Luck as Risk

Fernando Broncano-Berrocal

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Abstract: The aim of this paper is to explore the hypothesis that luck is a risk-involving phenomenon. I start by explaining why this hypothesis is prima facie plausible in view of the parallelisms between luck and risk. I then distinguish three ways to spell it out: in probabilistic terms, in modal terms, and in terms of lack of control. Before evaluating the resulting accounts, I explain how the idea that luck involves risk is compatible with the fact that risk concerns unwanted events whereas luck can concern both wanted and unwanted events. I turn to evaluating the modal and probabilistic views and argue, firstly, that they fail to account for the connection between risk and bad luck; secondly, that they also fail to account for the connection between risk and good luck. Finally, I defend the lack of control view. In particular, I argue that it can handle the objections to the probabilistic and modal accounts and that it can explain how degrees of luck and risk covary.

4th of July of 1943, 11:07 pm. A Consolidated B-24 Liberator takes off from Gibraltar Airport. It carries Władysław Sikorski, the commander-in-chief of the Polish Army and the Prime Minister of the Polish government-in-exile. Sixteen seconds after takeoff the aircraft crashes into the sea. Sikorski dies along with ten other people. The pilot, Flight Lieutenant Eduard Prchal, survives.

Later investigations of this World War II event failed to pin down the specific cause of the accident, but it is believed that the elevator system of the aircraft was jammed. Prchal's efforts to move the stick of the steering mechanism were all in vain. He could not pull up and the plane lost height quickly. Inevitably, it ended in the waters of the Strait of Gibraltar.

Prchal's lucky survival and events alike suggest that there is a close connection between luck and risk. For a lot of risk is involved in taking off in an aircraft whose elevator system is jammed, and a lot of luck is involved if that risk is materialized, the aircraft crashes and yet one survives against all odds. Indeed, cases of this sort give prima facie reason to think that luck is a risk-involving phenomenon. In this paper, I aim to explore this hypothesis.

Here is the plan. In §1, I will take a closer look at the luck as risk hypothesis in the light of the parallelisms between both phenomena and introduce three ways to spell it out: in probabilistic

terms, in modal terms, and in terms of lack of control. In §2, I will explain how luck can be naturally understood as a risk-involving phenomenon even if luck and risk are different—especially in view of the fact that risk concerns unwanted events, whereas luck can concern both wanted and unwanted events. In §3, I will criticize the modal and the probabilistic models of the luck as risk hypothesis. I will argue, firstly, that they fail to account for the connection between risk and bad luck; secondly, that they also fail to account for the connection between risk and good luck. In §4, I will defend the lack of control view. In particular, I will argue that it can handle the objections to the probabilistic and modal views and that it can explain how degrees of luck and risk covary.

1. The luck as risk hypothesis

Luck is a phenomenon that is attributed *post hoc*, i.e., to events that have occurred. Risk, by contrast, is attributed *a priori* (i.e., before the fact) and thus applies to potential events. In view of this, the luck as risk hypothesis cannot be simply that luck and risk are the same phenomenon, but that luck is risk-involving, in the sense that some kind of risk always precedes luck.

That there is some interesting connection between luck and risk is evident if we consider cases like Prchal's survival. But there are at least two further theoretical considerations that also lend support to this connection. The first is a distinction that applies to both luck and risk, which is often overlooked in ordinary parlance. The second is the fact that degrees of luck and risk covary. Let's start with the first.

Luck and risk come in two guises. Sometimes, we talk of luck as a non-relational property of events. Consider lucky shots, lucky guesses or lucky discoveries: they all instantiate the property of being by luck. This is what we may call the *non-relational sense of luck*—strictly speaking, it is the actual occurrence of an event that is considered a matter of luck. But sometimes (actually most of the times) we talk of luck as if it established a relation between an agent and an event. For example, we say things such as 'Prchal was lucky to survive the accident', 'Sophie was lucky to hit the mark' or 'James was lucky to guess the answer'. In these cases, it is an agent who instantiates the relational property of being lucky with respect to the occurrence of an event. This is the *relational sense of luck*.[1]

[1] Some luck attributions are of the form 'Event E is lucky for agent S' (e.g., 'Surviving the accident was lucky for Prchal'). This suggests that luck in the relational sense can be also understood as a relational property of events with respect to agents. See Broncano-Berrocal (2016) and Milburn (2014) for further discussion on this distinction.

Exactly the same distinction applies to risk. An event may be risky in the sense that it is at risk of occurring. Let's call this the *non-relational sense of risk*—strictly speaking, it is the possible occurrence of an event that instantiates the property of being at risk of being materialized. But we also talk of risk as establishing a relation between an agent and an event. For example, we say things such as 'Jane is crazy to play Russian roulette, she is at serious risk of death' or 'Max has left the king unprotected, he risks losing the chess game'. Here the agents in question instantiate the relational property of being at risk with respect to the possible occurrence of an event (e.g., dying, losing). This is the *relational sense of risk*.[2]

The second parallelism between luck and risk is that *degrees of luck and risk covary*. Consider non-relational luck and risk. Playing Russian roulette with a six-shot revolver loaded with five bullets is riskier than playing with the same revolver but loaded with one bullet. In addition, surviving the former game is unsurprisingly luckier than surviving the latter. This lends support to the following thesis:

> *Non-Relational Risk-Luck Gradability Correspondence*: The more risk there is that an event E will occur, the luckier it is that E does not occur.[3]

Consider the previous example: the more risk there is that a Russian roulette player will die, the luckier it is that she survives.

The same point about gradability applies to relational luck and risk. A Russian roulette player pulling the trigger of a six-shot revolver that is loaded with five bullets is at more risk of dying than a player who shoots the same revolver with only one bullet in the chamber. Correspondingly, the former player is luckier than the latter if both survive. Again, this makes the following connecting thesis plausible:

> *Relational Risk-Luck Gradability Correspondence*: The more at risk an agent S is with respect to the possible occurrence of an event E, the luckier S is that E does not occur.

These two parallelisms (the relational/non-relational distinction and the gradability correspondence) suggest that luck relates to risk in an interesting way. However, this is not sufficient to secure the

[2] See Broncano-Berrocal (2016) for further discussion of this distinction.
[3] For the sake of simplicity, here and in what follows I will omit time indexes.

plausibility of the luck as risk hypothesis. What would really render the idea that luck is a risk-involving phenomenon plausible would be the fact that same sort of conditions featured by accounts of luck can be also intuitively replicated as conditions on risk. If this were the case, we would have enough motivation to deem the luck as risk hypothesis something more than a mere working hypothesis. But before entering into details, two caveats are in order.

Firstly, my focus will be on relational luck only. The reason is not just simplicity, but also the fact that the relational sense of luck is the most common one in ordinary parlance, i.e., more often we attribute luck to agents in connection to events (or to events in connection with agents) than to (the occurrence of) events *simpliciter*. Correspondingly, I will only focus on relational risk.

Secondly, the project of this paper is to distinguish plausible ways to spell out the luck as risk hypothesis. I am not interested in judging whether the different available views on luck and risk that will serve to model luck as a risk-involving phenomenon are individually correct *qua* accounts of luck or risk.[4] That is, I will be only concerned with investigating to which extent it is plausible to claim that, for a given condition (or set of conditions) C on luck, a significant event E is lucky for an agent S if only if an analogous condition (or set of conditions) for risk C* also holds for E and S. The methodological approach will be the following: the resulting luck-as-risk views will be deemed plausible if the relevant conditions they feature on luck (C) and risk (C*) go hand-in-hand, i.e., if there is no case in which C holds, but C* doesn't, or the other way around—in §3, we will see that two prima facie plausible views actually fall prey to this sort of counterexample. Without further ado, let's start with the first way to model luck as a risk-involving phenomenon.

A natural way to understand the nature of luck is *in probabilistic terms*. Suppose that you win a lottery with long odds. Given the odds, the fact that you have won was very improbable. This suggests that a significant event is lucky for an agent if only if it was improbable.[5] There are of course several ways to cash out this view depending on how the notion of probability is interpreted and on how many further constraints one includes in it. For example, the relevant probability of occurrence might be interpreted objectively, as a subjective expectation (a credence), might be conditionalized on one's evidence, on one's knowledge, on whether or not one is in a position to

[4] See Broncano-Berrocal (2016) for a comprehensive review.

[5] Here and in what follows, I will talk of *significant* events. The reason is that, when it is relational luck and risk we are talking about, an event does not count as lucky or risky for an agent unless it is significant to the agent. See §2 for discussion of the significance condition.

know that the event in question will occur, and so on. All these are valid ways to understand the nature of luck in probabilistic terms.[6]

The interesting point, however, is that the nature of risk can be also plausibly understood probabilistically. Suppose that you participate in a lottery in which you will die unless your ticket is the winner. There is a high risk of death and one explanation of this is that dying is very probable given the odds. So, in general, a plausible view of risk is that a significant event is risky for an agent if only if its occurrence is probable.[7]

This automatically connects (probabilistically construed) luck with (probabilistically construed) risk. It seems that if an agent S is lucky that an event E occurs (e.g., surviving) it is because not-E (e.g., not surviving, i.e., dying) was risky for S in the first place, and this means that E was very likely. So luck would be risk-involving in precisely this sense. By way of illustration, imagine that you survive the aforementioned deadly lottery because your ticket is the winner. The reason why you are lucky to survive is that there was high probability (i.e., high risk) that you would die. We may label this view *luck as probabilistic risk* or L-R_{Prob} for short.

A quite popular alternative to the probabilistic model is to understand luck *in modal terms*. The idea is that a significant event is lucky for an agent if only if the event is such that it effectively occurs but could easily have failed to occur. In possible worlds talk, this view can be formulated as follows: E is lucky for S if only if E occurs in the actual world and in most nearby possible worlds in which the initial conditions for E are the same as in the actual world, E does not occur. Consider a fair lottery. In most nearby possible worlds participants lose. That's why winners are lucky.[8]

Risk can be naturally explained in the same terms. Consider the deadly lottery again. Participants are at a serious risk of death. In modal terms, this can be put as follows: they risk dying because in most possible worlds where they hold a lottery ticket (i.e., in very similar circumstances to the actual ones) they would die.[9]

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[6] See Broncano-Berrocal (2016) for a review.

[7] This view roughly corresponds to the notion of risk in science and contexts of decision-making. See Möller (2012) for discussion of the latter. See also Broncano-Berrocal (2015) and Pritchard (2015) for further discussion on probabilistic risk.

[8] The modal account of luck has been most prominently defended by Pritchard (2005; 2014).

[9] See Pritchard (2015) for this kind of account of risk.

Once luck and risk are understood in modal terms, the two notions seem to go hand-in-hand. As in the case of L-R_{Prob}, the idea is to explain the fact that an agent S is lucky that a significant event E occurs (e.g., surviving) in terms of not-E (e.g., dying) being risk for S before E's occurrence. In modal terms this would translate as the simple idea that S is lucky that E because E would fail to occur in most nearby possible worlds. Let's call this view *luck as modal risk* or L-R_{Mod} for short.

The final intuitive way to understand luck is *in terms of lack of control*. Consider Prchal's lucky survival. A key factor is that he lacked control over the aircraft, in particular what was beyond his control was the fact that he would survive the takeoff. In normal conditions where pilots can handle the steering mechanism of their aircrafts, surviving a takeoff is something they have control over, and moreover, something that it is not a matter of luck for them. This lends support to the following view: a significant event E is lucky for an agent S if only if S lacks control over E (alternatively, just in case E is beyond S's control). There are of course several ways to interpret the relevant notion of control.[10] But it suffices for present purposes to understand it pre-theoretically (I will elaborate on the notion of control in §4).

The interesting point is that lack of control is also a plausible way to account for risk. Before crashing, Prchal was at a high risk of death. This is plausibly explained by the fact that he lacked control over the steering mechanism, since the elevation system of the aircraft was jammed. Generalizing, the view would be that a significant event E is risky for an agent S if only if S lacks control over E (alternatively, just in case E is beyond S's control).

Once again we have a match between the notions of luck and risk. The hypothesis is that events are lucky for agents because they are preceded by risk. In terms of lack of control, this can be formulated as follows: a significant event E is lucky for an agent S insofar as E is beyond S's control. Let's call this the *luck as uncontrolled risk* view or L-R_{Con} for short.

The fact that three intuitive ways to understand the nature of luck can be replicated with loss of plausibility as intuitive ways to understand risk, moreover, the fact that the three *main* accounts of luck in the literature can be easily coupled with plausible corresponding accounts of risk suggests that the luck as risk hypothesis is not a mere working hypothesis, but a very plausible way to think of

[10] See Broncano-Berrocal (2016) for a review of lack of control accounts of luck and Broncano-Berrocal (2015) for a defense of a specific version of this kind of view.

luck. In §3 and §4, I will evaluate which of the three distinguished views (L-R_{Prob}, L-R_{Mod} , and L-R_{Con}) is the most plausible candidate for modelling luck as a risk-involving phenomenon. But before that, we need to address two potential impediments to cashing out luck in terms of risk, namely two intuitive differences between the two phenomena that should be taken into account.

2. How can luck be a risk-involving phenomenon if luck and risk are different?

The first difference, as Pritchard (2015) correctly points out, is that risk typically concerns unwanted events, but luck can concern both wanted and unwanted events. Winning a prize in a raffle, for example, is lucky but not risky, because it is something (typically) wanted. In addition, Pritchard thinks that a second difference has to do with the fact that we can meaningfully talk of very low levels of risk, but we can't talk of low levels of luck in a meaningful way.

The question that naturally arises is whether these two differences are consistent with the hypothesis that luck is a risk-involving phenomenon. In what follows, I will argue that the former difference is compatible with the hypothesis (so we can take it into account) and that the latter is controversial (so we don't need to take it into account). Let's start with the controversial one.

While it is true that we talk of low levels of risk meaningfully—e.g., think of any activity that we would regard as safe but not completely exempt from potential mishaps—,[11] it seems wrong to deny that talk of low levels of luck is meaningful. Consider the following example:

> *Football Star*
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> Leo Messi, one of the best football players in the world (if not the best), masterfully dribbles past ten players of the opposing team. He runs at great speed towards the goal. Several defenders chase him. The goalie anxiously awaits wondering from what angle the shot will come, whether he should lunge left or right. Messi is determined to strike the ball to the lower-right corner of the goal. In a matter of milliseconds, he takes a look at the goalie's position, visualizes the trajectory of the shot and raises his left foot. When he is about to strike the ball, he trips over his right foot and makes a beautiful chip shot instead. The

[11] An example would be vaccines. Although they entail some risks (e.g., they might have some side effects), numerous randomized, placebo-controlled trials conclude that they are safe and effective in preventing potentially deadly diseases, so the benefits clearly outweigh the risks. In other words, the best available science considers vaccination a *low* risk activity.

stumble goes unnoticed and the stadium celebrates what can be fairly considered the best goal in the history of football.

Since nobody in the history of professional football has dribbled past a whole team and scored, we would not consider Messi's play a mere matter of luck. Quite the opposite: we would deem it a very skilfull and competent performance. But since the last part of the play (i.e., the shot) involves an unnoticed stumble, we cannot objectively say that is completely exempt from luck either. The upshot is that cases of very competent performances like this are such that it seems appropriate to say that they involve low levels of luck, despite the great skill displayed. Moreover, correspondingly to such low levels of luck, these sorts of cases involve akin levels of risk. For example, the risk that Messi would trip over his own feet before effectively doing so was rather low (because he is unbelievably good at running fast while controlling the ball). Thus, in keeping with the luck as risk hypothesis, a low level of risk (of failing because of a stumble) precedes a corresponding low level of luck (of scoring because of a stumble). In sum, we shouldn't be worried about Pritchard's claim that talk of low levels of risk is meaningful but talk of low levels of luck is not: not only both are meaningful, but they are also correspondingly related to each other.[12]

Let's turn to the second difference, namely the fact that risk concerns unwanted events whereas luck can concern both wanted and unwanted events. How does this difference bear on the idea that luck is a risk-involving phenomenon? Let's see this in more detail.

It is widely agreed that in order for an agent S to be lucky with respect to the occurrence of an event E (or for E to be lucky for S) E must be significant to S, in a subjective or in an objective way, i.e., E must somehow affect S's subjective or objective interests (e.g., one's desires, one's

[12] Pritchard's intuition that talk of low levels of luck is not meaningful is probably influenced by his own modal account of luck. In particular, he thinks that we can talk of low levels of risk when events are modally far off, but "once the non-obtaining of the target event becomes modally far off it no longer makes any sense to talk of luck" (Pritchard 2015: 446). In this way, for Pritchard winning a lottery that (unbeknownst to one) has been rigged in one's favor doesn't count as lucky. By contrast, lack-of-control theorists have different intuitions, because insofar as one lacks control over a significant event to some degree (e.g., the outcome of a lottery, kicking a ball without stumbling) one is correspondingly lucky to the same degree. This is of course compatible with there being low levels of luck. Other views in the literature also endorse the existence of low levels of luck. For instance McKinnon (2013: 510) defends a view according to which "we attribute credit proportional to the agent's skill, and the rest to luck". This obviously allows for cases where low levels of luck are involved. See Broncano-Berrocal (2016) for discussion.

preferences, one's life, and so on).[13] The same can be plausibly said about risk. S is at risk with respect to the possible of occurrence of E (or E is risky for S) only if E is significant to S in a subjective or in an objective sense.

By way of illustration, think of any insignificant event, such as a leaf that is about to fall from a tree which is 1000 km away from you. Does this potential event pose any risk to you? Intuitively, it doesn't, and the reason is that none of your interests will be affected in any relevant manner. Exactly for the same reason it wouldn't be lucky for you either (i.e., it would be neither good nor bad luck for you).

With these considerations in place, we can now explain in what sense risky events are negatively valenced by default: namely, in the sense that, if they materialize, the impact they have is always detrimental to our interests.[14] Bad luck is also detrimental to our interests (otherwise it wouldn't be described as 'bad'). This suggests an interesting connection between risk and bad luck, namely:

> *Risk-Bad Luck Connection*: An event E is bad luck for an agent S, only if E is risky for S and E occurs.

Suppose that you bet your life savings on one roulette spin. You are at risk of losing them insofar as this is something that would clearly have a negative impact on your interests. Suppose further that such a risk materializes and you lose. This is bad luck for you. So a risk precedes your bad luck.

The interesting question (as far as the luck as risk hypothesis is concerned) is how can negatively valenced risk give rise to good luck. The answer is actually straightforward: since materialized risks give rise to bad luck, risks that do not materialize give rise to good luck. In other words:

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[13] This view is by Ballantyne (2012). Alternative (but more problematic) significance conditions on luck can be found in Coffman (2007) and Pritchard (2005: 132–3). See Broncano-Berrocal (2016) and Ballantyne (2012) for discussion.

[14] While the intuitive notion of risk seems inherently tied to unwanted outcomes, exposing oneself to some risks may lead to beneficial outcomes that otherwise could not be achieved. For instance, there is something intrinsically wrong about overprotective environments, namely they tend to prevent personal growth and development. By way of illustration, in order to develop abilities we often need to be exposed to stressors that push us beyond our limits (e.g., consider physical abilities). In addition, we also sometimes talk of investments as being risky (in that one might lose the amount invested), but insofar as they might produce high profits, they are typically considered 'good' risks. In sum, our intuitions about risk seem to be parasitic on our intuitions about what the costs and the benefits of the possible outcomes are.

Risk-Good Luck Connection: An event E is good luck for an agent S, only if not-E is risky for S and E occurs.

Consider the roulette example again. Suppose that you bet your life savings on one roulette spin. You are at risk of losing them (i.e., you are at risk of not winning) and, again, this is detrimental to your interests. Suppose, however, that such a risk does not materialize and you win. Winning is good luck for you. So a (negatively valanced) risk precedes your good luck.

This result is unsurprising. After all, our judgments about good and bad luck are typically made against a background of positive and negative expectations, i.e., with an eye on whether the relevant possible outcomes (or the absence thereof) would be beneficial or detrimental to our interests. The bottom line is that the crucial difference between luck and risk—namely, that risk only concerns unwanted events whereas luck concerns both wanted and unwanted events—is no impediment to interpreting luck as a risk-involving phenomenon. Quite the opposite: it follows naturally from how we ordinarily think about the impact of materialized and unmaterialized risks on our subjective and objective interests.

L-R_{Prob}, L-R_{Mod} , and L-R_{Con} interpret these connections between risk and good/bad luck differently, insofar as they disagree on how to spell out the relevant notion of risk. In the next section, I will assess whether the probabilistic and modal interpretations can account for them. The upshot will be that they can't.

3. Against the modal and probabilistic interpretations

Let's start with L-R_{Prob}. On this view, risk is a matter of probable occurrence and luck is preceded by risk so understood. More precisely, the relevant notion of risk featured by L-R_{Prob} is the following:

Probabilistic Risk: An event E is risky for an agent S if only if E's occurrence is probable and E would have a negative impact on S's subjective or objective interests.

With this notion of probabilistic risk in place, L-R_{Prob} explains *Risk-Good Luck Connection* (the thesis that S has good luck that E occurs only if not-E was risky) as follows: if S has good luck that E occurs, then not-E was probable and would have a negative impact on S's interests. By way of illustration, suppose that you bet your life savings on one roulette spin and, luckily, you win. Your

good luck can be explained by the fact that it was probable (i.e., probabilistically risky) that you would lose and by the fact that this would have a very negative impact on your financial and personal interests. But since this risk doesn't materialize, you are (positively) lucky.

However, while the connection between good luck and probabilistic risk seems pretty straightforward (I will cast doubt on this below though), it is unclear how probabilistic risk relates to bad luck. Consider *Risk-Bad Luck Connection*, the thesis that S has bad luck that E occurs only if E was risky. This thesis, translated in probabilistic terms, would amount to the following: if S has bad luck that E occurs, then E was probable and would have a negative impact on S's interests. But this tweaked version of *Risk-Bad Luck Connection* is problematic. Consider the following two lotteries:

> *Two Lotteries*
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> Lottery 1 is a standard fair lottery with long odds where only one participant wins (namely, the one whose ticket number is selected). Lottery 2 is a non-standard fair lottery with the same number of participants as Lottery 1, but in which the selected ticket number is the only loser, i.e., the participant in its possession is the only person who doesn't receive a prize. In addition, suppose that losing is as negative for participants of Lottery 2 as it is for participants of Lottery 1.

In Lottery 1, the most probable event is that participants will lose (i.e., they are at probabilistic risk of losing). In Lottery 2, by contrast, the most probable event is that participants will win. L-R_{Prob} and its version of *Risk-Bad Luck Connection* deliver a very counterintuitive verdict here. To see this, notice that since the probability of losing Lottery 2 is so low, such an event cannot be considered risky as per L-R_{Prob} standards. But by assumption, losing Lottery 2 is at least as bad luck (if not more) as losing Lottery 1. After all, it is very bad luck that someone loses a lottery in which nearly everyone who participates will win—in comparison to losing a lottery in which nearly everyone will lose. Therefore, we have a case in which an improbable risk materializes and gives rise to bad luck. In other words, contrary to what L-R_{Prob} professes, probabilistic risk does not track bad luck.

Let's turn now to L-R_{Mod}. This view understands risk in terms of easily possibility of occurrence and luck as preceded by this kind of risk. Here is a more precise formulation of the relevant notion of modal risk:

> *Modal Risk*: An event E is risky for an agent S if only if E would occur in most nearby possible worlds and E would have a negative impact on S's subjective or objective interests.

Let's see how L-R_{Mod} explains the connection between modal risk and good luck. In brief, *Risk-Good Luck Connection* would be translated as the thesis that if an event E is good luck for an agent S, then E occurs in the actual world but would fail to occur in most nearby possible worlds, which would have a negative impact on S's interests.

This tweaked version of *Risk-Good Luck Connection* seems to capture the connection between risk and good luck (I will also cast doubt on this). By way of illustration, suppose that you bet your life savings on one roulette spin and, luckily, you win. In most nearby possible worlds (or in a sufficient proportion of them) you would lose. This would affect your interests negatively, but since this risk does not materialize in the actual world (because you win), you have good luck.

However, as in the case of L-R_{Prob}, it is dubious that L-R_{Mod} can account for the connection between risk and bad luck. Consider *Two Lotteries* again. In Lottery 1, most participants would lose in most nearby possible worlds (i.e., they are at risk of losing). In Lottery 2, by contrast, most participants would win in most nearby possible worlds. This difference makes L-R_{Mod} and its version of *Risk-Bad Luck Connection* get the wrong results. The modal risk of losing Lottery 2 is very low, almost nonexistent, given that what is easily possible is the fact that one wins. But by assumption, losing Lottery 2 is at least as bad luck (if not more) as losing Lottery 1—again, because nearly everyone who participates in Lottery 2 wins whereas nearly everyone who participates in Lottery 1 loses. Therefore, we have a case in which a remote possibility materializes giving rise to bad luck. This means that, contrary to the main tenet of L-R_{Mod}, modal risk does not track bad luck.

The problems for L-R_{Prob} and L-R_{Mod} do not end with their inability to account for the connection between risk and bad luck. There is another problem in the offing. In a nutshell, significant events that arise from *coincidences* are paradigmatic instances of luck. But a coincidence might be such that its components are at no or little risk of failing to occur (i.e., they might be very probable or modally robust). This means that there are cases of luck that involve no modal or probabilistic risk. If this mismatch is not worrisome enough, these sorts of cases also serve to show

that neither L-R_{Prob} nor L-R_{Mod} can explain the connection between risk and good luck. Let's see all this in more detail.

A coincidence is an event that cannot be explained because there is no causal or nomological antecedent between its components.[15] Suppose that you are an ice cream lover. You crave for an ice cream, so you head to your preferred local ice-cream shop. Another person goes to the same shop. It's scorching hot and he/she wants an ice cream to cool him/her down. While waiting in line, you strike up a conversation with this other person. You like each other. You get to know each other. You fall in love. You live a long and happy life together.

There is a causal explanation for why you go to the ice-cream shop: you are an ice cream lover and you fancy an ice cream. There is a causal explanation for why the other person goes to the ice-cream shop: it's scorching hot and he/she wants an ice cream to cool him/her down. There is a causal explanation for why you fall in love: you like each other. However, there is no causal explanation for why you arrive simultaneously at the ice-cream shop. This is an inexplicable coincidence. Unsurprisingly, meeting your life companion is very good luck for you, not only because it is something tremendously positive, but also because it arises out of a coincidence.

One key feature of coincidences is the following: they are no less coincidental if their components are very probable or modally robust. In other words, the probabilistic or modal profile of their components is completely tangential to their being coincidences: all that matters is that such components have no common antecedent, i.e., that there is no causal explanation of why they eventually come together. By way of illustration, suppose that you are completely determined to buy an ice cream at the local ice-cream shop so that the probability that you will go there is 1 or close to 1 (alternatively, there are no or few nearby possible worlds in which you would not go the ice-cream shop). Suppose that the same applies to the other person. It is still a coincidence that you both meet in the line. That you meet is obviously very good luck for you and that you didn't would be certainly detrimental to your interests. However, note that, before getting to know each other, there was no modal or probabilistic risk that you didn't meet. To make the point more vivid, consider this other example:[16]

[15] See Owens (1992) for this view.
[16] The case is from Broncano-Berrocal (forthcoming).

Takeover

For the past three months, hundreds of corporations have been secretly trying to take over Sansa's firm, an event that would have very unwelcome consequences for her workers: they would be fired. Sansa knows how to stop these hostile takeovers. For any attempt, she just needs to file a legal complaint via an online submission system. However, unbeknownst to Sansa, there is a problem with the document targeted against the takeover attempt of company number 978, the Cersei Group. An unusual interference in the data stream has modified the contents of the submitted file in such a way that the competent authority has received a document with so many arguments justifying the acquisition that it has decided to give green light. Everybody in the company is in panic. In particular, everyone fears that they will lose their jobs. However, when Cersei, the CEO of the Cersei Group, is about to seal the takeover effectively, the Stannis Group (its long-standing competitor) discloses a scandal that makes Cersei's company's shares drop 99%—no one at the Stannis Group, not even Stannis, the CEO, knows that Cersei was trying to take over Sansa's firm. As a consequence, the corporation goes bankrupt and the takeover does not succeed. In fact, it is the Stannis Group that takes over Cersei's company. The disclosure of the scandal was part of Stannis's meticulous and independent plan to bring down and take over the competition. As luck would have it, it was scheduled one year ago at coincidentally the same time Cersei was about to close the takeover.

L-R_{Prob} and L-R_{Mod} get the wrong results in *Takeover*, because they respectively entail that if an event E is good luck for an agent, not-E was probable/would be the case in most nearby possible worlds. In *Takeover*, Sansa's workers are lucky that the takeover does not succeed and that they can keep their jobs. This is good luck for them insofar as the fact that they are not fired arises out of an inexplicable coincidence, something that is obviously positive for their interests. More specifically, what is inexplicable is that the Stannis Group's careful plan to take over Cersei's company is executed at exactly the same time Cersei is about to seal the takeover of Sansa's firm—recall that the submitted legal document that would stop the takeover suddenly changes in a way that makes Cersei's takeover feasible.

However, given how determined Stannis is to carry out his plan, it is highly probable that Cersei's takeover will not succeed and that Sansa's workers can keep their jobs. Given such a determination, this event would also occur in most nearby possible worlds. In other words, there is no modal or probabilistic risk that Sansa's workers will be fired. Since the fact that Sansa's workers can keep their jobs is good luck for them and there is no modal or probabilistic risk involved, we cannot but conclude that modal and probabilistic risk do not track good luck.

4. The lack of control interpretation: a defense

We have seen that neither L-R_{Prob} nor L-R_{Mod} are adequate ways to model luck as a risk-involving phenomenon. A more promising candidate is L-R_{Con}. On this view, risk is a matter of lack of control and luck is understood as being preceded by this sort of risk, namely by an *uncontrolled risk*:

> *Uncontrolled Risk*: An event E is risky for an agent S if only if E is beyond S's control and E would have a negative impact on S's subjective or objective interests.

Consider *Two Lotteries*. Recall that Lottery 1 is a standard lottery with long odds with only one winner, while Lottery 2 is a non-standard lottery with the same number of participants but with only one loser. The participants of both lotteries lack the same degree of control over the outcomes, i.e., the risk of losing is the same. Since the assumption was that losing would have the same negative impact on the interests of participants of Lottery 1 and 2, and the risk (i.e., the degree of lack of control over the lottery outcomes) is the same in both, participants of Lottery 1 and 2 are equally unlucky to lose. L-R_{Con} accounts in this way for the connection between risk and bad luck.

But here is an interesting question for L-R_{Con}. If in a lottery with long odds all participants have the same degree of control over the outcomes (viz., none), why is that we have the intuition that lottery losers are less unlucky than winners are lucky, i.e., why is that the degree of 'luckiness' of winning such a lottery is higher than of losing it? While the degree of lack of control over an outcome sets the baseline for how risky for a participant a possible lottery outcome is, the degree of significance that the outcome (or the absence thereof) has for the participant can dramatically increase its degree of luckiness. If you participate in a standard lottery like Lottery 1 where you know that nearly everyone will lose, you won't be very disappointed if you lose as well. Winning such a lottery, by contrast, would come with a much higher degree of significance. Consider now the

opposite case, Lottery 2, where you expect that nearly everyone will win a prize. Here, it is losing that comes with a much higher degree of significance (namely, of disappointment), precisely because by buying a ticket of Lottery 2 you basically take for granted that you will get a prize.

These considerations give us a more accurate idea of how degrees of luck covary with degrees of risk. Recall *Relational Risk-Luck Gradability Correspondence*, the thesis that the more at risk an agent S is with respect to the possible occurrence of an event E, the luckier S is that E does not occur. Now that we know that degrees of luck and risk depend on degrees significance, we can formulate two more specific theses:

> *Negative Significance-Luck Gradability Correspondence*: The more negative the occurrence of an event E for agent S is, the luckier S is that E does not occur.
>
> *Positive Significance-Luck Gradability Correspondence*: The more positive the occurrence of an event E for agent S is, the luckier S is that E occurs.

An analogous thesis can be formulated for degrees of control, on which degrees of luck depend:

> *Lack of Control-Luck Gradability Correspondence*: The more an event E is beyond an agent's (S) control, the luckier or unluckier S is with respect to E.

Notice that *Negative Significance-Luck Gradability Correspondence* and *Lack of Control-Luck Gradability Correspondence* together specify the sense in which risk (when understood in terms of lack of control) covaries with luck: namely, the more negative the occurrence of E for S is and the more E is beyond S's control, the luckier S is that E does not occur. Consider Prchal's lucky survival. Obviously, it would have been terribly negative for Prchal's interests to die in the accident. This eventuality was also significantly beyond his control (the elevation system of the aircraft was jammed and there was nothing we could do about it). This explains why he was so lucky to survive. In this way, L-R_{Con} can explain the connection between risk and good luck.

Finally, let's consider *Takeover*. As we have seen, the case is problematic for L-R_{Prob} and L-R_{Mod} because it shows that there can be luck without modal or probabilistic risk. Sansa's workers are lucky not to be fired (because it is coincidental that they are not), but before being so lucky, there was no modal or probabilistic risk that they would lose their jobs—given how determined Stannis

was to take over the company that was trying to take over Sansa's firm (Cersei's), it was actually very probable that Sansa's workers would keep their jobs, and in no nearby possible worlds they would lose them. Intuitively, however, before Stannis's takeover was effective, Sansa's workers were at risk of losing their jobs. Otherwise how could it be explained that they panicked fearing that they would be fired?

L-R_{Con} can easily explain in what sense Sansa's workers were at risk of becoming jobless before luckily keeping their jobs in the company. In a nutshell, this eventuality was negative for them and it was something beyond their control. This is why Stannis's takeover of Cersei's firm was so lucky for them. In sum, L-R_{Con}, explains the cases that are troublesome for its rivals, L-R_{Prob} and L-R_{Mod}.

By way of conclusion (and in order to avoid common misunderstandings about lack of control views as well as hasty objections), we can say something more about the notion of control that is relevant here. The first thing to keep in mind is that there is no unique way to control an eventuality. Consider how Sansa typically stops hostile takeovers: she files a legal complaint. Her control arises from the fact that her knowledge of the law is vast. In a way, she competently brings an eventuality (viz., a possible takeover) to a desired state (viz., a frustrated takeover attempt). Now, the most common way to do this is by exerting some sort of causal influence. For example, Leo Messi has control over the ball in this sense when dribbling past a whole team by moving the ball and himself in certain ways. We can call this kind of control *effective control*.

But Sansa's or Messi's actions are not the only ways to exert control. Consider Sansa's workers. They clearly lack control in the effective sense: they are aware that the legal complaint filed by Sansa will not work, and there is nothing in their capacity as company workers that they can do to make it work. Interestingly enough, they have no inkling about Stannis's intervention. This leads to the following idea: had they known sufficiently about it, they would have been in a position to take proper action (e.g., they could have announced the scandal themselves, made sure that Stannis's takeover came to a good end, and so on).

This points to a second kind of control, which we may call *tracking control*. It is the kind of control that a sufficiently vigilant pilot has when flying on autopilot mode. The pilot neither exercises effective control (i.e., has no causal influence) over the aircraft, nor she aims to bring the

aircraft's flight to some desired stated either. However, we cannot say that the aircraft is beyond her control, because she is in a position to exert effective control if needed (e.g., in areas of turbulences). [17] In general, having tracking control is a matter of actively checking or monitoring whether something is in a certain desired state, in such a way that one is thereby in a position to exercise effective control over it if needed, or alternatively, to act in ways that would allow one to achieve goals related to the thing controlled (e.g., a pilot, knowing that the there is no possible way to effectively control a broken down aircraft, can grab her parachute and jump; farmers, who have no effective control over the sun, can still competently count on there being enough sun the next months so that they can sow their crops and make them grow).

The key point is that, depending on the practical context, one of the two forms of control will be the one needed to make oneself safe from risky eventualities. Sometimes, both are needed. What I hope to have shown in this paper is that, no matter how probable, improbable, modally robust or fragile an eventuality is, if it materializes and it is bad luck for one, it is because it has a negative impact on one's interests, but also, and more importantly, because it is beyond one's control. If it is good luck instead, it is surely because it positively affects one's interests, but again it is due to one's lack of control. Either way, risk, understood in this way in terms of lack of control, always precedes luck.

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[17] See Broncano-Berrocal (2015) for discussion of these two kinds of control.

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