Contrastive Causation

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> [C]ausal statements are commonly made in some context, against a background which includes the assumption of some *causal field*. A causal statement will be the answer to a causal question, and the question 'What caused this explosion?' can be expanded into 'What made the difference between those times, or those cases, within a certain range, in which no such explosion occurred, and this case in which an explosion did occur?' Both causes and effects are seen as differences within a field. …
> —Mackie (1974, 34–35)

Causation is widely assumed to be a *binary* relation: *c* causes *e*. I will argue that causation is a *quaternary, contrastive* relation: *c* rather than ***C**** causes *e* rather than ***E****, where ***C**** and ***E**** are nonempty sets of contrast events. Or at least, I will argue that treating causation as contrastive helps resolve some paradoxes.

1. The Assumption of Binarity

Causation is widely assumed to be a binary relation: *c* causes *e*. Anyone familiar with the literature will recognize the pattern. One starts with '*c* causes *e* if and only if …' and then considers how to continue.[1] But why start there? Why assume binarity? One finds no arguments in the literature.

One might argue that binarity reflects the *surface form* of causal ascriptions. But surface form is equivocal. There are indeed binary ascriptions, such as 'Pam's throwing the rock caused the window to shatter'. But there are also contrastive ascriptions, such as 'Pam's throwing the rock rather than the pebble caused the window to shatter rather than crack'. Moreover, surface form is treacherous. Some surface forms compress more complex logical forms, and some logical forms reflect conceptual errors. One cannot read reality off surface form.

One might argue that binarity reflects the *intuitive adicity* of causal relations. But adicity is not so easily intuited. Our intuitive judgments merely provide evidence as to the acceptability of utterances (Chomsky 1977). Anything more is theory.

One might argue that binarity resolves *theoretical problems*. But which? What have accounts of '*c* causes *e* if and only if …' produced but paradox? What if an alternative works better?

Alternatives have recently emerged, primarily from van Fraassen's (1980) contrastive account of explanation and Hitchcock's (1993, 1995, 1996) contrastive account of probabilistic causation. Van Fraassen maintains that explanation is *contrastive on the e-side*: *c* explains *e* rather than *E**.[2] Does John's syphilis explain his paresis? Van Fraassen answers *yes* and *no*: "We can explain why John, rather than his brothers, contracted paresis, for he had syphilis; but not why he, among all those syphilitics, got paresis" (1980, 111). It is natural to extend this view over to causation. Does John's syphilis cause his paresis? *Yes* and *no:* John's syphilis causes him to have paresis rather than perfect health like his brothers, but John's syphilis does not cause him to have paresis rather than just syphilis alone.

Hitchcock argues that probabilistic causation is contrastive *on the c-side*: *c* rather than *C** causes *e*.[3] Does Jane's moderate smoking cause her lung cancer? Hitchcock answers *yes* and *no*:

> The solution to this puzzle is to deny that there is any such thing as *the* causal relevance of moderate smoking for lung cancer. … Relative to heavy smoking, it is a negative cause of (prevents) lung cancer; relative to abstaining, moderate smoking is a positive cause of (causes) lung cancer. … Relations of positive or negative causal relevance only hold relative to specific alternatives. (1996, 402)

In other words, Jane's moderate smoking rather than abstaining causes her lung cancer, but Jane's moderate smoking rather than heavy smoking does not.

I will argue that causation is contrastive *on both sides*: *c* rather than *C** causes *e* rather than *E**, where *C** and *E** are nonempty sets of contrast events.[4] Why both sides? First and foremost, virtually all of the arguments below apply to both sides. Second and secondarily, contrastivity on both sides is needed for chaining. In a causal chain, the first effect serves as the second cause. For this to be possible, the same structure must flank both sides of the causal relation. Thus the toppling of the first domino rather than its standing causes the toppling of the second domino rather than its standing, which causes the toppling of the third domino rather than its standing, and so forth. If causation were only contrastive on one side, no such chain could be constructed—the links would not match.

The arguments for contrastivity will require three main assumptions. First, I shall need to speak of the causal relata, and so I will assume that these are *events* (or sets thereof). In particular, I will treat the causal relata as concrete, coarse-grained, worldbound occurrences. Second, I

shall need to test for causal relatedness, and so I will assume that *counterfactual dependence* provides a decent test. In particular, I will use a difference-making test for singleton contrasts: *c* rather than *c** causes *e* rather than *e** if and only if $O(c^*) > O(e^*)$ (in words: if *c** had occurred, then *e** would have occurred).[5] Third, I shall need to say what fixes the contrast sets **C*** and **E***, and so I will assume that these are fixed by *context* (when not directly articulated). <mark>In particular, I will derive the contrasts from the questions structuring the causal inquiry.</mark>

In what follows, I will argue that contrastivity helps resolve paradoxes as to whether absences are causal (section 2), whether events are fragile (section 3), whether causation is extensional (section 4), whether causation is transitive (section 5), and whether selection of "the cause" is objective (section 6). I will conclude by evaluating the assumptions made regarding events, counterfactuals, and contexts (section 7).

2. The Paradox of Absences

Are *absences* causal? To ascend semantically, can negative nominals such as 'the gardener's not watering my flowers' denote causes and/or effects?

On the one hand, here are four reasons for accepting that absences are causal. First, some absence-citing ascriptions are *intuitively acceptable.* For instance, it sounds right to say that the gardener's not watering my flowers caused my flowers to wilt.

Second, absences play the *predictive and explanatory roles* of causes and effects. For instance, the pilot's not lowering the landing gear may be invoked to predict a crash or to explain why a crash occurred. This is the predictive and explanatory signature of causation.

Third, absences play the *moral and legal roles* of causes and effects. For instance, the negligent father who does not feed his child is morally and legally responsible for the child's starving. This presupposes causal responsibility. Thus H. L. A. Hart and Tony Honoré note:

> There are frequent [legal] contexts when the *failure* to initiate or interrupt some physical process; the failure to provide reasons or draw attention to reasons which might influence the conduct of others; and the failure to provide others with opportunities for doing certain things or actively depriving them of such opportunities are thought of in causal terms. (1985, 2–3)

Fourth, absences *mediate causation by disconnection*, which features in some of the most paradigmatic cases of causation. For instance, decap-

itation causes death by preventing oxygenated blood from preventing brain starvation. The absence of blood mediates the dying.[6]

On the other hand, here are three reasons for denying that absences are causal. First, some absence-citing ascriptions are *intuitively unacceptable*. For instance, it sounds wrong to say that the queen of England's not watering my flowers caused my flowers to wilt.

Second, absence causation is *theoretically problematic*. What exactly do negative nominals such as 'the gardener's not watering my flowers' denote? There are three main options: (i) *a nonactual event*: a merely possible event of a watering; (ii) *an actual fact*: the fact that the gardener failed to water my flowers; and (iii) *an actual event*: whatever the gardener actually did in the relevant interval, his napping, say. Each option is problematic. Both (i) and (ii) conflict with the idea of causation as involving actual events, assigning spooky powers to possibilia and abstracta. Both (i) and (iii) conflict with the idea of causation as counterfactual dependence. With (i), the supposition of the nonoccurrence of what does not actually occur simply leaves us at actuality and so does not entail the nonoccurrence of the wilting. With (iii), the supposition of the nonoccurrence of the gardener's napping does not entail the nonoccurrence of the wilting since the gardener might just have watched the news instead.[7]

Third, absence causation is *metaphysically abhorrent*. When the gardener does not water my flowers, there is no energy-momentum flow or other physical process connecting this absence (wherever located, if at all) to the wilting flowers. Absences impart no "oomph." Thus Armstrong maintains: "[O]missions and so forth are not part of the real driving force in nature. Every causal situation develops as it does as a result of the presence of positive factors alone" (1999, 177). And Hall (forthcoming) notes that absence causation violates the *spatiotemporal continuity* of ordinary macrocausation. For instance, if the gardener's not watering my flowers can be said to occur anywhere, it would be on the couch where he naps, miles from my garden.

Thus the question of whether absences are causal yields the following paradox:

(1) (+) Absence causation is intuitive: intuition accepts some absences as causal.

(2) (+) Absences play the predictive and explanatory roles of causes and effects.

(3) (+) Absences play the moral and legal roles of causes and effects.

(4) (+) Absences mediate causation by disconnection.

(5) (−) Absence causation is counterintuitive: intuition rejects some absences as causal.

(6) (−) Absence causation is theoretically problematic.

(7) (−) Absence causation is metaphysically abhorrent.

Contrastivity resolves the paradox of absences, by reconciling (1)–(7). The reconciliation strategy is as follows: (i) treat negative nominals as denoting actual events, and (ii) treat absence-talk as tending to set the associated contrast to the possible event said to be absent. For instance, given that the gardener napped and my flowers wilted, 'The gardener's not watering my flowers caused my flowers not to blossom', is to be interpreted as: the gardener's napping rather than watering my flowers caused my flowers to wilt rather than blossom.

Beginning with (6), the contrastive strategy takes the third view of negative nominals, as denoting actual events. This third view no longer conflicts with counterfactual dependence given contrastivity since the contrast turns the counterfactual antecedent down the right path: to $O(c^*)$ instead of $\sim O(c)$. Thus, the gardener's napping rather than watering my flowers did cause the flowers to wilt rather than blossom, whereas the gardener's napping rather than watching the news did not. Here the role of absence-talk is to set the contrast. This is an implementation of Hart and Honoré's view:

> The corrective here is to realize that negative statements like 'he did not pull the signal' are ways of describing the world, just as affirmative statements are, but they describe it by *contrast* not by *comparison* as affirmative statements do.[8] (1985, 38)

Contrastivity thus reconciles absence causation with a counterfactual, event-based framework.

Turning to (1)–(4), the contrastive strategy allows for absence-citing ascriptions to turn out *true*. This explains their intuitive acceptability. The negligent father's moral and legal responsibility is grounded in the truth of: the father's slurping gin rather than feeding his child caused the child to starve rather than be nourished. The predictive and explanatory role of causes is respected: the pilot's fiddling with his cap rather than lowering the landing gear serves to predict that, and explain why, the plane crashed rather than landed safely. Causation by disconnection is mediated: the executioner's beheading the prisoner

rather than burying the hatchet caused the prisoner's brain cells to starve rather than be oxygenated, which in turn caused the prisoner to die rather than survive. Contrastivity thus preserves all the plusses of absence causation.

Moving to (7), the contrastive strategy locates the "oomph" in absence causation. Where c and e are not actually connected, the members of C^* and E^* would have been connected. Or in more complex cases, there is a continuous chain composed of connections and would-be-connections.[9] Thus, when the gardener naps rather than watering my flowers, there is a would-be-connection from the causal contrast of the watering to the effectual contrast of my flowers blooming. Likewise, there is a would-be-connection from the pilot's lowering the landing gear to a safe landing. To take a more complex case, when the governor fails to stay the order of execution, there is a would-be-connection from governor to executioner, then an actual connection from executioner to axe to prisoner's neck, then a would-be-connection from prisoner's blood to brain. Contrastivity thus allows causation to be glossed in terms of *differences in "oomph."*

The one aspect of the paradox of absences that the contrastive strategy does not directly resolve is (5), the problem of counterintuitive causal claims. That is, contrastivity allows that the queen's reigning on her throne rather than watering my flowers causes my flowers to wilt rather than blossom. But perhaps this remaining implausibility can be explained away *pragmatically*. Perhaps the reason it sounds wrong to say that the queen's not watering my flowers causes them to wilt is that we never supposed that the queen would deign to water my flowers. Contrastivity helps explain why this affects the acceptability of the absence claim. We resist taking such an unrealistic supposition as a contrast. The queen's watering my flowers is not easily swallowed as a *relevant alternative*. At c^* sits an irrelevance. The contrasts trigger the pragmatics.[10]

3. The Paradox of Fragility

How modally *fragile* are events? For instance, could a given window shattering have occurred at any different time or in any different manner and still count as the same event?[11]

On the one hand, here are four reasons for denying (maximal) fragility. First, fragility is *counterintuitive*, ruling that one could not change a word, lift a finger, or pause a moment, and still count as giving the

same talk (Lewis 1986a, 198; Paul 2000, 236). By way of analogy, fragility is akin to the highly counterintuitive view that one could not chip a fingernail, lose a hair, or blink more rapidly, and still count as the same individual.

Second, fragility *miscounts traces*. When the speck of dust hits the window alongside the rock, the speck makes some difference as to the window shattering through the contribution of a speck of force. But surely the speck of dust does not cause the window to shatter. To hold otherwise is to miscount such paradigmatic noncauses as preempted backups, innocent bystanders, and hounds baying in the distance as causes since their presence contributes photons and sound-waves that make a trace of a difference to the effect.

Third, fragility *miscounts delayers*. When the doctor revives the patient for one last instant, surely the doctor's efforts do not cause the patient to die. To hold otherwise is to incur Lewis's retort: "Who would dare to be a doctor?" (1986c, 250).

Fourth, fragility *precludes excision*. Fragility renders the nearest non-*c* worlds too close. As Lewis notes: "But if *C* is taken to be fairly fragile, then, if almost-*C* occurred instead of *C*, very likely the effects of almost-*C* would be almost the same as the effects of *C*" (2000, 190). For instance, in order to evaluate the causal impact of Killer's pulling the trigger, one had better look to worlds in which Killer's pulling of the trigger is excised completely rather than just looking to "almost-*c*" worlds in which Killer merely *presses* on the trigger instead of pulling on it, on pain of losing the dependency.[12]

On the other hand, here are three reasons for accepting fragility. First, fragility *reveals the impact of traces*. When the speck of dust hits the window alongside the rock, the speck does contribute some force to the shattering. Moreover, the rock itself is but a handful of dust—it has an exhaustive decomposition into dust-sized parts. So if the speck of dust cannot cause the window shattering, then no dust-sized part of the rock can either. This renders it mysterious how the whole rock can cause the shattering—do whole rocks generate emergent causal powers?

Second, fragility *counts hasteners*. When the catalyst speeds up the poison or the preempting rock arrives a millisecond earlier than the backup, surely the catalyst and early rock count as causes. But without fragility, it follows that *e* would have occurred anyway (and by the same process, in the case of the catalyst), and so it seems that one loses dependency.

Third, fragility yields the only *principled* view of causation. Counterfactual accounts that test whether $\sim O(c) > \sim O(e)$ are committed to a principled distinction between whether an event is present or absent. Yet without fragility, no principled distinction between presence and absence remains. As soon as some variation of time and/or manner is permitted, the floodgates are open. This leaves the binary theorist in the position of requiring a principled distinction when there is none to be drawn. As Lewis came to admit:

> How much delay or change do we think it takes to replace an event by an altogether different event, and not just by a different version of the same event? An urgent question, if we want to analyze causation in terms of the dependence of whether one event occurs on whether another event occurs. Yet once we attend to the question, we surely see that it has no determinate answer. We have not made up our minds; and if we presuppose sometimes one answer and sometimes another, we are entirely within our linguistic rights. This is itself a big problem for a counterfactual analysis of causation, quite apart from the problem of preemption. (2000, 186)

In practice, most theorists are left in the position of rejecting fragility and then refusing to say much more. The standard view on fragility has become: *don't ask, don't tell.*

Thus the question of whether events are (maximally) fragile yields the following paradox:

(8) ($-$) Fragility is counterintuitive.
(9) ($-$) Fragility miscounts traces.
(10) ($-$) Fragility miscounts delayers.
(11) ($-$) Fragility precludes excision.
(12) ($+$) Fragility reveals the impact of traces.
(13) ($+$) Fragility counts hasteners.
(14) ($+$) Fragility is the only principled stance.

Starting with (8), the contrastive strategy fits intuition by flatly *denying* fragility. The same event could still be present, even with slight differences.[13]

Jumping to (14), the contrastive strategy stays principled by *divorcing* causation from the presence/absence distinction. The question of whether c^* counts as a mere variation on c or a replacement for it bears no weight (likewise for e^* and e). The contrastive account has no concern with $\sim O(c)$ and $\sim O(e)$ and so no concern with whether these are met by slight differences or not. One simply invokes specific contrasts.

Contrastivity thus reconciles the vagaries of transworld event comparisons with objective causation.

Of course, there may be *linguistic* indeterminacy as to which contrasts are in play in a given causal claim. But this is where indeterminacy *ought* to be located. What is indeterminate is simply which causal claim a given binary ascription encodes. Once all the terms of the contrastive relation (c, C^*, e, and E^*) are fixed, one has a *principled quaternary relation.*

Similar comments apply to (11): by invoking specific contrasts, the contrastive strategy avoids any need for excision. One simply substitutes c^*. The question of whether c^* is almost-c, sorta-kinda-c, or entirely-not-c bears no weight. Contrastivity thus provides a natural way to split the difference with respect to the problems of excision: *yes,* Killer's squeezing the trigger rather than walking away (entirely-not-c) causes Victim to die rather than live; but *no,* Killer's squeezing the trigger rather than pressing it (almost-c) does not.

Turning to (9) and (12), the contrastive strategy resolves the causal status of traces. Did the speck of dust's hitting the window rather than veering wide cause the window to shatter? *Yes* and *no*: the speck of dust's hitting the window rather than veering wide did cause the window to shatter in manner m rather than m' (where the difference between m and m' is the difference made by the bit of force the dust contributes), which respects (12); but the speck of dust's hitting the window rather than veering wide did not cause the window to shatter rather than remain intact, which respects (9). In general, the difference between e and e^* quantifies the impact of the difference between c and c^*. The contrasts *measure* impact.

By measuring impact, contrastivity reconciles causation with the scientific image. We distinguish causes from noncauses. But the physical laws determine a function from hypersurfaces of back lightcones to their apexes. Vary the values of physical parameters *anywhere* in the back lightcone, and the values of the physical parameters at the apex will likely vary (Latham 1987; Field 2003). Functional dependence is ubiquitous. The scientific image thus seems to leave no room for a distinction between causes and noncauses along a hypersurface. But specify the contrasts and the impasse is resolved. Does the presence of a given physical quantity q at point p cause a given effect to occur? *Yes* and *no*: The instantiation of q rather than q' causes e to occur in manner m rather than m', but (for the intuitive noncauses) does not cause e to occur rather than some rather distant contrast e^*. Contrastive causation measures functional dependence.

The one aspect of the paradox of fragility that the contrastive strategy does not directly resolve is the hastener/delayer asymmetry in (10) and (13). That is, contrastivity yields a symmetrical treatment. Contrastivity allows hasteners to count as causes for some contrasts but not for others. For instance, the poison being catalyzed rather than acting on its own causes Victim to die at t_0 rather than t_1; but the poison being catalyzed rather than acting on its own does not cause Victim to die at t_0 rather than survive the day. (This is the measure of the impact of the catalyst.) And contrastivity allows delayers to count as causes for some contrasts but not for others. For instance, the doctor's reviving Victim rather than unplugging the respirator causes Victim to die at t_1 rather than t_0; whereas the doctor's reviving Victim rather than unplugging the respirator does not cause Victim to die at t_1 rather than survive the day. (This is the measure of the impact of the doctor.) Where's the asymmetry?

Perhaps the hastener/delayer asymmetry can be explained away *pragmatically*. The asymmetry is puzzling because the metaphysical situation is symmetric. As Mackie notes in this regard: "Why should moving something to an earlier time count as causing it, while moving it to a later time does not?" (1992, 486) (see also Bennett 1987). Our intuitions are asymmetric, I propose, because: (i) we have an intuitive image of ourselves as agents intervening in the course of events, (ii) hasteners close opportunities for further intervention whereas delayers open them, and (iii) we are more concerned with closing opportunities because of the finality involved. *Finalizing* feels more salient than *postponing*.[14] Contrastivity helps implement this pragmatic explanation for the following reason. The contrasts on which hasteners count as causes (t_0 rather than t_1) are finalizing-contrasts, whereas the contrasts on which delayers count as causes (t_1 rather than t_0) are mere postponing-contrasts. Thus the hastening-favorable contrasts will typically count as more relevant contributions to the conversation. The difference sits at $c*$. The contrasts trigger the pragmatics.[15]

4. The Paradox of Extensionality

Is causation extensional? If c causes e, and $c=c'$, does it follow that c' causes e? Likewise, if c causes e, and $e=e'$, does it follow that c causes e'? To ascend semantically, can causal claims change truth-value by the mere substitution of co-referring event nominals?

On the one hand, here are two reasons for accepting extensionality. First, extensionality is *intuitive*. Thus Mackie remarks:

> We can surely substitute co-referring expressions in singular causal statements: if the assassination at Sarajevo in 1914 caused the First World War, so did the assassination in the capital of Bosnia in 1914, and so did Gabriel Prinzip's best-known action. (1974, 249; see also Davidson 1967)

Second, extensionality fits a *realist* metaphysic. History is a vast causal process, much of which is mind independent. As Strawson writes, "causality is a natural relation … that relationship holds however *A* and *B* may be described" (1985, 118). How could mere talk stem the tide of causation?

On the other hand, extensionality is subject to *counterexamples*, of which I shall discuss a representative three. First, to borrow an example from Anscombe (1969), one might accept that de Gaulle's making a speech caused an international crisis but deny that the man with the biggest nose in France's making a speech caused an international crisis (without denying the facts). One wants to say: the size of the nose was not relevant.

Second, to adapt an example from McDermott (1995), one might accept that McEnroe's tension caused his serving awkwardly but deny that his tension caused his serving. One wants to say: he was going to serve anyway.[16]

Third, to take an example from Achinstein (1975), one might accept that Socrates' *drinking hemlock* at dusk caused his death but deny that Socrates' drinking hemlock *at dusk* caused his death. One wants to say: *when* he drank the hemlock did not matter. This case is instructive because it shows that extensionality cannot be salvaged by distinguishing causation from causal explanation (as per Davidson 1967 and Strawson 1985), or by moving to facts (as per Bennett 1988) or to fine-grained events (as per Goldman 1970, Kim 1976, and Lewis 1986c). The hemlock case involves a mere difference in the location of linguistic focus.[17]

Thus the question of whether causation is extensional yields the following paradox:

(15) (+) Extensionality is intuitive.
(16) (+) Extensionality fits a realist metaphysic.
(17) (−) Extensionality fails in the de Gaulle case.
(18) (−) Extensionality fails in the serving case.
(19) (−) Extensionality fails in the hemlock case.

Contrastivity resolves the paradox of extensionality by reconciling (15)–(19). The reconciliation strategy is as follows: (i) uphold extensionality and (ii) treat description shifts as tending to induce contrast shifts. To uphold extensionality in a contrastive framework is to allow substitution of identicals at all four argument places. So if c rather than C^* causes e rather than E^*, and if $c=c'$, then c' rather than C^* causes e rather than E^*. The analogous substitution schemas are valid at C^*, e, and E^*.

By upholding extensionality, the contrastive strategy respects (15) and (16). Substitutions of co-referential terms cannot impact causal relations. Thus if de Gaulle's making a speech rather than biting his tongue caused crisis rather than calm, then the man with the biggest nose in France's making a speech rather than biting his tongue did too. Quaternary causation is mind independent. Mere redescription cannot stem the causal tide.

The contrastive strategy explains away the counterexamples of (17)–(19) as contextually induced contrast shifts. Starting with the hemlock case of (19), the focus effect begs for contrastive explanation. Thus 'Socrates' *drinking hemlock* at dusk' is naturally interpreted as c: Socrates' drinking hemlock at dusk, rather than c^*: Socrates' drinking wine at dusk (or some other salient alternative to drinking hemlock); whereas 'Socrates' drinking hemlock *at dusk*' is naturally interpreted as c: Socrates' drinking hemlock at dusk, rather than c^*: Socrates' drinking hemlock at dawn (or some other salient alternative to occurring at dusk).[18] These different contrasts may differ in effect. What Socrates drank matters; when he drank it does not.

Turning to the serving case of (18), the difference between McEnroe's serving awkwardly and his serving also suggests a contrastive explanation. The underlying contrastive truth is: McEnroe's being tense rather than calm caused his serving awkwardly rather than smoothly, but it did not cause his serving rather than standing still. The different descriptions of the effect ('McEnroe's serving awkwardly' versus 'McEnroe's serving') suggest different intended contrasts. His tension made a difference to how he served, not to whether he served.

Backtracking, finally, to the nose case of (17), the difference between de Gaulle's making a speech and the man with the biggest nose in France's making a speech also suggests a contrastive explanation. The underlying contrastive truth is: de Gaulle's making a speech rather than biting his tongue causes crisis rather than calm, but de Gaulle's making a speech rather than cutting off his nose to spite his

face does not. The different descriptions of the cause suggest different intended contrasts. It was the speech that made the difference, not the nose.

5. The Paradox of Transitivity

Is causation *transitive*? If *c* causes *d*, and *d* causes *e*, does it follow that *c* causes *e*?

On the one hand, here are two reasons for accepting transitivity. First, transitivity is *intuitive*. As Hall points out: "That causation is, necessarily, a transitive relation on events seems to many a bedrock datum, one of the few indisputable *a priori* insights we have into the workings of the concept" (2000, 198). The transitive inference feels virtually analytic.

Second, transitivity links causation to the notion of a *causal history*. When the car crashes, Lewis notes that, "We have the icy road, the bald tire, the drunk driver, the blind corner, the approaching car, and more." He adds:

> [E]ach of these causes in turn has its causes; and these too are causes of the crash. So in turn are their causes, and so, perhaps, *ad infinitum*. The crash is the culmination of countless distinct, converging causal chains. (1986b, 214)

Without transitivity (or some substitute), nothing links causal histories. There is no chaining.

On the other hand, transitivity is subject to *counterexamples*, of which I shall discuss a representative three.[19] First, there is McDermott's (1995) case of the *dog-bite*, in which Terrorist is about to detonate a bomb with his right forefinger, when Dog runs by and bites off that finger. Dog's biting causes Terrorist to press with his left forefinger, and Terrorist's pressing with his left forefinger causes the explosion, but intuitively Dog's biting does not cause the explosion.

Second, there is Hall's (2000) case of the *boulder*, in which the boulder is rolling down the hill towards Hiker, when Hiker sees it and ducks out of the way. The boulder's rolling causes Hiker's ducking, and Hiker's ducking causes his survival, but intuitively the boulder's rolling does not cause Hiker's survival.

Third, there is the case of *nudgings*,[20] on which the speck of dust nudges the rock off trajectory$_1$ onto trajectory$_2$, which causes the rock to reach trajectory$_2$'s midpoint. The rock's reaching trajectory$_2$'s midpoint then causes the window to shatter. But surely the speck of dust's

nudging the rock does not cause the window to shatter. To hold otherwise is to miscount such paradigmatic noncauses as preempted backups, innocent bystanders, and hounds baying in the distance as causes since their presence contributes photons and sound-waves that nudge the causal process. This is to fare just as poorly as the fragility theorist, which shows that one gets the worst consequence of fragility merely by accepting transitivity.

Thus the question of whether causation is transitive yields the following paradox:

(20) (+) Transitivity is intuitive.
(21) (+) Transitivity links causal histories.
(22) (−) Transitivity fails in the dog-bite case.
(23) (−) Transitivity fails in the boulder case.
(24) (−) Transitivity fails in the nudgings case.

Contrastivity resolves the paradox of transitivity, by reconciling (20)–(24). The reconciliation strategy is as follows: (i) treat causation as *differentially transitive*: if c rather than C^* causes d rather than D^*, and d rather than D^* causes e rather than E^*, then c rather than C^* causes e rather than E^*; and (ii) reveal the counterexamples to require illicit shifts in D^*.

Starting with (20), contrastivism accepts the core idea of transitivity, suitably amended for quaternicity. Indeed, an even stronger connection exists, namely, that every *token* with the form 'if c causes d and d causes e, then c causes e', will count as true *given fixed contrasts*. For as long as the contrasts do not shift within the utterance, C^*, D^*, and E^* will be fixed to the same implicit values throughout, thus implicitly fitting the differential transitivity schema.

Rolling to (21), differential transitivity links causal histories. At the first step back, the road's being icy rather than clean, the tire's being bald rather than treaded, and the driver's being drunk rather than sober, all cause the car's crashing rather than driving on. Stepping backwards, the weather's being snowy rather than dry causes the road's being icy rather than clean, the butterfly's beating its wings rather than gliding causes the weather's being snowy rather than dry. And so on back through history.

Bounding over to the counterexamples of (22)–(24), none of these involve differential transitivity. All require illicit shifts in the value of D^*. That is, all the counterexamples have the form: c rather than c^* causes d rather than d_1^*, and d rather than d_2^* causes e rather than e^*,

where $d_1{}^* {\neq} d_2{}^*$. In (22), Dog's biting off Terrorist's right forefinger rather than barking causes Terrorist's pressing with his left forefinger rather than his right forefinger: c rather than c^* causes d rather than $d_1{}^*$. But Terrorist's pressing with his left forefinger rather than his right forefinger does *not* cause the bomb to explode rather than remain intact. The bomb would explode either way. So d rather than $d_1{}^*$ does *not* cause e rather than e^*. What does cause e rather than e^* is Terrorist's pressing with his left forefinger rather than walking away (d rather than $d_2{}^*$), and Dog's biting off Terrorist's right forefinger rather than barking does *not* cause that. There is no differential chain. The value of $\boldsymbol{D^*}$ has illicitly shifted from {Terrorist's pressing with his right forefinger} to {Terrorist's walking away}.[21]

Similar comments apply to (24). The speck of dust nudging the rock rather than veering wide causes the rock to reach trajectory$_2$'s midpoint rather than trajectory$_1$'s midpoint: c rather than c^* causes d rather than $d_1{}^*$. But the rock's reaching trajectory$_2$'s midpoint rather than trajectory$_1$'s midpoint does *not* cause the window to shatter rather than remain intact. The window would shatter either way (albeit in a slightly different manner, which measures the impact of the dust). So d rather than $d_1{}^*$ does *not* cause e rather than e^*. What does cause e rather than e^* is the rock's reaching trajectory$_2$'s midpoint rather than merely dropping to the ground before the window (d rather than $d_2{}^*$), and the speck's nudging the rock does *not* cause that. There is no differential chain. The value of $\boldsymbol{D^*}$ has illicitly shifted from {the rock's reaching trajectory$_1$'s midpoint} to {the rock's dropping to the ground before the window}.

It might seem, however, as if the contrastive strategy fails for (23).[22] That is, it might seem as if one can construct a differential chain here, as follows: (i) the boulder's rolling down the hill rather than remaining still causes Hiker to duck rather than walk upright, and (ii) Hiker's ducking rather than walking upright causes the hiker to survive rather than be crushed by the boulder. This would constitute failure. Contrastivity would license: the boulder's rolling down the hill rather than remaining still causes Hiker to survive rather than be crushed.

But perhaps the appearance of failure here is due to an equivocation. Event nominals are shifty. For instance, here is a clearly equivocal "counterexample" based on the dog-bite case: (i) Dog's biting off Terrorist's right forefinger rather than barking causes Terrorist's pressing with his left forefinger rather than doing something else, and (ii) Terrorist's pressing with his left forefinger rather than doing something

else causes the bomb to explode rather than remain intact. Here talk of 'Terrorist's doing something else' is equivocal. Indeed, the proof of the contrastive solution to the dog-bite case is there is no univocal denotation of this nominal that could satisfy both (i) and (ii). To satisfy (i), that something else must be a right forefinger pressing since that is the difference the dog-bite makes. Whereas to satisfy (ii), that something else must not involve any sort of pressing since only that would make a difference to the bomb.

Perhaps this sort of equivocation occurs in the boulder case. What does talk of 'Hiker's walking upright' denote? The proof of the contrastive solution is that there is no univocal denotation of this nominal that could form a differential chain. For in order to satisfy the first link (the boulder's rolling down the hill rather than remaining still causes Hiker to duck rather than walking upright), that walking upright must involve the boulder remaining still. That is the walk that the supposition of a still boulder entails. Whereas in order to satisfy the second link (Hiker's ducking rather than walking upright causes Hiker to survive rather than be crushed by the boulder), that walking upright must involve the boulder rolling. That is the walk that would entail death. Same talk, different walks.

So the apparent counterexample in (23) does not really involve a differential chain. Differential transitivity requires *identity* of middle contrast. But the denotation of 'Hiker's walking upright' must shift from d_1^* to d_2^*, where $d_1^* \neq d_2^*$ by Leibniz's Law, since d_1^* and d_2^* differ in relation to the boulder.[23] Hence, (23) fits the pattern of contrastive solutions after all: the value of D^* has illicitly shifted from {hiker's walking upright without incoming boulder} to {hiker's walking upright with incoming boulder}.[24]

6. The Paradox of Selection

Is selection of "the cause" objective? For instance, when the short circuit and the oxygen combine to produce the fire, most speakers will distinguish between the short circuit as "the cause," and the presence of oxygen as a mere "background condition." Is there an objective basis for this?

On the one hand, here are two reasons for denying that selection is objective. First, our selections seem, overall, to be *capricious*. Thus Mill maintains:

> Nothing can better show the absence of any scientific ground for the distinction between the cause of a phenomena and its conditions, than the

> capricious manner in which we select from among the conditions that which we choose to denominate the cause. (1950, 244)

Mill's view has completely won the field and is echoed by contemporary authors such as Lewis:

> We sometimes single out one among all the causes of some event and call it 'the' cause, as if there were no others. Or we single out a few as the 'causes', calling the rest mere 'causal factors' or 'causal conditions'. … 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. (1986a, 162)

Virtually the entire literature views selection with this sort of dismissive glance, as a mere matter of subjective caprice.

Second, the few attempts to state objective principles of selection have *flopped*. Thus, for instance, Ducasse (1926) maintains that the principle is between sufficient causes and necessary conditions. But it is difficult to see how this captures our selection of the short circuit over the presence of oxygen as each factor seems necessary and neither sufficient. Hart and Honoré (1985, 33) maintain that the distinction is between abnormal situations and free actions as causes versus normal situations and nonagential factors as conditions. This seems to do better with respect to the short circuit (abnormal) versus the presence of oxygen (normal) but at the price of such vagueness that it seems merely verbally distinct from the no-basis view.[25]

On the other hand, here are three reasons for accepting that selection is objective. First, selection is *predictable*. Virtually everyone selects the short circuit as the cause, not the oxygen. This seems more than mere subjective caprice. This is the sort of stable intuition that philosophers normally treat as data rather than rubbish.

Second, selection is *integral to our moral and legal practices*. The moral and legal salience of the distinction between cause and condition surfaces in cases such as *The Empire Jamaica* (1955: as discussed in Hart and Honoré 1985, 119–20). Here the owners of a ship had sent it to sea without properly licensed officers. The ship was involved in a collision. The pilot, though unlicensed, was generally competent. The problem was that he was napping at the time. Thus the question for the courts was: were the owners liable for the collision, on grounds of having sent their ship to sea without properly licensed officers? Or was the connection *superseded* by the general competence of the pilot? There is no question that sending the ship to sea is "a cause" of the collision. The

legal question is whether it is *the cause*. This is a question that the courts treat as objective, addressed by evidence and debate, not by caprice.

Third, selection is *an inseparable aspect of our causal concept*. As Hart and Honoré say: "The contrast of cause with mere conditions is an inseparable feature of all causal thinking, and constitutes as much the meaning of causal expressions as the implicit reference to generalizations does" (1985, 12).[26] To dismiss selection is to deprive us of any intuitive grasp on objective causality. For how are we to judge causality if our judgments are shot through with selection effects? Lewis writes: "I am concerned with the prior question of what it is to be one of the causes (unselectively speaking). My analysis is meant to capture a broad and nondiscriminatory concept of causation" (1986a, 162). But do we actually possess any such concept? Perhaps the idea of a "broad and nondiscriminatory concept" is a *philosopher's myth*.

Thus the question of whether selection is objective yields the following paradox:

(25) (−) Selection is capricious.
(26) (−) Selection principles have proved difficult to state.
(27) (+) Selection is predictable.
(28) (+) Selection is integral to our moral and legal practices.
(29) (+) Selection is an inseparable aspect of our causal concept.

Contrastivity resolves the paradox of selection by reconciling (25)–(29). The reconciliation strategy is as follows: (i) deny that there is any objective basis for selection *independent* of the contrasts but (ii) maintain that there is an objective basis *given* the contrasts.[27]

Starting with (25) and (27), the contrastive strategy reconciles caprice and predictability. What is capricious is the context. Speakers in different contexts, employing different contrasts, may disagree about "the cause." What is predictable is selection given the context. Speakers in the same context, employing the same contrasts, will agree about "the cause." In other words: what varies capriciously is the *causal inquiry*; what is predictable is "the cause" given the inquiry.

In the case of the short circuit and the oxygen producing the fire, the contrastive strategy generates the following prediction: (i) the speaker who presupposes that oxygen was present and a fire occurred will label the short as the cause; whereas (ii) the speaker who presupposes that there was a short and a fire occurred will label the presence of oxygen as the cause. In other words: (i) the speaker who is inquiring into what ignited the oxygen will select the short; whereas (ii) the

speaker who is inquiring into what the short inflamed will select the oxygen. This prediction is borne out in the following passage from Hart and Honoré:

> In most cases where a fire has broken out the lawyer, the historian, and the plain man would refuse to say that the cause of the fire was the presence of oxygen, though no fire would have occurred without it: they would reserve the title of cause for something of the order of a short-circuit, the dropping of a lighted cigarette, or lightning. Yet there are contexts where it would be natural to say that the presence of the oxygen was the cause of the fire. We have only to consider a factory where delicate manufacturing processes are carried on, requiring the exclusion of oxygen, to make it perfectly sensible to identify as the cause of a fire the presence of oxygen introduced by someone's mistake. … [I]n making this distinction it is plain that our choice, though responsive to the varying context of the particular occasions, is not arbitrary or haphazard. (1985, 11)

Turning to (26), the reason why attempts to state objective principles of selection have flopped is that there are none. There is no objective difference between the short and the oxygen with respect to the fire. There is merely a linguistic difference as to which contrasts are in play.

Moving to (28), the contrastive strategy fits our moral and legal practices. In legal contexts, the appropriate contrasts are codified in the law.[28] In *The Empire Jamaica*, the answer to whether the owners were liable comes out: *no*. Their sending the ship to sea without licensed officers (what actually transpired) rather than with licensed officers (the lawful course) was not the cause of collision rather than safe passage. For the pilot's lack of license did not bear on his general competence and so made no difference to the collision. What did make a difference to the collision was the pilot's negligence at the time, and the pilot's lack of license made no difference there. Had the pilot been licensed, he would have been no less likely to nap. The license would not have awoken him. Such fits the finding of the court, which ruled for the owners, on grounds that whether or not the pilot held a license made no difference to the real cause, which was not the pilot's general level of competence but rather his negligence at the time.

Concluding with (29), the contrastive strategy treats selection as an inseparable aspect of our causal concept. Selection reflects the contrasts. Thus selection is built into the semantics. In this respect, the causal contrastive framework is roughly analogous to that of *epistemic contextualism* (or better: *contrastivism*) in that it integrates relevant alternatives into the relation.

Indeed, the contrastive view of selection mirrors the Mackian view (see opening quote), in which selection is governed by the causal inquiry. The inquiry determines a set of relevant alternatives, "differences within a field" (Mackie, 1974, 35). The main difference between this view and Mackie's is that Mackie postulates a two-stage process of causal judgment (1974, 35): (i) a binary and preselective semantics of connection, with (ii) selection operating as a pragmatic afterthought, "reflecting not the meaning of causal statements, but rather their conversational point." The contrastive view unifies connection and selection within the single question of whether c rather than C^* made the difference between e and E^*.

Everyone agrees that intuitions about claims of the form 'c causes e' are context dependent.[29] The causal inquiry with its attendant contrasts plays a role. The only question is whether these contrasts should be factored into the semantics (contrastivity), or shunted into the pragmatics (binarity). Virtually the entire literature has followed the second path. I wonder why.

7. Events, Counterfactuals, and Contexts

The arguments for contrastivity above assume that (i) the causal relata are *events*, (ii) the causal relation is roughly that of *counterfactual dependence*, and (iii) the causal contrasts are fixed by *context*. It remains to ask, by way of conclusion, whether these assumptions are tenable.

Starting with the assumption that the causal relata are events, what is being assumed is that the causal relata are *concrete, coarse-grained, worldbound occurrences*. This is roughly the Davidsonian view.[30]

The Davidsonian view fits the arguments for contrastivity. First, to handle (6), the contrastive treatment of absences requires that negative nominals denote events. This requires coarse-grainedness, such that the nominals 'the gardener's not watering the flowers' and 'the gardener's napping' can co-refer.[31] Second, to handle the "oomph" intuitions of (7), the treatment of absences requires concreteness. Third, to handle shifty intuitions as per (8), the treatment of fragility requires that events have lax and shifty modal profiles. This requires worldboundness, where the modal profiles of events are counterpart theoretic. And fourth, the treatment of extensionality allows that nominals like 'McEnroe's serving' and 'McEnroe's serving awkwardly' can co-refer without compromise of extensionality, as with (17)–(19). This preserves the coarse-grained view.

The Davidsonian view is independently plausible. Yet three main objections have arisen. First, it is objected that (i) *absences* are causal and that (ii) absences are nonevents, from which it is concluded that (iii) the causal relata must be *facts* (Mellor 1995). Second, it is objected that (i) causation is *extensional* and that (ii) there are causal differences between pairs such as McEnroe's serving and his serving awkwardly, from which it is concluded that (iii) the causal relata must be *fine grained* (Goldman 1970, Kim 1976, Lewis 1986c). Third, it is objected that (i) causation is *transitive* and (ii) that if one does not distinguish, for instance, the fire's blazing from the fire's blazing purple, then transitivity would fail: putting potassium salt in the fire causes the fire's blazing purple, and the fire's blazing causes the house's burning down, but putting potassium salt in the fire does not cause the house's burning down, from which it is concluded that (iii) the causal relata must be *fine grained* (Woodward 1984, Ehring 1997, Paul 2000).[32] As argued above, contrastivity answers all these objections.[33] So what emerges is that the contrastive view not only fits the Davidsonian view of the causal relata, it may even rescue it.

Turning to the assumption that the causal relation is roughly that of counterfactual dependence, what is being assumed is that *difference making* provides a decent test for contrastive causation with singleton contrasts: *c* rather than *c** causes *e* rather than *e* if and only if $O(c^*) > O(e^*)$. This is the Lewisian counterfactual test,[34] suitably amended for quaternicity.

The Lewisian test fits the arguments for contrastivity. It backs the intuitive judgments of whether or not there is contrastive causation in all the cases above, in particular (as the reader may confirm) those concerning (1)–(4), (6), (9), (11)–(12), (17)–(19), (22)–(25), and (27)–(28).

The difference-making test is independently plausible. As Lewis notes: "We think of a cause as something that makes a difference" (1986a, 160–61). And only the contrastive view takes this literally since it articulates what the differences are: ***C**** and ***E****. Indeed, the success of the "binary" Lewisian test, $\sim O(c) > \sim O(e)$, may itself be due to *implicit contrastivity*. The negated occurrence suppositions $\sim O(c)$ and $\sim O(e)$ are shifty. For instance, consider the following negated occurrence suppositions: (i) if *John* had not kissed Mary…, (ii) if John had not *kissed* Mary…, and (iii) if John had not kissed *Mary*… . Here (i) is naturally read as supposing that someone else kissed Mary; (ii) is naturally read as supposing that something else transpired between John and Mary;

while (iii) is naturally read as supposing that John kissed someone else. Or consider: (i) … then McEnroe would not have served, and (ii) … then McEnroe would not have served awkwardly. Here (i) is naturally read as concluding that McEnroe would have stood still, while (ii) is naturally read as concluding that McEnroe would have served smoothly. Thus to rely on intuitive readings of negated occurrence suppositions is to rely on implicit contrastivity. The negated occurrence suppositions are read as the contextually relevant alternatives. This is why the "binary" counterfactual test seems so successful. So what emerges is that the contrastive view not only fits the Lewisian test for the causal relation, it may even underlie it.

That said, the difference-making test is no analysis. And I do not know how to provide one. To develop a contrastive counterfactual analysis, one must first restrict the relata. One might begin as follows: c rather than c^* causes e rather than e^* if and only if (i) c and e are actual, distinct events; (ii) c^* is a possible event alternative to c, and e^* is a possible event alternative to e; and (iii) $O(c^*) > O(e^*)$. One must next extend the analysis to sets of contrasts. One might try: c rather than C^* causes e rather than E^* if and only if (i) c and e are actual, distinct events; (ii) C^* is a set of possible events alternative to c, and E^* is a set of possible events alternative to e; and (iii) there is a one-one mapping from C^* to E^* by counterfactual entailment: $(\forall x \in C^*)(\exists y \in E^*)$ $(O(x) > O(y))$ & $(\forall y \in E^*)(\exists x \in C^*)$ $(O(x) > O(y))$. One must next extend the analysis to the indeterministic case. Perhaps: c rather than C^* causes e rather than E^* if and only if (i) c and e are actual, distinct events; (ii) C^* is a set of possible events alternative to c, and E^* is a set of possible events alternative to e; and (iii) there is a one-one mapping from C^* to E^* by counterfactual chance raising: $(\forall x \in C^*)(\exists y \in E^*)$ $(O(x) > PR(O(y)))$ & $(\forall y \in E^*)(\exists x \in C^*)$ $(O(x) > PR(O(y)))$, where $PR(O(y))$ is the proposition that the chance of the occurrence of y would rise. But now one must face preemption, and here contrastivity is no help.[35] One might try the usual maneuvers here, for what this is worth. Really the contrastive view is compatible with virtually any sort of analysis of causation. It is also compatible with resistance to analysis.[36]

Concluding with the assumption that the causal contrasts are fixed by context, what is being assumed is that the contrasts derive from the structure of the causal inquiry. The causal inquiry determines a three-part structure: (i) the background circumstances, (ii) the causal options: $\{c\} \cup C^*$, and (iii) the effectual options: $\{e\} \cup E^*$. This is the Mackian view, on which "A causal statement will be the answer to a

causal question," where "Both causes and effects are seen as differences within a field" (Mackie 1974, 34–35).[37]

The Mackian view fits the arguments for contrastivity. First, to handle (1)–(4) and (7), the treatment of absences requires that negative nominals set the contrast to the possible event said to be absent. This requires, for instance, that the use of the nominal 'the gardener's not watering my flowers' should set the causal options to {c: the gardener's napping, c^*: the gardener's watering my flowers}, which may be confirmed by the intuitive reading of the negated occurrence supposition 'if the gardener had not failed to water my flowers …' as O(c^*).

Second, to handle (17)–(19), the treatment of extensionality requires that shifts in descriptions induce shifts in the contrasts. This requires, for instance, that shifts between 'McEnroe's serving' and 'McEnroe's serving awkwardly' should tend to shift the effectual options between {e: McEnroe's serving, e_1^*: McEnroe's standing still} and {e: McEnroe's serving awkwardly, e_2^*: McEnroe's serving smoothly} respectively. This may be confirmed by the intuitive readings of the negated occurrence suppositions: '… then McEnroe would not have served' and '… then McEnroe would not have served smoothly', as O(e_1^*) and O(e_2^*) respectively.

Third and finally, to handle (25)–(27), the treatment of selection requires that the context of causal inquiry can determine the contrasts. This requires that the framing of questions such as 'what ignited the oxygen?' should set the presence of oxygen in the background and the causal options to something like {c: the occurrence of the short, c_1^*: the dropping of a lighted cigarette, c_2^*: a lightning strike}.[38] In contrast, the question 'what did the short inflame?' should set the occurrence of the short in the background and the causal options to something like {c: the presence of oxygen, c_{1*}: the presence of hydrogen}. And the treatment of selection requires that the legal question 'Was sending the Empire Jamaica to sea without licensed officers the cause of the collision?' should set the sending of the ship to sea in the background and the causal options to: {c: sending the ship to sea without licensed officers, c^*: sending the ship to sea with licensed officers}. For all of these cases, the settings of the relevant alternatives may be confirmed by the readings of the associated negated occurrence suppositions, and the setting of the background may be confirmed by what lacks relevant alternatives. The background is what is held fixed.

The Mackian view is independently plausible. It is perhaps the only plausible account of selection in the literature. Further, the details of

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the Mackian view may be explained by the contrastive approach. For why should causal inquiry determine this tripartite structure with background, causal options, and effectual options? It would be no wonder that causal inquiry should determine such a structure if the causal relation made direct reference to causal options and effectual options and thereby made indirect reference to the background as what is fixed. So what emerges is that the contrastive view not only fits the Mackian view of the contextual determination of contrasts, it explains it.

That said, the Mackian view of the contextual determination of contrasts must fit a general linguistic approach to context. So one might hope to fit the Mackian view into the Stalnakerian view of context, in which a context may be represented by a set of possible worlds, the context *set*, "which includes all the situations among which speakers intend to distinguish with their speech acts" (Stalnaker 1998, 99), and which is "the set of possible worlds recognized by the speakers to be the 'live options' relevant to the conversation" (Stalnaker 1978, 84–85). The idea would be to assimilate the options of the causal inquiry to the "live options" of the context set and assimilate the background circumstances to the background presuppositions, which works when the causal inquiry supplies a causal and effectual question, such as 'What happened, and why?', or 'What did you do, and what resulted?'

But not all causal inquiries fit this pattern. In the inquiries into what inflamed the oxygen and into what the short ignited, the effect (the occurrence of the fire) is presupposed. It is not in question. Indeed, in some causal inquiries, the values of both cause and effect are presupposed, and what is in question is only their linkage (for instance, it may be presupposed that the subject drank the soup and died, and in question only whether there is a link). This is a failure of fit. That which takes contrasts on the Mackian view may be that which is presupposed on the Stalnakerian view. Perhaps the Mackian view might fit some other general linguistic approach to context. This is a problem for everyone. It does not matter here whether the contrasts are to be factored into the semantics or shunted into the pragmatics. Either way, the contrasts must be generated from the context. But I don't know how.

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Notes

[1] Examples of assumed binarity from the most prominent work of the last fifty years include Mackie 1965, Davidson 1970, and Lewis 1986a. Examples from the more recent journals include Yablo 2002, McDermott 2002, and Schaffer 2001.

[2] More precisely, van Fraassen maintains that a why-question is an ordered triple $<e, \boldsymbol{E^*}, R>$ containing an explanandum proposition e, a set of contrast propositions $\boldsymbol{E^*}$, and a ternary explanation relation R (1980, 141–46). An explanation is a direct answer to such a question and thus takes the form: e rather than $\boldsymbol{E^*}$ because c, where R holds between c, e, and $\boldsymbol{E^*}$.

[3] More precisely, Hitchcock claims that causal talk provides qualitative information about the graph of functional dependence between values of the c variable and the e variable (1993, sec. 6). It is just that this is typically done via a single cause-contrast c^* (1995, 261). Hitchcock ultimately allows a *plurality* of forms of causal ascription (including the ternary effect-contrastive and quaternary contrastive forms), expressing different aspects of functional dependency.

[4] Woodward (2003) and Maslen (2004) also advocate contrastivity in both slots. For Woodward, such contrastivity is the natural consequence of a *manipulationist* view of causation:

> Any manipulation of a cause will involve a change from one state to some specific alternative, and how, if at all, a putative effect is changed under this manipulation will depend on the alternative state to which the cause is changed. Thus, if causal claims are to convey information about what will happen under hypothetical manipulations, they must convey the information that one or more specific changes in the cause will change the effect (or the probability of the effect). This in turn means that all causal claims must be interpretable as having a contrastive structure. (2003, 146)

[5] This difference-making test is merely intended as a useful heuristic—I am *not* proposing an analysis.

[6] Other paradigm cases of causation featuring disconnection include gun firings, heart failures, and muscle contractions (thus all human action). See Schaffer 2000 for further discussion.

[7] This is essentially the trilemma discussed in Lewis 1986a (189–93). On this basis, Dowe (2000) speaks of absence causation as forming "a universal problem" for theories of causation.

[8] This view of negative nominals can claim two further pillars of support. First, the distinction between positive and negative nominals seems *superficial.* For instance, 'the victim's dying' and 'the victim's not living' seem to be mere stylistic variants. Negative nominals should denote what positive nominals denote, namely, actual events. Second, negative definite descriptions work analogously for *individuals.* For instance, a token of 'the person not wearing pants' will refer (in a suitable context) to an actual individual, not some negative or disjunctive spook. Though see n. 31 for further discussion.

[9] For a survey of the variety of omission and prevention scenarios and the connections and would-be-connections embedded therein, see Dowe 2000 (esp. 133–40).

[10] Point of clarification: one needs to explain not only why speakers will *resist asserting* that the queen's failing to water my flowers caused them to wilt; one needs also to explain why speakers will go so far as to *assert the denial* of the claim. The contrastive explanation here is that the negative nominal 'the queen's failing to water my flowers' does not typically succeed in setting the contrast to the queen's watering my flowers due to the irrelevance of such. Rather, the contrast will typically get set to something more queenly: attending a feast, say. So the causal claim will come out as: the queen's reigning on her throne rather than attending a feast causes my flowers to wilt rather than blossom. Which is false. No wonder we deny it.

[11] The question of fragility is only relevant to causation in a counterfactual framework. But related questions arise in other frameworks. In a regularity framework, the question may be phrased in terms of how precisely events are typed: does a shattering in a slightly different manner or at a slightly different time fall under the event-type *E*? In a process framework, the problem surfaces with the question: does a trace process that makes a negligible contribution to the effect still count as a cause of it? For the causal primitivist, the problem surfaces with the question: if *c* makes for a slight difference in *e*, do *c* and *e* fall under the causal primitive? In general the problem may be posed as: is there a

distinction between *merely affecting e* and *causing e*?

[12] Nor can this problem be met by pointing out that traces of the pulling will impact the exact manner of the death in a way different from a pressing. For this response demotes trigger pullings to the same category as such paradigmatic noncauses as preempted backups, innocent bystanders, and hounds baying in the distance. Really this response is merely parasitic on the way fragility miscounts traces.

[13] The denial of fragility fits a counterpart-theoretic treatment of events. Events are worldbound occurrences. Whether e_1 at w_1 counts as 'the same event' as e_2 at w_2 is a lax and shifty affair. Nothing in the theory of causation should turn on it.

[14] The notion of finality is connected to the legal notion of *proximal* (as opposed to *distal*) cause. One decently reliable gloss of proximality is via the "last man in" rule, according to which the proximal cause is the last agent who could (foreseeably and permissibly?) have prevented the effect. For instance, if Ann persuades Ben to rob the bank, then Ann's persuasion is merely distal and Ben's thieving is proximal. Ben is the "last one in." The brunt of the responsibility thus falls on Ben's shoulders.

[15] Perhaps a better contrastivist explanation of the hastener/delayer asymmetry, which I owe to Hitchcock (peronal communication), stems from the following observation: (i) there exist times t such that the hastener caused the patient to be dead-at-t rather than alive-at-t; whereas (ii) there is no time t such that the delayer caused the patient to be dead-at-t rather than alive-at-t. The contrastivist might then claim that the most natural reading of '… caused the patient to die' is in terms of causing the patient to be dead-at-t (for some contextually relevant t) rather than alive-at-t. This will render 'the hastener caused the patient to die' true (when the right time is relevant) and 'the delayer caused the patient to die' false, which was what was wanted.

[16] I take it as intuitive that McEnroe's serving awkwardly *is* his serving. But the seeming causal difference in this sort of case has led Goldman (1970), Kim (1976), and Lewis (1986c) to differentiate these sorts of events, though Lewis acknowledges that, "There is a pervasive intuition—I was long persuaded by it—that it is wrong to count both the first and the second event because if we do, we count something twice over" (1986c, 256). What will emerge (section 7) is that contrastivity explains the seeming causal difference here without needing the counterintuitive differentiation between events.

[17] Here I am assuming that focal differences cannot constitute factive or eventive differences. Matters differ with explanation—indeed, it is clear that focal differences can generate explanatory differences (as can be seen in the hemlock case). But the reason why focal differences can generate both causal and explanatory differences is that both causation and explanation are contrastive. Focal differences are contrast differences (see n. 18).

[18] Thus Rooth (1992) proposes the *alternative semantics* approach to focus. On Rooth's treatment, focus adds a semantic marker whose value is a contextually determined set of alternatives. So 'Socrates *drinking hemlock* at dusk' gets semantically interpreted as […[Socrates [drinking hemlock]$_F$ at dusk]…], where [drinking hemlock]$_F$ induces a dual interpretation, one of which is

drinking hemlock, and the other of which involves the salient alternatives thereto. Where focus is semantically effective, it is because contrasts are semantically operative.

[19] The literature of the last ten years has seen a cascade of counterexamples. See McDermott 1995, Kvart 1997, Hall 2000, Paul 2000, and Hitchcock 2001 for examples and discussion. Virtually everyone involved (with the notable exception of Lewis (2000)) seems to have been convinced.

[20] Nudgings are inspired by Hall's switching cases (2000, sec. 4): nudgings are just trace switchings.

[21] One could change dog-bite (likewise for the other cases) to allow for a differential chain, but then it will be obvious that the case has become causal (Hitchcock 2001). For instance, one could consider a case in which Dog was supposed to chomp off Terrorist's *head* and not just nip off one of his fingers. Now Dog's nipping off Terrorist's right forefinger rather than chomping off Terrorist's head (c rather than c_3^*) does cause Terrorist's pressing with his left forefinger rather than dying (d rather than d_3^*), and Terrorist's pressing with his left forefinger rather than dying does cause the bomb's exploding rather than remaining intact (e rather than e^*). But just as clearly, Dog's nipping off Terrorist's right forefinger rather than chomping off Terrorist's head causes the bomb's exploding rather than remaining intact. Indeed, this is a case that could be well described in absence language as: 'Dog's failing to kill Terrorist caused the explosion'. Or one could consider a case in which, unbeknownst to Terrorist, the detonator would only work were it pressed by Terrorist's *left* forefinger. Now Terrorist's pressing with his left forefinger rather than his right forefinger (d rather than d_1^*) does cause the bomb's exploding rather than remaining intact (e rather than e^*). But just as clearly, Dog's biting off Terrorist's right forefinger rather than barking causes the bomb's exploding rather than remaining intact.

[22] Indeed, Hitchcock and Maslen both reject differential transitivity, due to boulder-style cases.

[23] What remains true is that d_1^* and d_2^* are intrinsically similar. This explains why they fall under a common nominal, why they may be spoken of in most contexts as 'the same event', and why they might seem to fit differential transitivity. They are close counterparts.

[24] The line of retreat on (23) would be to add further conditions to differential transitivity. Here Maslen (personal communication) suggests adding: $O(d^*) > O(c^*)$. This makes further use of the contrasts and preserves the solution to (22) and (24), while providing a new answer to (23) since $\sim(O(d^*) > O(c^*))$: it is not the case that had Hiker walked upright, the boulder would have remained still. Causal histories could still be constructed as per (21) (The intuitions of transitivity in (20) may be harder to explain though, and the maneuver may be somewhat ad hoc).

[25] van Fraassen (drawing on Zwart) provides a telling survey of proposed principles of selection:

> Lewis White Beck says that the cause is that factor over which we have most control; Nagel argues that it is often exactly that factor which is not under our control; Braithwaite takes the salient factors to be the unknown ones; and David Bohm takes them to be the factors which are the most variable. (1980, 125)

[26] Those who have taught causation will recognize the phenomenon. One's students will persist in speaking of "the cause" and will only grasp the philosopher's concept of "a cause" after repeated indoctrination.

[27] Selection is the only argument for contrastivity that applies to just one side of the causal relation: the *c*-side. Though perhaps there is also selection on the *e*-side, between *the effect* and *its byproducts* (or *side effects*). Still, it seems that the effect/byproduct distinction is not quite parallel to the cause/condition distinction since the effect/byproduct distinction seems to have more to do with agential intentions and less to do with the contrastive structure of causal inquiry. I do not have an explanation for this asymmetry.

[28] Thus Hart and Honoré speak of establishing legal causation by constructing a "parallel series" (counterfactual situation) and comment: "the parallel series is constructed by asking what the course of events would have been had the defendant acted lawfully" (1985, lx). Note that the contrast of lawful behavior is *not* predictable from a binary framework. For instance, if one is contracted to build a roof and plays chess instead, the causal impact of this breach is not to be determined by simply excising the chess game but rather by supposing that one took the specific actions to fulfill the contract.

[29] In this respect, the data supporting a contextualist treatment of 'causes' is far stronger than the data supporting a contextualist treatment of 'knows'.

[30] There are two main differences between this view and Davidson's. First, Davidson is noncommittal with respect to the interworld individuation of events, whereas this view treats events like Lewisian individuals, as worldbound entities with counterpart-theoretic modal profiles. Second, this view is noncommittal with respect to the intraworld individuation of events, whereas Davidson (1969) offers a definite (albeit circular) account of individuation. That said, this view is clearly in the Davidsonian spirit.

[31] Strictly speaking, what the contrastive solution requires is that negative nominals function *somehow* to tend to set c ($/e$) to an actual event and $c*$ ($/e*$) to the possible event said to be absent. Co-referentiality is the most natural mechanism for the proper setting of $c(/e)$. However, as a referee noted, the co-referentiality claim faces an objection from *property differences*. For instance, (i) the gardener's not watering my flowers seems to differ from (ii) the gardener's napping, in that only (ii) can be said to have lasted for an hour and to have been refreshing. I do not know how to account for this difference. However, I would reply, by way of *tu quoque*, that the other leading views of negative nominals face the same problem. The view of negative nominals as denoting non-actual events faces the objection that (i) seems to differ from (iii) the merely possible event of the gardener's watering my flowers, in that only (i) can be said to have actually happened. The view of negative nominals as denoting actual facts faces the objection that (i) seems to differ from (iv) the fact that the gardener did not water my flowers, in that only (iv) can be said to be widely known. In any case, it is possible to maintain the contrastive solution without co-referentiality, as long as $c(/e)$ can still be set to an actual event by some other mechanism.

[32] In further defense of the Davidsonian view, one might argue that facts are *abstract* and thus of the wrong category to impart causal "oomph" (Hausmann

1998). Moreover, fine-grained events à la Kim require *spurious distinctions* such as between Brutus's stabbing Caesar and Brutus's killing Caesar (Davidson 1969) and do not ultimately solve the problems of extensionality and transitivity that have motivated the introduction of such distinctions, as the hemlock case of (19) and the transitivity cases of (22)–(24) reveal.

[33] In the transitivity case, D^* must shift from {the fire's burning red} to {the fire's being extinguished}.

[34] The Lewisian test is presaged in Hume's *Enquiry* and forms the *sine qua non* test used in the courts.

[35] The problem is that it ought to come out true that Preemptor's throwing the rock rather than dropping it causes the window to shatter rather than remain intact, even though had Preemptor dropped the rock, the window would still have shattered due to Backup's throw. The contrastive counterfactual analysis, as formulated so far, gets this wrong.

[36] Lewis had the following to say against regularity analyses: "I have no proof that regularity analyses are beyond repair, nor any space to review the repairs that have been tried. Suffice it to say that the prospects look dark. I think it is time to give up and try something else" (1986a, 160). The same may now be said against virtually any analysis of causation (or any other natural concept, for that matter).

[37] Mackie credits the idea of the causal field to his teacher, Anderson.

[38] This style of treatment is upheld in the *partition semantics* for questions developed by Groenendijk and Stokhof (1997). On this semantics, a question denotes a partition on logical space, where the cells of the partition constitute the possible answers. So the question, 'What ignited the oxygen?' when asked in a context in which the domain of possible igniters contains short circuits, lit cigarettes, and lightning bolts will denote the set {the short circuit ignited the oxygen, the lit cigarette ignited the oxygen, the lightning bolt ignited the oxygen}.