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Lotteries and Justification

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Abstract

The lottery paradox shows that the following three individually highly plausible theses are jointly incompatible: (i) highly probable propositions are justifiably believable, (ii) justified believability is closed under conjunction introduction, (iii) known contradictions are not justifiably believable. This paper argues that a satisfactory solution to the lottery paradox must reject (i) as versions of the paradox can be generated without appeal to either (ii) or (iii) and proposes a new solution to the paradox in terms of a novel account of justified believability.

1. Consider the following three theses:

Sufficiency Thesis (ST). If the probability of p on one's evidence is very high, then p is justifiably believable for one.

Conjunction Closure (CC). If p is justifiably believable for one and q is justifiably believable for one, then their conjunction, p and q, is justifiably believable for one.

No Contradictions (NC). No proposition one knows to be a contradiction is justifiably believable for one.

While individually plausible, it turns out that ST, CC and NC are jointly inconsistent. To see this, notice that no matter how high we set the standards for satisfaction of the predicate 'very likely', there will be some fair lottery with exactly one winner such that it is very likely on my evidence that each ticket will lose. So suppose that a ticket will very likely lose if the chance that it will lose is at least $(n-1)/n$ and let l be a fair lottery I know to have n tickets and exactly one winner. By ST, for each ticket $i \in l$, it is justifiably believable for me that i will lose. By CC, it is justifiably believable for me that all tickets in l will lose. Since I also know that l has exactly one winner, by a further application of CC, it is justifiably believable for me that all tickets in l will lose and that exactly one ticket in l will win. However, I know that this is a contradiction and so, by NC, it is not justifiably believable for me. This is Kyburg's [1961, 1970] famous lottery paradox.

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2. One of ST, CC and NC has to go. But which one? It is widely agreed that the least promising candidate is NC. After all, it is reasonable to think that NC is a basic principle of justified believability.

In fact, there is independent reason to think that it NC is not at the fault in the lottery paradox since the paradox can be generated without invoking NC. To see this, consider the following plausible thesis:

No Moore Pardoxes (NMP). Propositions of the form 'ϕ but I don't know that ϕ' (henceforth also 'Moorean propositions') are not justifiably believable for one.

Now consider a lottery, l', which is just like l except that there is *no guarantee* that the lottery will have a winner. Instead, all I know is that there might be a winner, and hence that I do not know that all tickets will lose. It is not hard to see that the lottery paradox can be generated with ST, CC and NMP only. By ST and CC, it is justifiably believable for me that all tickets will lose. Since I know that I do not know that all tickets will lose, it is justifiably believable for me that I do not know that all tickets will lose. By another application of CC, it is justifiably believable for me that all tickets will lose but I do not know that all tickets will lose. By NMP this is not justifiably believable for me. We thus have a version of the lottery paradox that does not rely on NC.[1]

3. Denying CC is perhaps initially the most attractive option. After all, one might think that even if we have to give up CC, it might be possible to rescue at least a restricted version of CC. Thus consider:

CC'. If p is justifiably believable for one and q is justifiably believable for one, then their conjunction, p and q, is justifiably believable for one, *unless it is a contradiction*.

Another noteworthy consequence of the Moore paradoxical version of the lottery paradox is that this way of restricting CC won't do the trick either. The reason for this is that the Moore paradoxical version of the lottery paradox shows that no contradiction is needed to generate the paradox. After all, the proposition that all tickets will lose but I do not know that all tickets will lose is not contradictory. Replacing CC by CC' won't do the trick.

Of course, one could add to the list of riders. Thus consider:

CC". If p is justifiably believable for one and q is justifiably believable for one, then their conjunction, p and q, is justifiably believable for one, *unless it is either a contradiction or a Moorean proposition*.

[1] In fairness to deniers of NC, it should be noted that this argument might turn out dialectically ineffective against those who reject NC. After all, if you are willing to reject NC, you will likely not be too attached to NMP either. At the same time, for the many who do not want to give up NC, it does provide an additional reason for not so doing: they would have to give up a further plausible principle governing justified believability. Thus, even if these considerations do not move foes of NC, I take them to provide some reason to think that NC is not the culprit of the paradox. Of course, if NC is not the culprit, it'll have to be either CC or ST.

Now, CC” smacks of *ad hoc*ness. What would be needed to remove the air of *ad hoc*ness is some unifying and independently plausible account of why CC” should feature these riders. I cannot help but suspect that the only plausible candidate appeals to the notion of justified believability. The reason why CC” makes exceptions for contradictions and Moorean propositions is that they are not justifiably believable. But that, of course, won’t do at all since holding that the conjunction of two justifiably believable propositions is justifiably believable unless it isn’t renders the principle trivial. All we would have done is replace *ad hoc*ness by triviality.

4. Fortunately, the most common reason for rejecting CC is different. Here is the rough idea: We are fallible cognitive agents in the sense that, for a wide range of propositions, there will always be a small risk that, when we come to believe them, we make a mistake. At the same time, we are capable of justified belief in the sense that justified belief is attainable for a wide range of propositions, including a subset of propositions in the aforementioned range. Given that this is so, justified believability is compatible with a small risk of error. The aggregation of justifiably believable propositions involves an aggregation of small risks of error. Small risks of error accumulate to larger risks of error. Crucially, while justified believability is compatible with a small risk of error, it is not compatible with too large a risk of error. The problem with CC is that aggregation of justifiably believable propositions may lead to risk of error that is simply too large. In that case, even though each member of the aggregate is justifiably believable, the aggregate as a whole is not. CC is bound to fail [e.g. Kyburg 1997, Foley 1979. An ancestor of the idea can be found as early as Ramsey 1929].

These considerations would seem to provide a more promising diagnosis of the lottery paradox. After all, for any fair lottery with n tickets and exactly one winner, and any subset of m tickets, the risk that all its members won’t lose is m/n. When n is sufficiently large and m sufficiently small, this risk will be very small, small enough, in fact, to allow that the proposition that all members of the subset will lose is justifiably believable for one. At the same time, when m is large enough, the risk of error will be too large to allow the proposition that all members of the subset will lose to be justifiably believable for one. If this is right, CC is bound to fail in the lottery case.

This diagnosis predicts that one cannot justifiably believe of all tickets in a fair lottery that they will lose. When the lottery is large enough, one cannot even justifiably believe of nearly all or even most tickets that they will lose. One would run too great a risk of error in so doing. This looks like a welcome result. After all, it appears independently plausible. In a lottery with one million tickets and one winner, one cannot justifiably believe that all one million tickets will lose. One also cannot justifiably believe that the first 999,567 or the first 500,000 tickets will lose either. One is too likely to be in error here. These results add to the attractiveness of the present proposal.

5. I do not want to deny that this diagnosis is attractive at first glance. However, I will argue that, despite its initial appeal, in the final analysis it remains unsatisfac-

tory. The reason for this is that the paradox can once again be generated in a way that bypasses the relevant principle, in this case CC. Here's the alternative principle:

Minimal Coherence (MCH). If one knows that the conclusion of an argument one knows to be valid is not justifiably believable for one, then some premise of the argument is not justifiably believable for one either.

Suppose you were to believe the premises of an argument you know to be valid, whilst knowing that you cannot justifiably believe its conclusion. Belief in the premises rationally commits you to the truth of the propositions you believe. Knowing the argument to be valid rationally commits you to the truth of its conclusion. If you simultaneously know that you cannot justifiably believe its conclusion, you are in the unfortunate situation of being rationally committed to the truth of a proposition that you know you cannot justifiably believe. Your doxastic state is incoherent in a manner reminiscent of a Moorean paradox. MCH captures the plausible thought that such incoherences must be avoided.

MCH is inconsistent with ST. There are several ways of arguing this. Here is one. Note that, by NC, one class of propositions that are not justifiably believable for one are propositions one knows to be contradictory. As a result, MCH serves to motivate the following principle:

Minimal Consistency (MCN). If one knows that the conclusion of an argument one knows to be valid is a contradiction, then some premise of the argument is not justifiably believable for one.[2]

To see that MCN is inconsistent with ST, let S_1 be an agent who knows that there is a valid argument from the premise set $\{$*ticket 1 will lose l, . . . , ticket n will lose l, l has n tickets, l has one winner*$\}$ to the conclusion $\perp$. By MCN, some member of the premise set is not justifiably believable for S_1. At the same time, each member of the premise set is very likely to be true on S_1's evidence. By ST, each member of the premise set is justifiably believable for S_1.

While I take this argument to provide strong reason to believe that ST is false, it does not serve to show that the above mentioned diagnosis in terms of accumulation of small risks is bound to remain unsatisfactory. Fortunately, there is another way of arguing that MCH is inconsistent with ST, which does the trick. Recall that, by NMP, no proposition of the form 'ϕ but I don't know that ϕ' is justifiably believable for one. Let S_2 be an agent who knows:

P1. that there is a valid argument from the premise set $\{$*ticket i will lose l, I don't know that ticket i will lose l*$\}$ to the conclusion *ticket i will lose l but I don't know that ticket i will lose l*, for each $i \in l$,

P2. that any such conclusion is Moore paradoxical and thus is not justifiably believable for him,

P3. that he does not know that ticket i will lose, for each $i \in l$.

[2] Notice that, besides receiving support by the plausible MCH and NC, MCN is independently plausible. After all, it captures the epistemic force of reductio arguments [Kaplan 1981].

Since S_2 knows P1 and P2, by MCH, he cannot justifiably believe at least one of the argument's premises. That means that either *ticket i will lose l* or *I don't know that ticket i will lose l* is not justifiably believable for S_2. Since, by P3, S_2 knows the latter premise to be true for each $i \in l$, it follows that *ticket i will lose l* is not justifiably believable for S_2, for each $i \in l$. At the same time, ticket i will lose l is highly probably on his evidence and so, by ST, justifiably believable for S_2.

Crucially, the fact that small risks of error accumulate to larger risks of error does little to block the present argument. After all, we are aggregating justified believability for only two propositions. And while the risk of error associated with each proposition may be small enough to be compatible with justified believability and yet too large to be so compatible when aggregated, it need not be. Given that the probability of *I don't know that ticket i will lose l* surpasses the threshold at issue in ST, we can set up l such that the odds against winning are high enough that the probability of *ticket i will lose l but I don't know that ticket i will lose l* is still above the threshold at issue in ST. It comes to light that, on ST, Moore paradoxical propositions come out as justifiably believable. Since this cannot be the case, ST must be false.

6. We ought, then, to look for a solution to the lottery paradox according to which ST comes out false. Unfortunately, there is an immediate difficulty that this project faces. As Douven and Williamson [2006] have recently argued, the prospects of finding a satisfactory such solution are dim. After all, one might think that a satisfactory solution will retain at least the following qualified version of ST:

ST'. If the probability of p on one's evidence is very high, then p is justifiably believable for one, *unless one's justification for believing p is defeated* [Douven and Williamson 2006: 758].

Given that we want to retain at least ST', our mission is to countenance a type of defeater such that all and only propositions of the form 'ticket ι will lose lottery λ' (henceforth also 'lottery propositions') are not justifiably believable for one. The problem that Douven and Williamson have identified is that an important class of proposals for such a defeater is bound to fail. More specifically, they have shown that no *structural property* can make for a defeater of the kind sought after. Roughly, a property of propositions is structural if it supervenes only on its truth-functional and probabilistic properties or, in other words, if it can be defined in strictly logical and mathematical terms only. The reason why structural properties don't make for the right kind of defeater is, in essence, that, for any proposition p with probability < 1 and structural property, P, we can run a lottery on p, as it were, by making it a member of a set, Δ, of equiprobable propositions which are jointly inconsistent. Given that CC and NC continue to hold, we can still generate the paradox. If so, the assumption that p has P does precious little to block the lottery paradox. Thus, structural accounts of the defeat property at issue in ST' are bound to fail.[3]

[3] Douven and Williamson also argue that their result applies to the most prominent solutions to the lottery paradox that venture to replace ST by ST', including the ones in [Pollock 1995, Ryan 1996] and Douven's own earlier proposal in [Douven 2002].

7. In view of this, the obvious move at this stage is to try and work out a non-structural account of the defeat property at issue in ST'. Douven and Williamson explicitly acknowledge that their result does not foreclose this option. However, they also emphasise that it is far from clear that this can be done without collapsing the resulting sufficient condition on justified believability into one on which justified believability requires probability 1 [Douven and Williamson 2006: 774-75]. I will not attempt to meet this challenge.

Fortunately, however, there is another way of avoiding Douven and Williamson's result, which denies not only ST but also ST'. In what follows, I will explore the prospects of one way of implementing just this kind of solution.

Recall that, according to ST', high probability on one's evidence is sufficient for justified believability unless one has a defeater. In the interest of readability, in what follows I will use 'prima facie justified believability' as a shorthand for 'justified believability unless one has a defeater'. This gives us the following alternative way of stating ST':

ST'. If the probability of *p* on one's evidence is very high, then *p* is prima facie justifiably believable for one.

ST' makes a lot of sense for anyone working in what may be called a traditional epistemological framework. Roughly, the traditionalist framework takes true belief to be a fundamental epistemic good and justified believability to be essentially connected to true belief. Now, on this view, if the probability of a proposition, *p*, on one's evidence is very high, then it is very likely on one's evidence that in believing *p*, one will secure the fundamental epistemic good of true belief. Given that justified believability is taken to be essentially connected to this fundamental epistemic good, it makes perfect sense to grant prima facie justified believability to a proposition the probability of which is high on one's evidence. In this way, it is only natural that champions of a traditional epistemological framework should be attracted to ST'.

While the traditional framework is arguably still the most popular one in contemporary epistemology, there is an alternative view that has received an increasing amount of support in recent years, which following Williamson [2000] we may call the knowledge first framework. According to this framework, again roughly, the relevant fundamental epistemic good is knowledge rather than true belief. Correlatively, justified believability is taken to be essentially connected not to true belief but to knowledge.

For those adopting a knowledge first epistemology, it is far from clear that they should accept ST' in the first place. While it makes sense to grant prima facie justified believability to a proposition the probability of which is high on one's evidence if the fundamental epistemic good to which justified believability is essentially connected is true belief, the same does not hold if the relevant fundamental epistemic good is knowledge and not just true belief. After all, if so, from the fact that the probability of a proposition, *p*, on one's evidence is high, it simply does not follow that it is very likely on one's evidence that in believing *p*, one will secure the fundamental epistemic good to which justified believability is essentially connected according to the knowledge firster. In fact, considerations concerning lottery propositions forcefully indicate that a proposition can be very likely on one's evidence, whilst this fundamental epistemic good is still out of reach entirely. As a result, knowledge first epistemologists should have little inclination to sign up to ST' in the first place.

Recent years have witness a surge of knowledge first epistemological accounts of justified belief. Knowledge firsters have argued that justified belief just is knowledge [Sutton 2007, Williamson Forthcoming, Littlejohn 2013], possible knowledge [Jenkins Ichikawa 2014] or the appearance of knowledge [Reynolds 2013]. It has been argued that justified belief is normatively coincident with knowledge [Smith 2014] and that one has justification for believing a proposition just in case one has justification for believing that one is in a position to know it [Smithies 2012]. We also find knowledge first versions of accessibilist [Millar 2010], mentalist [Bird 2007] and virtue epistemological [Miracchi 2015, Kelp Forthcoming-a,b, Kelp and Ghijsen Forthcoming] accounts of justified belief. Many (if not all) of these views are good candidates for offering a solution to the lottery paradox on which we don't have justification for believing lottery propositions, on the face of it at least. In fact, its champions often motivate their view in part by the fact it provides this kind of solution to the lottery paradox. Moreover, for at least the vast majority of these views, the reason why we don't have justification for believing lottery propositions is clearly not that a defeater is present. Rather, on these views, we are never in the ballpark for justification to begin with. If so, there is reason to believe that, on these views, lottery propositions turn out to not enjoy even prima facie justified believability.

Of course, all of the above accounts are importantly different. To investigate whether all solutions to the lottery paradox that have been proposed by knowledge firsters survive closer scrutiny will go well beyond the scope of this paper. For that reason, in what follows, I will focus on my own knowledge first version of virtue epistemology. More specifically, I will first introduce the view and then argue that it offers a viable solution to the lottery paradox, leaving comparisons with other knowledge first accounts of justified belief for another occasion.[4]

8. Consider a framework for what I call 'simple goal-directed practices' (SGPs), which feature two types of particular, *moves* and *targets*, and a *designated relation*. For a practice to be goal-directed, it must have a success condition. In SGPs a success is defined as a move that stands in the designated relation to the target. By way of illustration, consider a very simple version of target archery, call it ARCH, in which the target is a disc with a set surface area, moves are shots taken from a set distance and the designated relation is the hit relation. A success in ARCH, then, is a shot that hits the target.

With the basic framework in play, I offer the following accounts of (i) abilities to attain success in a given SGP, (ii) exercises thereof and (iii) competent moves in

[4] See [Kelp and Ghijsen Forthcoming, Kelp Forthcoming-b] for some such comparisons.

a given SGP.

SGP Ability. One has an ability to attain success within a certain range, *R*, of SGPs, and relative to a set of conditions of shape (*SH*) and situation (*SI*), just in case, one has a grounded way of move production, *W*, such that using *W* in *SH* and *SI* disposes one to attain success within *R*.

The core idea here is that abilities involve *dispositions to attain success* [Sosa 2010, Greco 2010]. For instance, for an archer to have the ability to hit the target in ARCH, he must have the disposition to hit the target in ARCH.

Abilities are relative to *ways of move production*. The reason for this is that an agent may have more than one way of move production available not all of which may constitute an ability to attain success. For instance, while an archer may shoot with his right or with his left hand, only one way of shooting may qualify as an ability to hit the target.

Moreover, the ways of move production at issue in abilities must be *grounded*. Not every disposition to succeed constitutes an ability. Consider an archer who shoots arrows straight up in the air. On a faraway planet in which the gravitational forces are very different, this way of shooting may dispose him to hit the target. However, that does not mean that the archer has the ability to hit the target, not even on that planet. What makes the difference between a genuine ability and a mere disposition to succeed? Taking a leaf from Millikan [2000: ch. 4], I want to say that etiology matters. Here is Millikan:

> In general, the conditions under which any ability will manifest itself are the conditions under which it was historically designed as an ability. These are conditions in which it was learned, or conditions in which it was naturally selected for. They are conditions necessary to completing the mechanisms by which past successes were reached by the systems or programs responsible for the abilities.
>
> [Millikan 2000: 61]

The reason why the archer's way of shooting does not qualify as an ability is that it does not satisfy the etiological constraint. The archer's way of shooting arrows up in the air did not lead him to successful moves in the conditions in which he acquired this way of move production. That's why it does not qualify as an ability. In other words, the archer's way of shooting is not grounded. The groundedness condition thus captures the etiological constraint on abilities, which makes the difference between a genuine ability and a mere disposition to succeed.

Finally, abilities are relative to conditions of shape and situation [Sosa 2010]. For instance, an archer may have the ability to hit the target when shooting in virtue of having a grounded way of shooting that disposes him to hit the target when sufficiently concentrated, sober, not being shoved while releasing the arrow (= *SH*), winds are normal, targets are not sabotaged (= *SI*) and so on. Compatibly with that, his way of shooting may not dispose him to hit the target when too drunk, shooting in a hurricane and so on.

With the account of SGP abilities in play, here is how I understand their exercise.

SGP Exercise. One exercises an ability, *A*, to attain success within a certain range *R* of SGPs and relative to *SH* and *SI* just in case one has *A* and produces a move via the way of move production at issue in *A*.

Exercises of SGP abilities are uses of the ways of move production at issue in them. An archer exercises his ability, *A*, to hit the target just in case he produces a shot via the way of shooting at issue in *A*.

In my view, unsuitable *SH* prevent agents from using the relevant ways of move production and hence from exercising their abilities. For instance, being too drunk, distracted, nervous, etc. prevents an archer from using the way of shooting that in more favourable *SH* qualifies as an ability to hit the target. In contrast, unsuitable *SI* do not prevent agents from exercising their abilities. A shot may be blown off target by a gust of wind (unsuitable *SI*) and yet the agent may have exercised his ability to hit the target.

Finally, exercises of SGP abilities must be distinguished from competent SGP moves. In order to produce a competent move in an SGP, one must not only exercise an SGP ability, but the SGP must also be in the range of one's ability. Consider an SGP in which the target is line-shaped (call it ARCH_X) and an archer who does not have the ability to hit the target in ARCH_X. Of course, our archer may still produce a shot via a way of shooting that constitutes an ability to hit targets in other SGPs, such as ARCH. In that case, he will have exercised an SGP ability. However, that does not make his shot competent. After all, the ability he is exercising is the wrong ability for the SGP he is engaging in, i.e. ARCH_X. A competent move, then, is a move in an SGP that is within the range of the ability exercised. This gives us:

Competent SGP Moves. A move in a given SGP, *S*, is competent if and only if it is produced by an exercise of an ability attain success within a certain range *R* of SGPs and relative to *SH* and *SI* such that $S \in R$.

9. With this account of SGPs, abilities, their exercises and competent moves in play, I suggest to view inquiry into specific whether questions as an SGP, or better: as a set of SGPs (one for each question). The idea here is that the targets of inquiry are *correct answers*. For instance, the target of an inquiry into whether *p* is the proposition that *p*, if *p* is true and the proposition that not-*p*, if *p* is false. Moves in inquiry are *beliefs*. For instance, believing *p* constitutes a move in an inquiry into whether *p*, as does believing not-*p*. The designated relation in inquiry is the *knowledge relation*. A success in inquiry, then, is a belief that qualifies as knowledge (henceforth also a 'knowledgeable belief' for short).[5] For instance, a belief that *p* stands in the designated relation to the target of an inquiry into whether *p* if and only if it qualifies as knowledge that *p*.

The corresponding accounts of abilities to know, their exercises and competent moves in inquiry are then straightforward:

Ability to Know. One has an ability to know propositions within a certain range, *R*, and relative to *SH* and *SI*, just in case, one has a grounded way of belief formation, *W*,

[5] See [Kelp 2014a,b,c] for arguments that knowledge is the goal of inquiry.

such that using W in SH and SI disposes one to form knowledgeable beliefs about propositions within R.

Exercises of Abilities to Know. One exercises an ability, A, to know propositions within range R and relative to SH and SI just in case one has A and forms a belief via the way of belief formation at issue in A.

Competent Belief. One's belief that p is competent if and only if it is formed by an exercise of an ability to know propositions within R and relative to SH and SI such that $p \in R$.

10. On my account of knowledge, knowledge is a basic form of epistemic success, to wit, success in inquiry. One interesting fact about knowledge is that it features a competence condition: one knows that p only if one competently believes that p. The reason this is interesting is that successes in SGPs do not generally require that the move be competent. Even a randomly fired shot (e.g. a shot taken whilst blindfolded at an undetectably moving target) may still hit the target and thus be successful. In contrast, a randomly formed belief (e.g. a belief based on the outcome of a fair coin toss, supposing it were possible to form a belief in this way) will not qualify as knowledge.

In addition, it is widely agreed that knowledge requires an epistemically sufficiently hospitable environment. These considerations motivate the following competence condition on knowledge:

Knowledge (K). One knows that p only if one competently believes that *p in SI* (alternatively: one believes that p via an exercise, in SI, of an ability to know propositions within R and relative to SH and SI such that $p \in R$).

Of course, K does not offer a reductive analysis of knowledge in terms of justified true belief. It is not intended to either. After all, K is meant to be part of a knowledge first approach to epistemology, which explicitly drops the ambition of giving a reductive analysis of this kind.[6]

Moreover, in true knowledge first-style, I venture to reverse the traditional direction of analysis and offer an account of justified belief in terms of knowledge. The core idea is that justified belief is competent belief in the sense at issue in Competent Belief. In other words,

Justified Belief (JB). One justifiably believes that p just in case one competently believes that p (alternatively: one believes that p via an exercise of an ability to know propositions within R and relative to SH and SI such that $p \in R$).

11. What about the lottery paradox then? In order to connect JB with the lottery paradox, we first need a principle connecting JB with the notion of justified believability. Here's my suggestion:

[6] I do not mean to suggest that there is nothing of philosophical substance to be said about the nature of knowledge. In fact, I am inclined to think that the nature of knowledge is given by the thesis that knowledge is the goal of inquiry.

Justified Believability (JBY). p is justifiably believable for one only if one is in a position to believe p via an exercise an ability to know propositions within range R and relative to SH and SI such that $p \in R$.

To see how JBY solves the lottery paradox, consider first arbitrary lottery proposition, say 'ticket 3 won't win the fair lottery I am about to hold' (henceforth 'p_l'). By JBY, p_l is justifiably believable for one only if one is in a position to believe that p_l via an exercise of an ability to know propositions in range R and relative to conditions SH and SI such that $p_l \in R$. This in turn requires one to be in possession of a grounded way of belief formation, W, such that using W disposes one to form a knowledgeable belief that p_l in at least some SH and SI. Crucially, however, when the only evidence bearing on p_l one has at one's disposal is the probabilistic evidence concerning the low odds of winning, no grounded way of belief formation in one's possession disposes one to form a knowledgeable belief that p_l, no matter what conditions one may find oneself in. In consequence, p_l is not in the range of any of one's abilities to know. If so, one is not in a position to believe p_l via an exercise an ability to know propositions within range R and relative to SH and SI such that $p_l \in R$. By JBY, p_l is not justifiably believable for one. Since p_l is arbitrary lottery proposition, the result generalises to all propositions of the form 'ticket i won't win fair lottery l'. In consequence, when the probabilistic evidence is the only evidence one has, by JBY, lottery propositions are not justifiably believable for one.[7]

Finally, it may be worth stressing once more that the reason why we don't have justification for believing lottery propositions on this view is not that a defeater present. Rather, we are never in the ballpark for justification to begin with. As a result, there is reason to believe that, on the present view, lottery propositions are not even prima facie justifiably believable.

12. Before closing, it may be worth noting a few more appealing features of JBY. First, it validates NC. After all, no one even has an ability to know propositions that they know to be contradictory. Hence, by JBY, known contradictions are not justifiably believable. Similarly, JBY validates NMP as no one has an ability to know Moorean propositions either.

As I argue elsewhere [Kelp Forthcoming-b] in more detail, JB is compatible with a version of a closure principle for justified belief:

Closure-JB (CJB). If one competently deductively reasons from $p_1, \ldots, p_n$ to q; if one thereupon comes to believe that q; and if one justifiably believes that $p_1, \ldots, p_n$ throughout, then one's belief that q is justified.

[7] There may be cases in which one has other ways of forming beliefs about lottery propositions. For instance, one may have been told by a reliable informant that a certain ticket will lose the lottery because the lottery is rigged against it. Since, at least in certain conditions, believing lottery propositions on the basis of the informant's say-so disposes one to acquire knowledgeable beliefs about lottery propositions, in this situation one is in a position to believe the lottery proposition via an exercise of an ability to know. By JBY, the lottery proposition is justifiably believable for one. I take this to be the right result.

Notice that knowing that there is a valid argument from $p_1, \ldots, p_n$ to q constitutes one way of being in a position to competently deductively reason from $p_1, \ldots, p_n$ to q. If so and if CJB holds, then the following principle is also plausible:

> Closure-JBY (CJBY). If $p_1, \ldots, p_n$ are justifiably believable for one and one knows that there is a valid argument from $p_1, \ldots p_n$ to q, then q is justifiably believable also.

It is not hard to see that CJBY also serves to validate MCH and, in conjunction with NC, MCN.

It thus comes to light that, apart from offering a promising solution to the lottery paradox that rejects ST (and ST'), my knowledge first virtue epistemological account of justified belief serves to validate NC and NMP, is compatible with CJB, CJBY and CC and promises to validate MCH and MCN (modulo CJBY). Since, as we have seen above, there is reason to believe that a solution to the lottery paradox that abandons ST is desirable and since all the aforementioned principles are highly plausible, I submit that this is good news for my account.

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