

# Strevens's Counterexample to Lewis's 'Causation as Influence', and Degrees of Causation (Pre-publication version: please do not cite)

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**ABSTRACT** Sungho Choi has criticised Michael Strevens's counterexample to David Lewis's final theory of 'token' causation, causation as 'influence'. I argue that, even if Choi's points are correct, Strevens's counterexample remains useful in revealing a shortcoming of Lewis's theory. This shortcoming is that Lewis's theory does not properly account for *degrees* of causation. That is, even if Choi's points are correct, Lewis's theory does not capture an intuition we have about the *comparative* causal statuses of those events involved in Strevens's counterexample (we might, for example, intuit that Sylvie's ball-firing is *as much/more/less* a cause of the jar's shattering as/than is Bruno's ball-firing).

## 1. Introduction

Sungho Choi has criticised<sup>1</sup> Michael Strevens's counterexample<sup>2</sup> to David Lewis's final theory of 'token' causation, causation as 'influence'<sup>3</sup> (hereafter, '*CaI*'). I argue that, even if Choi's points are correct, Strevens's counterexample remains useful in revealing a shortcoming of *CaI*. This shortcoming is that *CaI* does not properly account for *degrees* of causation. This paper proceeds as follows. Section 2 articulates *CaI*. Section 3 articulates Strevens's counterexample to *CaI*, and Choi's criticism of Strevens's counterexample. Section 4 argues that, even if Choi's points are correct, *CaI* does not capture an intuition we have about the *comparative* causal statuses of those events involved in Strevens's counterexample (we might, for example, intuit that Sylvie's ball-firing is *as much/more/less* a cause of the jar's shattering as/than is Bruno's ball-firing).

## 2. *CaI*

*CaI* involves three ideas. Idea one: an 'alteration' of an event. Consider this event *E*: the vase's shattering. Lewis defines an 'alteration' of *E* as:

'[E]ither a very fragile *version* of *E* or else a very fragile *alternative event* that is similar to *E*, but numerically different from *E*.<sup>4</sup>

To elucidate, an event is considered 'fragile' if we impose stringent conditions for its occurrence (if we say that any change in one of its details turns it into a numerically different event).<sup>5</sup> Now, one alteration of *E* is *E*'s *actual* alteration: exactly when and how the vase shattered. The other alterations of *E* are un-actualised (one example: the vase shattering one millisecond later, and into more pieces).

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<sup>1</sup> Choi (2005, 106-113).

<sup>2</sup> Strevens (2003, 4-7, 11-17).

<sup>3</sup> Lewis (2000).

<sup>4</sup> *Ibid.*, 188. Emphases mine.

<sup>5</sup> *Ibid.*, 185-186.

Idea two: ‘influence’. Let  $C$  and  $E$  be two single, distinct, actual events. Lewis holds:

$C$  ‘influences’  $E$  ‘if and only if there is a substantial range  $C_1, C_2, \dots$  of different not-too-distant alterations of  $C$  (including the actual alteration of  $C$ ) and there is a range  $E_1, E_2, \dots$  of alterations of  $E$ , at least some of which differ, such that if  $C_1$  had occurred,  $E_1$  would have occurred, and if  $C_2$  had occurred,  $E_2$  would have occurred, and so on.’<sup>6</sup>

Idea three concerns the relationship between influence and causation. Lewis holds:

$C$  is a cause of  $E$  iff  $C$  directly influences  $E$ , or there is a chain of stepwise influence (hereafter, an ‘*ICHAIN*’) leading from  $C$  to  $E$  (that is, a sequence of (actual) events  $C, D_1, D_2, \dots, D_n, E$ , such that  $C$  influences  $D_1, D_1$  influences  $D_2, \dots, D_{(n-1)}$  influences  $D_n$ , and  $D_n$  influences  $E$ ).<sup>7</sup>

Let’s observe *CaI* in action. Consider this scenario: Sylvie throws a rock at a vase. Beside her, Bruno laughs. Here, *CaI* delivers the intuitive result that: Sylvie’s throw is a cause of the vase’s shattering; Bruno’s laughter is not. This is because Sylvie’s throw has substantial direct influence on the vase’s shattering. That is, there are many different, not-too-distant alterations of Sylvie’s throw (e.g., her throwing one millisecond later/with slightly more force) upon which alterations in the vase’s shattering (i.e., the vase’s shattering one millisecond later/into more pieces) counterfactually depend. Bruno’s laughter, however, has no substantial direct influence on the vase’s shattering. *Maybe* one distant alteration of Bruno’s laughter is so infectious that it delays Sylvie’s throw (and hence, the vase’s shattering) by a second. Nevertheless, no not-too-distant alteration of Bruno’s laughter appears to alter the vase’s shattering.<sup>8</sup> Moreover, one cannot identify any *ICHAIN* leading from Bruno’s laughter to the vase’s shattering.

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<sup>6</sup> Ibid., 190.

<sup>7</sup> Ibid., 191. See also Lewis (1973, 563).

<sup>8</sup> Unfortunately, Lewis is vague about what it takes for an alteration of an event to qualify as ‘not-too-distant’. He says that, for some particular alteration of an event, whether or not we think it to be ‘not-too-distant’ may be a matter of ‘mood’ (2000, 197).

3. *Strevens's counterexample to CaI; Choi's criticism of Strevens's counterexample*

Here is Strevens's counterexample to *CaI*.<sup>9</sup>

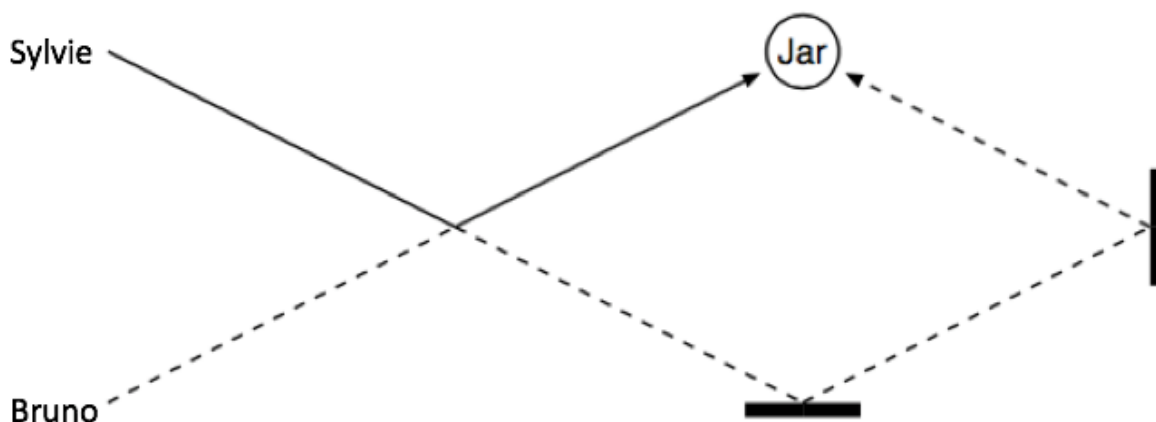


Diagram 1

Solid line: actual trajectory of Sylvie's ball.  
Dotted line: actual trajectory of Bruno's ball.

*SCE*: at time  $t_1$ , and using identical rifles, Sylvie and Bruno fire at a jar intrinsically identical, minute lead balls. Sylvie, who never misses, shoots so that her ball will ricochet two times prior to striking the jar. Bruno shoots directly at the jar. The balls, however, collide in mid-air at time  $t_c$ . Consequently, they *perfectly* exchange trajectories and spin (we thus take the motion of the balls to be that of two point particles; this admittedly requires something like a fortuitous gust of wind at  $t_c$ ).<sup>10</sup> Stipulate moreover that the two balls' speeds are always identical (and extremely high). Ultimately: Sylvie's ball shatters the jar; Bruno's ricochets, then flies through thin air.<sup>11</sup>

Let *SF* stand for Sylvie's firing, *BF* for Bruno's firing, and *JS* for the jar's shattering. For two reasons, Strevens argues that *CaI* delivers this *unintuitive* result: *SF* is not *at all* a cause of *JS*. First: *SF* has no substantial direct influence on *JS*.<sup>12</sup> After all, hold fixed *BF*, and consider an alteration of *SF* in which Sylvie fires one millisecond earlier/later, or one in which her rifle points one degree to the left/right. Given the properties of both balls, these alterations result in: no collision  $\rightarrow$  Bruno's ball striking the jar (before Sylvie's ball finishes ricocheting)  $\rightarrow$  *no* alteration to *JS*. Second: there appears no *ICHAIN* leading from *SF* to *JS*.<sup>13</sup> This second point, however, is where Choi most seriously disagrees.<sup>14</sup>

<sup>9</sup> Strevens (2003, 4-7, 11-17).

<sup>10</sup> *Ibid.*, 5, n2.

<sup>11</sup> Strevens, I think, mistakenly calls *SCE* a case of 'late cutting' pre-emption (*ibid.*, 17, n11). Standard late cutting involves: an effect; one pre-empting cause; one (non-causal) pre-empted alternative (see Lewis (2000, 182-84)). *SCE* involves an effect that has, intuitively, *two causes*.

<sup>12</sup> Strevens (2003, 4-5, 12-13).

<sup>13</sup> *Ibid.*, 5-7, 13-14.

<sup>14</sup> Choi (2005, 110-113).

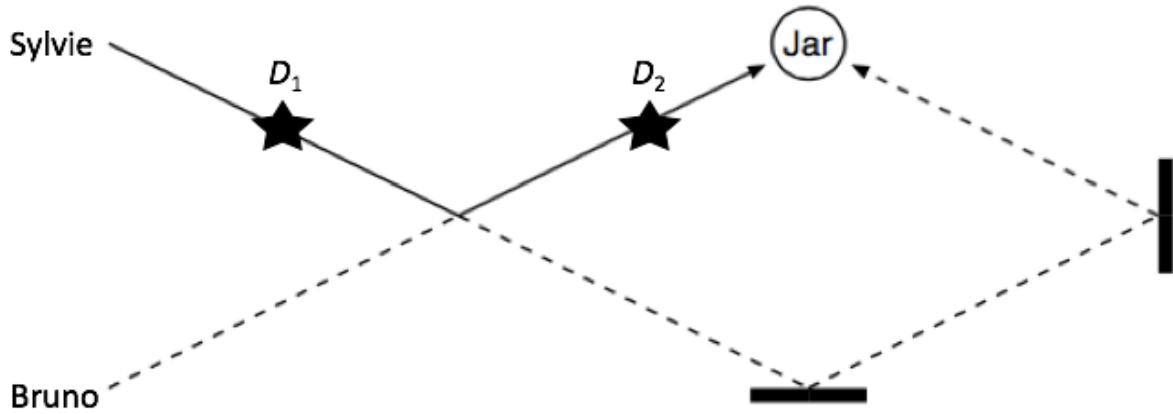


Diagram 2

Referring to Diagram 2, and using both Choi's and Lewis's terminology<sup>15</sup>, let  $D_1$  and  $D_2$  be: the (fragile) events whose occurrence conditions consist of all the intrinsic and spatio-temporal properties satisfied by the region that Sylvie's ball occupies at, for  $D_1$ , time  $t_2$  before  $t_c$ , and for  $D_2$ , time  $t_3$  after  $t_c$ .

Strevens claims:  $D_1$  has no substantial influence on  $\mathcal{J}S$ . After all, alter, say, the spatio-temporal properties of Sylvie's ball at  $t_2$ . This results in: no collision  $\rightarrow$  no alteration to  $\mathcal{J}S$ . Strevens also claims:  $SF$  has no substantial influence on  $D_2$ . After all, alter, say, the timing, or direction of  $SF$ . This results in: no collision  $\rightarrow$  the occurrence condition of  $D_2$  being satisfied by Bruno's ball (Strevens notes: on Lewis's metaphysics, it isn't a violation of the occurrence condition of  $D_2$  if the ball at  $D_2$ 's spatio-temporal region loses the property of 'belonging to' Sylvie<sup>16</sup>; said property, after all, is extrinsic).

Choi, however, claims: Strevens is twice mistaken. (i)  $D_1$  *does* influence  $\mathcal{J}S$ . After all, alter the *mass*, or *shape*, of Sylvie's ball at  $t_2$ . Admittedly, if  $t_2$  were, say, right after  $t_1$ , then these alterations result in: Sylvie's ball taking a different post- $t_2$  trajectory (balls of different mass/shape encounter different amounts of air resistance)  $\rightarrow$  no collision. However, stipulate that  $t_2$  is *right before*  $t_c$ . Then, neither alteration prevents the balls' collision. Both, however, alter the manner of the collision, and resultantly the manner of  $\mathcal{J}S$ . Furthermore, (ii)  $SF$  *does* influence  $D_2$ . After all, alter the *surface properties*, or *electrical charge*, of the ball Sylvie fires. Neither alteration prevents the balls' collision. Both, however, in altering an intrinsic property of Sylvie's ball at  $t_3$ , alter  $D_2$ .

Combining (i) the fact that  $D_1$  influences  $\mathcal{J}S$ , with the (safe) claim that ' $SF$  influences  $D_1$ ', and combining (ii) the fact that  $SF$  influences  $D_2$ , with the (safe) claim that ' $D_2$  influences  $\mathcal{J}S$ ', Choi concludes: there are (at least) two *ICHAINs* leading from  $SF$  to  $\mathcal{J}S$  – one 'via'  $D_1$  (*ICHAIN*<sub>1</sub>), and one 'via'  $D_2$  (*ICHAIN*<sub>2</sub>). Thus, *CaI* delivers the intuitive result that  $SF$  is a cause of  $\mathcal{J}S$ , and '[SCE] spells no trouble whatsoever for [CaI].'<sup>17</sup>

<sup>15</sup> Ibid., 110-111; Lewis (1986a, 244-249).

<sup>16</sup> Strevens (2003, 7).

<sup>17</sup> Choi (2005, 113).

#### 4. *CaI*, *SCE*, and degrees of causation

I think, however, that even if Choi's points are correct, *SCE* still spells some trouble for *CaI*. In what follows, I argue that, even if Choi's points are correct: *CaI* does not capture an intuition we have about the *comparative* causal statuses of *SF* and *BF*. Thus, insofar as my argument succeeds, *SCE* remains useful in revealing the failure of *CaI* to properly account for *degrees* of causation.<sup>18 19</sup>

Here is the intuition I have in mind:

*Comparative Intuition: SF is (at least) as much a cause of JS as is BF.*<sup>20</sup>

I think that *Comparative Intuition* is, and should be, held as strongly as is the (absolute) intuition that *SF* is a cause of *JS*. Question: what buttresses our intuition in section 1 that Sylvie's rock-throw is a cause of the vase's shattering, while Bruno's laughter is not? One answer: informed (only) of Sylvie's rock-throw, I can *predict*, *explain*, and *blame* someone for, the vase's shattering. Informed (only) of Bruno's laughter, I can do none of these things. However, and to utilise Jonathan Schaffer's terminology, note that: 'the core *epistemic*, *explanatory*, and *ethical* connotations of causation'<sup>21</sup> are no *more* present in the claim that '*BF* caused *JS*', than they are in the claim that '*SF* caused *JS*'. Suppose the jar were a national treasure. First, and to endorse Lewis's view that we *don't* ordinarily consider events fragile<sup>22</sup>: comparing a scenario in which I'm informed (only) of *BF*, with one in which I'm informed (only) of *SF*, it's not as if I can only predict *JS* (here taken as a non-fragile event) in the former. Second: consider the question – 'why did the jar shatter?' Likely, most would find the answer – 'because Sylvie fired' – to be no more lacking than the answer – 'because Bruno fired'. Third: it'd be

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<sup>18</sup> In the contemporary literature, there exists the idea that *CaI* can account for, or at least play a role in our understanding of, degrees of causation. Lewis (2000, 191) himself, for example, thinks that degrees of causation track degrees of influence. Another example is found in James Woodward (2010). Now, Woodward doesn't find *CaI* promising as an analysis of 'causation *simpliciter*' (ibid., 304). Nevertheless, he suggests that *CaI* can play a role in 'distinguish[ing] [...] among causal relationships' (ibid., 304). In more detail – Woodward connects the 'specificity' of causal relationships in biological contexts to influence (ibid., 301-308). And while he doesn't explicitly state that degrees of causation track degrees of 'specificity', he does state that: where  $C_1$  and  $C_2$  are both causes of some effect  $E$ , if the causal relationship between  $C_1$  and  $E$  is more 'specific' as compared to the causal relationship between  $C_2$  and  $E$ , then possibly we are justified if we 'single out or "privilege" the causal role of [ $C_1$ ]' (ibid., 316). See also Matthew Braham and Martin van Hees (2009, 331, n16), who discuss one point of similarity between their measure of degrees of causation, and *CaI*.

<sup>19</sup> There is another scenario in which, even if Choi's points are correct, *SCE* spells trouble for *CaI*. Say we modify *SCE* so that: both balls detect and decimate balls that aren't intrinsically similar to them. Then,  $D_1$ 's influence on *JS*, and *SF*'s influence on  $D_2$ , are eliminated.

Consequently, *CaI* must deliver the *unintuitive* result that *SF* is not *at all* a cause of *JS*.

<sup>20</sup> One may worry that, as stated, *Comparative Intuition* (absurdly) implies that *JS* was caused twice over (once by *SF*, and once by *BF*). If so, one may read *Comparative Intuition* as saying: *SF* and *BF* contributed to *the* causing of *JS* to the same degree. On this reading, 'degrees of causation' should be read as 'degrees of causal contribution' (see Alex Kaiserman (2016, 387-389)).

<sup>21</sup> Schaffer (2001, 12-13). Emphasis mine.

<sup>22</sup> Lewis (2000, 185-186); Lewis (1986b, 198).

surprising if Judge blamed Bruno more than she did Sylvie. More likely, liability for the jar's damages would be apportioned equally.

Nevertheless, two considerations might motivate:

*Counter Intuition*:  $BF$  is more a cause of  $JS$  than is  $SF$ .

Consideration<sub>1</sub> is this asymmetry: had Sylvie not fired, nothing about  $JS$  changes. However, had Bruno not fired, the jar would've shattered slightly later, and in a slightly different manner. Consideration<sub>2</sub> is that  $JS$  occurred at a time, and in a manner more (and, in fact, exactly) in line with Bruno's, rather than Sylvie's, intention.

If, however, Consideration<sub>1</sub> and Consideration<sub>2</sub> are what motivate *Counter Intuition*, then *Counter Intuition* is misleading. Consider this scenario:

*Unlucky President*: at time  $t_1$ , Assassin<sub>H</sub> and Assassin<sub>R</sub> poison President's coffee. Assassin<sub>H</sub> uses poison  $H$ , which will induce heart failure at time  $t_4$ . Assassin<sub>R</sub> uses poison  $R$ , which will induce respiratory failure at time  $t_5$ . At time  $t_2$ , President drinks her coffee. At time  $t_3$ , however, poison  $H$  and poison  $R$  interact in President's system – poison  $H$  neutralises the respiratory-failure-inducing elements of poison  $R$ ; poison  $R$  neutralises the heart-failure-inducing elements of poison  $H$ . But President isn't so lucky – she happens to be fatally allergic to some other element  $e$  of poison  $H$ . Element  $e$  induces in President respiratory failure at  $t_5$ , and she dies.

Considerations parallel to Consideration<sub>1</sub> and Consideration<sub>2</sub> are present in *Unlucky President*. In *Unlucky President*, we have Consideration<sub>1\*</sub>, which is this asymmetry: had Assassin<sub>H</sub> not poisoned President's coffee, nothing about President's death changes. However, had Assassin<sub>R</sub> not poisoned President's coffee, President would've succumbed to heart failure at  $t_4$ , and not respiratory failure at  $t_5$ . In *Unlucky President*, we also have Consideration<sub>2\*</sub>: President's death occurs at a time, and in a manner more (and, in fact, exactly) in line with Assassin<sub>R</sub>'s, rather than Assassin<sub>H</sub>'s, intention. However, does either Consideration<sub>1\*</sub> or Consideration<sub>2\*</sub> push us to think that 'Assassin<sub>R</sub>'s poisoning caused President's death'? No. Most intuitively, Assassin<sub>H</sub>'s poisoning caused President's death. This shows that: considerations like Consideration<sub>1</sub> and Consideration<sub>2</sub> aren't substantially relevant to causation. Thus, if *Counter Intuition* is motivated by Consideration<sub>1</sub> and Consideration<sub>2</sub>, then *Counter Intuition* should be suppressed.

*Comparative Intuition*, then, is justifiably strong. But I now argue that *CaI* violates this intuition: it counts  $SF$  as (significantly) *less* a cause of  $JS$  than is  $BF$ .

What determines how much a cause  $BF$  is of  $JS$ ? On *CaI*, it is (roughly) the amount of influence that  $BF$  has on  $JS$ .<sup>23</sup> What determines this amount? Centrally, it is the size of the range of: alterations to  $BF$  that lead to changes in  $JS$ . Accounting for those types of alterations that Strevens and Choi consider, there are (at least) *four* types of alterations to  $BF$  that lead to said changes: alterations to the *timing* and *direction* of  $BF$ , and to the *mass* and *shape* of the ball Bruno fires.

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<sup>23</sup> Lewis (2000, 190-191).

What determines how much a cause  $SF$  is of  $\mathcal{J}S$ ? Now, because  $SF$  has no substantial direct influence on  $\mathcal{J}S$ <sup>24</sup>,  $CaI$  must appeal to  $ICHAIN_1/ICHAIN_2$ . For each of these  $ICHAIN$ s, however,  $CaI$  is silent on whether the determinant is (A) the amount of influence that  $SF$  has on  $D_1/D_2$  (the amount of influence present in ‘link’<sub>1</sub> of the  $ICHAIN$ ), (B) the amount of influence that  $D_1/D_2$  has on  $\mathcal{J}S$  (the amount of influence present in ‘link’<sub>2</sub> of the  $ICHAIN$ ), or (C) some weighted average of [(A) + (B)]. Nevertheless, let’s first determine (A) and (B):

(‘Link’<sub>1</sub> of  $ICHAIN_1$ ): (at least) *six* types of alterations to  $SF$  lead to changes in  $D_1$  (alterations to the *timing* and *direction* of  $SF$ , and to the *mass*, *shape*, *surface properties* and *electrical charge* of the ball Sylvie fires);

(‘Link’<sub>2</sub> of  $ICHAIN_1$ ): (at least) *two* types of alterations to  $D_1$  lead to changes in  $\mathcal{J}S$  (alterations to the *mass* and *shape* of the ball at  $D_1$ ’s spatio-temporal region);

(‘Link’<sub>1</sub> of  $ICHAIN_2$ ): (at least) *two* types of alterations to  $SF$  lead to changes in  $D_2$  (alterations to the *surface properties* and *electrical charge* of the ball Sylvie fires);

(‘Link’<sub>2</sub> of  $ICHAIN_2$ ): (at least) *four* types of alterations to  $D_2$  lead to changes in  $\mathcal{J}S$  (alterations to  $D_2$ ’s *spatio-temporal* properties (this counts for two), and to the *mass* and *shape* of the ball at  $D_2$ ’s spatio-temporal region).

Let the ‘strength’ of an  $ICHAIN$  ‘link’ be the amount of influence present in that ‘link’. I now claim that, for  $ICHAIN_1$  and  $ICHAIN_2$ ,  $CaI$  must say: what determines how much a cause  $SF$  is of  $\mathcal{J}S$  is – the strength of the  $ICHAIN$ ’s *weaker* ‘link’. This follows from my next, more general, claim that: if an event  $C$  is a cause of another event  $E$  because there is a (two-‘link’)  $ICHAIN$  leading from  $C$  to  $E$ , then how much a cause  $C$  is of  $E$  supervenes upon the strength of said  $ICHAIN$ ’s weaker ‘link.’ I will now evidence the just-mentioned general claim by constructing one (two-‘link’)  $ICHAIN$  in each of two causal scenarios. I will then show that, in these  $ICHAIN$ s: varying the strength of the stronger ‘link’ (while holding fixed that of the weaker ‘link’) *doesn’t* vary our intuitions about how much  $C$  is a cause of  $E$ . Varying the strength of the weaker ‘link’ (while holding fixed that of the stronger ‘link’), however, *does*. The first  $ICHAIN$  I construct will possess  $ICHAIN_1$ ’s *strong-weak* pattern of influence (i.e.,  $C$  ( $SF$ ) has no substantial direct influence on  $E$  ( $\mathcal{J}S$ );  $C$  strongly influences some intermediate event  $D$  ( $D_1$ );  $D$  weakly influences  $E$ ). The second will possess  $ICHAIN_2$ ’s *weak-strong* pattern of influence (i.e.,  $C$  ( $SF$ ) has no substantial direct influence on  $E$  ( $\mathcal{J}S$ );  $C$  weakly influences  $D$  ( $D_2$ );  $D$  strongly influences  $E$ ).

### Scenario 1

*Divorce*: only two things elicit in Wife hatred for Husband (the first significantly more so than the second): (1) the memory of their first fight, which occurred in the rain; (2) the memory of their second fight, which occurred in the fog. Wife, nevertheless, has fallen for Paramour. Thus, she has decided that she will file for divorce from Husband on Thursday afternoon. On Wednesday afternoon, Husband goes on a drinking binge. Late Wednesday night, Husband arrives home. His drunkenness annoys Wife, and the two fight in their driveway. Because fog

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<sup>24</sup> Admittedly, if Sylvie fires early enough, her ball will ricochet and shatter the jar before Bruno’s ball can. We can, however, all but eliminate this small amount of influence by adding to  $SCE$  that: the jar is placed at its location right before it actually shatters.

happens to descend, the fight is so serious to Wife that it (temporarily) lays her thoughts of Paramour to rest, and independently drives her to file for divorce on Thursday afternoon.

We can construct a *strong-weak ICHAIN<sub>Divorce</sub>* with these three events: (*C*) Husband's drinking binge on Wednesday afternoon; (*D*) the fight late Wednesday night; (*E*) Wife's filing for divorce on Thursday afternoon. (1) *C* has no substantial direct influence on *E* – altering whether or not/how/what/how long Husband drinks changes nothing about Wife's filing for divorce. (2) *C* strongly influences *D* – altering whether or not/how long Husband drinks changes whether or not/at what time the fight occurs. (3) *D* weakly influences *E* – altering whether or not/how long Wife and Husband fight changes nothing about Wife's filing for divorce. However, if the fight had occurred in the rain, then Wife would've filed for divorce, say, earlier.

Now, does strengthening *ICHAIN<sub>Divorce</sub>*'s stronger 'link' (*C*'s influence on *D*) make us intuit that *C* is more a cause of *E* than before? No. Add to *Divorce* that the fight's topic is sensitive to the type of alcohol that Husband consumes – this *doesn't* make us intuit that Husband's drinking binge is more a cause of Wife's filing for divorce than before. But what if we strengthen *ICHAIN<sub>Divorce</sub>*'s weaker 'link' (*D*'s influence on *E*)? Add to *Divorce* that the timing of Wife's filing for divorce is sensitive to whether or not (but not the extent to which<sup>25</sup>) Husband is drunk during the fight (perhaps Wife takes sober fights most seriously, and would've filed for divorce earlier if Husband were sober during the fight<sup>26</sup>) – this *does* make us intuit that, versus before, Husband's drinking binge is more a cause of Wife's filing for divorce on Thursday afternoon (and not, say, early Thursday morning).

## Scenario 2

*Resolve*: Colonel is testing Recruit's resolve. Recruit possesses a button which, if pressed, activates a light which Gunman takes as a signal to shoot Prisoner. Now, Gunman will only ever shoot at time  $t_2$ . Also, iff Recruit doesn't press the button by time  $t_1$ , Colonel will shoot Prisoner at  $t_2$ . The following three events occur: (*C*) Recruit presses the button at  $t_1$ ; (*D*) Gunman fires at  $t_2$ ; (*E*) Prisoner dies at  $t_3$ .

*C-D-E* form *weak-strong ICHAIN<sub>Resolve</sub>*: (1) *C* has no substantial direct influence on *E* – altering whether or not/how/when Recruit presses the button changes nothing about Prisoner's death at  $t_3$ . (2) *C* weakly influences *D* – altering how Recruit presses the button changes nothing about Gunman's firing at  $t_2$ . And neither does having Recruit press the button *before*  $t_1$ . However, if Recruit doesn't press the button (by  $t_1$ ), Gunman wouldn't have fired. (3) *D* strongly influences *E* – altering whether or not/how Gunman fires changes whether or not/how Prisoner dies.

Consider these two possible additions to *Resolve*: (1) Gunman possesses many rifles to choose from, each of which inflicts death differently; (2) Recruit possesses another button which, if pressed, *prevents* Gunman's firing (Colonel will nonetheless shoot Prisoner at  $t_2$  if this button is pressed<sup>27</sup>). Again, only that addition which strengthens the *ICHAIN*'s weaker 'link' (addition (2)) makes us intuit that *C* is more a cause of *E* than before.

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<sup>25</sup> This stipulation denies *C* substantial direct influence on *E*.

<sup>26</sup> I think that an alteration of the fight in which Husband is sober requires no bigger a Lewisian 'miracle' (1979, 468-469) than do those alterations of  $D_1$  that Choi appeals to.

<sup>27</sup> This stipulation denies *C* substantial direct influence on *E*.



There is evidence, then, that in (two-‘link’) *ICHAIN*s: how much *C* is a cause of *E* supervenes upon the strength of the *ICHAIN*’s weaker ‘link’. Resultantly, unless one (A) reasonably explains why this doesn’t apply to *ICHAIN*<sub>1</sub> and/or *ICHAIN*<sub>2</sub>, or (B) denies that the causal status of *C* has something to do with *ICHAIN*s (or counterfactual dependence in general): how much *SF* is a cause of *JS* supervenes upon the strength of, for *ICHAIN*<sub>1</sub>, ‘link’<sub>2</sub>, and for *ICHAIN*<sub>2</sub>, ‘link’<sub>1</sub>.

This result, however, likely forces *CaI* to (counterintuitively) count *SF* as (significantly) *less* a cause of *JS* than is *BF*. After all, *four* types of alterations to *BF* count towards the influence that *BF* has on *JS*. Only *two* types of alterations to *D*<sub>1</sub> count towards the influence that *D*<sub>1</sub> has on *JS*. And only *two* types of alterations to *SF* count towards the influence that *SF* has on *D*<sub>2</sub>. Certainly, it remains possible that for, say, *ICHAIN*<sub>2</sub>: the *total number* (as opposed to the number of *types*) of alterations to *SF* that lead to changes in *D*<sub>2</sub> is greater than the *total number* of alterations to *BF* that lead to changes in *JS*. But this would be surprising. Why think, for example, that there are (significantly) more surface properties that Sylvie’s ball might’ve had, than there are angles at which Bruno might’ve fired? It also remains possible for the defender of *CaI* to try to identify more *types* of alterations to *SF* that lead to changes in *D*<sub>2</sub>. This strategy, however, can only be a stopgap, unless it can be shown that: for each such newly-identified type of alteration to *SF*, there is no not-too-distant, hitherto-unidentified, type of alteration to *BF* that leads to changes in *JS*. Showing this would be difficult. After all, there appear many examples of the latter (e.g., altering properties like the muzzle velocity and barrel length of Bruno’s *rifle* will affect the travel of his ball).

I end by blocking one last manoeuvre that the defender of *CaI* might perform. Consider:

‘*Threshold Operation* of *CaI*: causation isn’t a scalar relation. That is, there are no degrees of causation – either an event *C* is a cause of another event *E*, or it isn’t, period. Thus, if the strength of the weaker ‘link’ of *ICHAIN*<sub>1</sub>/*ICHAIN*<sub>2</sub> determines anything, it’s simply *whether or not* *SF* is a cause of *JS*. That said, in both *ICHAIN*s, said strength meets that minimum amount of influence  $\alpha$  required to establish causation. So there is a sense in which *CaI* *does* capture *Comparative Intuition* – *SF* is ‘as much’ a cause of *JS* as is *BF* in that neither firing can be said to be more or less a cause than the other. (On ‘*Threshold Operation*, then, any influence that *C* has on *E* exceeding  $\alpha$  is ignored.)

Besides its diverging from Lewis’s writing<sup>28</sup>, there are (at least) two reasons to reject ‘*Threshold Operation*’.

First: causation *is* plausibly a scalar relation. After all, this appears to be the ‘common sense’, or ‘ordinary’, view. For one thing, Christopher Hitchcock and Joshua Knobe offer experimental evidence for their claim that ‘ordinary causal judgments of subjects’ come in degrees.<sup>29</sup> For another thing, Michael Moore argues that the *law* treats causation as scalar.<sup>30</sup> Thus, in tort law, the idea of ‘degrees of causal contribution’ is both taken as sensible, and employed widely. We see this especially in negligence cases in which the doctrine of *divisible harm* is invoked so as to apportion liability amongst several defendants according to the degree

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<sup>28</sup> (2000, 191) indicates that Lewis thinks causation *is* a scalar relation; (2000, 188-189) sees Lewis establish causation with reference to comparative, and not absolute, standards.

<sup>29</sup> Hitchcock and Knobe (2009, 602).

<sup>30</sup> Moore (2009, 71, 118-123). See also Braham and van Hees (2009, 324).

of causal contribution each makes to some *indivisible* harm.<sup>31</sup> One such case<sup>32</sup> – in *Moore v. Johns-Manville Sales Corp* 781 F 2d 1062 (5th Cir 1986), liability for each plaintiff’s asbestosis was apportioned according to: the degree to which each (defendant) manufacturer’s (asbestosis-containing) products caused the plaintiff’s asbestosis (i.e., each defendant’s ‘degree of relative causation’). Therefore, if we think that our concept of causation should accord with how causation is employed ‘ordinarily’, we should also think that causation *is* a scalar relation.

Second: determining the value of  $\mathbf{x}$  appears impossible. After all,  $\mathbf{x}$  cannot be some one particular value. This is because: we can easily conceive of one pre-emption case in which (the event intuited as) the pre-empting cause *doesn’t* exhibit  $\mathbf{x}$  amount of influence on the effect, and another pre-emption case in which (the event intuited as) the (non-causal) pre-empted alternative *does*.<sup>33</sup> Now, one may then say: determine  $\mathbf{x}$  on a case-by-case basis. This, however, would require one to establish some standard set of case features relevant to determining  $\mathbf{x}$  (so as to ensure that our determinations of  $\mathbf{x}$  are not *ad hoc*). At this point, however, I simply cannot see what these features might be.\*

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<sup>31</sup> Moore (2009, 118-119).

<sup>32</sup> *Ibid.*, 119, n36 contains more case examples.

<sup>33</sup> See Phil Dowe (2000, 6-7).

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