# *What Tim Can and Cannot Do: A Paradox of Time Travel Revisited*

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***Abstract***

Time travel, it has been argued, leads to paradoxes, and in particular to a problem known as the grandfather paradox. Lewis has famously argued for the now standard view that the grandfather paradox is merely apparent. But underlying Lewis's solution is a faulty account of ability statements – one, according to which ability statements express possibility statements. I argue, contrary to Vihvelin and others, that an ameliorated view of ability statements allows for the same treatment of the seeming paradox. Hence, Lewis's take on the grandfather paradox stands despite the failure of the particular view of ability statements it is built upon.

**Keywords:** *time travel, grandfather paradox, abilities, can, possible worlds*

Time travel, it has been argued, leads to paradoxes, and in particular to a problem known as the grandfather paradox. If time travel were possible, it would be possible for a situation to occur in which a time traveler can and cannot kill his own grandfather. Since that is impossible, time travel is impossible. Or so the argument goes.

For illustration, suppose Tim travels back to the year 1921 to kill his grandfather. Back in the past, he buys a rifle, trains to shoot, tracks his grandfather down, and aims. Can Tim kill his grandfather? The answer seems to be: yes and no. On the one hand, he can; he clearly has what it takes and the circumstances are just perfect. On the other hand, he cannot; if he could, he could do what is logically impossible. Tim obviously did not kill Grandfather in 1921, after all, because Grandfather lived on after that and, among other things, fathered Tim's father. If Tim killed him in 1921, it would therefore be true that he killed him in 1921 and did not kill him in 1921. Hence, it is logically impossible for Tim to kill Grandfather in 1921.

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Lewis [7] has famously argued for the now standard view that the grandfather paradox is merely apparent. On Lewis's view, the time traveler can kill his own grandfather in one sense of "can", but not in another. On Lewis's view of ability statements, which I will call "Possibilism", a statement of the form "S can $\phi$" is true if and only if it is possible, relative to certain facts, for S to $\phi$. Based on this view, it can then be shown that it is possible for the time traveler to kill his grandfather relative to one set of facts but not another. As Lewis puts it, "he can and he can't, but under different delineations of the relevant facts" [7, p. 151]. Thus, there is no paradox to begin with, on his view.

In this paper, my aim is twofold. In the first three sections, I will argue that Lewis's solution to the grandfather paradox stands on shaky ground because the view of ability statements it is based upon is false. In the second part of the paper, however, I will defend Lewis's solution to the grandfather paradox on the basis of a more comprehensive view of abilities. Section 1 briefly recapitulates Lewis's analysis of abilities in terms of restricted possibility and his solution of the grandfather paradox. Section 2 recapitulates Kenny's [3] demonstration that ability statements do not express restricted possibility. In section 3, I will provide what I take to be the reasons for the divergence between the logic of possibility and that of ability statements. In section 4, I will present a more comprehensive view of abilities – the success view – and show that it incorporates a crucial insight from Lewis's account of abilities, while circumventing its problems. In section 5, I will derive Lewis's solution for the grandfather paradox from the success view and conclude that Lewis's take on the grandfather paradox stands despite the failure of the particular view of ability statements it rests upon. Section 6 raises a well-known problem for conditional analyses of abilities and shows that it does not affect the success view.

## *1 The grandfather paradox and Lewis's solution*

If Lewis is right, the grandfather paradox is merely apparent because it equivocates on "can". Given Lewis's views on ability statements, this is an obvious take on the problem.

Ability statements, as I will use the term, are statements of the form "S can $\phi$", where S is an agent, $\phi$ is an action, and "can" is used circumstantially, as opposed to deontically or epistemically. Examples are "I can dance", "Sue can fly a plane" and, most crucially for our purposes, "Tim can kill Grandfather". On Lewis's view, ability statements express

restricted possibility claims. "S can $\phi$" is true, according to Lewis, iff S's $\phi$ing is compossible with the relevant facts. In other words,

**POSS.** "S can $\phi$" is true iff there is a relevant world in which S $\phi$s.

The relevant worlds are those in which the relevant facts obtain. Call this view "Possibilism". Possibilism is a contextualist view about ability statements: which facts are relevant will vary across ascriber contexts:

> To say that something can happen means that its happening is compossible with certain facts. Which facts? That is determined (...) by context. An ape can't speak a human language – say, Finnish – but I can. Facts about the anatomy and operation of the ape's larynx and nervous system are not compossible with his speaking Finnish. The corresponding facts about my larynx and nervous system are compossible with my speaking Finnish. But don't take me along to Helsinki as your interpreter: I can't speak Finnish. My speaking Finnish is compossible with the facts considered so far, but not with further facts about my lack of training. What I can do, relative to one set of facts, I cannot do, relative to another, more inclusive, set. (ibid.:150)

Lewis's views about ability statements are in line with Kratzer's ([4], [5]) modal semantics. According to Kratzer, the modal auxiliary "can" functions as a sentence operator which has scope over a proposition and assigns restricted possibility. "Lewis can speak Finnish" has the same deep structure as "Apple trees can grow here" on that view, namely "CAN relative to F (p)", where F is the set of facts that has to obtain in the relevant worlds and p is the proposition which has to be true in at least one of those worlds. In the case of "Apple trees can grow here", F may contain facts about the soil and the weather, for instance; in the case of "Lewis can speak Finnish", F may contain facts about Lewis's larynx system, his amount of training, or any other set of Lewis's features.

Let's now see how the grandfather paradox equivocates on "can", on Lewis's view. As he points out,

> Tim's killing Grandfather that day in 1921 is compossible with a fairly rich set of facts: the facts about his rifle, his skill and training, the unobstructed line of fire, (...) and so on. (...) Relative to these facts, Tim can kill Grandfather. But his killing Grandfather is not compossible with another, more inclusive set of facts. There is the simple fact that

> Grandfather was not killed. (...) Relative to these facts, Tim cannot kill Grandfather. He can and he can't, but under different delineations of the relevant facts. You can reasonably choose the narrower delineation and say that he can; or the wider delineation and say that he can't. But choose. What you mustn't do is waver, say in the same breath that he both can and can't, and then claim that this contradiction proves that time travel is impossible. (ibid.:151)

Lewis's take on the grandfather paradox is very appealing:

**SOLUTION.** Tim can kill Grandfather in one sense, but not in another, in that he can kill him, relative to one set of facts, but cannot kill him, relative to another.

SOLUTION is widely accepted throughout the literature on time travel.[1] Yet, as I shall now argue, it is ill-justified as it stands, because Possibilism is false; ability statements are not restricted possibility claims. Since SOLUTION rests on a false assumption, it stands on shaky ground.

## *2 The problem with Possibilism*

That Possibilism fails is most vividly shown by Kenny [3]. As Kenny lays out, the "can" of ability does not obey the most fundamental laws of the logic of possibility. Since the possibility operator is defined by the formal rules that govern it, treating the "can" of ability in terms of a restricted possibility operator is bound to fail.

Any system of modal logic normally thought suitable for alethic interpretations of the operators contains the axiom

**K.** $\Diamond(p) \vee \Diamond(q) \quad \leftrightarrow \quad \Diamond(p \vee q)$

Let's focus on the right-to-left direction of the biconditional:

**K*.** $\Diamond(p \vee q) \ \rightarrow \ \Diamond(p) \vee \Diamond(q)$

As Kenny lays out, K* does not hold if the possibility operator is interpreted as the "can" of ability. Inserting the "can" of ability for the diamond, K* reads:

**K*ABILITY.** If S can $\phi$ or $\psi$, then S can $\phi$ or S can $\psi$.[2]

K*ABILITY has many true instances: if I can eat an apple or a banana, then I can eat an apple or I can eat a banana. But there are problem

cases. Suppose I can hit the dartboard. That implies that I can hit the upper or the lower half. Yet, it may well be true that I cannot hit the upper half and I cannot hit the lower half [3, pp. 215f.].[3] It is therefore false that

**#.** If S can hit the upper half or hit the lower half, then S can hit the upper half or S can hit the lower half.

This becomes more obvious the more discriminatory we get: that I can hit the dartboard implies that I can hit one square-millimeter on the board, or another, or another, and so on. But it obviously does not imply that I can hit any particular square-millimeter on the board.

Hence, the left hand side of K*ABILITY can be satisfied while the right hand side is not. Hence, Axiom K is false for the "can" of ability. That provides us with strong reason to think that ability statements are not restricted possibility claims after all. SOLUTION is based on a misguided view of abilities.

Where does that leave us? Well, Vihvelin ([12], [14]), for instance, thinks SOLUTION is just flat-out false. She takes her own view of abilities to show that there is *no* good sense of "can" according to which Tim can kill Grandfather. On her view, abilities have to be analyzed by means of a highly complex counterfactual: a highly enriched version of the counterfactual "If S intended (chose, decided, ...) to $\phi$, she would $\phi$." Of course, the implications of conditional analyses for time travel are controversial (e.g. [9]). And so is the analysis itself. As we will see in section 6, conditional analyses run into problems of their own. For now, however, let's just note that not *any* view of abilities will clearly guarantee the viability of SOLUTION.

Yet, I will argue, SOLUTION holds ground. It is ill-supported by Lewis's argument because the particular view of ability statements it is built upon is mislead. Yet, as I will argue, the same take on the paradox falls out of an ameliorated view of abilities.

## *3 Diagnosing the Problem*

To see what an ameliorated view of abilities will have to look like, we need to extract the problem underlying Kenny's objection to Possibilism. Recognizing a formal problem is one thing; identifying the roots of the problem is quite another.

The problem with Possibilism is that agents may be more or less reliable in bringing about an action. An agent who manages to solve a

Rubik's cube all the time is more reliable in solving the Rubik's cube than an agent who manages to solve the Rubik's cube only once in a 100 cases; a child who manages to unlock a certain door in nine out of ten cases is more reliable in unlocking the door than a child who manages to unlock the door only every tenth time.

In connection with Possibilism, this matters because the scale of reliability of agents' performances underlies a second dimension of contextsensitivity exhibited by ability statements. Of the agent who manages to solve the Rubik's cube only once in 100 cases, we do not usually want to say "She can solve the Rubik's cube". Yet, there may well be contexts in which we *do* want to say it. She has what it takes; she has done it before; it is within the range of what she can do.

Likewise in the case of the child who manages to unlock the door every tenth time. If someone suggested to hand the child the latchkey to the house to walk home by herself and let herself in, we will rightly say "Let's not do that; she can't unlock the door. She'll be locked out". Considering to leave the kid at home *without* locking the door, however, we will rightly say: "Let's not do that. She can unlock the door. She may leave the house all by herself and get run over by a car".

This indicates that different *degrees* of an agent's reliability in bringing about $\phi$ are required across different contexts for an ability statement to be true. For "S can $\phi$" to come out true, S has to be *reliable enough* in managing to bring about $\phi$, where what counts as enough will depend on the context.

Possibilism cannot account for this feature of ability statements. Compossibility is an all or nothing matter, and it is much too easy to be had. In the case of the agent who fails to solve the Rubik's cube most of the time, the problem is not that her solving the Rubik's cube is not *compossible* with whatever set of facts we are interested in, after all. Yet, there is a good sense in which "She can solve the Rubik's cube" is false: one that has to do with the fact that she is not reliable enough in solving it. This fact eludes the possibilist – possibility does not provide the means to line up degrees of reliability, let alone set an appropriate threshold on that scale. As a result, Possibilism does not yield the right truth conditions for statements of the form "S can $\phi$".

Vetter [12] has noted the same problem in her discussion of a possibilist treatment of dispositions. Considering an analysis of "x is fragile" in term of it being possible, in a properly restricted sense, for x to break, she notes:

> This cannot be quite right. Bricks and bridges made of steel

> are not fragile (not in a typical context, anyway). Yet in view of certain inherent properties of the brick or the bridge, it is possible that they break; among the worlds in which the brick or the bridge possess all of their actual intrinsic properties, there are some where they break. (...) We need a stronger characterization of the truth conditions for '$x$ is fragile' (...). [12, p. 71]

The point here is that being fragile, relative to one's intrinsic properties, is not a matter of breaking in *some* world in which one's intrinsic properties are held fixed. Holding the intrinsic features of various objects fixed, there will be some among the so-restricted worlds in which even non-fragile objects break.

Kratzer's modal semantics appears to provide a fix for this, but doesn't.[4] As Kratzer rightly observes, modal expressions are gradable. Some things are more easily possible than others. For some things there is a good possibility, for others merely a slight possibility. And so on. Kratzer also acknowledges that the "modal base" of a modal expression – the set of worlds over which the possibility operator takes scope in a given context – is the wrong tool to account for graded modals. Suppose we want to find out whether it is more easily possible, in view of what we know, for Sam to be the culprit than it is for Liam to be the culprit. In that case, we need to restrict the modal base to the ones in which what we know obtains. But that does not help. If each agent can be the culprit in view of what we know, then we will find both a world in which Sam is the culprit and one in which Liam is the culprit among the thus-restricted worlds. To account for the fact that there is a *better* possibility for the one than for the other, we need a means to establish a scale of some kind.

For this reason, Kratzer introduces what she calls the "ordering source" of modal expressions [5, pp. 46f.]. The ordering source ranks the relevant worlds in accordance to their closeness to some ideal. A bouletic ordering source ranks worlds by how close they are to fully satisfying the speaker's desires. A deontic sources ranks worlds by how close they come to meeting the demands of morality or the law. A stereotypical ordering source ranks worlds by how close they are to being entirely normal. Kratzer models the ordering source as a set of propositions, which together express an ideal. Roughly, a world is closer to the ideal the more propositions of the ideal are true in it. A world in which all the laws are respected, for instance, is closer to the deontic ideal than a world in which some or all laws are broken. That there is a better

possibility for Sam to be the culprit than for Jim to be the culprit presumably draws on a stereotypical ordering source. The ideal is a world in which everything is normal. Worlds in which Sam is the culprit are less extraordinary than worlds in which Liam is the culprit. Thus, there is a better possibility for the former than for the latter, despite the fact that there is some possibility for each.

The question is: does the ordering source help with degrees of reliability in the case of abilities? Let's consider two meteorologists, Ted and Fred. Fred predicts the weather correctly in 99% of all relevant possible situations, Ted predicts it correctly in only 88% of all relevant possible situations. Clearly, Fred has a higher degree of reliability in predicting the weather. At first, it seems plausible that a stereotypical ordering source will do the job in this case. For are not worlds in which Fred predicts the weather correctly more normal than worlds in which Ted predicts the weather correctly? Fred is more reliable in his predictions, after all. But that's an error. For of course, in the most normal world imaginable, both Fred *and* Ted will predict the weather correctly. The quota of each meteorologist's correct predictions exceeds 50%, after all. Hence, worlds in which both make the right prediction are, *ceteris paribus*, more normal than worlds in which one of them goes wrong.[5]

We can now pursue two strategies. We can run through various ordering sources and check if one or the other fares better with respect to degrees of abilities. Or we can think about the issue in more abstract terms. I suggest we do the latter. Reliability is a matter of performances across various situations – it is a matter of a quota. If Fred is more reliable than Ted in predicting the weather, then this has to do with Fred predicting the weather correctly across a wider range of circumstances. This eludes the possibilist. For even if we rank the worlds in accordance to some ideal, the possibilist will only ever judge the agent's degree of ability on the basis of her performance of (at least) *one* world, namely that which comes closest to the ideal. And that is a problem. No matter what kind of ranking we impose on the possible worlds, the fact that there is a difference between two agents in the worlds closest to the ideal will never ensure that this difference mirrors the agents' differences in terms of some relevant quota across worlds.

This failure of Possibilism is also what underlies the formal problem Kenny notes about Possibilism. If the truth of an ability statement like "S can $\phi$" requires that S be sufficiently reliable in $\phi$ing, then it is not to be expected that K*ABILITY holds.

K*ABILITY, recall, states that

**K*ABILITY.** If S can bring it about that S $\phi$s or $\psi$s, then S can bring it about that S $\phi$s or S can bring it about that S $\psi$s.

This is invalid, because it may be true that I can hit the upper half of the dartboard or hit the lower half, but it need not therefore be true that I can hit the upper half or I can hit the lower half.

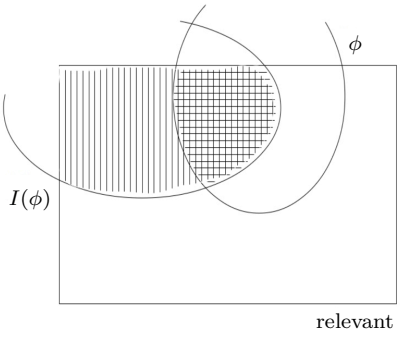
We are now in a position to see *why* this counterexample and others like it arise: my reliability in hitting the upper half or hitting the lower half of the board will be much higher than both my reliability in hitting the upper half and my reliability in hitting the lower half. That is why I may well have the former ability, but at the same time lack either of the latter. And of course, my reliability decreases as we become more and more discriminatory, which is just right.

## *4 The success view of ability and the grandfather paradox*

Understanding what is wrong with Possibilism is instructive because it paves the way towards a more comprehensive view of abilities. Apparently, any such view will have to do justice to the fact that abilities require sufficient reliability of the agent's performances. Here is a view which meets this requirement – and other adequacy conditions for a comprehensive view of abilities as well [2, ch. 4]. Abilities, on that view, are a matter of modal success:

**SUCCESS.** An agent S has an ability to $\phi$ iff S $\phi$s in a sufficiently high proportion of the relevant possible situations in which S intends to $\phi$.

Call this the *success view of ability, or simply SUCCESS.*[6] Here is a Venn diagram illustrating the account.



In the box, we have the relevant possible situations. Analogously to Lewis's relevant worlds, the relevant situations are the situations in which the relevant facts obtain. Which facts are relevant varies across contexts. In the vertically dashed area, we have the relevant situations in which the agent intends to $\phi$. In the horizontally dashed area, we have the relevant intention situations in which the agent effectively $\phi$s. What matters for an agents ability is the proportion of *the relevant intention cases in which the agent performs the action* to *the relevant intention cases* as a whole. In the diagram, this corresponds to the proportion of the *horizontally dashed area* to the *vertically dashed area*. Let's call this proportion the agent's "modal success rate". If it is sufficiently high the agent has the ability to $\phi$. If not she lacks it. As I will explain below, what counts as sufficiently high varies across contexts as well.

That abilities have to do with the modal tie between intentions and performances is not a new idea. In fact, it is the core intuition driving so-called conditional analyses of abilities. According to such views, an agent has the ability to $\phi$ iff some counterfactual conditional roughly of the form "If the agent intended (tried, chose, ...) to $\phi$ the agent would $\phi$" is true. SUCCESS retains the intuition underlying conditional analyses in that it, too, analyzes abilities in terms of a modal tie between intentions and performances. Yet, and this will turn out to be of crucial importance in the next section, the modal tie it postulates is not spelled out in terms of a counterfactual conditional. Instead, SUCCESS implements a core element of Possibilism by working with restrictions on the modal realm.

Yet, there are two important differences to Possibilism: first, SUCCESS restricts the possible situations twice over – only (1) *relevant* situations in which the agent (2) *intends* to $\phi$ matter. It is the second restriction to intention cases that secures the link between intentions and performances. Secondly, the kind of quantification that is applied to those situations differs, too. Instead of postulating that there be at least *one* $\phi$ing world among the subset of situations that matters, SUCCESS postulates that there be a sufficient *proportion* of $\phi$ing situations. In what follows, I'll refer to this feature by saying that the view applies what we can call "proportional quantification" to the relevant intention cases.[7]

SUCCESS has lots of merits, most of which I cannot talk about in detail in this paper.[8] Here, I just want to point out that SUCCESS provides a means to account for the role reliability plays in our practice of ability attribution. It therefore explains why axiom K* does not hold for the "can" of ability.

The modal success rate measures the range of possible circumstances in which the agent's intentions are followed by the corresponding action. Thus, the success rate just *is* the measure for reliability. An archer is more reliable in hitting the bull the higher the proportion of relevant intention situations in which she hits the bull. An agent is more reliable in solving a Rubik's cube the higher the proportion of relevant intention situations in which she solves it. The more reliable lock opener is one who opens the lock in a higher proportion of relevant situations in which she intends to open it.

This yields the scale we need in order to account for the kind of contextsensitivity that goes along with degrees of reliability: which modal success rate is required varies across contexts. Sometimes, we are content with any success rate above zero. Usually, however, we will demand a much higher success rate. How high it needs to be depends on the context of utterance. This is all as it should be. The success rate provides the tool we need to account for degrees of reliability and the corresponding contextsensitivity of ability statements.

In the light of SUCCESS, it is no surprise that K*ABILITY fails. It may well be that an agent's modal success rate in hitting the bull is high enough to count as sufficient in a context – she hits the bull most of the time she intends to hit it, say –, but her modal success rate in hitting a particular half of the bull (or a particular square millimeter, for that matter) is too low to count as sufficient in the same context. That is why K*ABILITY does not state a law: from the fact that I can hit the upper or the lower half of the bull it does not follow that I can hit the upper half or that I can hit the lower half. The success view explains this pattern smoothly.

Let's now return to the grandfather paradox. Given Lewis's reliance on a mislead view of abilities, SOLUTION is ill-justified. But that does not make it false. It also falls out of the success view. Possibilism contains two elements: (i) a restriction of the possible worlds to the ones that are relevant in a given context, and (ii) the postulate that the agent $\phi$ in at least one of these worlds. The import of Kenny's objection, I argued, is that there is something wrong with the latter of those elements; there being at least one relevant $\phi$ing-world is often not enough for an agent to have an ability, and it certainly does not provide the scale of reliability we need to account for the contextsensitivity of ability statements. What Kenny's objection does *not* show is that there is anything wrong with the former of the two elements of Possibilism: the context dependent restrictions to the relevant possible worlds. But

this element of Possibilism is what enables SOLUTION.

Since SUCCESS retains it, SOLUTION is vindicated. Tim can and cannot shoot Grandfather, but under different delineations of the relevant facts. He shoots him in a sufficient proportion of the possible situations in which he intends to shoot him *and the facts about his rifle, his skill and training, the unobstructed line of fire, and so on, obtain.* He does not shoot him in a sufficient proportion of the possible situations in which he intends to shoot him *and the fact that he does not shoot him obtains.* SOLUTION stands despite the fact that Lewis derived it from a faulty view of abilities.

## *5 Conditional Analyses and Impeded Intentions*

I have mentioned that Vihvelin ([14], [15]) takes her own account of abilities to conflict with SOLUTION. That is because Vihvelin defends a more sophisticated version of the conditional analysis of abilities [15, p. 187]. On any such view, having an ability is a matter of a (number of) counterfactual(s) of the following basic form to be true: If the agent intended (chose, decided, ...) to $\phi$, the agent would (or at least might) $\phi$. This is never true in cases of time travel, on Vihvelin's view. Hence, SOLUTION fails.

Whether or not a conditional analysis allows for SOLUTION need not concern us here. The conditional analysis is faced with problems of its own. Since one of these problems appears to result directly from the postulation of a modal tie between intentions and performances, it may appear to arise for the success view as well. That would be problematic for the vindication of SOLUTION. If the success view fails, SOLUTION turns out ill-supported yet again.

To see the problem, note that the conditional analysis does not state a sufficient condition for an agent to have an ability. It may well be true that an agent would perform a certain action, *if* she intended to perform it, but the agent may, for some reason or other, be unable to form the intention to begin with. In that case, the agent lacks the ability, but the counterfactual comes out true ([1], [6], [17]). For illustration, suppose Betty is in a coma.[9] In that case, there is a very good sense of "can" in which she cannot raise her arm. Conditional analyses fail to account for that sense.[10] The counterfactual will invariably come out true: if Betty intended to raise her arm, she would.

This has to do with the counterfactual structure of the analysis. On the standard semantics of counterfactuals, to find out whether Betty has

the ability to raise her arm, we have to move to the closest possible worlds in which she intends to raise it and check whether or not she raises her arm in those worlds. But since the coma prevents her from intending to raise her arm in the first place, we have to move *beyond* the coma worlds in order to reach the closest possible intention worlds. Since Betty is not in a coma in those worlds, there is no reason to assume that she would not succeed in raising her arm in those worlds. Hence, the counterfactual turns out true, while the agent lacks the ability. This spotlights a severe problem about the conditional analysis. The counterfactual incorrectly turns out true whenever an agent cannot $\phi$ in virtue of an impairment that also prevents her from intending to $\phi$ to begin with. Call this "the problem of the impeded intention".

Note that the problem is structural and does not hinge on the particular example. Vihvelin, for instance, would not accept the coma case as a counterexample to her analysis of abilities, because she only looks at cases in which the agent had the opportunity to $\phi$. Since Betty presumably lacks the opportunity (which I grant), the case is unproblematic for her account.[11] But there are other problem cases. A phobic cannot, in view of her phobia, touch the spider sitting right in front of her. Her problem is not one of motor-control, however. If she formed the intention to touch the spider, she would. The problem is rather that she cannot form the intention (understood as whatever mental event sends the motor-command) in the first place. Hence, the counterfactual turns out true, while the agent lacks the ability. And this time, the agent clearly has the opportunity.[12] The problem of the impeded intention is a structural problem for conditional analyses, not a counterexample to specific versions of the view.

At first glance, the same problem seems to arise for the success view. For isn't the modal success rate of the coma patient in fact very high? The coma patient will only form the intention to raise her arm when she is not in a coma, after all. And in such cases nothing will prevent her from raising her arm. Thus, it seems as though the coma patient's modal success rate is actually just as high as that of any average non-comatose agent.

This argument is rooted in a misunderstanding of the success view. The success view retains Lewis's important insight that the realm of possible situations has to be restricted to the relevant ones right from the beginning. And this feature makes all the difference when it comes to cases of impeded intentions. The success view states that to have an ability to $\phi$, the agent has to $\phi$ in a sufficient proportion of relevant

situations in which she intends to $\phi$. But this condition is *not* met for the coma patient. After all, the set of relevant situations will contain *only* situations in which the agent *is* in fact in a coma. Among those situations, there will neither be any intention cases, nor arm raising cases to begin with. Looking back at the Venn diagram, that is to say that both I($\phi$) and $\phi$ will be empty in such a case.

This has two consequences. First, the modal success rate is not sufficiently high. Zero success cases are never sufficient. Secondly, the proportion constituting the modal success rate is unspecified to begin with. We are dividing by zero here. Thus, it is not true that there is a sufficient proportion of performance worlds among the relevant intention worlds. If there is no proportion whatsoever, then there is certainly no *sufficient* proportion. For these two reasons, SUCCESS rightly fails to be met whenever the set of the relevant intention worlds is empty. In contrast to the conditional analysis, the success view rightly predicts that coma patients cannot raise their arm.

The key to the right treatment of cases of impeded intentions is therefore Lewis's tool of restricting the possible worlds, or situations, to the relevant ones from the outset. Where conditional analyses are committed to checking for performance worlds among the *closest* intention worlds, the success view checks for performance worlds among a subset of the *relevant* situations. And while the *closest* intention worlds will lie beyond the coma worlds, the *relevant* situations will all *be* coma worlds: the impediment to intending to $\phi$ is retained across the relevant situations. As a consequence, the success view rightly yields that the coma patient (and other agents whose intentions are impeded) lack the ability to raise their arm (or whatever action is at issue in the particular case). Lewis's insight that abilities are always had in relation to some set of facts is therefore crucial when it comes to stating the modal tie between intentions and performances constitutive of agents' abilities.

## *6 Wrapping up*

On the view I have laid out, an agent has an ability iff the agent $\phi$s in a sufficient proportion of the relevant possible situations in which the agent intends to $\phi$. Looking back at SOLUTION, it is easy to see that it is the restriction to worlds that does the work in Lewis's argument. Tim can kill grandfather in relation to one set of facts, but not another. Lewis spells this out in terms of compossibility, and this, as Kenny shows, is the wrong framework. As I have also argued, however, the faulty bit is not

essential to the argument. What really does the work is the restriction to the relevant worlds.

This element of Lewis's view of abilities not only remains unaffected by Kenny's argument. Rather, as we have seen in the last section, it is actually decisive in the treatment of cases of impeded intentions. Lewis is absolutely right in *two* respects, then: (i) abilities are had in relation to the relevant facts and (ii) which facts are relevant will be a matter of the context. This element of Possibilism should be retained in any comprehensive view of abilities. It is therefore part of the success view as well.

Because the success view retains the restriction to the relevant situations, it allows for Lewis's solution to the grandfather paradox. SOLUTION stands. And now it stands on even better feet.

### *Notes*

1 For an interesting criticism see [16].

2 "Can" is not a sentence operator in natural language. Kenny therefore tries to mirror the logical structure of K* by formulating the principle stated in K*ABILITY thus: If S can bring it about that S $\phi$s or S $\psi$s, then S can bring it about that S $\phi$s or S can bring it about that S $\psi$s. I am not convinced that this is a good way of expressing K*ABILITY and thus stick with the natural construction of "can" statements instead.

3 Kenny discusses a different example more prominently: "Given a pack of cards, I have the ability to pick out on request a card which is either black or red; but I don't have the ability to pick out a red card on request nor the ability to pick out a black card on request" (ibid.:215). I discuss the darts example, because it is somewhat simpler.

4 I have made this point before [2, ch. 3].

5 Let's stipulate that both make better predictions the more normal the weather conditions are.

6 I develop and defend that view in great detail in [2, ch. 4]. Of course, not every ability is an ability to act. Breathing, recognizing one's friend Simon, and understanding simple conversations in French are all things I have an ability for. Yet, none of them are properly analyzed in terms of a modal link between intentions and performances. For the extension of the success view to non-agentive abilities (as I call them) see [2, ch. 5].

7 Vetter [11] introduces this term in connection with Manley and Wasserman's [8] account of dispositions, which the success view of ability resembles in some crucial respects.

8 But see [2, ch. 4].

9 The example is from van Inwagen [10].

10 It is often overlooked that there may well be an equally good sense in which she *can* raise her arm.

> Suppose Betty loves to pick cherries from her grandmother's trees. The doctor may well say to the grandmother: "Don't worry. She lost her legs, but she can still raise her arm. In the summer, you will see her picking cherries from your trees again." The problem with conditional analyses is not that there is no such sense, but that the analyses fail to account for the equally good sense in which comatose Betty *cannot* raise her arm.

11 Thanks to an anonymous referee for bringing this to my attention.

12 Whatever opportunities are, they are external to the agent's mind [4, p. 218]. A coma may well deprive an agent of the opportunity to raise her arm, but viewing a phobia as a lack of opportunity to touch a spider seems hopeless.

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