

# A Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes)

Peter Brössel (Ruhr University Bochum) & Anna-Maria A. Eder (University of Cologne)

(Forthcoming in Alexandra Zinke & Verena Wagner (eds.),  
*Suspension in Epistemology and Beyond*, Routledge)

## Abstract

When is it (epistemically) rational to suspend judgment on a proposition? Before addressing this question, one has to clarify what suspension of judgment (in short: suspension) is and establish rationality standards for the attitudes that constitute suspension. Ideally, suspending can be reduced to attitudes for which one already has established rationality standards. This paper distinguishes two kinds of suspension, weak and strong, and offers a reductionist account of suspension based on credence. However, it does not reduce suspension to credence alone but takes a higher-order perspective on credence into account. Other doxastic attitudes, such as belief and doubtful belief, are also reexamined and defined in the light of this higher-order perspective.

## 1. Introduction

When is it (epistemically) rational to suspend judgment on a proposition? To answer this question, one has to clarify what suspension of judgment (in short: suspension) is, and one needs to propose rationality standards for the attitudes that constitute suspension. If suspending judgment is reducible to attitudes for which one has already established rationality standards, this would spare us from developing new rationality standards for suspension. The most widely accepted precise account of rational reasoning or rational doxastic attitudes in philosophy and beyond (e.g., cognitive science, computer science, etc.) is Bayesianism. According to it, rational credences, or degrees of belief, obey the probability calculus. Thus, one could identify suspension with a credal attitude and then transfer our rationality standards from credences to suspensions. For example, if suspending with respect to  $p$  consisted in having middling credences towards  $p$ , an agent's suspension with respect to  $p$  would be rational if and only if rationality requires having middling credences towards  $p$ . Unfortunately, this naive credal account of suspension is problematic (Friedman 2013b; del Rio 2024). Del Rio argues that “there are no good credal accounts of suspension—ones that cohere well with plausible assumptions about our doxastic condition” (del Rio 2024, 4). We show below that he is wrong concerning what we call ‘Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes)’. Our account is inspired by ideas which suggest that suspending judgment on proposition  $p$  requires the absence of (dis)belief in  $p$  and a higher-order attitude which in some way or other concerns the absence of that (dis)belief. Roughly, the idea of our credal account is that suspension and other doxastic attitudes should be distinguished by the higher-order attitude of the agents towards that absence

of (dis)belief and towards their credences. Whether one suspends judgment depends not only on one's (ordinary, or first-order,) beliefs or credences.

This chapter is structured as follows. Section 2 suggests searching for an account of suspension that reduces suspension to familiar doxastic attitudes such as (dis)belief and credences. Section 3 introduces motivations for credal accounts and desiderata for suspension. It discusses the Naive Belief and the Naive Credal Account of Suspension and their problems. Section 4 presents Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes). It outlines an account of rational reasoning sensitive to higher-order evidence and defines suspension of judgment and other doxastic attitudes based on this account. The definition of suspension satisfies the motivations and desiderata outlined in Section 3. One consequence of this definition of suspension in terms of credences is that whether one suspends judgment on a proposition  $p$  and whether one believes  $p$  no longer depends purely on one's credence in  $p$ . Section 5 concludes the chapter by summarizing our findings.

## **2. Reductionist and Non-Reductionist Approaches to Suspension**

Approaches to providing a characterization of suspension typically come in two strains: *reductionist* and *non-reductionist* approaches. Non-reductionist accounts to suspension are often summarized under the label '*sui generis* accounts'. They posit that suspension cannot be reduced to (dis)belief, credence, and other familiar doxastic propositional states or attitudes; it is, thus, *sui generis*. Among the *sui generis* approaches, one can find different variants. Atkins (2017), for example, argues that suspension is a propositional attitude that cannot be reduced to other doxastic attitudes. A second variant of a non-reductionist approach is Friedman's. According to her, suspension consists of an attitude with a question as content. Friedman refers to such attitudes as 'interrogative attitudes' (Friedman 2013a and 2017). Accordingly, suspension is not a propositional attitude; it does not have a proposition as content.

The first challenge for non-reductionist approaches to suspension is to show that a further mental state or attitude is required. Non-reductionist approaches posit the existence of a different kind of mental state or attitude without providing empirical evidence for their existence. Cognitive scientists posit mental states to account for behavioral data (e.g., about observable features of the body and brain) and phenomenal experiences. This distinguishes contemporary cognitive science (see Chomsky 1980; Fodor 1975) from the behaviorist tradition, which seeks to explain only the behavioral data and without positing mental states. Accordingly, positing additional kinds of mental states or attitudes requires that they allow us to explain an agent's behavior and experiences better than this would be possible without these kinds of mental states and attitudes. Interrogative attitudes, in particular, could be accounted for by the desire to know or to represent the world accurately. To the best of our knowledge, contemporary

cognitive science does not feel the need to posit suspension as an attitude different in nature from other doxastic attitudes. This challenges the *sui generis* approaches discussed above.

A second challenge concerns the relationship between suspension and other doxastic states or attitudes. To believe a proposition excludes that one suspends judgment on it. Compare this with the relations between believing, desiring, and hoping  $p$ . The first two are typically considered distinct propositional attitudes independent of each other; one can combine them freely, and neither is reducible to the other. Believing  $p$  neither excludes desiring  $p$  nor desiring *not*- $p$ . Hoping  $p$ , conversely, is not independent of the other propositional attitudes: they cannot be combined freely. According to the standard account (Bloeser & Stahl 2022, Sect. 3), hoping that  $p$  amounts to desiring that  $p$  while believing that  $p$  is possible (even though eventually not certain). Hoping  $p$  is thus incompatible with believing with certainty that *not*- $p$ . Like hope, suspension is not independent of belief. *Sui generis* approaches have a hard time explaining this dependence. If suspension were *sui generis*, just like believing and desiring, why are suspension and belief not arbitrarily combinable? This suggests that suspension is either reducible to doxastic states such as belief, disbelief and credences or that it is, like hope, reducible to a combination of doxastic and non-doxastic propositional attitudes. Only in the former case could we consider suspension a doxastic attitude.

Although the mentioned challenges of *sui generis* approaches do not show that non-reductionist accounts are wrong, they provide enough reason to keep looking for reductionist accounts.<sup>1</sup>

### **3. Naive Doxastic Accounts of Suspension**

#### **3.1 The Naive Belief Account of Suspension**

The most straightforward reductionist suspension account is what we refer to as the ‘Naive Belief Account of Suspension’. According to it, suspension is simply the absence of both belief and disbelief, and rational suspension requires that neither believing nor disbelieving would be rational in the given epistemic situation. This account is easily dismissed. Following such an account, a typical three-year-old (rationally) suspends judgment on Einstein’s general theory of relativity because she has no propositional attitudes towards the theory (see Friedman 2013c: 168 for a similar example). However, this verdict seems counterintuitive. We should at least distinguish between propositions that one does not even consider, understand, and grasp and those that one considers, understands, and grasps but neither believes nor disbelieves. Following Zinke (2021), we should reserve talking about suspending to the latter cases. An alternative way of putting this idea is to require that we differentiate between propositions that we consider and

assign credences to and propositions that we do not even consider and assign no credence. This leads us to the Naive Credal Account of Suspension.

### 3.2 The Naive Credal Account of Suspension

The Naive Credal Account of Suspension is understood in the context of a general approach that relates categorical doxastic attitudes, such as belief, disbelief etc., to credences. According to del Rio (2024), the connection between credences and such categorical doxastic attitudes is one of the reasons why epistemologists started to care about credences in the first place. Referring to Christensen (2004) and Titelbaum (2022), del Rio names the following motivations for introducing credences into the traditional epistemological picture:

**Credal Motivation 1:** We are more confident in some beliefs (e.g.,  $p \vee \text{not-}p$ ) than we are in some other beliefs (e.g.,  $p$ ).

**Credal Motivation 2:** We can believe  $p$  at  $t_1$  and respond to new evidence for  $p$  at  $t_2$  by becoming more confident that  $p$ .

**Credal Motivation 3:** We can believe  $p$  at  $t_1$  and respond to mild new evidence against  $p$  at  $t_2$  by becoming mildly less confident that  $p$  while continuing to believe  $p$  at  $t_2$ .

**Credal Motivation 4:** We can rationally believe each of a long string of conjuncts and also rationally believe in the negation of the conjunction” (del Rio 2024, 10; notation slightly adapted).

According to Bayesianism, epistemic states consist of (rational) credence functions  $Cr$  that fulfil two conditions:

- (i) They obey the probability calculus (concerning a language).
- (ii) They are updated by strict conditionalization: if  $E$  is the new evidence, then  $Cr_{\text{new}}(p) = Cr_{\text{old}}(p|E)$  for any proposition  $p$ .

As mentioned, Bayesianism is the most widely accepted precise account of rational reasoning or rational doxastic attitudes in philosophy and beyond. So combining Bayesianism with a general account that relates various doxastic attitudes to credences promises to validate the above four credal motivations and to answer our starting question (i.e., ‘When is it (epistemically) rational to suspend judgment on a proposition?’). A first attempt to present such a general account is the following:

**Naive Credal Definition:** For all agents with (probabilistic) credence functions  $Cr$  it holds that the agent

- (i) *believes*  $p$  if and only if  $Cr(p) \in \{\text{high credences}\}$ ,

- (ii) *suspends* judgment concerning proposition  $p$  if and only if  $Cr(p) \in \{\textit{middling credences}\}$ ,
- (iii) *disbelieves*  $p$  if and only if  $Cr(p) \in \{\textit{low credences}\}$ .<sup>2</sup>

The naive account subscribes to the well-known Lockean Thesis. According to it, an agent is rational in believing a proposition if and only if her rational credence in the proposition is (sufficiently) high, i.e., higher than a certain threshold (Foley 1992, 111). One moment's reflection shows that the four credal motivations are satisfied only if we assume that the set of high credences includes more than the maximum credence, 1. The Naive Credal Account of Suspension (and Other Doxastic Attitudes) consists of Bayesianism and the Naive Credal Definition. Bayesianism sets the rationality standards for credence. The Naive Credal Definition allows us to transfer rationality judgments from credences to categorical doxastic attitudes.

### 3.3 Problems

Despite validating del Rio's credal motivations and its elegance, many reject the Naive Credal Account of Suspension based on desiderata for accounts of suspension. A crucial desideratum, the Disjunction/Conjunction Condition, originates from Friedman 2013b. It has been summarized succinctly by del Rio (2024, Sect. 2.1):

**Desideratum 1—“Disjunction/Conjunction Condition:** There are some cases such that it is rationally permissible to suspend on an arbitrary number of [probabilistically independent] propositions and to suspend on their conjunction and to suspend on their disjunction” (del Rio 2024, 5 and see also Fn. 9).

Friedman (2013b, 60) holds that this principle follows from what she calls “the absence of evidence norm”. According to the norm, “in the absence of evidence for or against an ordinary contingent proposition  $p$ , it is epistemically permissible to suspend judgment about  $p$ ” (Friedman 2013b, 60). She argues that the possibility mentioned above arises when our evidence is irrelevant to individual propositions and their conjunctions and disjunctions.

Desideratum 1 only requires that there be “some such cases” without specifying which cases. Del Rio's (2024) Credal Motivation 4 suggests that there might also be cases in which “it is rationally permissible to suspend on an arbitrary number of [probabilistically independent] propositions,” disbelieve their conjunction, and believe their disjunction. So, what are the cases to which Desideratum 1 applies? Del Rio (2024) provides the following example that outlines such a case:

**“Mystery Urn:** There is an urn. All you know about this urn is that it contains at least one marble, that it contains nothing that is not a marble, and that each

marble it contains is either blue or red. You have no idea how its contents were selected nor how marbles are drawn from the urn”<sup>3</sup> (del Rio 2024, 12f.).

Consider the following statements concerning the Mystery Urn example, which go back to del Rio but are slightly modified here (2024, 13):

***n*th BLUE:** The *n*th marble drawn from the mystery urn is blue.

**ALL BLUE:** All marbles drawn from the mystery urn are blue.

**SOME BLUE:** Some marbles drawn from the mystery urn are blue.

Friedman’s Disjunction/Conjunction Condition applies here because we know little about the mystery urn. (We do not know the exact rules for drawing marbles from that urn, how often marbles will be drawn, and whether the marbles will be returned to the mystery urn after the draw.) In the Mystery Urn case, it is undoubtedly rationally permissible to suspend judgment on each of the *n*th BLUE propositions, the ALL BLUE and the SOME BLUE propositions.

Epistemologists familiar with Bayesianism immediately see that satisfying Desideratum 1 while accepting the Naive Credal Definition is hardly possible. Suppose the Mystery Urn case is a case that exemplifies Desideratum 1:

- For each *n* we want it to be rational to suspend judgment on ***n*th BLUE**: thus,  $Cr(\mathbf{nth\ BLUE}) \in \{middling\ credences\}$ .
- We want it to be rational to suspend judgment on **ALL BLUE**: thus,  $Cr(\mathbf{ALL\ BLUE}) \in \{middling\ credences\}$ .
- We want it to be rational to suspend judgment on **SOME BLUE**: thus,  $Cr(\mathbf{SOME\ BLUE}) \in \{middling\ credences\}$ .

The problem is that in general, i.e., for arbitrary kinds of mystery urns, these three requirements can only be satisfied if we assume that the set *{middling credences}* referred to in the Naive Credal Definition includes all except the extreme credences 0 and 1. Thus, all credences are either middling credences, 0 or 1. As a consequence and assuming the Naive Credal Definition, belief requires credence 1 and disbelief credence 0 (see Friedman 2013b, del Rio 2024: Sect. 1). We can see why this is the case by studying the following graphs. Let us assume that we start for each *n*th BLUE proposition with a credence of .5 and that the propositions are probabilistically independent. The graphs depict the development of the probabilities of ALL BLUE/SOME BLUE based on the number of *n*th BLUE propositions that form the conjunction/disjunction. We can see how fast the probability of the ALL BLUE/SOME BLUE approaches extreme values.

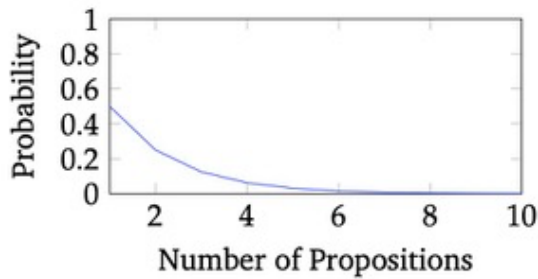


Figure 1: Probability of the conjunction

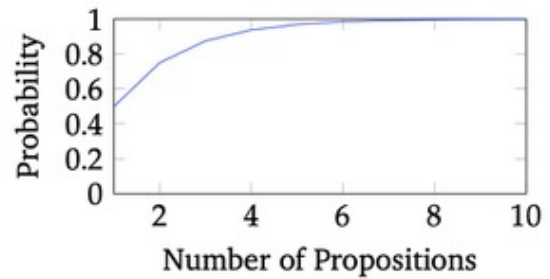


Figure 2: Probability of the disjunction

According to philosophers participating in the debate, this cannot be an acceptable outcome. Again, a moment's reflection shows that if the high credence necessary for belief means certainty (i.e., probability 1), then none of the credal motivations discussed by del Rio is satisfied (as pointed out by del Rio 2024, 10f.). If we search for a credal account of categorical doxastic attitudes, equating suspension of judgment with non-extreme probabilities (i.e., all except 0 and 1) is not attractive. Consequently, if accepting the Naive Credal Definition were the only option to reduce categorical doxastic attitudes to (probabilistic) credences, we could follow Jeffrey's Radical Probabilism (i.e., deny the relevance of categorical doxastic attitudes for epistemology in general) instead. Radical Probabilism rejects bridge principles that allow us to reduce categorical doxastic attitudes to credences (Jeffrey 1992).

In response to the above problems, philosophers searched for other ways to understand suspension that is driven by the absence of evidence. Del Rio (2024) considers using imprecise or interval probabilities to characterise such suspensions but ultimately argues that they fail. In particular, del Rio emphasises that despite suspending judgment on all the relevant statements in the Mystery Urn case, we are intuitively more willing to bet on SOME BLUE than on ALL BLUE. Thus, despite suspending judgment on both statements, we consider the first more credible. Del Rio shows that the imprecise or interval probability approach to understanding suspension that is driven by the absence of evidence fails because it does not satisfy a further desideratum (del Rio 2024, Sect. 3.2.1). Adapted to the Mystery Urn example, the desideratum says:

**Desideratum 2—Suspension with Ordering:** In the Mystery Urn case, it should be possible that

- (i) we suspend judgment on all the relevant statements and
- (ii) we order them according to their credibility:

ALL BLUE < *n*th BLUE < SOME BLUE.

In the following, we want to suggest a novel, higher-order approach that satisfies Desiderata 1 and 2.

## **4. Higher-Order Doxastic Accounts of Suspension**

### **4.1 Higher-Order Belief Accounts of Suspension**

To improve upon the Naive Credal Account of Suspension (and Other Doxastic Attitudes), earlier reductionist approaches suggested that suspending on  $p$  requires the absence of (dis)belief concerning  $p$  and a higher-order attitude about the absence of that (dis)belief, e.g., the belief that one does not know whether  $p$  (e.g., the first formulation of agnosticism in Russell 1997), the belief that one's evidence supports neither believing nor disbelieving  $p$  (Russell's second formulation in Russell 1997), the "belief or opinion that one cannot yet tell whether or not  $p$ , based on one's evidence" (Raleigh 2021, 2455), or the belief that one neither believes nor disbelieves  $p$  (Crawford 2004). Let us refer to such accounts as 'Higher-Order Belief Accounts of Suspension'. Thus, whether an agent suspends judgment on a proposition still depends solely on the agent's beliefs and disbeliefs; the naive view discussed in the previous section merely neglects to consider higher-order (dis)beliefs. The typical three-year-old is missing these higher-order beliefs concerning the general theory of relativity and thus does not suspend judgment. These Higher-Order Belief Accounts of Suspension do not account for the relations between credences and categorical doxastic attitudes. Without further ado, they cannot explain our intuitions in the Mystery Urn example. Why do we suspend judgment on all three relevant statements (i.e.,  $n$ th BLUE, ALL BLUE, SOME BLUE) but still consider some of them considerably more credible than others? In this and other regards, the following subsection explores the prospects and limits of Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes). This requires a small amount of set-up first.

### **4.2 Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes)**

Subsection 4.2.1 outlines a higher-order credal account of rational reasoning that Brössel (ms.) introduces. Subsection 4.2.2 provides a reductionist account of categorical doxastic attitudes based on this account of rational reasoning: Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes).

#### **4.2.1 A Higher-Order Credal Account of Rational Reasoning**

In the following, we introduce the philosophical idea of the Higher-Order Credal Account of Rational Reasoning. We leave spelling out the formal details of such an account for another occasion. The account's foundational idea posits that rational agents who deliberate how to reason are in a similar position to laypersons who deliberate which expert's advice to follow. More specifically, we assume that rational agents do not, as is commonly assumed by Bayesians, commit to a single (probabilistic) credence function, which they only update in response to new evidence. Instead, they are equipped with a



repertoire of possible (probabilistic) reasoning strategies (e.g., Levi 1997; Brössel 2012, Schurz 2019).<sup>4</sup> They commit to them more or less firmly based on higher-order evidence about these functions (Brössel & Eder 2014; Eder & Brössel 2019, Schurz 2019).

Just like laypersons have to weigh how much they should trust the advice of an expert, rational agents have to weigh how strongly they want to rely on their reasoning strategies. Thus, the degree, or weight, of an agent's commitment to each of these (probabilistic) reasoning strategies is adjustable. Such (Meta-Bayesian) agents revise the weight of their commitment in response to evidence concerning the strategies' performances. These (probabilistic) reasoning strategies are not understood as a priori credence functions, which are fixed. The following paragraphs unpack these ideas.

The epistemic state of a (Meta-Bayesian) agent at a given point in time  $t$  is characterized by three components: (i) a (finite) collection of the agent's (probabilistic) reasoning strategies  $\mathbf{RS}_t$  over a specific language  $L$ ,<sup>5</sup> (ii) a set of weights  $\mathbf{W}_t$  that specify how strongly the agent is committed to each reasoning strategy, and (iii) the agent's total body of evidence  $\mathbf{E}_t$ .

A reasoning strategy  $RS_i$  reflects how one reasons based on the available evidence, where each strategy suggests a (particular) credence in a hypothesis in the light of the available evidence. Like in standard Bayesianism, the reasoning strategies an agent considers are subjective. Different (Meta-Bayesian) agents can consider different reasoning strategies. At time  $t$ , the (overall) credence in a hypothesis  $H$ ,  $Cr_t(H)$ , is calculated as the aggregate of the (particular) credences suggested by each reasoning strategy in the light of the available evidence  $\mathbf{E}_t$ ,  $RS_i(H|\mathbf{E}_t)$  ( $\in \mathbf{RS}_t$ ) adjusted by the weights  $w_i \in \mathbf{W}_t$  of one's commitment to these strategies. Mathematically, this is represented as  $Cr_t(H) = \sum_i w_i \times RS_i(H|\mathbf{E}_t)$ . The weights  $w_i$  are assumed to be non-negative, sum to 1, and reflect the (Meta-Bayesian) agent's assessment of the strategies' reliability. The (overall) credence in a hypothesis can be seen analogously to the aggregate of the (particular) credences suggested to a layperson by experts, where the credences of those experts who are considered more competent receive more weight. An immediate implication of this understanding of a (Meta-Bayesian) agent's epistemic state is that the agent's credence obeys the probability calculus if the considered reasoning strategies adhere to it, which is assumed here.

To form their credences, Meta-Bayesian agents seek to determine how strongly they should commit to each reasoning strategy. When they do so, they cannot simply rely on their current (overall) credences to evaluate them. Such a strategy would justify one's inductive predictions by the very predictions one adopts, a methodologically contentious approach. Instead, following Schurz's (2019) *Theory of Meta-Induction*, we suggest relying on the reasoning strategy's historical performance to predict its future performance. The historical performance of a reasoning strategy depends on its

systematic power, i.e., on how accurate its predictions, explanations, and retrodictions of the evidence are (Brössel 2015).

In the literature, a plethora of accuracy, or scoring, measures are discussed (Douven 2020). As pointed out by Douven (2020, 1576), “scoring may serve different purposes in different contexts, and depending on the purpose, we may want to impose different requirements” on it. Thus, which accuracy measure we want to employ is an important topic of discussion. Nevertheless, for the present purpose, this discussion is not central. What is relevant for the present purpose is that we can estimate for each of these measures how accurate a reasoning strategy is based on its track record. Formally, such an estimate is called a ‘point estimate’. We use point estimates in science and in everyday life. For example, we might estimate the sick leave days of an employee in the upcoming year by considering her track record concerning sick leaves in the last years.

Based on such a point estimate of the accuracies of the considered reasoning strategies, we can assign different weights to them. However, merely anticipating a reasoning strategy to be somewhat accurate (concerning the predictions, explanations, and retrodiction of the evidence it offers) is insufficient for assigning it a positive weight; comparison also matters. For instance, suppose there are only two reasoning strategies. One has consistently been less accurate. Then it is intuitively rational to disregard this reasoning strategy. Assigning weights to reasoning strategies is akin to evaluating various experts’ advice and relying on those who have historically been *more* reliable or accurate. Again, we leave the formal details of estimating the accuracy of reasoning strategies and defining the weights based on this information to another occasion. However, roughly put, if one expects that a reasoning strategy does not influence one’s (future) credence positively, then one does not assign it a positive weight. One ignores that reasoning strategy because one expects to regret listening to it. If one expects it to positively influence one’s future credences, one assigns a positive weight and allows it to influence one’s credences. One assigns some weight to a reasoning strategy if one expects to regret it if one does not listen to it at all.

The (outlined) strategy for determining the weights of reasoning strategies, which delineates how strongly one is committed to each strategy, leads one to commit more and more to more accurate reasoning strategies and less and less to less accurate ones. For more details concerning the benefits of such an approach, see Schurz (2019).

#### **4.2.2 Our Higher-Order Credal Account of Suspension and Other Doxastic Attitudes**

Based on the Higher-Order Credal Account of Rational Reasoning, we provide Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes), which

defines such attitudes in terms of credence. We focus on del Rio's Mystery Urn example to motivate our definitions.

In the Mystery Urn example, we should suspend judgment on the statements *n*th BLUE, ALL BLUE, and SOME BLUE. In addition, the statements can be ordered according to their credibility. SOME BLUE is more credible than ALL BLUE, and the credibility of *n*th BLUE lies between those of the other two statements (see Desideratum 2—Suspension with Ordering). Our approach can account for this desideratum by referring to the higher-order uncertainty about how to reason in the case of the Mystery Urn example. It might be an urn with one marble or a billion marbles, the percentage of blue marbles between 0 and 100, and the drawing process might be a random draw with replacement or a not-quite-random draw (e.g., because we draw from the top layer) without replacement or some other possibility. These uncertainties lead to a higher-order uncertainty concerning which reasoning strategy to apply in the Mystery Urn example.

The higher-order uncertainty concerning which reasoning strategy to apply in which case is crucial to Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes). This becomes clear in the following presentation of our account. First, we introduce our credal account by defining the notions of belief, disbelief, and two kinds of suspension: Then, after presenting our credal account, we discuss its philosophical consequences.

**Definition 1—Belief:** An agent *believes* that *p* if and only if in the light of the agent's total evidence, all her reasoning strategies with a positive weight assign a high credence in *p* (i.e., greater or equal than some threshold  $r > .5$ ).

**Definition 2—Disbelief:** An agent *disbelieves* that *p* if and only if in the light of the agent's total evidence, all her reasoning strategies with a positive weight assign a low credence in *p* (i.e., lower than or equal to  $1 - r$ ).

In the *Mystery Urn* example, the requirement to suspend judgment on propositions arises not just in dependence on the credibility of the propositions. These two definitions generalize this insight to belief and disbelief. There must be more than high or low credence to believe or disbelieve. A high (overall) credence in a proposition does not qualify for belief if one is not certain that a high credence is rationally required, i.e., if one is not fully committed to reasoning strategies that assign a high credence. Accordingly, having high credence in SOME BLUE does not mean that one must believe this proposition. There are too many higher-order uncertainties. As said, it might be an urn with one or a billion marbles, the percentage of blue marbles might lie between 0 and 100, and the drawing process might be a random draw with replacement or some other drawing procedure. In most possible scenarios, the credibility of SOME BLUE is (near) 1, which suffices for an overall credence near 1 and, thus, above our threshold *r*. However, since there are some scenarios in which the credibility of SOME BLUE is less than our threshold *r*, we do not believe that SOME BLUE. For example, the scenarios in

which there are either just two marbles in the urn or a zero percent of blue marbles call for reasoning strategies that do not assign SOME BLUE a threshold large enough for belief. The situation for disbelief and the proposition ALL BLUE is analogous.

Our notions of belief and disbelief satisfy all four of del Rio's 2024 credal motivations. We are more confident in some beliefs than in others; new evidence can increase or decrease our confidence in some propositions while we continue to believe them. Finally, "we can rationally believe each of a long string of conjuncts and also rationally believe the negation of their conjunction" (del Rio 2024, 10). The main intuitive principle for beliefs our account does *not* satisfy is the following: if one believes  $p$  and one's credence in  $q$  is even greater than that in  $p$ , then one also believes  $q$ . For example, one's credences in the *Mystery Urn* example might resemble one's credences in a case where a fair coin is thrown: the probability, or credence, for SOME BLUE equals the probability for some heads in a series of coin throws. Nevertheless, according to our account, it is possible that one neither believes nor disbelieves SOME BLUE in the Mystery Urn case but still believes that some coin throws will land heads. Similarly, according to our account, in a fair lottery with thousands of tickets and only one winner, it is possible to rationally believe for each ticket that the ticket is a losing ticket while also disbelieving that all tickets will be losers. Let's move on to introducing suspension.

For suspension, we suggest distinguishing two kinds:

**Definition 3—Strong Suspension:** An agent *strongly suspends judgment* concerning  $p$  if and only if, in the light of the agent's total evidence, all her reasoning strategies with a positive weight assign middling credences in  $p$  (i.e., credences in the interval  $(r, 1 - r)$ ).

**Definition 4—Weak Suspension:** An agent *weakly suspends judgment* concerning  $p$  (we also say the agent is ignorant concerning  $p$ ) if and only if, in the light of the agent's total evidence, some of the agent's reasoning strategies with a positive weight assign a high credence in  $p$  and others assign a low credence in  $p$ .

As mentioned before, our account is inspired by ideas that suggest that suspending judgment on a proposition  $p$  requires both the absence of (dis)belief in  $p$  and a higher-order attitude in some way or other concerning the absence of that (dis)belief. Definition 3 transfers this idea to the realm of credence. The weights agents assign to reasoning strategies reflect their higher-order expectations about the accuracy of reasoning strategies.

According to Definition 3, strong suspension requires that there be no higher-order uncertainty about how to reason. All reasoning strategies that one assigns a positive weight agree that one should assign middling credences. Thus, strong suspension requires the higher-order certainty that, according to all reasonable reasoning strategies, one's evidence supports neither believing nor disbelieving  $p$ . The prototypical case for

propositions for which we have such higher-order certainties are fair coin tosses. One's credence for a fair coin landing heads on the next coin throw is middling, and one is fully committed to reasoning strategies that assign middling credence to the proposition at hand. This commitment is due to the higher-order certainty that these reasoning strategies are the most accurate. However, our prototypical case for strong suspension also has far-reaching consequences for disjunctions and conjunctions. Suppose we are going to toss our fair coin one hundred times. There is still no higher-order uncertainty about which reasoning strategy one should adopt. We are certain that assigning a high credence to "Some coin toss will land heads" is correct, and thus we believe that proposition. Similarly, we do not doubt that assigning low credence to "All coin tosses will land heads" is correct, and thus we disbelieve that proposition. Thus, for (probabilistically independent) propositions on which we strongly suspend judgment, we often do not strongly suspend judgment on their conjunctions and disjunctions. Strong Suspension does not satisfy Desideratum 1—Disjunction/Conjunction Condition. However, in the Mystery Urn example, we are lacking this kind of higher-order certainty. We are not certain that assigning a middling credence is rationally required. Thus, we submit that the suspension in the case of Mystery Urn is a different kind of suspension: weak suspension or what others, in decision theory, refer to as 'ignorance' (Peterson, 2009, Ch. 3).

This discussion shows that our weak notion of suspension (i.e., ignorance) satisfies Desideratum 1—Disjunction/Conjunction Condition. In the Mystery Urn example, it is possible and might, given our evidence, be rationally required to weakly suspend on all three statements: SOME BLUE, nth BLUE, and ALL BLUE. However, our strong notion of suspension does not satisfy Desideratum 1—Disjunction/Conjunction Condition, as mentioned above. The strong notion of suspension is relevant when we are certain about the first-order evidential relationships between the evidence and a proposition but cannot answer the question about the proposition's truth. Weak suspension, or ignorance, is the right kind of doxastic attitude for many topics for which we lack the knowledge to judge whether our current evidence supports or counter-supports a proposition. For further illustration, imagine a mathematical conjecture. We know that having a credence of one-half is not the rational credence in that proposition; it is a mathematical claim, and we, thus, should assign either credence 0 or 1. Since we cannot decide which reasoning strategy is required, we adopt overall credence one-half, knowing that this is not the credence we should assign. This is a different kind of suspension than in the case of the toss of a fair coin; it is a case of weak suspension.

Desideratum 2—Suspension with Ordering is also satisfied by Weak Suspension. Probabilistic reasoning strategies typically assign a higher credence to SOME BLUE than to ALL BLUE, and no probabilistic reasoning strategies assign ALL BLUE a higher credence than SOME BLUE. Thus, as long as one reasoning strategy with a positive weight assigns

SOME BLUE a higher credence, the agent ends up assigning a higher credence to SOME BLUE than to ALL BLUE.

Our above definitions also imply that persons who do not grasp a proposition do not believe, disbelieve, or suspend judgment on that proposition. Having any of these propositional attitudes requires reasoning strategies involving this proposition, which presupposes grasping the proposition. Thus, a typical three-year-old will have no propositional attitude towards the general theory of relativity. The typical three-year-old will not have adopted any reasoning strategies involving Einstein's theory.

A moment's reflection reveals that there are logical relations between the propositional attitudes defined above. In particular, believing  $p$  implies that one does not suspend, weakly or strongly, on  $p$ , i.e., suspending on  $p$  implies that one does not believe  $p$ . The same holds for disbelieving  $p$ . The converse, however, is not true. Not suspending on  $p$  does not imply that one believes or disbelieves  $p$ . The absence of strong and weak suspension is compatible with a further kind of propositional attitude, doubtful (dis)belief, which is defined as follows:

**Definition 5—Doubtful Belief:** An agent *doubtfully believes*  $p$  if and only if, in the light of the agent's total evidence, some of the agent's reasoning strategies with a positive weight assign a credence between thresholds  $r$  and  $1 - r$  and all others assign a credence above the threshold  $r$ .

Instances of doubtful belief differ from belief in that the agents are uncertain whether they should assign a high credence.

This concludes the presentation of *Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes)*, consisting of Bayesianism and Definitions 1–5. It presents the relationship between credences, higher-order certainties, and categorical doxastic attitudes.

## 5. Conclusion

We introduced Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes) based on the Higher-Order Credal Account of Rational Reasoning. This account is inspired by work in epistemology which suggests that suspension requires both the absence of (dis)belief concerning  $p$  and a higher-order attitude pertaining to the lack of that (dis)belief. According to our account, belief requires higher-order certainty that one should assign a high credence, and disbelief requires higher-order certainty that one should assign a low credence. We distinguished two kinds of suspension: strong and weak suspension. Strong suspension requires higher-order certainty that middling credences should be assigned, and weak suspension requires higher-order uncertainty

about whether high or low credences should be assigned. The resulting higher-order credal account satisfies Desiderata 1 and 2.

We took the first steps towards establishing Our Higher-Order Credal Account of Suspension (and Other Doxastic Attitudes). The account deserves closer and more critical inspection and a comparison with other accounts about the relationship between credences and categorical doxastic attitudes. Future research will show which of these accounts is more attractive. When evaluating the accounts, it should not only matter how they perform concerning problems related to suspension but also how they perform in general, for instance, concerning problems bearing on the relation of credences and other categorical doxastic attitudes in general.<sup>6</sup>

## Acknowledgements

We presented this chapter at the Thinking About Suspension workshops at the Universities of Frankfurt and Constance. The network Thinking About Suspension, led by Verena Wagner and Alexandra Zinke, organized these workshops. We are grateful to the workshop's audience for their helpful comments on our presentations, which helped us improve the chapter. In writing the final version of this chapter, we greatly benefited from the feedback on an earlier version given by Christopher von Bülow, Daniela Schuster and Alexandra Zinke. Peter Brössel's research on this paper has been generously supported by an Emmy Noether Grant from the German Research Council (DFG), reference number BR 5210/1-1 and the DFG Research Training Group "Situated Cognition" (GRK 2185/1).

## References

- Atkins, Philip (2017). "A Russellian Account of Suspended Judgment." *Synthese* 194: 3021–3046.
- Bloeser, Claudia, & Titus Stahl (2022). "Hope." In *The Stanford Encyclopedia of Philosophy* (Summer 2022 Edition), E. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/sum2022/entries/hope/>>.
- Brössel, Peter (2012). *Rethinking Bayesian Confirmation Theory*. Dissertation, University of Konstanz.
- Brössel, Peter (2015). "On the Role of Explanatory and Systematic Power in Scientific Reasoning." *Synthese* 192 (12), 3877–3913.
- Brössel, Peter (ms.). "Meta-Bayesianism as a Solution to the Dogmatism of the Prior."
- Brössel, Peter, & Anna-Maria A. Eder (2014). "How to Resolve Doxastic Disagreement." *Synthese* 191: 2359–2381.

- Chomsky, Noam (1980) *Rules and Representations*. New York: Columbia University Press.
- Christensen, David (2004). *Putting Logic in its Place: Formal Constraints on Rational Belief*. Oxford: Oxford University Press.
- Crawford, Sean (2004). "A Solution for Russellians to a Puzzle about Belief." *Analysis* 64: 223–229.
- del Rio, Andrew (2024). "Suspending Belief in Credal Accounts." *Noûs* 58: 3–25.
- Douven, Igor (2020) "Scoring in Context." *Synthese* 197 (4): 1565–1580.
- Eder, Anna-Maria (2021). "Disagreement in a Group: Aggregation, Respect for Evidence, and Synergy." In A. Carter & F. Broncano-Berrocal (eds.), *The Epistemology of Group Disagreement*, Routledge: 184–210.
- Eder, Anna-Maria, & Peter Brössel (2019). "Evidence of Evidence as Higher-Order Evidence." In M. Skipper & A. Steglich-Petersen (eds.), *Higher-Order Evidence: New Essays*, Oxford: Oxford University Press: 62–83.
- Fodor, Jerry (1975). *The Language of Thought*. New York: Thomas Crowell.
- Foley, Richard (1992). "The Epistemology of Belief and the Epistemology of Degrees of Belief." *American Philosophical Quarterly* 29: 111–121.
- Friedman, Jane (2013a). "Question-Directed Attitudes." *Philosophical Perspectives* 27: 145–174.
- Friedman, Jane (2013b). "Rational Agnosticism and Degrees of Belief." *Oxford Studies in Epistemology* 4: 57–81.
- Friedman, Jane (2013c). "Suspended Judgment." *Philosophical Studies* 162: 165–181.
- Friedman, Jane (2017). "Why Suspend Judging?" *Noûs* 51: 302–326.
- Jeffrey, Richard (1992). "Radical Probabilism (Prospectus for a User's Manual)." *Philosophical Issues* 2: 193–204.
- Levi, Isaac (1997). *The Covenant of Reason: Rationality and the Commitments of Thought*. Cambridge: Cambridge University Press.
- Peterson, Martin (2009). *An Introduction to Decision Theory*. Cambridge: Cambridge University Press.
- Raleigh, Thomas (2021). "Suspending is Believing." *Synthese* 198: 2449–2474.
- Rinard, Susanna (2013). "Against Radical Credal Imprecision." *Thought* 2: 157–165.
- Russell, Bertrand (1997). "What Is an Agnostic?" In J. Slater, B. Russell, & P. Köllner (eds.), *The Collected Papers of Bertrand Russell, Volume 11*, Routledge: 549–558.
- Schurz, Gerhard (2019). *Hume's Problem Solved: The Optimality of Meta-Induction*. Cambridge MA: MIT Press.



Titelbaum, Michael (2022). *Fundamentals of Bayesian Epistemology, volume 1*. Oxford: Oxford University Press.

Wagner, Verena (2022). “Agnosticism as Settled Indecision.” *Philosophical Studies* 179: 671–697.

Zinke, Alexandra (2021). “Rational Suspension.” *Theoria* 87: 1050–1066.

---

<sup>1</sup> In this paper, we only consider approaches that reduce suspension to other doxastic attitudes, such as belief, disbelief, and credence. Other approaches assume that suspension can be reduced to other familiar mental states with propositional content such as desires, intentions, etc. or to mental actions, but that they cannot be reduced to the agent’s beliefs and disbeliefs. Wagner (2022) champions such a proposal for understanding suspension. She holds that suspension is a mental act that results in the agent being agnostic concerning the question based on the agent’s endorsement of their settled “indecision that marks the end of inquiry” (2022, 671f.). The drawback of this approach is that it is not easy to answer the question of when suspension is rational. We cannot transfer standards of rationality from credences or beliefs to standards of rationality for suspension.

<sup>2</sup> For our argumentation here it is not relevant what exactly high credence, low credence and middling credences are.

<sup>3</sup> Rinard (2013) has discussed a very similar example concerning the representation of ignorance within the imprecise credence framework.

<sup>4</sup> Understandings of reasoning strategies can differ in detail. For similarities and differences in understanding such reasoning strategies see Eder 2021.

<sup>5</sup> Formally, those reasoning strategies are just given by a set of probabilities. Note that they are not interpreted as credences. Credences result from such reasoning strategies as provided below. We are grateful to Alexandra Zinke for urging us to emphasize this.

<sup>6</sup> Thanks to Igor Douven for making us aware that this more general focus should be emphasised.