

The Epistemic and the Deontic Preface Paradox

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Abstract

This paper generalizes the (epistemic) preface paradox beyond the principle of belief aggregation and constructs a similar paradox for deontic reasoning. The analysis of the deontic case yields a solution strategy—*restricting* belief/obligation aggregation rather than giving it up altogether—that can be transferred to the epistemic case. Our proposal amounts to a reasonable compromise between two goals: (i) sticking to bridge principles between evidence and belief, such as the Lockean Thesis, and (ii) obtaining a sufficiently strong logic of doxastic and deontic reasoning.

1 Introduction

The (epistemic) *preface paradox*, first articulated by Makinson (1965), presents a challenge to the combination of two ideas: (i) the agent’s available evidence provides a sufficient criterion for qualitative belief or rational acceptance (e.g., expressed by the Lockean Thesis); and (ii) there are valid informative rules for reasoning with the propositions we believe, such as inferring to their conjunction.

In this paper, we show that the tension between (i) and (ii) is not specific to aggregating beliefs by conjunction: it emerges as soon as we accept *some* reasonable inference patterns for believed propositions (e.g., Modus Ponens). We construct an analogous paradox for deontic reasoning, which we call the *deontic preface paradox*. We argue that the analysis of the deontic case, where the problem of conflicting obligations is well-studied, highlights a feasible, and hitherto unexplored, solution strategy for the epistemic case. Specifically, we argue that reasoning in the preface paradox is essentially

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akratic, and that this is adequately mirrored by *restricting* the aggregation of beliefs and obligations. Finally, we show that our proposal is compatible with natural bridge principles between evidence and belief, such as the Lockean Thesis.

The structure of the paper is as follows: Section 2 presents the epistemic preface paradox and develops a version where Modus Ponens for rational belief replaces belief aggregation as a premise of the paradox. Section 3 constructs a deontic analogue of the preface paradox, followed by an overview of escape routes in Section 4. Section 5 makes a case for *restricting* aggregation rules for obligations while Section 6 transfers this strategy to the epistemic case and explores its wider implications. Section 7 draws the balance and wraps up our results.

2 The (Epistemic) Preface Paradox

Here is our formulation of the epistemic preface paradox, adapted from Cevolani and Schurz (2017, p. 210):

Jay, an academic historian, has just published his last book containing the substantive claims C_1, \dots, C_n . Since Jay is a serious scholar, he has carefully checked these claims and he believes that each statement C_i is true. Thus, he infers that also their conjunction $C_1 \wedge \dots \wedge C_n$ is true. Still, Jay is perfectly conscious of his own fallibility as a writer and researcher. Thus, in the preface of his book, he acknowledges that such an ambitious and long work is bound to contain some error. But this amounts to saying that Jay believes that $\neg C_1 \vee \neg C_2 \dots \vee \neg C_n$. Thus, Jay seems to entertain two logically incompatible beliefs. How can this be rational?

Certainly, it sounds odd to believe a proposition and its negation at the same time. After all, belief is supposed to express something like rational *acceptance*, and we can hardly accept two contradictory propositions (or a logical contradiction).¹ Rational belief should therefore respect both of the following principles:

No Contradictory Beliefs Rational belief in A excludes rational belief in $\neg A$: $B(A), B(\neg A) \vdash \perp$.

¹Some scholars, such as Jeffrey (1970), deny that there is an epistemically interesting notion of qualitative belief or rational acceptance. All that is required for rational doxastic attitudes are coherent numerical *credences* (i.e., credences that conform to the laws of probability). Since there is nothing probabilistically incoherent in Jay assigning a high credence to all of the C_i and also to the disjunction $\neg C_1 \vee \neg C_2 \dots \vee \neg C_n$, there is no paradox. This position is known as “radical probabilism”, but it neglects that the qualitative notion of belief (as rational acceptance) has an important role in our cognitive practices, and in reasoning and decision-making in particular. In fact, it is studied in quite diverse fields such as epistemology, doxastic logic and belief revision theory.

No Belief in Contradictions Contradictory propositions cannot be rationally believed: $B(\perp) \vdash \perp$.

Jay's epistemic state in the preface paradox clashes with No Contradictory Beliefs, so something must have gone wrong. What exactly? Apparently, Jay's beliefs are justified by a principle like

Sufficient Evidence for Belief A rational agent should see to it that whenever the available evidence for a proposition X exceeds a (possibly subjective) threshold t , he or she believes X .

This criterion sounds eminently plausible: rational belief should track evidence. Equally plausibly, for each of the C_i as well as the disjunction $\neg C_1 \vee \neg C_2 \dots \vee \neg C_n$ ("somewhere in the book, there will be an error") there seems to be sufficient evidence to warrant rational belief, at least when the number of claims n is large enough.

Moreover, when adding $\bigwedge C_i$ to his belief set, Jay has made use of

Belief Aggregation (Closure of Belief under Conjunction) Rational belief in A and B implies rational belief in $A \wedge B$. Schematically: $B(A), B(B) \vdash B(A \wedge B)$.

This sounds very natural, too: if we believe, or accept, A and B , we have committed ourselves to their truth, and thus to the truth of their conjunction. However, Belief Aggregation and Sufficient Evidence for Belief clash with No Belief in Contradictions:

Proposition 1 (Epistemic Preface Paradox, version with Belief Aggregation). *Assume that each of the propositions in $S = \{C_1, C_2, \dots, C_n, \neg C_1 \vee \neg C_2 \dots \vee \neg C_n\}$ satisfies Sufficient Evidence for Belief. Then Sufficient Evidence for Belief, Belief Aggregation and No Belief in Contradictions are incompatible.*

The proof is simple: From Sufficient Evidence for Belief and repeated Belief Aggregation over the individual claims in S we obtain $B(\bigwedge C_i)$. Since by assumption $B(\neg \bigwedge C_i)$, we can infer $B(\perp)$ and No Belief in Contradictions is violated.

Which of the premises should we reject? No Belief in Contradictions is clearly too fundamental to reject. This leaves us with the choice between giving up Sufficient Evidence for Belief—or its application to this specific case—and giving up Belief Aggregation. The latter move bars the inference that Jay believes $\bigwedge C_i$ as well as $\neg \bigwedge C_i$ and is advocated, among others, by Kyburg (1961), Foley (1992, 2009), Christensen (2004) and, on the basis of an accuracy-based argument, also Easwaran (2016).²

²Yet another group of epistemologists, such as Gustavo Cevolani and Gerhard Schurz, analyzes the Preface Paradox in terms of truthlikeness: the criterion for rational acceptance

The case for rejecting Belief Aggregation is reinforced by the idea that the concept of evidence is anchored in our numerical credences or graded beliefs (e.g., explications of probability as “degree of confirmation”, Carnap 1950; see also Sprenger and Hartmann 2019, ch. 1). The link between graded and qualitative belief is most naturally expressed by a bridge principle such as

Lockean Thesis (e.g., Foley 1992) Rationally believe proposition X if and only if the credence in X is higher than a threshold $t \in [1/2, 1)$.³

We do not need to accept the Lockean Thesis to generate the preface paradox, but it is a particularly popular and intuitively compelling explication of Sufficient Evidence for Belief. It also allows different agents to apply different standards of evidence (i.e., credence thresholds t). What is more, the Lockean Thesis explains what is wrong with Belief Aggregation: aggregating a lot of propositions, each of which is reasonably believed, we may end up with a very improbable proposition. Belief Aggregation is therefore too strong.⁴

However, in a certain way, this response makes things too easy. The point of having a qualitative notion of belief on top of rational credence is to identify propositions we can *accept* and treat as if they were true. It makes therefore sense to assume that at least *some* laws of classical logic should govern valid reasoning with rational beliefs (see Harman 1986; MacFarlane 2004, for discussion). Whoever rejects Belief Aggregation should therefore identify the inferences that we *can* apply to our rational beliefs. A natural candidate is

Schema K for Rational Belief Rational belief in both A and the material conditional “if A , then B ” implies rational belief in B . Schematically:
 $B(A), B(A \supset B) \vdash B(B)$.

In support of Schema K, we note that Modus Ponens is one of the most fundamental rules of classical logic. In many axiom systems (e.g., Stalnaker’s and Lewis’s conditional logics), it is one of the few, or even the only

should not be based on high credence, but on high expected truthlikeness, which is a related, but different notion. In this analysis of the paradox, Jay can rationally accept the conjunction of the C_i —and not accept its negation—because this is a rational strategy to maximize expected truthlikeness (Cevolani 2017; Cevolani and Schurz 2017).

³The value 1 is excluded since this would mean that a rational agent only believes tautologies or propositions whose truth he has verified, and does not believe anything which is even minimally uncertain.

⁴The Lockean Thesis is not uncontroversial and some scholars prefer more intricate bridge principles between credence and rational acceptance, such as Leitgeb’s Humean Thesis (Leitgeb 2014, 2017). However, it has large intuitive appeal as a sufficient criterion for rational belief and it can be motivated independently by an accuracy-based epistemology (Easwaran 2016).

valid rule of inference. Also in empirical research, it regularly emerges as a strongly endorsed inference, much more than other classically valid inference schemes such as Modus Tollens (Evans and Over 2004; Johnson-Laird and Byrne 1991; Oaksford and Chater 2010). If we reject Schema K, it is unclear to what extent classically valid inferences apply to our reasoning with rational beliefs.

However, accepting Schema K runs into the same problems as accepting Belief Aggregation:

Proposition 2 (Epistemic Preface Paradox, Schema K version). *Assume that each of the propositions in $S = \{C_1, C_2, \dots, C_n, \neg C_1 \vee \neg C_2 \dots \vee \neg C_n\}$ satisfies Sufficient Evidence for Belief. Then Sufficient Evidence for Belief, Schema K and No Contradictory Beliefs are jointly incompatible.*

Proof. We prove the proposition by induction on the number of claims n . The base case $n = 1$ generates an instance of No Contradictory Beliefs without further assumptions. We now show the inductive step, assuming that the proposition holds for $S_{n-1} = \{C_1, \dots, C_{n-1}, \neg C_1 \vee \neg C_2 \dots \vee \neg C_{n-1}\}$. We rewrite the proposition $\neg C_1 \vee \neg C_2 \dots \vee \neg C_n$ as

$$C_n \supset (C_{n-1} \supset (\dots \supset \neg C_1))$$

and apply Schema K to this proposition and C_n , which are (by Sufficient Evidence for Belief) both in our belief set. This yields

$$B(C_{n-1} \supset (C_{n-2} \supset (\dots \supset \neg C_1)))$$

which is equivalent to

$$B(\neg C_1 \vee \neg C_2 \vee \dots \vee \neg C_{n-1}).$$

But now we can simply invoke the inductive hypothesis for S_{n-1} and derive a contradiction. Compare the results in Lissia 2022. \square

Proposition 2 establishes that it is not the particular power of Belief Aggregation (=closure under conjunction) that creates the paradox.⁵ Rather, the paradox emerges if we assume a minimum of inferential power represented by Schema K, which is a basic component of any normal modal logic and typically accepted as valid for rational belief (e.g., in standard doxastic

⁵There is a certain similarity between this result and the objection to Modus Ponens as a rule governing rational belief in McGee 1985. In McGee's alleged counterexample, we rationally believe both $A \rightarrow (B \rightarrow C)$ and A , but we do not believe $B \rightarrow C$. However, the case is different since the natural language indicative conditional does, according to most scholars, not coincide with the material conditional of Schema K.

logics such as KD_4 , compare Rendsvig, Symons, and Wang 2023; Stalnaker 2006). If we give up Schema K, how can we still reason with our beliefs? True, both Harman (1986, chapter 1–2) and MacFarlane (2004) consider the option that instead of adopting the belief in B , a rational agent may *revise* his previous belief in A or $A \supset B$. But the problem of identifying reasonable inference rules for rational belief remains.

We are thus stuck between a rock and a hard place: either we have to give up the eminently plausible principle of Sufficient Evidence for Belief, and its probabilistic explication, the Lockean Thesis. Or, if we decide to retain it, we lose all cognitively interesting inference patterns for our beliefs. If the preface paradox forces this conclusion upon us, we might as well abandon the project of a logic of qualitative belief altogether in favor of a purely quantitative, probabilistic description of doxastic attitudes (e.g., Jeffrey 1970, see also footnote 1). We will point out a way to avoid this conclusion, but the plausibility of our strategy will benefit from looking at the analogous deontic paradox first.

3 The Deontic Preface Paradox

We introduce the deontic version of the preface paradox by means of an example involving standard therapeutic technique for perfectionism, which is very widespread among practitioners of cognitive-behavioural therapy (CBT). In standard definitions, perfectionism is associated with a strong fear of being imperfect or failing to meet some goal or standard. The CBT technique usually goes under the label of “exposure”: intentionally allowing oneself to experience an “imperfect” situation which causes anxiety, frustration, or discomfort. The idea is that if the patient lets herself experience, on a regular basis, situations in which she feels anxious and/or frustrated (e.g. not having a perfectly clean apartment, or sending out a document containing a typo), this will progressively reduce her feelings of discomfort. The assumption behind this kind of therapy is that in perfectionism, a huge role is played by the subject’s (ill-founded) belief that failing to meet some specific standard will have terrible consequences, e.g., “if there’s a typo in my e-mail, everyone will think I’m incompetent”. The aim of exposure therapy is to challenge the patient’s distorted beliefs, which associate imperfection with catastrophic outcomes.

In a typical exposure assignment, the therapist asks the patient to deliberately fail at some task that she usually carries out perfectionistically. For instance, in the case of a perfectionistic high school student, the therapist may recommend that she gets a B instead of an A by handing in her homework late, or, in the case of a manager afraid of making errors, the therapist

may suggest that she purposely mispronounces a name during her next presentation. Of course, assignments are always designed so as not to involve excessive risks (e.g., failing an important exam): if an assignment were too risky, exposure could turn out to be counterproductive, since, in addition to the factual damage that the patient may suffer, the incident may provide confirmation for the patient's belief that failure is very dangerous.

Let us now apply this technique to a perfectionist academic: Laura, a historian who has just finished her latest book. She decides to seek help from a professional for dealing with her perfectionist traits, which have a very negative impact on her daily life. Her therapist suggests that she includes just one mistake in the draft of the book she has just finished. The book contains a great many claims that Laura deems scientifically very significant.⁶ Now, Laura has very good evidence that her therapist is highly reliable. In particular, she knows that her therapist has been very successful in treating an impressively high number of people struggling with perfectionism. She has, as a result, strong reasons to follow her therapist's advice: complying with the therapist's task is likely to lead to substantial improvements in her well-being. Moreover, including one single mistake in a book which contains a very high number of claims will be very unlikely to affect its overall scientific value, or her reputation. After all, many important books are known to contain one or—most often—a few errors. In a nutshell, all things considered, not reporting all claims correctly and introducing an error seems the best choice available to Laura. Her reasoning seems to be supported by the following plausible principle:

Perspectivism An agent ought to ϕ if and only if ϕ 'ing is her best choice in light of the evidence available to her.

Perspectivism has been defended by a large number of prominent authors (Andrić 2013; Dancy 2000, chapter 3; Gibbons 2010; Kieseewetter 2011, 2017, chapter 8; Lord 2015; Mason 2013; Robertson 2011; Scanlon 2008; Zimmerman 2008, 47–52). The idea is that the best available evidence determines whether or not we should accept a proposition, or perform an action.

Back to our example. Naturally, Laura begins to wonder where it would be best to include the mistake. She starts by considering claim C_1 : given her evidence, C_1 is a significant historical finding. Laura has, as a result, compelling reasons not to present it in a mistaken form. So claim C_1 does not seem the right place for including the mistake; refraining from misreporting C_1 seems, instead, the best choice.

⁶As usual, we assume that these claims are logically independent of each other, so that getting one of them wrong does not imply that any of the others will be wrong as well.

Suppose now that all the claims in Laura’s book are scientifically very significant. In this case she will reason in the same way when considering each of the other claims: C_2 , C_3 , and all the way to C_n . None of them seems to be the right place for introducing an error. In other words: when Laura considers the claims in her book collectively, introducing one error seems the best choice since, given their large number, including one single mistake is unlikely to affect the overall scientific worth of her work. Moreover, complying with the exposure task is very likely to assist in Laura’s therapy. In contrast, when she considers each single claim separately from the others, getting one specific claim C_i intentionally wrong does not seem reasonable.

We may assume that in addition to the scholarly value of her book and the advantages for her therapy, Laura also considers the ethical aspects of her actions. However, one single (deliberate) mistake in a volume which includes a large quantity of material does not seem to represent a particularly severe threat to the scientific integrity of the volume. Considerations related to the therapy should prevail. So, by Perspectivism, the claim that Laura ought to introduce an error still seems true. Directed at a single (scientifically important) claim, in contrast, the ethical worry may seem more pressing. In sum, when it comes to any specific claim C_i , reporting it in the form that she regards as correct seems the best option for Laura. Purposely including a mistake only becomes her best option when Laura considers her book as a whole.

Laura’s dilemma is that whatever she does, she will do at least *something* she ought not to do. This practical dilemma is inevitable. But can she at least *reason* to her best choice? It seems plausible that practical obligations (“oughts”) respect, like beliefs, the following principles:

Obligation Aggregation If we ought to A and also ought to B , then we ought to A and B . Formally: $O(A), O(B) \vdash O(A \wedge B)$.

No Impossible Obligations $O(\perp) \vdash \perp$.

The first principle expresses the idea that different obligations can be expressed as a single obligation, while the second expresses the idea that we cannot be obliged to do something logically impossible. Let R_i denote that Laura reports claim i correctly. $\neg R_1 \vee \dots \vee \neg R_n$ then denotes that Laura introduces (at least) one error into the book. We can show that given Perspectivism, Laura cannot accept the above two principles:

Proposition 3 (Deontic Preface Paradox, version with Belief Aggregation). *Assume that each of the propositions in $T = \{R_1, R_2, \dots, R_n, \neg R_1 \vee \neg R_2 \dots \vee \neg R_n\}$ satisfies Perspectivism: i.e., they are a best choice for the agent in the light of the available evidence. Then Perspectivism, Obligation Aggregation and No Impossible Obligations are jointly incompatible.*

The result is strictly analogous to Proposition 1: iteratively aggregating all the elements of T under the scope of the obligation operator yields $O(\perp)$, since T is a (classically) inconsistent set. But this contradicts No Impossible Obligations. In analogy to the epistemic preface paradox, given the plausibility of Perspectivism and No Impossible Obligations, it seems that Obligation Aggregation has to go.

However, even when we reject Obligation Aggregation, we can construe a similar paradox based on the more fundamental Schema K. Normal modal logics, including standard deontic logic (SDL), all satisfy the principle that we can apply Modus Ponens under the scope of the strong modal operator:

Schema K for Deontic Reasoning If we ought to A and also ought to B if A , then we also ought to B . Formally: $O(A), O(A \supset B) \vdash O(B)$.

This schema is highly attractive since we want *some* classically valid rule for reasoning with the obligations we have. Moreover, suppose we slightly strengthen No Impossible Obligations to the claim that we cannot have contradictory obligations:

No Contradictory Obligations If we ought to A , then we ought not to $\neg A$:
 $O(A), O(\neg A) \vdash \perp$.

All principles listed so far are valid in SDL (see McNamara and Van De Putte 2022). The following result shows that we do not need to assume Obligation Aggregation: Perspectivism already clashes with Schema K and No Contradictory Obligations.

Proposition 4 (Deontic Preface Paradox, version with Schema K). *Assume that each of the propositions in $T = \{R_1, R_2, \dots, R_n, \neg R_1 \vee \neg R_2 \dots \vee \neg R_n\}$ satisfies Perspectivism: i.e., it is a best choice for the agent in the light of the available evidence. Then Perspectivism, Deontic Schema K and No Contradictory Beliefs are jointly incompatible.*

The proof runs along the lines of the proof of the analogous Proposition 2. Thus, also in the deontic case, the paradox is not exclusively based on aggregating principles: it is a general problem of normal deontic logics. To tackle the paradox, we have to settle for one of the following options: (i) giving up Perspectivism; (ii) denying that Perspectivism applies to the propositions in T ; or (iii) weakening SDL as to invalidate one of the premises of the paradox. The following section examines option (i) and (ii).

4 Escape Routes: The Standing of Perspectivism

Perspectivism is a central premise in the deontic preface paradox: the agent's best choices in the light of her available evidence determine her obligations.

To avoid conflicting obligations and to guide the agent effectively, her best choices must be compatible with each other. In particular, the evidence must not support choices that cannot be performed jointly. According to this line of thought, one should reject

Evidence for Inconsistent Best Judgments An agent may have evidence for doing each of $\{\phi_1, \dots, \phi_n\}$ even if the set of ϕ_i is inconsistent.

If we exclude such situations, Perspectivism ceases to apply to Laura's case. After all, the gist of the paradox consists in the fact that Laura's best choices are incompatible with each other. This amounts to option (ii): we do not reject Perspectivism, but deny that it applies to Laura's concrete case.

However, this will not help unless we also know *which* of Laura's available options is not a best choice for her. To make this escape route work, Laura needs to reject either of the following two claims:

- A book can still be scientifically valid even if it contains an error.
- A single claim cannot be scientifically valid if it is reported wrongly.

Both claims seem, however, to be highly plausible.

A second possible way out of the predicament involves replacing Perspectivism with a similar bridge principle. This amounts to choosing option (i). In fact, Perspectivism is far from being uncontroversial in the literature on obligations and related normative concepts. A common complaint is that although this principle seems to do justice to the sense of "ought" in deliberation, it fails to make sense of how we use "ought" in advice. A famous remark by Judith Thomson (1986, p. 179) expresses this concern:

On those rare occasions on which someone conceives the idea of asking for my advice on a moral matter, I do not take my field work to be limited to a study of what he believes is the case: I take it to be incumbent on me to find out what is the case.

Philosophers have also stressed how a principle like Perspectivism fails to do justice to our intuition that a rational agent may seek new evidence in order to make a better decision. Note, however, that adopting some modified perspectivist principle along these lines would not help, since our scenario does not hint at any relevant piece of evidence that Laura may be currently neglecting and which is in principle accessible to her.

As an alternative principle to Perspectivism and its variants, consider Objectivism:

Objectivism An agent ought to ϕ if and only if ϕ 'ing is the best choice available to her given all the facts, including both those which are accessible to her and those which are not.

Accepting this principle, instead of Perspectivism, may block the deontic preface paradox, for example because CBT might, as a matter of fact, never work on Laura, even if we have excellent reasons to believe that it will. In that case, according to Objectivism, Laura ought not include a mistake in her draft, since if we consider all the facts, including those which are inaccessible to her while she is deciding whether to include the error, she will not benefit from complying with the exposure task.

The trouble with Objectivism is that, much like Perspectivism, it is a controversial principle. A very common line of objection against it argues that it would be useless in deliberation, since in asking ourselves what is the best available choice we only have limited information, i.e., we are by no means in a position to consider all the facts.

If we find neither option (i) nor (ii) feasible and stick to all obligations in T , Laura finds herself in an *akratic* situation. Akrasia is usually defined as acting freely and intentionally against one's best judgment. If Laura accepts all the obligations in T , she is bound to act akratically, no matter what she does. If she includes an error in her draft, then she will fail to act in accordance with one of the $O(R_i)$. If, in contrast, she refrains from including an error in the draft, then she will fail to act in accordance with $O(\neg \wedge R_i)$.

It can be asked whether this would be that bad, i.e. what is so wrong about akrasia? To be sure, philosophers usually assume that acting akratically entails acting irrationally. In fact, most authors consider akratic action to be the clearest example of practical irrationality. However, certain writers have argued that an akratic action is not necessarily irrational (see, in particular Arpaly 2000; Audi 1990; Frankfurt 1988; McIntyre 2006; Tappolet 2003). The agent's best judgment is not privileged: we may have failed to take all available evidence into account, and our emotional reactions can track reasons which our explicit judgments may overlook. This is why some argue that being moved by these emotions can be rational, even if it leads us to act against our explicit judgments. For example, we might feel that we should not make a certain financial investment, and this feeling might be well-founded, even though our explicit judgment recommends otherwise. Similarly, Frankfurt (1988) considers the case of an agent who makes a crazy judgment about what to do but in the end, does not follow her judgment and acts akratically. It seems that it would be rationally far worse for her to stick to her crazy judgment. Although acting akratically is perhaps not fully rational, it may sometimes be more rational than acting in accordance with one's judgment.

Laura's case diverges from cases of rational akrasia in the literature on rational action. No judgmental irrationality applies to Laura's case. Rather, akratic behaviour is inevitable because her best judgments lead to a set of

obligations full of logical tension. Thus, whoever advocates Perspectivism and accepts its application to our concrete example can hardly avoid embracing the idea that akrasia is sometimes rational. Indeed, Laura’s evidence seems to support all of $O(C_i)$ as well as $O(\neg \wedge C_i)$.

To sum up, the advocate of Perspectivism must accept the conclusion that it is sometimes rational to act akratically. Of course, she may avoid this consequence by giving up Evidence for Inconsistent Best Judgments. However, doing so would have the rather implausible consequences described at the beginning of this section. Note that we do not consider the possibility of rational akrasia as a drawback of Perspectivism; our point is simply that Perspectivism’s advocates should be aware of this consequence. The rest of the paper will pursue this line of thought and advocate that there is a consistent, and not unattractive, way of defending both Perspectivism and rational akrasia. This means, however, to weaken the logic of obligation and belief, i.e., to go for option (iii).

5 Escape Routes: Restricting Obligation Aggregation

If one accepts Perspectivism (and the rationality of akratic judgment), one needs to reject one of the principles of standard deontic logic used for deriving the paradox. A first candidate is No Contradictory Obligations: conflicting obligations seem to be a regular part of our daily life and it seems to be exactly this conflict that makes moral dilemmas interesting in the first place. Indeed, many deontic logics developed over the last decades allow for conflicting obligations (see, e.g., Beirlaen, Strasser, and Meheus 2013; Goble 2003, 2004; Hilpinen and McNamara 2013; McNamara and Van De Putte 2022).

However, rejecting No Contradictory Obligations alone will not do. In any logic satisfying Schema K and Necessitation, No Contradictory Obligations (i.e., $O(\perp) \vdash$) is *equivalent* to the principle that there are no impossible obligations (i.e., $\vdash \neg O(\perp)$).⁷ Since we arguably want to retain No Impossible Obligations, rejecting No Contradictory Obligations will not solve the paradox by itself.

This means that we have to weaken the more substantive principles. To this end, it is helpful to consider the following axiomatization of standard

⁷Proof: Suppose we have $O(\perp)$, in violation of No Impossible Obligations. Necessitation yields $O(\perp \supset A)$ and $O(\perp \supset \neg A)$ and Schema K then yields $O(A)$ and $O(\neg A)$, in contradiction with No Contradictory Obligations. Conversely, assume $O(A)$ and $O(\neg A)$ for some A . Since $A \supset (\neg A \supset \perp)$ is a truth of classical logic, we infer $O(A \supset (\neg A \supset \perp))$ from Necessitation and then, $O(\neg A \supset \perp)$ using Schema K. Applying Schema K again, with premises $O(\neg A)$ and $O(\neg A \supset \perp)$, yields $O(\perp)$.

deontic logic (see, e.g. Chellas 1980, p. 191):

$A \supset B \vdash O(A) \supset O(B)$	(Monotonicity)
$O(A), O(B) \vdash O(A \wedge B)$	(Obligation Aggregation)
$O(\top)$	(Necessitation)
$\neg O(\perp)$	(No Impossible Obligations)

Most discussion on modeling conflicting obligations has focused on restricting Monotonicity, Obligation Aggregation or both of them—especially since both Necessitation and No Impossible Obligations seem plausible and not central to deontic dilemmas.⁸ Moreover, the combination of Monotonicity, Obligation Aggregation and the scheme *ex falso quodlibet* of classical logic leads to deontic explosion from conflicting obligations, i.e., $O(A), O(\neg A) \vdash O(B)$ (everything is obligatory).⁹ Hence, we must not accept Monotonicity and Obligation Aggregation in their current form.

Monotonicity, which we have not discussed so far, is an eminently plausible principle: it says that we must be committed to the logical consequences of our obligations:

[...] the principle of inheritance of obligations is one of the most fundamental principles of SDL and has strong intuitive appeal. It requires the agent to take moral responsibility for the logical consequences of what he/she has committed to do. The rejection of the principle, therefore, seems to be contrary to one of our basic moral reasoning patterns. (Nute and Yu 1997, p. 26)

A first proposal is therefore to retain Monotonicity (and Necessitation and No Impossible Obligations) and to reject Obligation Aggregation, as proposed by Lou Goble (2003, 2004) in a series of papers. The resulting logic P is, however, very weak, since we cannot reason by *combining* different obligations we have. We can only reason from each obligation in isolation to its logical implications (e.g., if we ought to A and A implies B , then we also ought to B). While standard deontic logic may be (clearly) too strong and oblivious to the possibility of conflicting obligations, this proposal is clearly too weak as a logic of rational deontic *reasoning*.

In our opinion, a more promising proposal consists in the DPM.2 logic developed by Goble (2005). It introduces a dual modal operator expressing permissibility and defines it in the standard way as $P(A) := \neg O(\neg A)$: A

⁸In recent axiomatizations of SDL, such as Hilpinen and McNamara (2013) and McNamara and Van De Putte (2022), Necessitation is presented as a general inference rule along the lines of “if $\vdash A$ then $\vdash O(A)$ ”, from which the axiom in the text can be derived. For reasons of simplicity, we are sticking to Chellas’ formulation.

⁹Proof: Obligation Aggregation implies that we can infer $O(A \wedge \neg A)$. Classical logic (*ex falso quodlibet*) yields $(A \wedge \neg A) \supset B$. Thus we infer by Monotonicity that $O(B)$ for any B .

is permissible if $\neg A$ is not obligatory. Monotonicity and Aggregation are not dropped, but suitably restricted by introducing an additional premise. DPM.2 is axiomatized by

$$\begin{array}{ll}
A \equiv B \vdash O(A) \equiv O(B) & \text{(Substitution of Equivalents)} \\
A \supset B, P(A) \vdash O(A) \supset O(B) & \text{(Permitted Monotonicity)} \\
O(A), O(B), P(A \wedge B) \vdash O(A \wedge B) & \text{(Permitted Obligation Aggregation)} \\
O(\top) & \text{(Necessitation)} \\
\neg O(\perp) & \text{(No Impossible Obligations)}
\end{array}$$

The idea is that we can reason monotonically from *permissible* premises, saving the intuitions in favor of Monotonicity and blocking deontic explosion (because $O(\perp)$ does not imply $O(B)$ any more, for any B). Analogously, aggregation is permissible if the aggregate obligation has been permissible in the first place.¹⁰

If we apply Permitted Obligation Aggregation to the preface paradox, something interesting happens. We can infer in various ways from the obligations contained in $T = \{R_1, R_2, \dots, R_n, \neg \wedge R_i\}$. For example, we can aggregate the obligations to correctly report individual claims “bottom up” until we obtain the set of obligations $T' = \{O(R_1 \wedge \dots \wedge R_{n-1}), O(R_n), O(\neg \wedge R_i)\}$. But from here, we cannot go any further. Since by definition $O(\neg \wedge R_i) = \neg P(\wedge R_i)$, we cannot aggregate $O(R_1 \wedge \dots \wedge R_{n-1})$ and $O(R_n)$: their conjunction is not permissible and Permitted Obligation Aggregation cannot be applied. For the same reason, we cannot aggregate any other pair of obligations in T' . Likewise, we can reason “top down” from $O(\neg \wedge R_i)$ and an arbitrary $O(R_j)$ to obtain $O(\neg \wedge_{i \neq j} R_i)$, and so on, until we remain with, for instance, $T'' = \{O(R_1), O(R_2), O(\neg(R_1 \wedge R_2))\}$. Any further aggregation of obligations is blocked because no conjunction of elements of T'' is permissible in the first place.¹¹

The second version of the paradox is blocked in a similar way. Permitted Obligation Aggregation implies the following restriction of Schema K:¹²

$$O(A), O(A \supset B), P(A \wedge B) \vdash O(B) \quad \text{(Permitted Schema K for Obligations)}$$

¹⁰Strasser, Beirlaen, and Meheus (2012) suggest to replace Restricted Aggregation by a principle where each of the conjuncts, but not the conjunction, has to be permissible in the first place. It goes beyond the scope of this paper to review the implications of this choice for deontic logic, but this modification does not yield a resolution of the preface paradox.

¹¹Of course, these are not the only available reasoning patterns at Laura’s disposition: she can begin (and end) with any obligation to report a specific claim correctly.

¹²Proof: Suppose $O(A)$ and $O(A \supset B)$ and $P(A \wedge B)$, then by Permitted Obligation Aggregation, we infer $O(A \wedge (A \supset B)) = O(B)$.

Thus, Laura can reason from $O(R_1 \supset (R_2 \supset (\dots \supset \neg R_n)))$ and $O(R_1)$ by means of Permitted Schema K to $O(R_2 \supset (R_3 \supset (\dots \supset \neg R_n)))$ etc., but she will, at the end, find herself with the three obligations $O(R_{n-1} \supset \neg R_n)$, $O(R_{n-1})$ and $O(R_n)$. Then neither Permitted Schema K nor Permissible Obligation Aggregation will license any further inference.

To us, this is a rather realistic reconstruction of what happens in the head of a rational deontic reasoner. She infers to more specific obligations as long as she can consistently do so (using the restricted versions of Monotonicity and Obligation Aggregation), until she finally finds herself in a dilemma where she cannot aggregate any further. Laura stops short of accepting inconsistent obligations, but she finds herself in the dilemma of not being able to infer to a practical *decision*. This dilemma is exacerbated by the fact that she has various ways of strengthening the individual obligations: she could end up with $O(R_1)$, $O(R_2)$ and $O(\neg(R_1 \wedge R_2))$, but also with $O(R_{n-1})$ and $O(R_n)$ and $O(R_{n-1} \supset \neg R_n)$, and so on. On our reconstruction, rational deontic reasoning exhibits the akratic features that a proponent of Perspectivism (who decides to restrict Aggregation and Schema K) should endorse in the first place. Deontic reasoning does not always decide what an agent should do, but it highlights the source of the conflict she is in.

The preceding considerations are not supposed to make a case for Goble's particular deontic logic: there is a vast literature on deontic dilemmas and conflicting obligations, and we cannot pretend to decide that debate in this paper. We just wanted to show that a restriction of Obligation Aggregation (and Monotonicity) leads to a plausible analysis of the deontic preface paradox, and seems to square well with the reasoning of a rational agent. Furthermore, it takes into account the akratic features that follow from accepting Perspectivism.

6 Reconsidering the Epistemic Preface Paradox

In this section, we transfer the solution strategy from the deontic preface paradox—to weaken rather than to reject the reasoning principles—to the epistemic case. Due to the exact formal equivalence between the results for both cases, this transfer yields the restrictions:

$$\begin{array}{ll}
 B(A), B(B), NR(A \wedge B) \vdash B(A \wedge B) & \text{(Permitted Belief Aggregation)} \\
 B(A), B(A \supset B), NR(A \wedge B) \vdash B(B) & \text{(Permitted Schema K for Belief)}
 \end{array}$$

Here, NR stands for “not reject” and is defined as the dual operator for belief: $NR(X) = \neg B(\neg X)$. We do not reject X if we do not believe $\neg X$. This epistemic attitude is analogous to “permissible” in the deontic case and not

to be confused with suspension of judgment. In particular, it is compatible with (but weaker than) full belief. We also accept the epistemic analogues of Substitution of Equivalents, Necessitation and No Impossible Obligations: our epistemic attitudes toward logically equivalent propositions should be identical, we should believe tautologies ($B(\top)$) and not believe contradictions ($\neg B(\perp)$).

Applying these principles instead of their unrestricted versions, we obtain a novel diagnosis of the preface paradox, analogous to the deontic case. Suppose Jay reasons “bottom up” and aggregates individual beliefs, starting with C_1 and C_2 . Since he does not reject the conjunction of C_1 and C_2 , he can invoke Permitted Belief Aggregation to infer to $B(C_1 \wedge C_2)$.¹³ In the next step, he uses $NR(C_1 \wedge C_2 \wedge C_3)$ to infer, again with Permitted Belief Aggregation, to $B(C_1 \wedge C_2 \wedge C_3)$, and so on. Finally he obtains the belief set $\{B(\bigwedge_{j \neq n} C_j), B(C_n), B(\neg \bigwedge C_j)\}$. Conversely, he can reason “top down” with the help of Permitted Schema K, again analogous to the deontic case, and obtain the belief set $\{B(C_{n-1}), B(C_n), B(\neg(C_{n-1} \wedge C_n))\}$. In either case, Jay stops short of believing a proposition and its negation, but his reasoning shows strong akratic elements: his inferences fall short of resolving the tension between his beliefs and they do not tell him which premise to reject.

Two interconnected questions remain: Is the logic defined by the above restrictions too weak as a plausible logic of doxastic reasoning? And is it compatible with explicating the belief-credence connection along the lines of the Lockean Thesis?

Let us respond to the second question first. The Lockean Thesis can be understood as a necessary or as a sufficient condition for qualitative belief based on rational credences. If it is a *necessary* condition (=the \Rightarrow direction), this means that for any proposition X , $B(X)$ implies $p(X) > t$ for some $t \in [1/2, 1)$. By Contraposition, we can derive that $p(X) \geq 1 - t$ implies $NR(X)$.

However, this leads into trouble. Suppose we believe A and B . Then $p(A), p(B) > t$ and $p(A \wedge B) \geq 1 - t$. The \Rightarrow direction of the Lockean Thesis yields $NR(A \wedge B)$, and by Permitted Belief Aggregation, we thus infer $B(A \wedge B)$. Applying the \Rightarrow direction of the Lockean Thesis again, we obtain $p(A \wedge B) > t$. But there are many probability distributions compatible with our premises where $p(A \wedge B) \leq t$. Thus, we cannot maintain Permitted Belief Aggregation in combination with the \Rightarrow direction of the Lockean Thesis.¹⁴

The \Leftarrow direction of the Lockean Thesis, i.e., the claim about *sufficient* reasons for belief, fares better. According to this interpretation, for any proposi-

¹³This is because Jay does not believe $\neg(C_1 \wedge C_2)$, and so he does not reject $C_1 \wedge C_2$.

¹⁴The above argument presupposes $t > 1/2$, but that case is degenerate anyway since belief and non-rejection almost collapse into a single operator, distinguished only by the case $p(X) = 1/2$.

tion X , $B(X)$ is implied by $p(X) > t$ for some $t \in [1/2, 1)$. Conversely, $NR(X)$ implies $p(X) \geq 1 - t$. Suppose now that we believe A and B , and we do not reject $A \wedge B$ (and hence, $p(A \wedge B) \geq 1 - t$). Then, we can infer by means of Permitted Belief Aggregation to $B(A \wedge B)$. But this is perfectly compatible with the probability of $A \wedge B$ being lower than the threshold t : no contradiction occurs. We can infer to (believed) propositions whose probability is lower than the threshold t as long as they do not fall below a minimum standard of plausibility $1 - t$. To our mind, this is a reasonable tradeoff between being able to reason with believed propositions in a classically valid way and not inferring to wildly implausible or impossible propositions.

The choice of the threshold value t implements the cogency of our standards for belief. Note that t is, on our account, janus-faced: when it is close to 1, only few propositions *have* to be believed, but we are more liberal as to how many (and which) propositions *can* be believed, and more inferences from the believed propositions will be valid. When t is closer to $1/2$, we have to believe more propositions, so we have a richer premise set, but our capacity to reason is severed by the condition that any conclusion X of an inference must have probability $p(X) \geq 1 - t$. This is a more stringent requirement if $t = 2/3$ than if $t = 9/10$. All this holds, naturally, for Belief Aggregation as well as for Schema K.

Thus, we propose a hitherto unexplored option to respond to the preface paradox: to weaken doxastic logic by restricting Belief Aggregation and Schema K, and maintain the Lockean Thesis as a *sufficient* condition for qualitative belief. Of course, this goes against the orthodoxy and will make the resulting modal logics non-normal, but in the case of deontic logic, non-normality has become a mainstream view. The analogies between the epistemic and deontic dilemmas are sufficiently strong to justify an analogous move—especially if one wants to maintain Sufficient Evidence for Belief and one direction of the Lockean Thesis. The preface paradox can be therefore interpreted as an argument against the normality of a modal logic of belief.

To our mind, the alternative options fare worse. Our proposal is arguably more interesting and also cognitively more realistic than simply declaring Belief Aggregation invalid, without explaining why it often appears to be a sound principle, and qualifying the circumstances where it is actually valid. It is more ambitious than Jeffrey's 1970 move to give up on the concept of qualitative belief or rational acceptance, and to do epistemology in quantitative terms only (i.e., based on degrees of belief). This approach neglects that we often need to *accept* propositions in order to reason with them, and for making decisions, especially in cases where precise degrees of belief are hard to get by (see also Foley 2009). Moreover, our approach

avoids the implicit contextualism and the rejection of the Lockean Thesis in Leitgeb's (2014, 2017) stability theory of belief.

One could also accept Belief Aggregation, but reject that Sufficient Evidence for Belief applies to Jay's specific case. This proposal has been articulated in the context of a logic of *reasons* by Crupi and Iacona (2023). According to this analysis, if Jay bases all his beliefs on the total available evidence, it is simply not true that he has reason to believe each of the claims in his book *and* the proposition that it contains at least one error. Reasons for belief consist in evidential support, explicated as probabilistic relevance, not in high probability. If somebody wishes to reject the Lockean Thesis for independent reasons, this approach may be useful and promising, but it will not help the epistemologists who consider it a sound criterion for qualitative belief—usually the ones who feel the sting of the preface paradox the most.

Finally, our analysis shares several features with MacFarlane's (2004) discussion of the preface paradox in the context of the more general question of how logic governs rational belief. Like ourselves, MacFarlane rejects the aggregation principle $B(A), B(B) \vdash B(A \wedge B)$ and searches for a weaker belief norm, but his overall diagnosis is different.

First, for MacFarlane, Jay is "not entirely as [he] ought to be" and under an obligation to make his beliefs coherent. While simply giving up one or more beliefs is not the right option, he should collect more evidence in order to convince himself of the falsity of one of the beliefs in S . However, the story can be told in a way that there is simply no more evidence (e.g., historical sources) that Jay could take into account, and so we fail to see how this could be a generally valid recommendation.

Second, again according to MacFarlane, belief norms along the lines of $B(A), B(B) \vdash NR(C)$, for C being any logical consequence of A and B , are *not* refuted by the paradox. This is a position we must reject. It would imply $B(A), B(B) \vdash NR(A \wedge B)$: we would obtain the missing premise for applying Permitted Belief Aggregation and be able to infer $B(A \wedge B)$ from $B(A)$ and $B(B)$. In other words, unrestricted belief aggregation would be valid. Therefore, we must *reject* sufficiently implausible logical consequences of our beliefs. The Lockean Thesis provides the philosophical motivation for this attitude and points out what may be problematic about MacFarlane's proposed norm for belief. At the same time, we can agree with MacFarlane that believing A and B provides a *reason* for believing $A \wedge B$ —but a defeasible reason and not a sufficient one.¹⁵

¹⁵In MacFarlane's terminology, this means that we reject the $Wo-$ norm and accept the $Wr+$ and $Wr-$ norms.

7 Conclusions

It is time to wrap up. The standard resolution of the (epistemic) preface paradox consists in rejecting closure under conjunction for reasoning with the propositions we believe—a principle that we have called Belief Aggregation. Alternatively, some authors like Leitgeb (2014, 2017) and Crupi and Iacona (2023) keep Belief Aggregation unrestrictedly valid, but do not sign up to the Lockean Thesis, and similar bridge principles for connecting credence and belief.

This paper has outlined a middle way: to maintain the Lockean Thesis as a *sufficient* criterion for qualitative belief, and to *restrict* Belief Aggregation, instead of giving it up. This strategy has been motivated by an analysis of an analogous paradox for deontic reasoning. In deontic reasoning, giving up aggregation of obligations is independently motivated and it also squares well with what we have identified as an important corollary of the bridge principles between evidence and beliefs (or good decisions): the possibility of rational akrasia.

Both in the epistemic and the deontic case, Belief Aggregation and Schema K have been restricted to the case where the conjunction of the two premises is not rejected (=permissible, in the deontic case). This strategy does not require full commitment to the possibility of genuinely conflicting obligations or beliefs. It restricts their aggregation to cases where it seems to be rationally acceptable. Specifically, in the epistemic case, one can retain high probability as a sufficient (but not as a necessary) criterion for belief.

In our view, this proposal is a reasonable compromise between having an informative evidential criterion for belief, such as the Lockean Thesis, and making ampliative inferences in the set of one's beliefs. It bridges the gap between doxastic logicians who have traditionally accepted Schema K in its unrestricted form, and epistemologists who wish to connect credence to belief and cherish the Lockean Thesis. Further research is needed to investigate the implications of our proposal, but we hope to have made a good *prima facie* case.

References

- Andrić, Vuko (2013), "Objective consequentialism and the licensing dilemma", *Philosophical Studies*, 162, pp. 547-566.
- Arpaly, Nomy (2000), "On Acting Rationally Against One's Best Judgment", *Ethics*, 110, pp. 488-513.
- Audi, Robert (1990), "Weakness of Will and Rational Action", *Australasian Journal of Philosophy*, 68, pp. 270-281.

- Beirlaen, Mathieu, Christian Strasser, and Joke Meheus (2013), "An Inconsistency-Adaptive Deontic Logic for Normative Conflicts", *Journal of Philosophical Logic*, 42, pp. 285-315.
- Carnap, Rudolf (1950), *Logical Foundations of Probability*, University of Chicago Press, Chicago.
- Cevolani, Gustavo (2017), "Fallibilism, Verisimilitude, and the Preface Paradox", *Erkenntnis*, 82, pp. 169-183.
- Cevolani, Gustavo and Gerhard Schurz (2017), "Probability, Approximate Truth, and Truthlikeness: More Ways Out of the Preface Paradox", *Australasian Journal of Philosophy*, 95, pp. 209-225.
- Chellas, Brian F. (1980), *Modal Logic: An Introduction*, Cambridge University Press, Cambridge.
- Christensen, David (2004), *Putting Logic in its Place: Formal Constraints on Rational Belief*, Oxford University Press, New York.
- Crupi, Vincenzo and Andrea Iacona (2023), "Outline of a Theory of Reasons", *Philosophical Quarterly*, 73, pp. 117-142.
- Dancy, Jonathan (2000), *Practical Reality*, Oxford University Press, Oxford.
- Easwaran, Kenny (2016), "Dr. Truthlove, or: How I Learned to Stop Worrying and Love Bayesian Probabilities", *Noûs*, 50, pp. 816-853.
- Evans, Jonathan and David Over (2004), *If: Supposition, Pragmatics, and Dual Processes*, Oxford University Press, Oxford.
- Foley, Richard (1992), *Working Without a Net: A Study of Egocentric Epistemology*, Oxford University Press, Oxford.
- (2009), "Beliefs, Degrees of Belief, and the Lockean Thesis", in *Degrees of Belief*, ed. by Franz Huber and Christoph Schmidt-Petri, Springer, pp. 37-47.
- Frankfurt, Harry G. (1988), *The Importance of What We Care About: Philosophical Essays*, Cambridge University Press, Oxford.
- Gibbons, John (2010), "Things that make things reasonable", *Philosophy and Phenomenological Research*, 81, pp. 335-361.
- Goble, Lou (2003), "Preference Semantics for Deontic Logic. Part I: Simple Models", *Logique Et Analyse*, 46, pp. 383-418.
- (2004), "Preference Semantics for Deontic Logic - Part II: Multiplex Models", *Logique Et Analyse*, 47, pp. 335-363.
- (2005), "A Logic for Deontic Dilemmas", *Journal of Applied Logic*, 3, pp. 461-483.
- Harman, Gilbert (1986), *Change in View. Principles of Reasoning*, MIT Press, Cambridge (Mass.)
- Hilpinen, Risto and Paul McNamara (2013), "Deontic logic: A historical survey and introduction", in *Handbook of Deontic Logic and Normative Systems*, College Publications, London, pp. 3-136.
- Jeffrey, Richard (1970), "Dracula Meets Wolfman: Acceptance Vs. Partial Belief", in *Induction, Acceptance, and Rational Belief*, ed. by Marshall Swain, Reidel, Dordrecht, pp. 157-185.

- Johnson-Laird, Philip and Ruth M. J. Byrne (1991), *Deduction*, Lawrence Erlbaum Associates, Inc., Mahwah/NJ.
- Kiesewetter, Benjamin (2011), "Ought and the Perspective of the Agent", *The Journal of Ethics and Social Philosophy*, 5, pp. 1-24.
- (2017), *The Normativity of Rationality*, Oxford University Press, Oxford.
- Kyburg, Henry (1961), *Probability and the Logic of Rational Belief*, Wesleyan University Press, Middletown/CT.
- Leitgeb, Hannes (2014), "The Stability Theory of Belief", *Philosophical Review*, 123, pp. 131-171.
- (2017), *The Stability of Belief: How Rational Belief Coheres with Probability*, Oxford University Press, Oxford.
- Lissia, Lina Maria (2022), "Cut-Off Points for the Rational Believer", *Synthese*, 200, pp. 1-19.
- Lord, Errol (2015), "Acting for the right reasons, abilities, and obligation", *Oxford Studies in Metaethics*, 10, pp. 26-52.
- MacFarlane, John (2004), "In what sense (if any) is logic normative for thought?", Unpublished manuscript.
- Makinson, David C. (1965), "The Paradox of the Preface", *Analysis*, 25, pp. 205-207.
- Mason, Elinor (2013), "Objectivism and Prospectivism About Rightness", *The Journal of Ethics and Social Philosophy*, 7, pp. 1-22.
- McGee, Vann (1985), "A Counterexample to Modus Ponens", *The Journal of Philosophy*, 82, pp. 462-71.
- McIntyre, Alison (2006), "What is Wrong with Weakness of Will?", *The Journal of Philosophy*, 103, pp. 284-311.
- McNamara, Paul and Frederik Van De Putte (2022), "Deontic logic", in *The Stanford Encyclopedia of Philosophy*, ed. by Edward N. Zalta and Uri Nodelman, Fall 2022 edition, Metaphysics Research Lab, Stanford University.
- Nute, Donald and Xingzhong Yu (1997), "Introduction", in ed. by Donald Nute, Kluwer Academic Publishers, Dordrecht, pp. 1-16.
- Oaksford, Mike and Nick Chater (eds.) (2010), *Cognition and Conditionals: Probability and Logic in Human Thought*, Oxford University Press, Oxford.
- Rendsvig, Rasmus, John Symons, and Yanjing Wang (2023), "Epistemic Logic", in *The Stanford Encyclopedia of Philosophy*, ed. by Edward N. Zalta and Uri Nodelman, Winter 2023 edition, Metaphysics Research Lab, Stanford University.
- Robertson, Simon (2011), "Epistemic constraints on practical normativity", *Synthese*, 181, pp. 81-106.
- Scanlon, Thomas M. (2008), *Moral Dimensions: Permissibility, Meaning, Blame*, Belknap Press, Cambridge/MA.
- Sprengrer, Jan and Stephan Hartmann (2019), *Bayesian Philosophy of Science*, Oxford University Press, Oxford.

- Stalnaker, Robert (2006), "On Logics of Knowledge and Belief", *Philosophical Studies*, 128, pp. 169-199.
- Strasser, Christian, Mathieu Beirlaen, and Joke Meheus (2012), "Tolerating Deontic Conflicts by Adaptively Restricting Inheritance", *Logique Et Analyse*, 55, pp. 477-506.
- Tappolet, Christine (2003), "Emotions and the Intelligibility of Akratic Action", in *Weakness of Will and Practical Irrationality*, ed. by Sarah Stroud and Christine Tappolet, Oxford University Press, Oxford, pp. 97-120.
- Thomson, Judith Jarvis (1986), "Imposing Risks", in *Rights, Restitution, and Risk*, ed. by William Parent, Harvard University Press, Cambridge/MA, pp. 173-191.
- Zimmerman, Michael J. (2008), *Living with Uncertainty: The Moral Significance of Ignorance*, Cambridge University Press, Cambridge.