Lewisian-Style Counterfactual Analysis of Causation: A New Solution to the Overdetermination Problem

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Abstract: Causal overdetermination – i.e. instances in which x, y, and z all occur and intuitively the occurrence of x alone is sufficient for the occurrence of z and the occurrence of y alone is sufficient for the occurrence of z – has long been considered a problem for counterfactual analyses of causation. Intuitively, we want to say both x and y caused z, but standard Lewisian counterfactual analysis yields the result that neither x nor y caused z. David Lewis, himself, suggested that overdetermination ought to be left as "spoils to the victor". I show how, if we modify Lewis' account of events slightly, we can bring counterfactual analysis in line with our intuitions about overdetermination.

Keywords: events, causation, overdetermination, counterfactual analysis, David Lewis.

1 Introduction

Some have claimed that a Lewisian-style counterfactual analysis of causation cannot account for causal overdetermination:

> Cases of overdetermination raise special difficulties for Lewis' analysis. They constitute prima facie evidence that counterfactual dependency is too narrow to capture causal dependency. (Kim 1998, 206)

Although counterfactual analyses of causation suffer from various flaws, an inability to account for overdetermination is not one of them. The purpose of this paper is to convince proponents and critics of a Lewisian-style counterfactual analysis of causation that, within a broadly Lewisian system, overdetermination can be accounted for.

After providing background information on Lewis' theory of causation and his theory of events, I spend the majority of the paper discussing a paradigmatic case of over-determination. Namely, a case in which two independent events occur simultaneously and, as a result of this, a further event – which we would intuitively call an "effect" – occurs.[1] I examine the suggestion that causal overdetermination can be accounted for by using events whose members are spacetime regions picked out by disjunctions. I discuss two different ways in which this can be done and examine the merits and demerits of each. I suggest that Lewisian-style counterfactual analysts ought to embrace one of these ways, rather than leaving overdetermination as "spoils to the victor".

2 Lewis' Counterfactual Analysis of Causation

Lewis provides an account of particular cases of event causation in a deterministic world (Lewis 1973, 195).[2] Lewis is interested in "real causation" rather than in the instances of causation which are often of interest to people. If Jones dies in a car wreck, his death certificate will list "car wreck" as the cause of death. However, this is only the most salient cause. There will be other causes as well, e.g. running the red light, driving down Main St., not wearing his seatbelt, his heart's stopping, etc. In general, when asked "What caused y?" people give only one of the many causes of y as the answer. Lewis is not interested in whether or not there is something special about the cause people choose to give. Rather, he is interested in anything whatsoever which may reasonably be considered a cause of y:

1 Two events are considered "independent" if they arise from intuitively different causes. For instance, if Jim shoots Lisa because he hates her and John shoots Lisa because he wants her money, then Jim's shot and John's shot are independent events.

2 "By deterministic I do not mean any thesis of universal causation, or universal predictability-in-principle, but rather this: the prevailing laws of nature are such that there do not exist any two possible worlds which are exactly alike up to some time, which differ thereafter, and in which those laws are never violated" (Lewis, 1973, 196).

> We may select the abnormal or extraordinary causes, or those under human control, or those we deem good or bad, or just those we want to talk about. I have nothing to say about these principles of invidious discrimination. I am concerned with the prior question of what it is to be one of the causes. (Lewis 1973, 196)

The instances of causation generally of interest to people will be a subset of the instances of real causation.

Given that Lewis discusses causation as a relation between events, it is necessary to know a bit about his theory of events if one is to understand his account of causation. Lewis believes there are many different types of events which serve different purposes in different philosophical contexts (Lewis 1986b, 241). In this paper I will focus only on Lewis' account of the type of event which can best be used to form counterfactuals. In particular, two elements of Lewis' account of events need to be understood. First, one needs a general definition of what an event is. Second, one needs to know, for any event e, what is required in order for e to occur. Lewis answers the first question by equating events with transworld sets (Lewis 1986b, 247). He says, e.g. the event of Dana's being born is a transworld set s which has as members a relevant spacetime region from each world w_i in which Dana is born. A spacetime region is relevant to Dana's being born iff it is a minimal spacetime region of w_i in which she is born. A region r is a minimal spacetime region in which an event e occurs at w_i iff all of e that occurs at w_i occurs in r and there is no subregion of r in which all of e occurs:

> An event occurs in a particular spatiotemporal region . . . it does not occur in any proper part of that region. The whole of the event occupies the whole of its region. (Lewis 1986b, 243)

Assume, for illustration, that worlds w_k, w_m, and w_n each have one minimal spacetime region in which Dana is born, and that no other worlds have such a region. Then the event which is Dana's birth is $\{w_{ks}, w_{ms}, w_{ns}\}$.[3] Lewis claims an event occurs at a world iff one of its

[3] Where "w_{ks}" stands for the minimal spacetime region of w_k in which Dana is born, "w_{ms}" stands for the minimal spacetime region of w_m in which

members is present at that world (Lewis 1986b, 235). For instance, the event which is Dana's birth occurs at w_k, w_m, and w_n.

Lewis explains causation by first providing a counterfactual analysis of causal dependence, and then defining causation in terms of causal dependence. He uses event-propositions to form the antecedents and consequents of his counterfactuals. An event-proposition is a proposition which refers to an event, i.e. if "*x*" is used to refer to the event of Dana's hand-waving, then "O(x)" will be used to refer to the proposition that Dana waved her hand at the world under consideration. In explaining Lewis' account I will use "O(c)" to refer to the proposition that cause-event c occurred (i.e. a member of cause-event c is present at the relevant world) and I will use "O(e)" to refer to the proposition that effect-event e occurred (i.e. a member of effect-event e is present at the relevant world). Lewis claims that if c and e are two distinct possible particular events, then e depends causally on c at a world w iff the counterfactuals O(c) $\Box\!\!\rightarrow$ O(e) and ~O(c) $\Box\!\!\rightarrow$ ~O(e) are both true at w (Lewis 1973, 199). "O(c) $\Box\!\!\rightarrow$ O(e)" is true at w iff either there is no accessible world at which c obtains, or, at the closest accessible world at which c obtains, e also obtains (Lewis 1973, 197). "~O(c) $\Box\!\!\rightarrow$ ~O(e)" is true at w iff either c obtains at all accessible worlds, or, at the closest accessible world at which c does not occur, e does not occur either (ibid.). Thus, assuming that c occurs at some accessible worlds and does not occur at other accessible worlds, in order for e to depend causally on c at w it must be the case that e occurs at the closest world to w at which c occurs and that e does not occur at the closest world to w at which c does not occur. Lewis takes the notion of comparative overall similarity between w_k , w_m, and w_n as primitive (Lewis 1973, 196). W_k is closer to w_m than w_n is iff w_k is more similar to w_m then w_n is (ibid.).

Lewis uses his analysis of causal dependence to explain the notion of a causal chain from an event c to another event e: if d depends causally on c, and e depends causally on d, then there is a causal chain from c to e (Lewis 1973, 200). He then defines causation via causal chains: Event c causes event e iff there exists a causal chain leading

Dana is born, and "w_{ns}" stands for the minimal spacetime region of w_n in which Dana is born.

from c to e (ibid.). In other words, c causes e iff the requisite counterfactuals hold between c and e,[4] or between c and $x_{1\ldots}$, and between x_n and e, where the requisite counterfactuals hold between each x_i and the x_k immediately after it.[5]

3 The Problem of Over-Determination

Concerns that counterfactual dependence is too narrow to account for causation arise when one contemplates cases of causal overdetermination. Suppose we inhabit the actual world of the following universe:[6]

	Jim shoots. John doesn't shoot. Lisa dies.		
Jim shoots. John shoots. Lisa dies. x w_a	x w_1 Jim doesn't shoot. John shoots. Lisa dies. x w_2	Jim doesn't shoot. John doesn't shoot. Lisa doesn't die. x w_3	Jim shoots. John shoots. Lisa dies. w_4

[4] "O(c) □→ O(e)" and "~O(c) □→ ~O(e)" are true.

[5] "O(c) □→ O(x_1)" and "~O(c) □→~O(x_1)" are true, "O(x_1) □→ O(x_2)" and "~O(x_1) □→ ~O(x_2)" are true, …, "O(x_n) □→ O(e)" and "~O(x_n) □→ ~O(e)" are true.

[6] Of course, we tend to believe we inhabit a much larger universe, but positing only five worlds is a simplifying assumption upon which nothing hinges. I intend the closeness relations of the worlds to be represented by their relative positions to each other along the horizontal axis. I intend "x" to refer to every event which occurs at the actual world except Jim's shooting, John's shooting, and Lisa's dying. In other words, at w_1, w_2, and w_3 everything is exactly like it is at the actual world except (perhaps) Jim's shooting, John's shooting, and Lisa's dying. At w_4 x is not present. I intend w_4 to lack at least three of the events which occur at w_a, as this forces w_4 to be less similar to w_a than w_3 is.

At w_a Jim and John both shoot Lisa. The bullets from their shots hit Lisa at entirely different locations at the same moment and she dies as a result of this. Lisa's dying isn't counterfactually dependent on Jim's shot because, even if Jim hadn't shot, she still would have died. Likewise, Lisa's dying isn't counterfactually dependent on John's shot because, even if John hadn't shot, she still would have died. The worry is that, according to Lewis' theory, in this case of overdetermination there is nothing which can serve as the cause of Lisa's death, yet certainly something must have caused Lisa's death. Intuitively, we think this something is very closely bound up with Jim and John's actions.

4 Finding a New Solution to the Overdetermination Problem

We can find an answer to the question "What caused Lisa's death?" within a Lewisian-style counterfactual analysis framework if we consider an event whose members are spacetime regions in which a shot by Jim or John occurs. There are two possible ways in which we can use the disjunction Jim-or-John-shoot to pick out spacetime regions. We can use a-shooting-by-Jim-or-John in such a way that the members it picks out are minimal spacetime regions. In other words, a spacetime region is a member of the event described as "a shooting by Jim or John" iff it is a minimal spacetime region in which either Jim or John shoots (but not both, since one shooting is sufficient for the occurrence of a-shooting-by-Jim-or-John, the region in which both Jim and John shoot will not be minimal). I will discuss this option in section V, Minimal Spacetime Regions.

Alternatively, we can use a-shooting-by-Jim-or-John in such a way that the members it picks out are almost minimal spacetime regions: a spacetime region is a member of the event described as "a shooting by Jim or John" iff it is an almost minimal spacetime region in which either Jim or John shoots. A spacetime region is "almost minimal" iff it is the minimal spacetime region of a world in which all spacetime regions sufficient for the occurrence of a-shooting-by-Jim-or-John occur. Consequently, at any world w_i in which only one disjunct is present (i.e. at any world w_i in which only Jim shoots and at any world w_i in which only John shoots) the w_i member of the event is the

minimal spacetime region in which Jim shoots (at worlds in which Jim is the shooter) or in which John shoots (at worlds in which John is the shooter). At worlds in which both disjuncts are present (i.e. at worlds in which both Jim and John shoot) the w_i member of the event is the minimal spacetime region in which Jim and John both shoot. Such a spacetime region is not a minimal region in which Jim-or-John-shoot because part of it (e.g. the part in which Jim shoots) is sufficient for the occurrence of a shooting-by-Jim-or-John. However, it is almost minimal because it is the minimal region in which only both Jim and John shoot.[7] I will discuss this option in section VI: Almost Minimal Spacetime Regions.

5 Minimal Spacetime Regions

According to this possibility, the members of the event specified as "a shooting by Jim or John" are minimal spacetime regions in which exactly one of the disjuncts occurs. In a universe in which Jim shoots at w_a, w_1, and w_4 and John shoots at w_a, w_2, and w_4, this event is equivalent to $\{w_{ar}, w_{as}, w_{1r}, w_{2s}, w_{4r}, w_{4s}\}$.[8] I will evaluate events generated in this way with regard to two criteria: (1) how well the causal results yielded using such events square with our causal intuitions in cases of over-determination, and (2) whether or not such purported events are similar enough to what we intuitively think of as events to warrant being called "events".

An event whose members are minimal spacetime regions in which there is exactly one shooting, either by Jim or by John, causes Lisa's death at w_i iff

> "O(an event whose members are minimal spacetime regions in which there is exactly one shooting, either by Jim or by John) $\Box\!\!\rightarrow$ O(an event whose members are deaths of Lisa)"

[7] It is not, e.g., the spacetime region in which Jim shoots, John shoots, and President Bush gives a speech.

[8] Where "w_{ar}" refers to the minimal spacetime region in which Jim shoots at w_a, "w_{as}" refers to the minimal spacetime region in which John shoots at w_a, etc.

and

> "~O(an event whose members are minimal spacetime regions in which there is exactly one shooting, either by Jim or by John) □→ ~O(an event whose members are deaths of Lisa)"

are both true at w_i.[9,10] Since the closest world to w_a at which Jim or John shoots (i.e. w_a itself) is a world in which Lisa dies, "O(c*) □→ O(e)" is true at w_a. Since the closest world to w_a at which neither Jim nor John shoots (i.e. w_3) is a world in which Lisa doesn't die, "~O(c*) □→ ~O(e)" is true at w_a. Hence, at w_a, Lisa's death is causally dependent on Jim or John's shooting.

If minimal spacetime regions in which exactly one shooting, by Jim or by John, occurs are permitted to serve as members of the cause-event of Lisa's death, then counterfactual analysis will claim that Lisa dies the same death she actually died if only Jim shoots, if only John shoots, or if both Jim and John shoot, and that otherwise she does not die the same death. This result squares nicely with our causal intuitions. The case of Jim and John's shooting Lisa has specifically been chosen because we intuitively think it is a case of overdetermination. This means that we think Jim's shot alone would have sufficed to kill Lisa and we think John's shot alone would have sufficed to kill Lisa. We also think that Jim and John's both shooting is sufficient for Lisa's death. We also think that she would not have died the death she actually died had both Jim and John desisted from shooting.[11] Hence,

[9] Henceforth, I will use "c*" to denote an event whose members are minimal spacetime regions in which there is exactly one shooting, either by Jim or by John. I will use "e" to denote an event whose members are deaths of Lisa.

[10] For the purposes of this discussion, I will assume there are no intermediate events between c* (the disjunction of Jim's shot and John's shot) and e (Lisa's death). Everything I say will, *mutatis mutandis*, remain true when there are intermediate events between c* and e.

[11] Assuming the essence of Lisa's death is fine-grained enough that, at the closest world in which neither Jim nor John shoot, no event which is an instance of the same death Lisa died at the actual world occurs. She may not die within a time-frame which is reasonably close to the time-frame in

choosing an event which has as its member's minimal spacetime regions in which there is exactly one shooting, either by Jim or by John, as the cause-event of Lisa's death is compatible with our intuitions about what caused Lisa's death.

In general, using events whose members are spacetime regions picked out by disjunctions will produce causal results which square with our intuitions in cases of overdetermination. However, there are some who, on intuitive grounds, remain uncomfortable with events such as Jim or John's shooting, $\{w_{ar}, w_{as}, w_{1r}, w_{2s}, w_{4r}, w_{4s}\}$, which have more than one member from the same world. Lewis notes,

> I do not know how a genuine event could [have two w_i members] both of which actually occur. It would have to occur in any region where either disjunct occurs. Hence it would have to occur twice over in one world, which a particular event cannot do. (Lewis 1986a, 212)

Such an intuitive discomfort is not a defensible response for a Lewisian to have. Lewis has already claimed that an event can occur twice and that each occurrence of the event is as "metaphysically real" as any other occurrence of the event. So, according to Lewis, events are already happening twice. An event can occur in the actual world and the exact same event can occur at a neighboring concrete world.[12] There is no non-*ad hoc* way for the Lewisian to allow an event to occur twice, but to ensure that each occurrence is at a different world.

6 Almost Minimal Spacetime Regions

According to this possibility, each member of the event specified as "a-shooting-by-Jim-or-John" is the minimal spacetime region in which all of the disjuncts which occur at the world under consideration occur. For instance, in a universe in which Jim shoots at w_a, w_1, and w_4

which she died at the actual world or she may die within this time-frame, but the death will not be similar enough to the death she died at the actual world to count as the same event.

12 Remember that, although an event is a transworld set, an event occurs – not where its set occurs (which would only be in the universe) – but where any of its members occur (which is at possible worlds).

and John shoots at w_a, w_2, and w_4, a-shooting-by-Jim-or-John is equivalent to $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$.[13] I will evaluate this event with regard to three criteria: (1) how well the causal results yielded using such events square with our causal intuitions in cases of overdetermination, (2) whether or not utilizing such events in counterfactual analysis leads to any insurmountable difficulties, and (3) whether or not this purported event is similar enough to what we intuitively think of as events to warrant being called "an event".

The event equivalent to $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$ will be a cause of Lisa's death at w_a iff "O(a-shooting-by-Jim-or-John) $\Box\!\!\rightarrow$ O(e)" and "~O(a-shooting-by-Jim-or-John) $\Box\!\!\rightarrow$ ~O(e)" are both true at w_a. The first counterfactual is true at w_a because Jim or John shoots at w_a and Lisa dies at w_a. The second counterfactual is true at w_a iff at the closest world at which neither Jim nor John shoot, Lisa doesn't die.[14] Since the world which is most like the actual world save in the fact that neither Jim nor John shoot (i.e. w_3) is a world in which Lisa doesn't die, the second counterfactual is true. Thus, using $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$ as the event which is a-shooting-by-Jim-or-John concludes, in accordance with our intuitions, that Lisa's death is causally dependent on Jim-or-John's-shooting.

Lewis stipulates that an event's members must be minimal spacetime regions:

> If an event occurs in a region, it does not occur in any proper part of that region… Parts of it, but not the whole of it, may occur in part of its region. (Lewis 1986b, 243)

The event which is equivalent to $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$ does not respect this stipulation. It contains two members, w_{ars} and w_{4rs}, which are not minimal. In other words, there is a proper part of w_{ars} (e.g. the part in which Jim shoots) which is sufficient for the occurrence of a-shooting-by-Jim-or-John. Likewise, there is a proper part of w_{4rs} (e.g. the part in

[13] Where "w_{ars}" refers to the minimal spacetime region of w_a in which Jim and John both shoot, "w_{1r}" refers to the minimal spacetime region of w_1 in which Jim shoots, etc.

[14] I.e. doesn't die the same death she died at the actual world.

which John shoots) which is sufficient for the occurrence of a-shooting-by-Jim-or-John.

There are two main concerns which arise when some of the members of an event are not minimal. The first concern is that the causal relations of the non-minimal members will be different than we (intuitively) think they should be. For instance, suppose event e' is the birth of Dana and I claim that the actual world member of this event is the spacetime region of California from five days before Dana is born until five days after her birth. There will be all sorts of events that are causally dependent on event e' at the actual world which (intuitively) are not causally dependent on Dana's birth at the actual world. In general, the closer the members of an event are to being minimal spacetime regions, the more intuitive the causal relations of the event will be. However, events described as disjunctions (e.g. a-shooting-by-John-or-Jim, Sam's-waving-his-left-or-right-hand) are an exception to this generalization. Although the spacetime region w_{ars} is non-minimal in the sense that part of it is sufficient for the occurrence of a-shooting-by-Jim-or-John, it does not include any region which is irrelevant to Jim or John's shooting. The proposed actual world member of Dana's birth (i.e. the spacetime region of California from five days before Dana is born until five days after her birth) does contain an irrelevant region (i.e. all of the region except the proper part of it in which Dana is born) and it is this which allows the actual world member to generate causal relations which we (intuitively) don't consider to stem from Dana's birth. Since w_{ars} does not contain any such irrelevant regions, its being non-minimal does not yield any counterintuitive causal results.

The second concern is that if we give up the minimal stipulation, we give up any principled way of determining how large the spacetime region of a member should be. Suppose that m_{ab} is the minimal spacetime region of the actual world in which Dana is born.[15] If we give up the stipulation that members of events must be minimal spacetime regions, then we have no reason to choose m_{ab} as the actual world member of Dana's birth. We might as well choose California from 1970 to 1980, or the U.S. from 1974 to 1976, or …, as these non-

15 Dana was born in Santa Barbara in 1975.

minimal regions all include what we intuitively consider the spacetime region of Dana's birth. Such choices will leave us with events which cannot be used to provide a satisfactory account of causation. Fortunately, events like $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$ do not suffer from this difficulty. Although they abandon the minimal spacetime regions stipulation, they replace it with the equally effective almost minimal spacetime regions stipulation. A spacetime region can be a member of an event iff it is an almost minimal spacetime region. A spacetime region is "almost minimal" iff it is the minimal spacetime region of a world in which all spacetime regions which are sufficient for the occurrence of the event under consideration occur. In the case of the event of Dana's birth, the almost minimal spacetime region of each world in which Dana is born will be exactly the spacetime region in which she is born at that world. In the case of the event of Sam's waving his hand, the almost minimal spacetime region of each world in which Sam waves his hand will be exactly the spacetime region in which Sam waves all of the hands which he waves at that world. Thus, we have a principled way of determining which spacetime region of any w_i counts as a member of any event e. In other words, we have a principled way of yielding events which, when used for counterfactual analysis of causation, yield causal results in line with our causal intuitions.

One may agree that $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$, when used as the cause-event of Lisa's death, yields causal results which coincide with our intuitions in the Jim/John/Lisa case, without agreeing that we ought to use $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$ in our causal analysis. One might, for instance, reject $\{w_{ars}, w_{1r}, w_{2s}, w_{4rs}\}$ due to a belief that it is not within the bounds of what we intuitively consider to be events. Although I am sympathetic to this objection, I believe it is ultimately unfounded.

When we think of events, or use the word "event" in general discourse, we are usually not thinking of transworld sets. When I remark to a friend, "The event of Jennifer Aniston's wedding proved to be less spectacular than expected" it is not a transworld set I mean to refer to. Lewis is aware of this and notes that, when we speak of events, it is generally the actual world member of the event under consideration which we mean to refer to (Lewis 1986b, 243). Suppose Jennifer Anis-

ton's wedding is equivalent to $\{w_{as}, w_{1s}, w_{3s}, w_{4s}\}$.[16] Be this as it may, when I talk about Jennifer Aniston's wedding I am not, in general, talking about $\{w_{as}, w_{1s}, w_{3s}, w_{4s}\}$. I am, rather, talking about w_{as}.[17] This is merely a terminological dispute. Perhaps Lewis ought to have called events such as $\{w_{as}, w_{1s}, w_{3s}, w_{4s}\}$ "transworld events" and have reserved the usage of "event" for w_{as}. I have gotten around this difficulty by calling $\{w_{as}, w_{1s}, w_{3s}, w_{4s}\}$ "an event" and referring to the members of events as "w_i members". Usually it is the w_i members, particularly the w_a member, we wish to talk about rather than the entire Lewisian event. This does not suggest that transworld sets cannot be usefully used to analyze causation. It merely suggests that calling such transworld sets "events" is a confusing terminology.

Although we might agree that transworld sets can be used to analyze causation, we might wish to place limits on which transworld sets can be so used. Lewis does this by claiming (1) only events can be used to analyze causation and (2) only some transworld sets are events. In particular, he includes as events only those transworld sets which have no more than one w_i member from each world w_i and which have as members only minimal spacetime regions (Lewis 1986b, 243 – 247). I have examined abandoning either of these requirements. In section 5, I considered abandoning the former stipulation. In this section, I have suggested abandoning the latter stipulation. Abandoning at least one of these stipulations allows us, unlike Lewis, access to events which can be used to provide a counterfactual analysis of causation. We are free to admit as events Jim-or-John's-

16 Where "w_{as}" stands for the spacetime region of the actual world in which Jennifer Aniston got married, "w_{1s}" stands for the spacetime region of possible world one in which she got married, etc.

17 When one says things like "Jennifer Aniston's wedding proved to be less spectacular than expected", "Jennifer Aniston's wedding cost a lot of money", and "All the *Friends* cast attended Jennifer Aniston's wedding", one is talking about the w_a member of Jennifer Aniston's wedding. It is only in modal contexts, when one makes statements like "It might have rained during Jennifer Aniston's wedding" or "Jennifer Aniston's wedding might have been in Sacramento" that one begins to implicitly consider other w_i members.

shooting, Jack-or-Judy's-laughing, and Sam's-waving-his-right-or-left-hand.[18] One might balk at the suggestion of calling something we usually describe using a disjunction "an event". One might agree there is an event of Jack's laughing, without agreeing there is an event of Jack-or-Judy's-laughing. Of course, logically speaking, if it's true that Jack laughs at w_a, then it's true that Jack or Judy laughs at w_a. So the difficulty must arise from calling Jack-or-Judy's-laughing "an event". Once we force ourselves to understand by "an event" what Lewis means by "an event", i.e. a transworld set, the oddity evaporates. This becomes clear when we consider the example below.

Lewisians accept the event of Jack's laughing. Suppose this event, e_1, is equivalent to $\{w_{as}, w_{1s}, w_{2s}, w_{3s}\}$ and that this event adheres to all Lewis' original stipulations (i.e. it has no more than one w_i member from each world w_i and its members are all minimal spacetime regions). The actual world member of Jack's laughing is w_{as}. This actual world member belongs to many different events. It belongs, for instance, to the event, e_2, of Jack's laughing after hearing a joke $\{w_{as}, w_{1s}, w_{2s}\}$. It also belongs to the event, e_3, of Jack's laughing while watching a movie $\{w_{as}, w_{3s}\}$. It belongs, additionally, to the event, e_4, of a parent of Dana's laughing $\{w_{as}, w_{1s}, w_{2s}, w_{3s}, w_{4r}, w_{6r}\}$. In short, something happens at the actual world. This happening can be described in many different ways. Another way to say this is just to say that this happening is a member of many different events. The actual world member, w_{as}, is the same in all these events, but the other world members are different. Thus, our intuitive description of the events will differ. All of

[18] An event, to be an event which we would normally describe using a disjunction, doesn't actually have to be described using a disjunction. Sam's-waving-his-hand is just as disjunctive as Sam's-waving-his-right-or-left-hand. Dana's-talking is as disjunctive as Dana's-whispering-or-shouting-or-mumbling-or… Sue's-going-home is equally as disjunctive as Sue's-riding-her-bike-home-or-Sue's-walking-home-or-Sue's-driving-home. In general, any event which is described with limited detail can be rewritten as a disjunction which describes all the possibly ways to fill-in the details of the event.

this Lewis accepts.[19] Suppose that Jack and Judy are my parents. Suppose further that Jack laughs only at w_a, w_1, w_2, and w_3 and that Judy laughs only at w_4 and w_6. Then, event e_4 can accurately be described as Jack-or-Judy's-laughing. This description and the description "a parent of Dana's laughing" pick out the same event. So, clearly, Lewis has no difficulty *per se* with events which can be described using disjunctions (Lewis 1986b, 266). Lewis' difficulty with such events arises when, additionally, more than one of the disjuncts occurs at the same world. Suppose that Judy had laughed at w_a, w_4, and w_6. In this case, Jack and Judy would both laugh at the actual world. This causes Lewis consternation. We can have an event Jack-and-Judy-laugh $\{w_a\}$, but, it seems, we cannot have an event Jack-or-Judy-laugh. Lewis claims we cannot because doing so would force us to claim the event of Jack or Judy's laughing has two actual world members (Lewis 1986a, 212). Although this is one possibility, contra Lewis, it is not the only possibility; we can use non-minimal spacetime regions instead. This allows us to naturally extend Lewis' account to include the event of Jack-or-Judy's-laughing when this event is such that they both sometimes laugh at the same world, e.g. $\{w_{asr}, w_{1s}, w_{2s}, w_{3s}, w_{4r}, w_{6r}\}$. The Lewisian account is thus simplified. Instead of accepting disjunctive events, except those such that more than one disjunct occurs at a world, the Lewisian can now accept all disjunctive events.[20]

7 Conclusion

I have presented two possible ways for the Lewisian to generate cause-events in cases of overdetermination. The Lewisian can use events whose members are minimal spacetime regions picked out by disjuncts. Alternatively, the Lewisian can use events whose members are almost minimal spacetime regions picked out by disjuncts. Both options yield the same causal results. The choice between them, hence, rests on factors other than their respective abilities to account

[19] He discusses this in the section of "Events" entitled "Events are Described Essentially and Accidentally" (Lewis 1986b, 247 – 254).

[20] By "disjunctive event" I mean simply an event which we would generally describe using a disjunction.

for overdetermination. For instance, those who remain uncomfortable with the idea that an event can occur twice at the same world, will wish to work within the second option.

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