Synthese
https://doi.org/10.1007/s11229-017-1620-8

A bitter pill for closure

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Received: 17 May 2017 / Accepted: 7 November 2017

Abstract The primary objective of this paper is to introduce a new epistemic paradox that puts pressure on the claim that justification is closed under multi premise deduction. The first part of the paper will consider two well-known paradoxes—the lottery and the preface paradox—and outline two popular strategies for solving the paradoxes without denying closure. The second part will introduce a new, structurally related, paradox that is immune to these closure-preserving solutions. I will call this paradox, *The Paradox of the Pill*. Seeing that the prominent closure-preserving solutions do not apply to the new paradox, I will argue that it presents a much stronger case against the claim that justification is closed under deduction than its two predecessors. Besides presenting a more robust counterexample to closure, the new paradox also reveals that the strategies that were previously thought to get closure out of trouble are not sufficiently general to achieve this task as they fail to apply to similar closure-threatening paradoxes in the same vicinity.

Keywords Lottery paradox · Preface paradox · Multi premise closure · Paradox of the pill

1 Introduction

The thought that justification is closed under multi premise deduction, i.e. that we are justified in believing what deductively follows from our antecedently justified beliefs, is undeniably an attractive one. Yet two familiar paradoxes, the lottery paradox and the

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Published online: 18 November 2017

preface paradox put pressure on this claim. In response to these challenges, proponents of multi premise closure have proposed various solutions to the two paradoxes that do not involve the rejection of multi premise closure. One popular closure-preserving response to the lottery paradox is to deny that we can justifiably belief of any lottery ticket, regardless of the size of the lottery, that it is a loser. A common motivation for this view is that purely statistical evidence alone is insufficient for justification and that justification requires more than high probability—I will call solutions that fall into this category, *Solutions from Statistical Evidence*.[1] Similarly, in response to the preface paradox, it is popular for proponents of multi premise closure to deny that purely inductive reasons for believing that the author's book contains at least one error are sufficient for justification. Instead they often argue that justification for believing that the author's book contains any errors requires some sort of *special reason*—I will call this family of solutions, *Solutions from Defending the Conjunction*.[2]

The primary objective of this paper is to introduce a new epistemic paradox—*The Paradox of the Pill*—which retains core features of the original paradoxes, but cannot be resolved by either *Solutions from Statistical Evidence* or *Solutions from Defending the Conjunction*. This makes the new paradox a more compelling counterexample to the claim that justification is closed under multi premise deduction than its two predecessors. Furthermore, besides presenting a more robust counter example to the claim that justification is deductively closed, the new paradox also brings into focus the limitations of various strategies that were previously thought to get closure out of trouble. I will argue that extant solutions to these paradoxes have exploited certain features of the lottery and the preface narratives that are inessential to the creation of closure-threatening paradoxes. From this we can conclude that these solutions have been too tailor-made and fail to get at the heart of the problem.

The plan is as follows. In Sect. 2 I will briefly present the three epistemic principles that are jointly responsible for the lottery and the preface paradox. Sections 3 and 4 will introduce the lottery and the preface paradox in turn and present some popular solutions available to those wanting to defend multi premise closure. In Sect. 5 I will outline the structure of a new paradox that would be immune to these closure-preserving solutions. Section 6 will develop this paradox and defend the claim that it makes a stronger case against multi premise closure than its two predecessors. Finally, in Sect. 7 I will discuss some more general concerns about previous solutions to the lottery and the preface paradox.

2 Three epistemic principles

The lottery paradox, first introduced by Kyburg (1961), and the preface paradox, first introduced by Makinson (1965), pivot on three epistemic principles.

[1] Proponents of this strategy include Kaplan (1996), Ryan (1996), Nelkin (2000), Buchak (2014) and Staffel (2016).

[2] Proponents of this response to the preface paradox include Pollock (1986), Ryan (1991), Leplin (2009), Kaplan (2013), Kim (2015) and Smith (2016).

Sufficiency Thesis (ST) If p is highly probable for S, then S is justified in believing p.[3]

Multi Premise Closure (MPC) If S is justified in believing p, and S is justified in believing q, then S is justified in believing the conjunction (p & q).

No Contradiction (NC) S is never justified in believing (p and ∼p).

While each of these principles is individually plausible, the two paradoxes demonstrate that they are jointly inconsistent. The difficulty lies in negotiating which of the principles to modify or reject. (ST) captures the popular view that epistemic justification is best explained by something along the lines of probability above a certain threshold. Threshold views of justification, with a threshold value $t < 1$, are popular because they can easily accommodate a number of features often associated with epistemic justification, for instance that justification is fallible and does not require certainty, or credence 1, and that justification comes in degrees.[4] (MPC), which simply states that agents are justified in believing the conjunction of their individually justified beliefs, while being intuitively compelling, has often been identified as the culprit in our epistemic paradoxes. Denying (MPC) however is generally considered to be a costly move and the apparent oddity of accepting that an agent can have a number of beliefs that are individually justified but fail to be justified in believing them together has motivated many to try and defend (MPC). Finally, (NC) states that one cannot justifiably believe a contradiction. (NC) is widely regarded as a fundamental constraint on theories of justification and generally considered to be beyond reproach. For the purpose of this paper I will follow this orthodoxy and regard (NC) as non-negotiable. The next two sections introduce the lottery and the preface paradox and outline some popular solutions available to those wishing to preserve (MPC).

[3] This formulation of the Sufficiency Thesis is adapted from Kelp (2017). Sometimes the lottery and preface paradox are presented in terms of the Lockean Thesis, which explains rational belief in terms of rational degrees of confidence or credences.

(LT) It is rational for you to believe p just in case it is rational for you to have degree of confidence y in p, where $y > x$. (Foley 1992: p. 112)

(ST) is essentially a justification analogue of the Lockean Thesis. One nice feature of (ST) is that it stays neutral on what epistemic factors we use to explain justification. The antecedent of (ST) could be spelled out internalistically in terms of degrees of belief or credences, but it is also compatible with other accounts of justification, for instance reliabilist accounts, which do not explain justification in terms of degrees of belief. In this sense (ST) is a more general principle that captures a wider range of views than (LT).
In recent work Leitgeb (2017) proposed a contextualized version of (ST), which offers additional resources for dealing with the puzzles discussed below. A full assessment of this strategy and its implications however falls outside of the scope of this paper.

[4] Different versions of (ST) might be motivated in different ways. For instance, as an anonymous referee helpfully pointed out, one of the primary motivations for the Lockean Thesisis is that an agent who has a very high credence in P but fails to believe P somehow seems rationally deficient. This idea could also be used to motivate (ST) under two assumptions: (i) that we can equate between justification and rationality and (ii) that high probability is explained in terms of 'high credence'. While discussions of the lottery and preface paradox often implicitly accept (i), for the purpose of this paper I want to remain neutral on (ii).

3 The lottery paradox

Consider Juliet who enters a fair lottery with n tickets and a guaranteed winner. Assuming that Juliet knows these facts about the lottery, then for any threshold value $t < 1$ used to spell out 'high probability' in (ST) we can always construct a lottery large enough to create the following paradox.

(L1) For any ticket Juliet is justified in believing that the ticket will lose; $JB_J(t_1)$ & $JB_J(t_2)$ ... & $JB_J(t_n)$.

(L2) If Juliet is justified in believing of any given ticket that it will lose, then Juliet is justified in believing that all tickets will lose; $JB_J(t_1 \,\&\, t_2 \,...\, \&\, t_n)$.

(L3) Since Juliet knows that the lottery is fair and that it has a guaranteed winner, Juliet is justified in believing that at least one ticket will win; $JB_J \sim (t_1 \,\&\, t_2 \,...\& \, t_n)$.

When combined with (MPC), (L1) – (L3) entail a violation of (NC) as they give rise to the following contradiction.

(L4) Juliet is justified in believing that every ticket will lose and that one ticket will win; $JB_J((t_1 \,\&\, t_2 \,...\& \, t_n) \,\&\, \sim (t_1 \,\&\, t_2 \,...\& \, t_n))$.

Since accepting the contradiction in (L4) is unacceptable as it would mean rejecting (NC) and rejecting (L3) is not a live option given the setup, we are left with two alternatives: either we reject (L1), the claim that Juliet is justified in believing of any ticket in the lottery that it will lose, or we reject (L2), the claim that Juliet is justified in believing that all tickets are losers. The former requires rejecting (ST), while the latter requires rejecting (MPC). Proponents of the first strategy include Ryan (1996), Kaplan (1996), Nelkin (2000), Leplin (2009), Buchak (2014), Staffel (2016), and Smith (2010, 2016). Proponents of the second strategy include Kyburg (1961), Foley (1992, 2009), David (2004), and Sturgeon (2008). Thus, if (MPC) is to be preserved we may simply deny (L1) and insist that lottery beliefs, no matter how probable, fail to be justified.

Denying justification for lottery propositions is of course at odds with (ST)—after all lottery propositions can be highly probable—and proponents of this strategy must somehow reconcile this tension. This is usually done in one of two ways: (a) by proposing modifications to (ST) or (b) by rejecting (ST) altogether and replacing it with an entirely different notion of justification. Whilst Leplin (2009) and Smith (2010, 2016) recently opted for a more radical strategy along the lines of (b), this paper is primarily concerned with the more common and less radical *modificationist* strategies of type (a). The result of these modifications is usually to prevent beliefs based on purely statistical evidence to count as justified. Following this strategy we get a modified version of the Sufficiency Thesis along the following lines.

> (ST*) If p is highly probable for S and further conditions are met, then S is justified in believing p.

One influential closure-preserving strategy along these lines is due to Dana Nelkin (2000: p. 388).[5] Nelkin argues that what initially motivates an acceptance of (L1) is a certain inference pattern, which she calls p-inferences.

[5] Similar views are defended or echoed in Kaplan (1996), Enoch et al. (2012), Buchak (2014) and Staffel (2016).

(P-inference) p has a statistical probability of n [where n is a very high number] → p

This inference pattern however, Nelkin argues, should be rejected. In order for a belief to be justified, so the argument continues, it requires more than just high statistical probability. More specifically, in order for a belief to be justified according to Nelkin an agent must also be in a position to *suppose* that there exists a causal or explanatory connection between the belief and the facts that would make it true. Consider for instance beliefs based on perceptual experiences. For such beliefs, we are usually in a position to suppose that there exists a causal connection between the belief and the facts that would make the belief true, i.e. the objects perceived. For beliefs about lottery tickets on the other hand this condition is not met, as there is no causal connection between the belief that your ticket will lose and the fact that would make the lottery belief true, i.e. the drawing of the lottery; We would believe that our ticket was a loser even if it was the case that we had the winning ticket. As a result, Nelkin argues, beliefs in lottery propositions are not justified. Thus the lottery paradox is solved and closure is preserved.

Closure-preserving solutions following this strategy exploit the fact that in lotteries the relevant evidence is purely statistical. All that is needed to solve the lottery paradox whilst preserving (MPC), is a properly motivated rejection of the idea that statistical evidence alone can justify beliefs. Let us call solutions to the lottery paradox following this strategy *Solutions from Statistical Evidence*. Importantly, solutions that set out to solve the lottery paradox by rejecting (L1) are motivated by, or at least rely on, the fact that it strikes us as intuitively acceptable to deny justification for lottery beliefs. Douven (2008) makes the stronger claim that denying justification for lottery beliefs does not just strike us as an intuitively *acceptable* response, but that it strikes many as the intuitively *correct* response; "Many have the intuition that the right response to the Lottery Paradox is to deny that one can justifiably believe of even a single lottery ticket that it will lose" (204).[6]

4 The preface paradox

The preface paradox is structurally related to the lottery paradox as it too involves a combination of (ST), (MPC), and (NC) to create a seemingly inconsistent set of beliefs. The paradox is often presented as follows.

> An author has just finished an ambitious, yet carefully researched, book. On the basis of her research the author has good evidence for every claim made in the book and is justified in believing that each claim made in the book is true. However the author is also aware that when it comes to ambitious books, even the best scholarship can turn out to contain errors and in the past this has always been the case. In light of this the author includes in the preface of her work an apology for any errors in her book.

[6] It is important to point out that Douven is only summarizing the state of the debate; he is not endorsing this as the correct solution to the lottery paradox.

The author's epistemic position is considered to be problematic as she appears to be justified in believing that each claim in her book is true whilst also being justified in believing that there is at least one error in her book. The formal structure of the paradox can be captured as follows.

(P1) The author is justified in believing each claim made in the book; $JB_A(p_1)$ & $JB_A(p_2)$ ... & $JB_A(p_n)$.

(P2) If the author is justified in believing each claim made in her book is true, then the author is justified in believing that all claims made in her book are true; $JB_A(p_1$ & p_2 .. & $p_n)$.

(P3) The author is justified in believing that her book contains at least one error; $JB_A \sim (p_1 \,\&\, p_2 \ldots \&\, p_n)$.

However, taken together (MPC) and (P1)–(P3) entail a violation of (NC) as they combine to produce the following contradiction.

(P4) The author is justified in believing a contradiction, namely that all claims in her book are true and that there are errors in her book; $JB_J((p_1 \,\&\, p_2 \,..\&\, p_n) \,\&\, \sim (p_1 \,\&\, p_2 \ldots \&\, p_n))$.

As in the lottery paradox, there are two prominent solutions to the preface paradox. One option is to reject (P2), which would effectively deny (MPC). Alternatively, those sympathetic to closure have the option of rejecting (P3) instead. Advocates of this latter strategy include Pollock (1986), Ryan (1991), Leplin (2009), Kaplan (2013), Kim (2015), and Smith (2016).

Arguments for rejecting (P3) typically pivot on the idea that the author's mere recognition of her own fallibility is not sufficient to justify the belief that her book will contain any errors. Given that our author has good reasons supporting every claim in the book, mere doubt arising from recognizing her fallibility is insufficient to defeat justification for believing the conjunction. To support this claim, Kaplan emphasizes the lack of a *special reason* for believing that the book contains any errors, " … [the author] should stand by her book—she should not shrink from saying that everything in it is true—until she has found *special reason* to think it contains an error" (2013: p. 16).[7]

Importantly, according to Kaplan and others following this strategy, the author is of course perfectly justified in believing that her book will *likely* contain errors; " [The author] is even free to confess to *being confident* that her book will turn out to contain some error or other. The only thing she cannot flatly say (or say anything that entails) that her book *has* errors" (2013: p. 17).[8] Similar remarks can be found in recent work by Kim, "... while authors are reasonable to assert that *surely* there are errors, the reasonableness of this assertion does not imply that they are rational to believe that there *are* errors" (2015: p. 1024).[9] Thus Kaplan and Kim invite us to replace (P3) with a weaker premise along the following lines.

(P3*) The author is justified in believing that it is likely that errors will be found in her book.

[7] Emphasis in italics added.

[8] Emphasis in italics added.

[9] Emphasis in italics added.

With (P3*) in place the paradox is resolved because there is no contradiction in our author believing that all claims made in her book are true whilst also believing it to be *likely* that her book contains at least one error.

Thus it seems that proponents of closure can once again defuse the challenge of a supposedly closure-threatening paradox. Proponents of (MPC) can exploit the fact that in the preface paradox there is no*special reason* for believing that the conjunction in question is false. Let us call solutions of this ilk, *Solutions From Defending the Conjunction*.

5 The possibility of a third related paradox

Thus far I have argued that neither the lottery paradox nor the paradox of the preface are able to make a decisive case against the claim that justification is closed under multi premise deduction. As we have seen, each paradox has a certain feature that proponents of (MPC) can exploit in responding to the respective puzzles. In the lottery paradox proponents of closure can exploit the fact that the evidence in question is purely statistical and resort to *Solutions from Statistical Evidence*. Likewise in the preface case proponents can appeal to *Solutions From Defending the Conjunction* seeing that there is no special reason for believing that the conjunction is false.

At this point one might wonder if it is possible to construct a new closure threatening paradox that would be immune to *Solution from Statistical Evidence* as well as *Solutions From Defending the Conjunction*. Such a paradox would have to satisfy the following two conditions: (a) the beliefs in the individual conjuncts must not be based on purely statistical evidence and (b) there must be a special reason for believing that a sufficiently long conjunction will contain an error. We can expect a paradox with these features to present a more robust counterexample to the claim that justification is closed under deduction than its two predecessors. However, currently there is no paradox available that has precisely this mix of features.[10] The next section will present such a paradox and fill this lacuna.

[10] An anonymous referee helpfully suggested that a certain variant of the preface paradox—the Homogeneous Preface Paradox—recently proposed by Easwaran and Fitelson (2015) might meet these two conditions. In what follows I will briefly argue that there are very good reasons for thinking that the Homogeneous Preface Paradox, like the standard preface paradox, fails to meet condition (b). As a result, proponents of (MPC) will be able to respond to the Homogeneous Preface Paradox by appeal to *Solutions From Defending the Conjunction.* In the Homogeneous Preface Paradox, unlike in the standard preface paradox, (P3) is not just supported by general second-order evidence about our human fallibility; instead the author, John, an empirical scientist, writes an ambitious book about the very hypothesis (H): that all scientific/empirical books of sufficient complexity contain at least one false claim (2015: p. 10). So, John, rather than having only second-order evidence in support of the claim that his book contains at least one error, now infers the belief from the first-order claims in his book. Does this change in the *type* of evidence supporting (P3) amount to there being any *special reason* for thinking that *John's book* contains any errors? Arguably not. Sure, John has written a book rich in first-order claims supporting (H), a hypothesis about the general fallibility of ambitious scientific works, but these claims do not provide any *special reason* in support of the claim that *John's book* contains any error. As Kaplan suggests, "even if there are other authors of comparably ambitious works, no less careful (and, perhaps, some more meticulous) than [the author], who have nonetheless failed to write error-free books. Those aren't special reasons for not standing behind [the author's] book; they are reasons that are routinely present…" (2013: p. 16). In the case of John then, the first-order claims supporting (H) fail to be special reasons for believing that his book contains any errors, for the claims supporting (H) will be routinely present as they bear no special relation to John's current book—they will apply equally to his next book. Hence, there are strong reasons for thinking that

6 A bitter pill for closure

Consider the following case.

> S is given a bitter pill that ensures that a very small portion of S's ordinarily justified beliefs, let's say 1 out of every 10,000, chosen at random, will be false. The pill achieves this result by occasionally impairing S's cognitive connection to the evidence resulting in occurrences of, for instance, misperceptions or false memories. Importantly however these occurrences are incredibly rare. Finally, S knows about the effects of the bitter pill.[11]

Let's briefly consider S's epistemic situation after taking the pill. After taking the pill S continues to form beliefs like everyone else and the vast majority of those beliefs, will turn out to be true—S will continue to form beliefs based on perception, memory, and testimony, etc. just as before taking the pill. However, not all of S's justified beliefs will be true, for the pill ensures that a small number of beliefs, chosen at random, are going to be false. Considering that these occurrences are extremely rare and that the vast majority of S's beliefs will remain entirely unaffected, we should expect that the overall impact of the pill on S's epistemic situation should be rather minimal. After all it is likely that we already form and sustain a host of false beliefs anyways and that we are no strangers to the occasional adaptation of a false belief. Furthermore, most theories of justification take as a starting point the assumption that justification is fallible and that there are instances of justified false beliefs. In accordance with this fallibilist spirit, (ST) will predict that those of S's beliefs that are made sufficiently probable by S's evidence will continue to be justified.

From the pill case we can derive a puzzle similar to the lottery and the preface paradox. Let's call this new paradox, *The Paradox of the Pill*.

(BP1) S, after taking the pill, continues to be justified in believing the propositions made sufficiently probable by her evidence; $JB_S(p_1)$ & $JB_S(p_2)$ ... & $JB_S(p_n)$.

(BP2) S is justified in believing the conjunction of her individually justified beliefs; $JB_S(p_1 \,\&\, p_2 \,..\, \&\, p_n)$.

(BP3) S is justified in believing that the conjunction of her justified beliefs will contain at least some false belief; $JB_S \sim (p_1 \,\&\, p_2 \,..\, \&\, p_n)$.

The combination of (BP2) and (BP3) however violates (NC) as it commits S to an inconsistent set of beliefs. Under closure S is justified in believing the conjunction of her individually justified beliefs, whilst the effects of the pill also justify her in believing that a long enough conjunction of her individually justified beliefs is going to be false.

Footnote 10 continued
the Homogeneous Preface Paradox does not meet condition (b). Moreover, in the absence of any special reason for believing that the book contains at least one error, proponents of (MPC) can respond to the Homogeneous Preface Paradox by appealing to *Solutions From Defending the Conjunction*.

[11] As with most thought experiments it is of course perfectly possible to provide an alternative narrative to capture the same epistemically relevant features. Those who find the pill case conceptually problematic are free to come up with an alternative narrative as long as it incorporates the same epistemic features – one obvious candidate would be a malevolent demon, which decides to deceive an agent about a small number of randomly chosen beliefs.

(BP4) S is justified in believing a contradiction, namely that the conjunction of her justified beliefs is true and that some members of the conjunction are false; $JB_J((p_1 \& p_2 .. \& p_n) \& \sim (p_1 \& p_2 .. \& p_n))$.

As in the previous cases, solving the paradox will require rejecting either (BP1), (BP2), or (BP3). If (MPC) is to be preserved, then (BP2) must be retained. This leaves (BP1) or (BP3). However, neither of the popular solutions for solving closure puzzles will deliver this result; neither *Solutions from Statistical Evidence*, which would target the individual conjuncts in (BP1), nor *Solutions From Defending the Conjunction,* which would target (BP3), will apply to the new paradox.

Solutions from Defending the Conjunction, which were plausible in response to the preface paradox, turn out to be unavailable in the case of the pill paradox. Recall, that in response to the preface paradox Kaplan and others argued that there was no special reason for believing that the conjunction would contain any errors. It was this feature of the preface paradox that proponents of (MPC) exploited to reject (P3). In the paradox of the pill however, there does exist such a special reason—the effects of the pill guarantee that a sufficiently long conjunction will contain at least one false belief. As a result, *Solutions from Defending the Conjunction* do not provide the necessary resources for rejecting (BP3) in the new puzzle.

Similar worries arise for *Solutions from Statistical Evidence.* Recall that *Solutions from Statistical Evidence* attempt to solve the lottery paradox by denying that purely statistical evidence, no matter how strong, is sufficient for justification. An influential argument for this type of strategy was due to Nelkin who argued that in order for a belief to be justified an agent must be in a position to *assume* that there exists a causal or explanatory connection between the belief and the evidence that will make it true. In case of the paradox of the pill however these types of solutions will fail. In the paradox of the pill, S's beliefs are not based on purely statistical evidence, as S continues to form beliefs based on perception, testimony, memory, etc. And since S's beliefs are formed using these ordinary methods, for every individual belief, S will be in a position to suppose that there exists a causal or explanatory connection between her belief and the facts that would make the belief true. Furthermore, consider that even under ordinary circumstances our beliefs are liable to occasional errors. We would not however conclude that this gets in the way of supposing that generally there exists a causal connection between our beliefs and the facts that make it true. Since we are no strangers to the occasional formation of false beliefs and since this does not compromise the assumption that our beliefs are causally connected to the evidence, there is no reason to deny that after taking the pill the agent can assume, for each belief, that there exists a causal connection between the belief and the facts that would make it true. Thus *Solutions from Statistical Evidence* will also not be able to solve the new paradox.

Since the prominent closure-preserving solution fail to apply the new puzzle, it appears that the most promising way out of the paradox is to reject (BP2), and as a result (MPC). To cement this conclusion let's briefly consider the prospects of alternative strategies for rejecting (BP1), i.e. strategies that would solve the lottery by rejecting (L1) and that would in principle apply to the new paradox. Pollock (1983) and Ryan (1996), for instance, reject (L1) on the more general ground that whenever one has

a set of beliefs and it is known that the set contains at least one false member, then, assuming one does not know which of the members is false, one is not justified in believing *any* member of the set.[12] In the case of the new paradox, these considerations might motivate a rejection of (BP1) by insisting that after taking the pill *none* of S's beliefs are justified. However, recall that strategies akin to *Solutions from Statistical Evidence* that reject (L1) by denying that we can have justified beliefs about lottery tickets are motivated by, or at least rely on, the idea that denying justification for lottery beliefs strikes us as an intuitively acceptable response. Douven made the stronger claim that denying justification for lottery beliefs is not just an intuitively acceptable response, but that it is the *intuitively correct* response. In case of the Paradox of the Pill however, insisting that *all* of S's beliefs are unjustified no longer strikes us as an intuitively correct, or even intuitively acceptable, result. Seeing that the pill only affects 0.01% of beliefs, it appears that embracing global skepticism about justification (and presumably knowledge) is an excessively costly and unconvincing response to the new puzzle; especially if we recall that most accounts of justification depart from the idea that justification is fallible, i.e. that we can have justified false beliefs. Thus, even strategies that solve the lottery by rejecting (L1) and that would in principle apply to the new paradox by rejecting (BP1) will not get closure out of trouble. In the case of the new paradox, these solutions lose their intuitive plausibility, which is what made them promising closure-preserving solutions to the Lottery Paradox in the first place.

A final response to the Paradox of the Pill might try to avoid the skeptical implication of the above strategies by proposing that only some of S's post-pill beliefs are unjustified.[13] This, one might hope, would go some way towards making the rejection of (BP1) a more plausible response to the new paradox. This proposal however faces a serious objection. First, recall that the effects of the pill are both *global*, i.e. the pill could affect any of S's beliefs, and *random*. This means that for every belief, regardless of its precise degree of evidential support or how confident S is about its truth, there exists an equal chance that it is affected by the pill. Put differently, we might say that with regards to the pill, all of S's beliefs are epistemically on par. For the idea of denying the justificatory status of only some of S's beliefs this gives rise to the following problem: Since the threat of the pill applies equally to all of S's beliefs, there will be no principled way for choosing which beliefs are unjustified. Therefore, choosing which of S's beliefs fail to be justified would be arbitrary. Arbitrarily choosing some of S's beliefs and insisting that they, despite being highly probable on S's evidence, are unjustified seems difficult to motivate and makes for an unsatisfactory response to the new paradox.

To strengthen this point we might consider analogies to the lottery and the preface paradox. In responding to the lottery paradox we would be reluctant to accept a proposal suggesting that we can arbitrarily choose some tickets about which to suspend judgment, whilst insisting that for the remaining tickets we are justified in believ-

[12] To motivate this claim, Ryan (1996) appeals to a principle she calls the 'Avoid Falsity Principle' while Pollock (1983) introduces the idea that became known as 'Collective Defeat'.

[13] I want to thank two anonymous referees for bringing this proposal to my attention.

ing that they are losers.[14] For this reason, the justificatory status of lottery beliefs is usually taken to be an all or nothing matter – either you are justified in believing of every ticket that it is a loser, or you lack justification for believing that any of them are losers. Seeing that the randomness of the pill's effect mirrors a lottery, the same 'all or nothing' reasoning should apply in the Paradox of the Pill. Likewise, as far as I know, no one has seriously proposed solving the preface paradox by simply choosing some claims in the book and insisting that the author lacks justification for believing precisely those claims. After all, in the preface paradox the author has good evidence supporting each claim in the book; as Eder (2015) warns, "Ignoring this and choosing arbitrarily which propositions not to believe seems to make dealing with rational belief (evidential support, and rational degrees of belief) somewhat superfluous: this is not a palatable option here…" (669). Again, these considerations seem to apply equally in the case of the new paradox—arbitrarily choosing some of S's beliefs and denying their justificatory status is not a satisfactory response to the paradox. These considerations point towards the following strategy for dealing with the Paradox of the Pill: either we grant that S has justification for every belief that is probable on her evidence, or, if one thinks that the right response to the paradox somehow involves rejecting (BP1), then one should be prepared to deny justification for all of S's beliefs. Thus aiming to solve the new paradox by targeting (BP1), i.e. by seeking fault with the individual conjuncts, is likely to be unsatisfactory. As pointed out before however, many of the popular strategies for solving the lottery paradox by targeting (L1) do not apply to (BP1) in the first place.

Seeing that many of the prominent closure-preserving strategies are not equipped to deal with the new puzzle, we can conclude that The Paradox of the Pill makes a significantly stronger case against (MPC) than its two predecessors.

7 Generality worries for standard closure-preserving solutions

It appears that *The Paradox of the Pill* is not just bad news for closure. The new puzzle also licenses some more general concerns about certain strategies for dealing with the lottery and the preface paradox. Previously it was thought that *Solutions from Statistical Evidence* or *Solutions from Defending the Conjunction* would be all that is needed to defend closure against the pressure coming from closure puzzles. However, it now seems that that these solutions have targeted features of the respective puzzles that turn out to be non-essential for constructing closure-threatening paradoxes. In other words, the features that these popular closure-preserving solutions target, rather than being necessary features of closure-threatening paradoxes, are merely incidental features of the lottery and the preface narratives. What the Paradox of the Pill illustrates, is that in close vicinity to the lottery and the preface paradox there lurk relevantly similar epistemic puzzles to which the prominent closure preserving solutions that were previously thought to get closure out of trouble do not apply.

[14] This claim, which is often just take for granted, is made explicit by Harman (2002). For an exception see Kroedel (2012).

The central idea underlying *Solutions from Statistical Evidence* put forth in response to the lottery paradox was that purely statistical evidence, no matter how strong, does not justify beliefs. This strategy identifies the statistical nature of the evidence as a crucial feature of the lottery paradox. Thus, proponents of *Solutions from Statistical Evidence* identify something along the lines of Nelkin's p-inferences as an essential feature of the puzzle.

(P-inference) p has a statistical probability of n [where n is a very high number] → p.

Subsequently, proponents of closure proposed modifications to the Sufficiency Thesis that would exclude beliefs based solely on statistical evidence from being justified. Recall Nelkin's proposal that for a belief to be justified an agent must be in a position to *presuppose* a casual connection to the facts. This strategy would of course be successful if it was an essential part of the puzzle that the individual conjuncts be supported by purely statistical evidence. What Nelkin and her followers seem to have overlooked however, is that one can be in a position to presuppose a casual connection to the evidence but still be in a lottery like environment. In the pill scenario this is achieved by building a lottery mechanism into S's causal connection to the evidence. As a result we can generate challenges to the closure principle without relying on evidence that is purely statistical. In other words, we can generate challenges for (MPC) without relying on p-inferences. This suggests that *Solutions from Statistical Evidence* are not sufficiently general to achieve their aim of saving (MPC) as they target a non-essential feature of the lottery-paradox. The statistical nature of the evidence, rather than being an essential feature of closure-threatening paradoxes is merely an incidental feature of the lottery narrative; in this sense the statistical nature of the evidence is a red herring.

Furthermore, strategies like *Solutions from Statistical Evidence* that set out to solve the lottery paradox by rejecting (L1)—the premise that we can justifiably believe that any given lottery ticket will lose—benefit from the fact that denying justification in lottery propositions is intuitively acceptable. In other words, denying justification for lottery beliefs does not strike us as particularly problematic or implausible. A possible explanation for this might be that when it comes to lottery tickets, we generally aren't overly concerned about the exact epistemic status of our beliefs. If it turned out that we are not justified in believing lottery propositions, then so be it; especially if this allows us to preserve the attractive principle of (MPC). After all it is plausible that our intuitive pull towards (MPC) outweighs our concerns over the exact epistemic status of lottery beliefs. However, things are different in the case of The Paradox of the Pill. In this case rejecting (BP1), i.e. denying that any of S's beliefs are justified, no longer strikes us as a plausible or acceptable solution. While it might have been intuitively acceptable to deny justification for individual lottery beliefs, it does not seem plausible to respond to a miniscule amount of risk (0.01%) by embracing global skepticism about justification. It seems again that solution to the lottery paradox that reject (L1) rely on a specific feature of the paradox—in this case the intuitive acceptability of denying justification in lottery beliefs – that is not an essential or general feature of closure puzzles but instead only a by-product of the particular lottery narrative. The Paradox of the Pill shows that we can create cases in which denying justification for the individual conjuncts is no longer a plausible strategy for preserving (MPC).

A similar worry arises for *Solutions from Defending the Conjunction* produced in response to the Paradox of the Preface. These solutions, as proposed by Kaplan for instance, pivot on the idea that in preface cases the author lacks justification for believing that the conjunction in question is false as there is no 'special reason' supporting it. Subsequently it is suggested that we replace (P3) with the weaker premise (P3*).

(P3*) The author is justified in believing that it is *likely* that errors will be found in her book.

In order for this strategy to apply more generally however, Kaplan and his followers must assume that the lack of a special reason against the conjunction is an essential feature of closure-threatening puzzles. However, as The Paradox of the Pill shows, we can easily construct closure-threatening paradoxes that avoid this feature of the preface paradox. In the paradox of the pill there does exist a special reason to believe that a sufficiently long conjunction is false, it is guaranteed by the pill's effects. Subsequently we cannot replace (BP3) with a weaker premise (BP3*).

(BP3*) S is justified in believing that the conjunction of her justified beliefs will *likely* contain at least some false beliefs

(BP3*) would fail to correctly capture the epistemic environment the pill creates, as the pill does more than just make it likely that a sufficiently long conjunction will be false—it guarantees it. Thus *Solutions from Defending the Conjunction* also seem to target a feature of the preface paradox that is merely incidental to the preface narrative but not essential for the creation of closure-threatening puzzles. As a result this strategy also fails to provide a more general solution to the paradoxes that threaten (MPC).

What The Paradox of the Pill shows, is that we can create problematic puzzles that do not incorporate any of the features previously targeted by many of the popular closure-preserving solutions to the lottery paradox and the paradox of the preface. This is the case because both strategies have targeted features of the respective puzzle that are non-essential for creating puzzles that put pressure on (MPC). In light of this generality worry, it might be the case that proponents of closure will have to revise their current strategies or explore alternatives if they want to solve the pill paradox whilst retaining multi premise closure. Until then however the rejection of closure seems to remain the most plausible solution to the new paradox.

8 Conclusion

In this paper I developed a new epistemic paradox, *The Paradox of the Pill*, which puts pressure on the claim that justification is closed under multi premise deduction. The new paradox is structurally related to the lottery and the preface paradox but differs from the two in some relevant respects. First, in contrast to the lottery paradox, the individual conjuncts are not supported by purely statistical evidence, and second, in contrast to the preface paradox, the falsity of a sufficiently long conjunction is guaranteed. These two features make the new puzzle immune to many of the prominent closure preserving solutions put forth in response to the lottery and preface paradox. What we end up with is a more robust and convincing counterexample to (MPC)

and any proponent of multi premise closure must be prepared to provide a response to this new puzzle. The new paradox also highlights that previous solutions to the lottery and the preface paradox might need to be reconsidered, seeing that they are not sufficiently general to resolve structurally similar puzzles in the same vicinity. A possible explanation for this generality worry is that many of the previous responses to the lottery and the preface paradox have targeted features of the respective puzzles that turn out to be non-essential for the creation of closure-threatening paradoxes. As a result of being too tailor-made, these solutions fail to generalize to relevantly similar paradoxes in the same vicinity. What these considerations show, is that proponents of closure have more work to do if they want to provide a convincing defense of the claim that justification is deductively closed.

Acknowledgements I would like to thank Patrick Greenough, Martin Smith, and members of the Arché Epistemology Research Group for excellent discussions, feedback, and advice on earlier versions of the paper. I also thank two anonymous referees of this journal for their helpful comments.

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