than  $E'$ , then  $C$  rather than  $C'$  is a cause of  $E$  rather than  $E'$ .<sup>14</sup>

( $CC_c$ ) entails *inter alia* that the following claims are true:

- v) In *Example 1*, the Prince's eating a biscuit rather than watering the plant caused the plant to die rather than survive.
- vi) In *Example 1*, the Prince's eating a biscuit rather than watering the plant caused the stomach to ache rather than not ache.
- vii) In *Example 1*, the Prince's failing to water the plant rather than watering the plant caused the plant to die rather than survive.
- viii) In *Example 2*, the Prince's eating a biscuit rather than going to the theatre caused the stomach to ache rather than not ache.
- ix) In *Example 2*, the Prince's eating a biscuit rather than watering the plant caused the stomach to ache rather than not ache.

Moreover, ( $CC_c$ ) does not entail the truth of the following claim:

- x) In *Example 2*, the Prince's eating a biscuit rather than going for a walk caused the stomach to ache rather than not ache.

I claim that (v–ix) are all true and (x) is false. Moreover, ( $CC_c$ ) does not entail any of the problematic consequences of the other sufficient conditions evaluated above. So a contrastive theory of causation provides a viable candidate for the metaphysical part of a solution to the Prince of Wales problem.

The second component of a contrastive theory of causation is the *semantic* claim that causal assertions with a non-contrastive surface form, when meaningful, are to be

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<sup>14</sup>I emphasise that ( $CC_c$ ) expresses a sufficient condition for a certain type of counterfactual dependence to entail causation. It is not intended to provide an analysis of causal claims of the form “ $C$  rather than  $C'$  is a cause of  $E$  rather than  $E'$ ”. As an anonymous referee pointed out to me, such claims are often correctly made when  $C$  and  $C'$  are compossible.

interpreted as contrastive causal assertions matching (CONT)<sup>15</sup>. In order to evaluate the semantic component of a contrastive theory, we need guidance on how to interpret causal assertions with a non-contrastive surface form.

According to a proposal due to Jonathan Schaffer (2005), claims asserting causation by omission are to be understood as asserting contrastive causal claims with the negative nominal (“the Prince’s not watering the plant”) referring to the more specific event in virtue of which the omission occurs (the Prince’s eating a biscuit) and the omission (“not watering the plant”) setting the associated contrast (watering the plant). So for example, claim (i) is to be interpreted as claim (v). Claim (v) is true, so (i) is true.

However, this proposal has problems explaining the desired judgements for (ii–iv). Schaffer’s proposal entails that (iv) should be interpreted as (vi). But (vi) is true, and the desired judgement is that (iv) is false. As far as I can see, the only option for a contrastive semantics here is to propose that contextual information concerning which relevant alternative would have occurred sets the associated contrast. The idea is to explain our judgement regarding (iv) on grounds that it should be interpreted as (x)<sup>16</sup>. There are two problems with this proposal. First, the proposal gets the wrong results for (ii) and (iii), which would have to be interpreted as (v) and (x) respectively. Second, (x) contains no reference to watering the plant, which is surely part of the semantic content of (iv)<sup>17</sup>.

I conclude that while a contrastive theory of causation provides a viable candidate sufficient condition for counterfactual dependence to entail causation, it does not provide an adequate explanation for the desired judgements concerning (i–iv). A complete solution to the Prince of Wales problem remains elusive.

## 6 Proportionality and Explanatory Depth

The two options I have considered so far share the assumption that the solution to the Prince of Wales problem is *uniform*, in the sense that one and the same principle provides the solution to both the metaphysical and psychological parts of the problem. Proportionality, as I reformulated it, gave a plausible account of the basis for our judgements, but failed to provide an informative sufficient condition for counterfactual dependence to entail causation. The contrastive theory, on the other hand, achieved the reverse—providing an informative sufficient condition, but failing to explain our judgements. The solution I propose is the obvious one. Proportionality should be

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<sup>15</sup>See Schaffer (2007, §1.3.1) for a helpful survey of arguments for the semantic component.

<sup>16</sup>Compare Schaffer (2005, p. 354, fn. 10).

<sup>17</sup>This point was emphasised to me by Carolina Sartorio.

invoked in the explanation of our causal judgements, but not in the metaphysics of causation. In this sense then, I propose a non-uniform solution.

In particular, I propose that we reject Sartorio's claim that (ii) and (iv) are false. Instead, we should say that (ii) and (iv) are true, but that there are pragmatic reasons not to assert them, since to do so would misleadingly imply that there are no more explanatory causal propositions to be asserted. This proposal can be decomposed into the following two independent claims. First, there is the claim that there is pragmatic pressure to assert (i) or (ii) but not both, and to assert (iii) or (iv) but not both. Second, there is the claim that the source of this pragmatic pressure concerns the explanatory quality of these propositions with respect to one another.

On the first claim, I will simply endorse a principle recently defended by Eric Swanson (2010):

(USE GOOD REPRESENTATIVES) When you ascribe some causal responsibility for *e* to a causal path to *e*, use good representatives of that path for the purposes at hand.

Swanson argues for this principle on two grounds. First, it fits with general principles of conversational and cognitive economy. Second, it explains a range of intuitive causal judgements. I will not recapitulate these arguments here. However, I note that if Swanson is right then (i) and (ii) are both candidates for representing a single causal path in *Example 1*, and (iii) and (iv) both candidates for representing a single causal path in *Example 2*. Due to principles of conversational and cognitive economy then, (i) and (ii) should not be asserted together if one is a better representative in at least one respect and worse in no respects. Likewise for (iii) and (iv)<sup>18</sup>.

My focus therefore will be on the second claim, according to which one important way in which an event can be a better representative of a causal path than another is by virtue of contributing to a better explanation of the effect. I will follow Swanson in honouring this claim with a principle<sup>19</sup>:

(USE EXPLANATORY REPRESENTATIVES) When you ascribe some causal responsibility for *e* to a causal path to *e*, use explanatory representatives of that path.

My task is to show that (ii) and (iv) violate (USE EXPLANATORY REPRESENTATIVES). I take them in turn.

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<sup>18</sup>For the full line of reasoning sketched here, see Swanson (2010).

<sup>19</sup>Swanson considers a number of different ways in which some events may be better representatives than others, but does not himself propose the connection with explanation.

Elsewhere I have argued that there is a dimension of explanatory value on which more general explanations are to be preferred to less general explanations (Weslake 2010). In particular, I have argued that there is a dimension of explanatory value on which explanation  $E_y$  is superior to explanation  $E_x$  when they stand in the following relationship:

- Every possible situation in which  $E_x$  applies is a situation in which  $E_y$  applies.
- There are possible situations in which  $E_y$  applies in which  $E_x$  does not apply.

Call this dimension of explanatory value *abstraction*. Along the dimension of abstraction, (i) provides a better causal explanation than (ii). So according to (USE EXPLANATORY REPRESENTATIVES), we should not assert (ii) when we are in a position to assert (i).

Another dimension of explanatory value is identified by Woodward (2006). A dependence relation is comparatively *sensitive* to the extent it would fail to obtain under various changes to the actual circumstances, and comparatively *insensitive* to the extent it would continue to obtain under various changes to the actual circumstances<sup>20</sup>. I claim that more insensitive causal claims are more explanatory than less insensitive causal claims<sup>21</sup>. Call this dimension of explanatory value *sensitivity*. Along the dimension of sensitivity, (iii) provides a better explanation than (iv), for there are various relevant changes to the actual circumstances under which the stomach ache would not have depended on the failure to water the plant. In particular, the dependence of the ache on the failure is sensitive to the fact that the failure occurred in virtue of eating the biscuit, rather than some other action that would not have led to the ache. So according to (USE EXPLANATORY REPRESENTATIVES), we should not assert (iv) when we are in a position to assert (iii).

While a full discussion is beyond the scope of this paper, I conclude this section with some comments on the relationship between abstraction and sensitivity. First, it is helpful to see abstraction and sensitivity as both contributing to explanatory quality by making for gains in *robustness*. Abstraction demands that explanations be robust across different ways in which they may be realised, while sensitivity demands that explanations be robust across variations in the actual circumstances. Second, note

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<sup>20</sup>But *which* changes determine sensitivity? Here again an appeal to contextually determined relevant alternatives is required (see Woodward 2006, pp. 13–15).

<sup>21</sup> Woodward himself (2006) is agnostic over whether sensitivity is a constraint on causation or a constraint on explanation. Either way we would have a solution to our problem. However, I opt for the latter since it fits more naturally with the account of explanatory depth that Woodward defends elsewhere (see especially Woodward and Hitchcock 2003a,b).

that abstraction and sensitivity are independent values. An explanation may be more abstract and more sensitive than another, as in (iv) with respect to (iii), or it may be more abstract and less sensitive than another, as in (i) with respect to (ii). My proposal requires simply that the gain in abstraction afforded by (iv) with respect to (iii) is not worth the cost to insensitivity. Third, my proposal does not require that abstraction and sensitivity are the only explanatory values, but merely that other values do not override the verdicts they deliver in this case. Finally, note that abstraction is an explanatory analogue of the requirement in  $(CC_B)$  that nothing less specific than C be sufficient<sub>B</sub> for E, and insensitivity an analogue of the requirement in  $(CC_B)$  that nothing more specific than C is needed<sub>B</sub> for E. It is in this sense, then, that my proposal has involved shifting the role of proportionality from the metaphysics of causation to the explanation for our causal judgements<sup>22</sup>.

## 7 Conclusion

If I am right, then we have a complete solution to the Prince of Wales problem. The pragmatics of causal discourse, in conjunction with the claim that abstraction and sensitivity are dimensions of explanatory depth, tells us why we resist asserting (ii) and (iv) even though they are true. We thereby solve the psychological part of the problem. As a bonus, it turns out that (cc) provides a viable candidate solution to the metaphysical part of the problem after all, thereby leaving in play the antecedently attractive claim that counterfactual dependence is sufficient for causation<sup>23</sup>.

In closing, I note three consequences of this proposal. First, if correct it shows that the proper home of proportionality may be in the theory of explanation rather than in the theory of causation. Theories of causation that have invoked proportionality, such as those due to Stephen Yablo (1992a) and Christian List and Peter Menzies (2009), may have mistaken explanatory principles for constraints on causation. Of course, the proposal also shows why the mistake would be a natural one, since these principles in turn play a role in the pragmatics of causal judgement. I argue that proportionality should play a role in the theory of explanation rather than in the theory of causation in (Weslake forthcoming).

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<sup>22</sup>Whether proportionality is playing this role is ultimately an empirical question. The existing evidence suggests that proportionality does play a role in causal judgement consistent with my proposal, but does not yet discriminate between the hypothesis that proportionality is a constraint on causal judgement and the hypothesis that it is a constraint on explanatory judgement. See especially Lien and Cheng (2000), Marsh and Ahn (2009) and Waldmann et al. (2010).

<sup>23</sup>I set aside the question of whether (cc) or  $(CC_C)$  (or both) are true. So long as at least one is, we have a solution to the problem. I have argued that Sartorio's examples leave both in play.

Second, if correct it shows that Schaffer (2005) is mistaken to claim that (i) should be interpreted as asserting (v). For I have claimed that we resist asserting (ii) because it is less explanatory than (i). This in turn depends on the claim that (i) should be interpreted as asserting a more general proposition than (ii). For parallel reasons, (iv) should not be interpreted as asserting (ix). Omissions cannot be evaded, for they make for explanatory differences<sup>24</sup>.

Third, it may appear that I have cheaply evaded the problem of cheap sufficiency. As I argued in §4, the problem of cheap sufficiency is a serious problem when it arises within the metaphysics of causation, for it is very difficult to provide a metaphysically principled account of the particular way in which proportionality should be constrained. However, to the extent that proportionality is instead part of the psychological part of a solution, we do not need anything so principled. For my proposal will be correct just in case abstraction really is playing the psychological role I have identified for it. The question of why we put a cap on abstraction in exactly the way we do is an empirical one, and it is neither here nor there whether it turns out that our judgements can be grounded in principled metaphysical distinctions<sup>25</sup>.

However, I do not think the problem of cheap sufficiency can be so easily evaded. On the proposal I have defended, it isn't simply that we *judge* that abstraction and sensitivity make for better explanations—we do so because they *really do* make for better explanations. But in that case, since the problem of cheap sufficiency arises equally well for the idea that abstraction is a dimension of explanatory depth as it does for the idea that causes must be proportional to their effects (see Strevens 2008, §3.6, Weslake 2010, §3.2.3, Potochnik 2011), it must be addressed after all. So I conclude with a lesson for the theorist of explanation—a solution to the problem of cheap sufficiency for the theory of explanation should respect the fact that sometimes omissions provide better explanations than the more specific events in virtue of which they occur.

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<sup>24</sup>Schaffer (personal communication) suggests that a contrastive semantics might be compatible with my proposal after all. The thought is that the pragmatic explanation I have given might account for our preference for using different descriptions rather than our preference for asserting different propositions. This is an intriguing suggestion, the proper evaluation of which would take us too far afield.

<sup>25</sup>For similar remarks on the role of sensitivity, see Woodward (2006, pp. 14–15).

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