Disagreement in a Group: Aggregation, Respect for Evidence, and Synergy

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1 Introduction

We often have to decide what to do. We do so based on our credences or beliefs. Decisions are often hard to make when we act as individual agents; however, they can be even harder when we are supposed to act as members of a group, even if we agree on the values attached to the possible outcomes. Consider, for instance, decisions of members of a scientific advisory board or research group, or of friends who are deciding which hiking path to take. Decisions in groups are often harder to make because members of a group doxastically disagree with each other: they have different doxastic attitudes, for instance, different credences or beliefs. And when they disagree, they are supposed to find an epistemic compromise.

In this paper, I focus on disagreement among members of a group who have different rational credences, where such credences are represented probabilistically and the rationality involved is epistemic rationality.[1] My main aim is to answer the following question:

Main Question How do members of a group reach a rational epistemic compromise on a proposition when they have different (rational) credences in the proposition?

A standard method of finding such an epistemic compromise is based on *Standard Bayesianism*. According to the method, the only factors among the agents' epistemic states that matter for finding the compromise are the group members' credences. What I refer to as the *Standard Method of Aggregation*, or *Weighted Straight Averaging*, proposes to settle on the weighted average of the group members' credences as the epistemic compromise.[2] The respective weights represent "the level of relative competence" of group members within the group, where the level is relative to the competence of the other members (Brössel and Eder 2014:2362). The *Standard Method of Aggregation* faces several challenges, of which I focus on two. They are both due to the fact that the method takes only the (rational) credences of the members of a group into account, and neglects other factors pertaining to agents' (rational) epistemic states.

I take the *Standard Method of Aggregation* as a starting point, criticize it, and propose to replace it by what I refer to as the *Fine-Grained Method of Aggregation*, which is introduced in Brössel and Eder 2014 and further developed here.[3] According to this method,

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[1]In this paper, I assume that rational credences obey the probability calculus and are updated in response to the evidence by some conditionalization rule. I say more on rational credences in Sect.3.1. Admittedly, many interesting cases of disagreement arise because it is not clear whether the credences involved are rational. However, I have my hands full with cases that involve rational credences and postpone the discussion of cases where it is not clear whether the credences that are involved are rational.

[2]For accounts that are in the spirit of *Weighted Straight Averaging*, see, e.g., Christensen 2007, Elga 2007, and Jehle and Fitelson 2009. And for literature that discusses it in the context of finding an epistemic compromise see Brössel and Eder 2014, Frances and Matheson 2019, and Moss 2011.

[3]I must leave it to another occasion to defend aggregation methods *per se* and also to discuss alternative ways of finding compromises.

the members' (rational) credences are not the only factors concerning the group agents' rational epistemic states that matter for finding an epistemic compromise. The method is based on a non-standard framework of representing rational epistemic states that is more fine-grained than *Standard Bayesianism*. I refer to this framework as '*Dyadic Bayesianism*'.[4] It distinguishes between an agent's rational reasoning commitments and the agent's total evidence. Rational reasoning commitments reflect how the agent rationally judges the evidential support provided by some evidence and how the agent rationally reasons on the basis of the evidence. Like Levi's (1974/2016, 1980, and 2010) confirmational commitments they are like a rule from the evidence to the doxastic state. The total evidence of the agent and the agent's rational reasoning commitments then determine the agent's rational credences. On the basis of this framework, the method of aggregation that I defend, the *Fine-Grained Method of Aggregation*, suggests that disagreeing members of a group aggregate their total evidence and their reasoning commitments—instead of their credences alone.[5]

In Section 2, I introduce some assumptions that clarify the focus of the paper: I present different kinds of doxastic disagreements and specify on which kind of disagreement I concentrate. In Section 3, I make some idealizing assumptions and introduce the *Standard Method of Aggregation*, which builds on *Standard Bayesianism*. I end the section by presenting two challenges to the *Standard Method of Aggregation*: one concerning the fact that the method does not respect the evidential states of agents, and the other that the method cannot account for synergetic effects. In Section 4, I propose *Dyadic Bayesianism* as an alternative to *Standard Bayesianism*. I compare it with Levi's (1974/2016, 1980, and 2010) framework for representing epistemic states, to which it can be traced, yet from which it slightly differs. The comparison will help provide a better understanding of *Dyadic Bayesianism*. Building on *Dyadic Bayesianism*, I propose the *Fine-Grained Method of Aggregation* as a means of providing an answer to the *Main Question*, and I discuss the challenges to the *Standard Method of Aggregation* in relation to the *Fine-Grained Method of Aggregation*. Finally, I summarize my results in Section 5.

2   Kinds of Doxastic Disagreement and Social Settings

In the following section, I present different kinds of doxastic disagreement and their social settings, albeit without aspiring to present a complete list of either. The kinds of disagreement and the settings that I introduce will suffice to clarify the focus of the present

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[4]In Brössel and Eder 2014, we use the term 'Pluralistic Bayesianism' in contrast to what Schurz 2012 and Unterhuber and Schurz 2013 call 'Monistic Bayesianism'; the latter corresponds to what we call '*Standard Bayesianism*'.

[5]In Brössel and Eder 2014, we focus on the formal properties of the *Fine-Grained Method of Aggregation*. Here my focus is more on the philosophical motivation of the account. Furthermore, in Brössel and Eder 2014 only reasoning commitments are aggregated. Here evidential states are also aggregated and I make room for synergetic effects, which are rejected in Brössel and Eder 2014. I discuss this in more detail in Sect. 4.4.

paper.

2.1 Shared vs. Different Total Evidence

Agents might disagree when they do not share the same total evidence but also when they do. The following example by Feldman describes a case in which agents don't share the same total evidence:

Criminal Case Example "Consider [...] the example involving the two suspects in a criminal case, Lefty and Righty. Suppose now that there are two detectives investigating the case, one who has the evidence about Lefty and one who has the evidence incriminating Righty. They each justifiably believe in their man's guilt. And then each finds out that the other detective has evidence incriminating the other suspect" (Feldman 2007:208).

Elga presents an example that shows a case in which the agents share the same total evidence:

Death-Penalty Example "Suppose that you and your friend independently evaluate the same factual claim—for example, the claim that the death penalty significantly deterred crime in Texas in the 1980s. Each of you has access to the same crime statistics, sociological reports, and so on, and has no other relevant evidence. Furthermore, you count your friend as an **epistemic peer**—as being as good as you at evaluating such claims.

You perform your evaluation, and come to a conclusion about the claim. But then you find out that your friend has come to the opposite conclusion" (Elga 2007:484).

Recent literature on disagreement has focused on cases where disagreeing agents share the same total evidence (before facing disagreement).[6,7] However, in social epistemology, we also need answers to the questions of whether and how to revise credences or how to find an epistemic compromise for both kinds of cases: when agents who face disagreement share the same total evidence (before they face disagreement), and when agents who face disagreement do not share the same total evidence (before they face disagreement). In this paper, I propose a method that is apt for finding an epistemic compromise when disagreeing agents share the same total evidence. In addition, given certain circumstances, the method is also apt when disagreeing agents do not share the total evidence.

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[6]Exceptions are, for example, Feldman 2007 and Grundmann 2013.

[7]I am concerned with revealed disagreement (Sect. 2.3), where agents who share the same total evidence continue to share their total evidence after the disagreement is revealed.

2.2 Coarse-Grained vs. Fine-Grained Disagreements

Agents doxastically disagree with each other with respect to a proposition just in case they have different doxastic attitudes toward the proposition. It is straightforward to distinguish between coarse-grained and fine-grained disagreement.[8] Imagine, for example, the above *Criminal Case* to be such that one detective believes that Lefty is guilty while the other detective disbelieves this or suspends judgment on it. I refer to such cases of disagreement as 'cases of coarse-grained disagreement', because they concern coarse-grained doxastic attitudes such as belief, disbelief, and suspension of judgment. Now imagine the *Criminal Case* to be such that one of the agents has a specific credence in the proposition that Lefty is guilty and the other agent has a higher or lower credence in it. I refer to such cases of disagreement as 'cases of fine-grained disagreement'. They concern credences which are fine-grained doxastic attitudes. Note that there are cases where there is no coarse-grained disagreement, but there is fine-grained disagreement: for instance, cases where both agents believe a proposition but to different degrees. In this paper, I focus exclusively on *fine-grained* disagreement, and will understand or represent credences in probabilistic terms.

2.3 Revealed vs. Unrevealed Disagreement

Many agents disagree with each other without being aware of it. And when they are aware of it, they might still be unaware whether they share the same total evidence. Or they might be aware that they disagree with each other and that they share the same total evidence. More complicated are cases in which the agents are aware that they disagree and that they do not share the same total evidence. In some of these cases they know what different pieces of evidence they have; in many cases, however, they do not know the extent to which their evidence differs. And even when they are aware of the difference in their total evidence, they might not be aware of how the evidence is judged. And sometimes they are aware of all those factors and are still in disagreement. I refer to the latter kind of disagreement as 'revealed disagreement'. In this paper, I focus exclusively on such disagreement.

2.4 Social Settings

In the literature, one can find different social settings in which agents face disagreement, and these might call for different methods for dealing with the disagreement. Following Wagner (2010:336-337) and Brössel and Eder (2014:2361-2362), I distinguish three kinds of social settings.[9] The first two concern agents as individuals, and the third concerns agents as members of a group.

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[8]See also Frances and Matheson 2019 and MacFarlane 2009. This distinction is similar to the distinction between weak and strong disagreement (for this latter distinction see, e.g., Grundmann 2019).

[9]See also Easwaran et al. 2016 for different social settings in the context of disagreement.

First, agents as individuals might disagree with other agents.[10] In such a setting, the individual agents are all involved in the disagreement: think, for example, of a dispute which you might have with a friend. Second, agents as individuals might come into contact with disagreement among other agents. In this kind of setting, an agent who is not involved in the disagreement experiences other agents who disagree with each other: think of a case where you have to consult experts who disagree, and who might or might not be aware of each other. In both kinds of settings, we usually focus on the doxastic attitude that is rational for an individual agent to hold after becoming aware of the disagreement. Now consider the third kind of setting: agents as members of a group might face disagreement and seek to find an epistemic compromise. This compromise is not to be mistaken for the doxastic states of the members of the group. The crucial difference between this and the first two kinds of setting is that it does not concern how agents as individuals revise their doxastic state in the face of disagreement. In the latter, third, kind of social setting, the members of the group might stick to their individual credences but, for example, decide to act on the basis of the epistemic compromise as long as they are in that social setting. (I am neutral on whether one has to stick to the compromise when one is no longer a member of the group.) The epistemic compromise is also not to be equated with the group credence. I am neutral on whether there is such a thing as group credences. Even if there is such a thing, the method for finding an epistemic compromise might be different from the method for finding the group credences.[11] The *Criminal Case Example*, as well as the *Death-Penalty Example*, can be extended to provide examples of the mentioned social settings (I leave it to the reader to make the required adjustments to these examples). In this paper, I focus on epistemic compromises.[12]

In Brössel and Eder 2014, we assumed that disagreements in all three social settings should be resolved in the same way. I'm now more cautious, however, and won't take a stance here on whether one should treat all of them in the same way. In this paper, I focus on disagreement among agents as members of a group who are required to find a (rational) epistemic compromise.

To sum up, in this paper I focus on cases where agents as members of a group are in revealed, fine-grained (doxastic) disagreement with respect to a proposition, and they are required to find an epistemic compromise on that proposition. In some such cases they

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[10]See Christensen 2009, Frances and Matheson 2019, Goldman and O'Connor 2019, Lackey 2010 for a discussion of prominent views on what to do when one faces such a situation.

[11]For an appealing account of group credence that is analogous to the *Standard Method of Aggregation*, see Pettigrew 2019. While our *Standard Method of Aggregation* refers to epistemic compromises, Pettigrew's method concerns group credences. Similarly, Easwaran et al. 2016 (Sect. 2) address aggregation rules as rules that represent the opinion of a group. However, the opinion may have the same function as the epistemic compromise: to assist the group in finding decisions.

[12]Discussions of judgment aggregation are related to discussions in this paper. However, judgment aggregation concerns the aggregation of categorical doxastic attitudes or of judgments of acceptance and rejection—as opposed to aggregation of credences (see List 2012, Sect.6.3 for a comparison, and List and Pettit 2002 and 2004 for judgment aggregations and their problems).

share the same total evidence and in others they do not.

3 The Standard Method of Aggregation

Before I proceed with a first candidate answer to the *Main Question*, I introduce idealizing assumptions most of which are common in probabilistic debates on disagreement. The idea is to take as starting points precise accounts of representations of epistemic states and accounts of aggregation and to investigate what follows under the given idealizing assumptions. The plan is that, based on the results, later investigations will step-by-step eliminate some of the idealizing assumptions.

3.1 Idealizing Assumptions

Stable Truth-Value

Here, I ignore the possibility that an agent has credences in propositions that change their truth-values over time: e.g., propositions that change their truth-value as soon as the agent holds a doxastic attitude towards the propositions. To be on the safe side, I also ignore the possibility that an agent has credences in propositions that lose or gain evidential support as a consequence of the agent adopting a doxastic attitude towards the propositions. Including propositions that change their truth value over time, or that lose or gain such evidential support, would require us to deal with problems that are not specific to the problem of finding an epistemic compromise.

True Evidence

I assume that the evidence available to agents is true. This allows us to ignore questions concerning whether one can rely on the evidence available to other agents or to oneself. For simplicity, perception and testimony—the primary sources of information about the world—are taken to be perfectly reliable (see, similarly, Eder and Brössel 2019).

Ideally Rational Doxastic States

I focus on ideally rational doxastic states. Since I focus on fine-grained disagreement, I focus on credences as doxastic states. In particular, I assume that the group members who are required to form an epistemic compromise are agents whose credences are (ideally) rational in the sense that they do not violate the probability calculus (they are understood as probabilities) and are updated by a conditionalization rule. Furthermore, by saying that a credence is (ideally) rational, I do not want to indicate that one is obliged to adopt it; rather, the credence is merely evaluated as ideal, where the notion of ideal rationality that I have in mind is evaluative.[13]

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[13]For an evaluative understanding of (ideal) rationality, see for example Christensen 2004, Easwaran and Fitelson 2015, Eder 2019, and Titelbaum 2015.

In probabilistic frameworks, it is common to equate rational epistemic states with rational credences in the following way[14]:

Standard Bayesianism "First, a (rational) agent's epistemic state is best represented by her (rational) credences alone. Second, (rational) credences obey the probability calculus and they are updated by strict conditionalization" (Brössel and Eder 2014:2360).[15]

If the members of a group disagree with each other, this is due to them having different rational credences, or credence functions. The task of finding a (rational) epistemic compromise amounts to finding another probability function that all members of the group can accept as an epistemic compromise, even if they do not accept it as their new credence.

Note that I am happy to accept further principles that restrict the scope of when a credence or credence function is rational. For instance, I am willing to adopt principles such as Lewis's (1980) *Principal Principle* and van Fraassen's (1984) *Reflection Principle*, or variants thereof. While such principles restrict the set of permissible or rational credence functions, which are then updated by strict conditionalization when new evidence is acquired, they do not necessarily single out a unique rational credence function. That is, I do not assume an inter-personal uniqueness principle, according to which two agents ought to agree on a credence in response to shared evidence.[16]

3.2   Weighted Straight Averaging

Now that I have specified the setting, let us return to the *Main Question*: How do members of a group reach a rational epistemic compromise on a proposition when they have different (rational) credences in the proposition? To answer this question, I first look at approaches in the literature on how to rationally deal with disagreement. In particular, I focus on accounts of whether, and if so how, it is rational for individual agents to revise their credences in the light of disagreement.

According to some approaches in the literature, after becoming aware of the disagreement it is rational for individual agents not to revise their credences at all (see Frances and Matheson 2019 for an overview of such approaches). Whatever the merits of such approaches for disagreeing agents as individuals, it is certainly not an option to adopt the credence as an epistemic compromise among members of a group.

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[14]Following Schurz 2012 and Unterhuber and Schurz 2013, Brössel and Eder (2014) refer to this position as *Monistic Bayesianism.*

[15]For an account in these terms that concerns disagreement, see, e.g., Jehle and Fitelson 2009.

[16]For literature on uniqueness principles, see Feldman 2007, Kelly 2014, Kopec and Titelbaum 2016, Rosa 2018, White 2005 and 2014.

Other approaches suggest it is not (necessarily) rational for agents to retain their doxastic states, but rather to revise them. There are two prominent approaches of this kind that fit our probabilistic setting here. According to the first, it is rational for the agent to revise her credence as she always does: by conditionalizing on the evidence—in this particular case, by conditionalizing her old credences on the new evidence about the disagreement with other agents.[17] This kind of approach also seems to be wrong-headed for finding an epistemic compromise. If the group members start with different credence functions, then they presumably will also have different credence functions after conditionalizing on the evidence concerning their disagreements. Their *a priori* credence functions would have to satisfy various as-yet-unspecified principles to ensure that the group members agree on some rational epistemic compromise after learning about their disagreement. It is far from clear how members of a group might end up having an epistemic compromise when they use a conditionalization rule. I agree with Easwaran et al. (2016), who acknowledge that the approaches in terms of conditionalization rule are overly demanding.[18] One could only apply such a rule if it were clear how to react to disagreement before one is aware of the disagreement. So this approach, even if successful, would presuppose that we have found an answer to our *Main Question*.

According to the second kind of approach that fits our probabilistic setting here, the agents' credences are aggregated via rules that combine the individual credence functions of the disagreeing agents to obtain a single probability function. According to the standard interpretation of these rules in the context of disagreement, the latter function should be adopted as the new credence function of the disagreeing agents. The most prominent and most often used aggregation rule will take center stage in the following: the *Standard Method of Aggregation*, or *Weighted Straight Averaging*.[19] According to it, the result of the aggregation should be the weighted average of the initial individual credences.[20] The respective weights of the agents reflect their level of relative (epistemic) competence. It is assumed that agents have a level of absolute competence which is independent of the level of competence of other agents. The level of relative competence puts the level of absolute competence of agents in relation to each other. It does so in such a way that the sum of the levels of relative competence is one. (I will say more about the weights after presenting the aggregation rule.)

In detail, *Weighted Straight Averaging* says the following:

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[17]I take Kelly's 2010 *Total Evidence View* to be along these lines. Grundmann describes Kelly's view as an account of aggregation of evidence (Grundmann 2019:130-131).

[18]Nevertheless, Easwaran et al. (2016) provide an account that mimics conditionalization given certain assumptions.

[19]There is no room here to discuss all such aggregation rules in detail. In particular, I will ignore the *Geometric Mean Rule*. For an extensive discussion of variants of this rule, see Brössel and Eder 2014, Easwaran et al. 2016, and Genest and Zideck 1986.

[20]Since it is a method that results in a single credence (function), Frances and Matheson (2019:Sect.5.1) refer to it (or a special case of it) as "a kind of doxastic compromise".

Weighted Straight Averaging Consider agents $s_1, \ldots, s_n$, with credence functions $\Pr_{Cr_{s_1}}$, $\ldots$, $\Pr_{Cr_{s_n}}$: the epistemic compromise $\mathrm{EC}_{\mathrm{SA}}[\Pr_{Cr_{s_1}}, \ldots, \Pr_{Cr_{s_n}}]$ is determined as follows:

for all propositions p

$$\mathrm{EC}_{\mathrm{SA}}\big[\underset{Cr_{s_1}}{\Pr}, \ldots, \underset{Cr_{s_n}}{\Pr}\big](p) = \sum_{i=1}^{n}\big[w_i \times \underset{Cr_{s_i}}{\Pr}(p)\big]$$

where each agent's epistemic weight is $w_i \in \mathbb{R}^+$ and for the sum of their weights it holds that $\sum_{i=1}^{n} w_i = 1$ (see, very similarly, Brössel and Eder 2014:2367).[21]

Instead of interpreting the result of the aggregation as the new credence of the agents, I propose to understand it as providing the rational epistemic compromise of the group. According to the *Standard Method of Aggregation*, or *Weighted Straight Averaging*, finding the epistemic compromise amounts to more than just averaging the group member's credences: it also takes the weights of the individual agents into account. As mentioned before, these weights are typically taken to reflect the level of relative competence of the agents in comparison to the other group members' competence (see Brössel and Eder 2014). It is common in social epistemology to focus on peer disagreement, where the agents involved in the disagreement all have the same competence and thus the same weight. *Death-Penalty Example* is a case in point. According to this example by Elga you disagree with a peer, who is a peer in virtue of "being as good as you at evaluating" the relevant claims.[22] It is common to assume that we can distinguish agents' competence in a fine-grained way. I assume that one can assign to each member $s_1, \ldots, s_n$ of a group a precise weight w_i within this group.[23] As mentioned before, this weight reflects the level of *relative* competence of an agent within this group.[24] However, the weight w_i of a group member can be assumed

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[21]This rule or variants thereof are often referred to as the 'Linear Opinion Pooling Rule'.

[22]Alternative accounts of peerhood not only assume that peers are equally competent but also that they share the same total evidence (for such an account, see Grundmann 2019). In this paper, I do not assume that the agents are epistemic peers and that peerhood requires that the agents share the same total evidence.

[23]It is common to use such weights in a formal setting (see, among others, Brössel and Eder 2014, Easwaran et al. 2016, Genest and Zidek 1986, Moss 2011, Pettigrew 2019).

[24]In the context of peer disagreement between agents as individuals, there are approaches according to which it is rational for an agent to move her credence in a proposition towards the credence in the proposition of a peer with whom she disagrees, but to put more weight on her own credences. This way she ends up with a credence closer to her initial credence than to the other peer's initial credence. Within the present formal setting she can do justice to this by assigning more weight to her own credence even though all agents involved are equally competent. (See Elga 2007 and Feldman 2007 for a discussion of what Elga refers to as the *Extra Weight View*, which is in this spirit. But Elga and Feldman do not endorse the view. Enoch 2010 argues for the related *Common Sense View*.) In such a case, the weights do not reflect the level of relative competence alone. Although such an approach might be adequate in the context of disagreement between agents as individuals, it is certainly not adequate in the context of disagreement between agents as members of a group that are supposed to find an epistemic compromise.

to depend on her level of (unrelativized) competence. Suppose for each member s_i of a group one quantifies her level of absolute competence with some number $c_{s_i} \in \mathbb{R}^+$. The weights are then calculated as follows: $w_i = \frac{c_{s_i}}{\sum_{i=1}^{n} c_{s_i}}$. This would ensure that the weights of all members of the group sum to one (i.e., $\sum_{i=1}^{n} w_i = 1$) and that equally competent group members receive the same weight within the group. Note, furthermore, that our assumption that $\sum_{i=1}^{n} w_i = 1$ excludes cases where for all agents s_i: $c(s_i) = 0$ (see also Brössel and Eder 2014:2375). That said, I won't present a general account of competence that tells us for any situation how to measure the unrelativized notion of competence for any situation but I simply assume its existence.

Before I turn to objections to the *Standard Method of Aggregation*, I highlight two important, well-known properties of the method.[25] I will return to them when I discuss the challenges to the *Standard Method of Aggregation* in the subsequent sections.

The first property is characterized by the following:

Irrelevance of Alternatives Consider agents $s_1, \ldots, s_n$ with credence functions $\mathrm{Pr}_{Cr_{s_1}}$, $\ldots, \mathrm{Pr}_{Cr_{s_n}}$. Their epistemic compromise on a proposition p depends only on their individual credences in the proposition p, i.e., $\mathrm{EC}_{\mathrm{SA}}[\mathrm{Pr}_{Cr_{s_1}}, \ldots, \mathrm{Pr}_{Cr_{s_n}}](p)$ is a function of $\mathrm{Pr}_{Cr_{s_1}}(p), \ldots, \mathrm{Pr}_{Cr_{s_n}}(p)$.[26]

Irrelevance of Alternatives seems attractive because it says that in finding an epistemic compromise we do not need to discuss and compromise on any other proposition than the one at hand.

The second well-known property of the *Standard Method of Aggregation* is that the method preserves existing agreement. In particular, if the group members all assign the same credence to a proposition, then the epistemic compromise will settle on the same credence. This is expressed by the following:

Unanimity If all agents $s_1, \ldots, s_n$ with credence functions $\mathrm{Pr}_{Cr_{s_1}}, \ldots, \mathrm{Pr}_{Cr_{s_n}}$ assign the credence r to the proposition p, then their epistemic compromise on p equals r too, i.e., $\mathrm{EC}_{\mathrm{SA}}[\mathrm{Pr}_{Cr_{s_1}}, \ldots, \mathrm{Pr}_{Cr_{s_n}}](p) = r$, if $\mathrm{Pr}_{Cr_{s_i}}(p) = r$, for all $s_1, \ldots, s_n$.[27]

This feature is initially appealing because it is in line with the purpose of finding an epistemic compromise: if the agents already agree on a proposition, applying the *Standard Method of Aggregation* does not change anything.

I cannot think of any reason that would justify putting more weight on the credences of a member of the group in finding a rational epistemic compromise where all members are equally competent. And in our setting, there is no reason to take into account non-epistemic factors that determine the weight of an agent within the group. Here, I assume that the group members' weights represent their relative competence.

[25]For a more detailed discussion of these and further properties, see Brössel and Eder 2014 and, especially, Genest and Zideck 1986, Jehle and Fitelson 2009.

[26]This label of the property is common in the literature (see, for example, Jehle and Fitelson (2009). Sometimes it is also referred to as 'Strong Setwise Function Property'.

[27]'Unanimity' is also the label Jehle and Fitelson (2009) use.

3.3 First Challenge: No Respect for Evidence

In the following, I present a challenge that can be raised against the *Standard Method of Aggregation*. The challenge is to present an account of aggregation that respects the evidence. The *Standard Method of Aggregation* is based on *Standard Bayesianism*, which only takes the doxastic state, the credences, of an agent into account. Since *Standard Bayesianism* ignores the agent's evidential state, it ignores important factors of the epistemic state of the agent.[28] As a first consequence of this, it is not able to accommodate the relevant difference in competence in acquiring and processing evidence. As a second consequence, it is not able to accommodate disagreements involving different total evidence.

Let me start by discussing the first consequence. Consider the following example, which hints at the challenge:

Disagreeing-Physicists Example "[S]uppose, first, theoretical physicist s_1 considers experimental physicist s_2 an expert with respect to gathering evidence, but a fool with respect to the confirmational import of the respective evidence. Accordingly, s_1 would like to assume s_2's evidence, but to ignore s_2's judgement of the confirmational import of the evidence. Or suppose, second, experimental physicist s_3 considers theoretical physicist s_4 a fool with respect to gathering evidence, but an expert with respect to the confirmational import of the given evidence. Accordingly, s_3 would like to ignore what agent s_4 accepts as evidence, but to assume s_4's judgement of the confirmational import of s_3's evidence" (Brössel and Eder 2014:2372; notation adapted).

This example makes clear that one better not ignore the evidential states of the agents—as *Standard Bayesianism* does. We therefore do not focus on the credences of an agent alone. As Weatherson emphasizes: "There are two things we assess when evaluating someone's beliefs [...] we evaluate both their collection and processing of evidence" (Weatherson 2008: 565). If we dropped our idealizing assumption that the evidence is always true, we would have to admit that some agents are better at acquiring evidence, and others are better at processing it. This should also be mirrored in their weights. Accordingly, an agent can receive different weights, one concerning the agent's evidence and another concerning the agent's processing of the evidence. Discussing group disagreement and epistemic compromise in the light of evidence that may not be true goes beyond the scope of this paper. Here, I neglect the weights with respect to the evidential states since I assume that the agents' evidence is true and that the agents are perfectly reliable in acquiring it (see Sect. 3.1.). However, it is a defect of *Standard Bayesianism* that it can't even allow for the difference between the mentioned kinds of weights.[29]

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[28]My criticism is related to Kelly's (2010) criticism of the *Equal Weight View* but different from it. Here is not the room to compare both.

[29]Note that I am not claiming that this difference is ignored in social epistemology in general. It might be standard to make the difference in non-formal epistemology, which does not focus on formally precise accounts.

Let's consider the second consequence of ignoring the agent's evidential state. Members of a group might disagree for different reasons. They might disagree because they judge their evidence differently or because they do not share the same total evidence. An agent who is better informed and has acquired more evidence might have a different credence in a proposition than an agent who is less informed and has less evidence. If the members of a group aggregate their credences, the different total evidence should be considered. Even if the members of the group are equally competent and receive the same weights, the difference in their evidence should be taken into consideration. The *Standard Aggregation Method* does not account for the difference in evidence or, to be more precise, it is not adequate when disagreeing members of a group don't share the same total evidence. According to this method, only the agents' credences in a proposition are aggregated. Recall, the *Standard Method of Aggregation* satisfies *Irrelevance of Alternatives*. According to it, only the credences are aggregated. Due to this the *Standard Method of Aggregation* and *Irrelevance of Alternatives* are not as attractive as they might initially seem.

3.4   Second Challenge: No Synergy

The following challenge is one that has been presented in the context of peer disagreement where agents disagree as individuals; however, it is straightforward to apply it analogously to the *Standard Method of Aggregation* as a method of finding an epistemic compromise. Examples of the following kind motivate the challenge:

Birthday Party Example I   Suppose two peers, Anma and Alma, remember that Peter promised them a year ago that he would come to their birthday party on the weekend. Both know that Peter never breaks a promise, but they do not consider their memory to be infallible. Anma ends up with a credence of .7 that Peter will come to the party. Alma is slightly more confident and assigns credence .9 to the same proposition.[30]

According to epistemologists such as Christensen (2009), Easwaran et al. (2016), and Grundmann (2019), it can sometimes be rational for the disagreeing agents to raise their credence in a proposition even above each of the agents' initial credences[31]; the above example is provided here as a case in support of this position. Roughly put, even though the agents disagree on the exact credence, the fact that they both assign a high credence to the proposition in question makes it rational in the particular situations for them to increase their probability above both their initial credences. This has been considered a synergetic effect. Let me be clear: I do not think that the credences alone determine whether there is a synergetic effect—the circumstances matter. In the example above, there is no doubt

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[30]See Christensen 2009, Easwaran et al. 2016, and Grundmann 2019 for similar examples. Along these lines, Easwaran et al. (2016) argue for a variant of the *Geometric Mean Rule* that does justice to such intuitions. Brössel and myself (2014) discuss a slightly different variant of the *Geometric Mean Rule* that is, in its essence, the same as that of Easwaran et al.. But we reject it based on the rule's synergetic effect.

[31]See Easwaran et al. 2016: Sect.6 for further references to the literature in favor of such synergetic effects.

about whether Peter breaks promises—both know that he does not. The little doubt that Anma and Alma have concerns the reliability of their memory. However, the evidence that the other peer also assigns a high probability to Peter coming to the party provides further evidence that their memory is not failing, which makes it rational for them to increase a credence even above .9. I think this would also hold if both had a credence of .9 that Peter will come to the party. A synergetic effect can seem rational even when the agents share the same credence in a proposition. Thus, a part of the second challenge is that cases like the one above speak against the *Standard Method of Aggregation* and against methods that satisfy *Unanimity*. In particular, contra *Unanimity*, examples such as *Birthday Party Example I* suggest that even in the light of an agreement between two agents, the agents should sometimes increase their probability in a proposition. Applied to epistemic compromises, this has as a consequence that even if the group members already agree, the epistemic compromise might differ from their initial credences.

Another part of the challenge is that there are also cases in which a synergetic effect seems counter-intuitive. I take the following example to be a case in point:

Birthday Party Example II Suppose a few seconds ago, the peers, Anma and Alma, heard Peter promise that he would come to their birthday party at the weekend. Both share the same evidence. They both know that Peter sometimes cannot fulfill his promises and might miss their party. Based on the shared evidence, Anma ends up with a credence of .7 that Peter will come to the party. Alma is slightly more confident and assigns credence .9 to the same proposition.

This example supports that it is not always rational to increase one's probability above both the initial credences even when they are high. Both agents are aware that circumstances might be such that they prevent Peter from attending the party. This time, the doubt does not concern the reliability of Anma's and Alma's memories, for they know for certain that Peter just made the promise and that the other person heard it too. That they both agree that such circumstances are unlikely is, in that case, not a reason to increase the probabilities for them even further. If this is correct, it also means that it cannot be a function of the agents' credences whether or not a synergetic effect is rational. In *Birthday Party Example I* and *II*, both agents have high credences in the proposition in question, and in only one example does it seem plausible that both agents should increase their probability above both their initial credences. The challenge is to answer the question of how agents can rationally increase their probability above their initial credences in the face of disagreement, and the answer should not exclusively depend on the agents' credences. In both examples, the distribution of credences is the same, but the examples call for different verdicts. The *Standard Method of Aggregation* exclusively considers the credences of the disagreeing agents, thus *Irrelevance of Alternatives* holds for it. However, in light of both examples, this does not seem appropriate.

4 An Alternative Method of Aggregation

The discussion of both challenges indicates that we are in need of an alternative method of aggregation that considers factors additional to the agents' credences. The *Standard Method* cannot meet the challenges. From the discussion of the challenges, it is apparent that we need a more fine-grained representation of epistemic states, which does not exclusively consider the credences of agents. I follow Brössel and Eder 2014, and Eder and Brössel 2019, in suggesting such a representation of epistemic states: *Dyadic Bayesianism*. Since the framework is non-standard in epistemology in general and in social epistemology in particular, I will spend some time introducing it, and comparing it with Levi's (1974/2016, 1980, and 2010) similar representation of epistemic states to which it traces back. Subsequently, I propose what I refer to as the *Fine-Grained Method of Aggregation*.

4.1 Dyadic Bayesianism

Dyadic Bayesianism represents different factors of agents' epistemic states that are relevant for finding a well-informed epistemic compromise. Let's start with the following example by Elga, which displays such factors:

Weather Forecaster Example "When it comes to the weather, I completely defer to the opinions of my local weather forecaster. [...] In treating my forecaster this way, I defer to her in two respects. First, I defer to her *information*: 'As far as the weather goes,' I think to myself, 'she's got all the information that I have—and more.' Second, I defer to her *judgment*: I defer to the manner in which she forms opinions on the basis of her information" (Elga 2007: 479).

The example shows that the following factors concerning an agent's epistemic state are relevant: the agent's evidence and how the agent reasons on the basis of the evidence. The following framework takes these factors into account:

Dyadic Bayesianism "An agent s's (rational) epistemic state is

1. a dyad/ordered-pair $\text{ES}_s = \langle \text{Pr}_{R_s}, tev_s \rangle$ consisting of (i) s's [rational] reasoning commitments, Pr_{R_s}, and (ii) s's total evidence, tev_s, such that
2. s's [rational] credences are as follows: $\text{Pr}_{Cr_s}(p) = \text{Pr}_{R_s}(p|tev_s)$, and
3. both Pr_{Cr_s} and Pr_{R_s} obey the probability calculus" (Brössel and Eder 2019:69).

An agent's (rational) epistemic state is represented by, first, the agent's rational *reasoning commitments* and, second, the agent's *total evidence*. Rational credences are then equated with reasoning commitments conditional on the total evidence. This framework is inspired by, and in many respects similar to, Levi's framework for representing epistemic states: he distinguishes between total evidence and confirmational commitments (see, e.g., Levi 1974/2016, 1980, 2010). Discussing crucial similarities and differences between these accounts will clarify *Dyadic Bayesianism* and what it owes to Levi's.[32]

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[32]For related frameworks and discussions see Brössel 2012, Hawthorne 2005, Lange 1999, Schurz 2012,

Reasoning Commitments and Levi's Confirmational Commitments

An agent's (rational) reasoning commitments, as I understand them, are captured by a probability function that reflects the agent's (rational) commitments concerning which (rational) credences to adopt on the basis of bodies of total evidence.[33] That is, they reflect how to reason from the evidence. In some sense, my reasoning commitments can be understood as bearing a close similarity to Williamson's (2000) objective evidential probabilities and Carnap's (1950) logical probabilities. However, reasoning commitments are understood in a more subjective fashion. According to Williamson, objective evidential probabilities measure "something like the intrinsic plausibility of hypotheses prior to investigation" (2000:211). The objective evidential probability of a proposition, or hypothesis, on some evidence, reflects the plausibility of the proposition given the evidence, before the evidence is acquired. For Carnap, logical probabilities represent the logical plausibility of a proposition given the evidence in question. The logical probability of the proposition given the evidence reflects a logical or *a priori* relation between the evidence and the proposition.[34] One can understand the reasoning commitments in a similar way, except that they are subjective evidential probabilities that measure the "intrinsic plausibility of hypotheses prior to investigation" as subjectively judged by the agent. Note that, as with credences or credence functions, I do not assume that there is a unique rational reasoning commitment function. Reasoning commitments also reflect how agents are committed to processing their evidence, i.e., what credences to adopt on various evidential bases. In particular, the reasoning commitments concerning a proposition conditional on some total evidence reflects the agent's subjective judgment of the evidential support provided by the evidence for the proposition. The reasoning commitment concerning a proposition conditional on some total evidence is tightly linked to the plausibility of the proposition given the evidence prior to any investigation and prior to acquiring any evidence. (Connoisseurs of Carnap and Levi might notice that my account is in this respect more in line with Carnap than with Levi (cf. Levi 2010:Sect.7). Note that for Levi, judgments of evidential support make sense only when they concern an expansion of the agent's total evidence, i.e, the agent's full belief. However, we are not concerned with full belief here.)

Reasoning commitments reflect "the judgements of the confirmational import of the evidence, which capture how agents justify their credences" (Brössel and Eder 2014: 2373). Reasoning commitments play an important role for agents in justifying their credences. For justifying one's credence in a proposition, one states one's evidence and the reasoning commitments that lead to the credence. And when we criticize someone's credences as unjustified, we can trace them back to either their evidence or their reasoning commitments (or both). Similarly, Carnap (1950) envisioned that we would use logical probabilities to

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and Unterhuber and Schurz 2013. Unfortunately, there is no room here to deal with those frameworks and discussions.

[33]Here Levi and I agree, see the next paragraph.

[34]For literature on Carnap's logical probabilities, see Hájek 2019, Leitgeb and Carus 2020, Levi 2010, and Maher 2006.

justify credences. Accordingly, one's credence would be justified by stating one's evidence and by referring to the logical probability of the proposition conditional on the available evidence.

Levi characterizes confirmational commitments as rules that do not need to be understood or represented as probabilities:

> X's state of full belief **K** cannot, in general, determine X's state **B** of credal probability judgements by itself. It needs to be supplemented by what I call a "confirmational commitment" (Levi 1974, 1979, 1980, Chap. 4) which is a rule specifying for each potential state of full belief relevantly accessible to X what X's credal state should be, when X is in that set of full belief. (Levi 2010: 99)

Analogous to my position concerning reasoning commitments, Levi assumes that confirmational commitments determine an agent's credal state. In particular, an agent's credal state is determined by the agent's full beliefs and her confirmational commitments.

It is noteworthy that reasoning commitments, as well as confirmational commitments, can change over time. Sometimes such changes are adequate when agents face disagreement with other agents, and the evidence about the disagreement indicates that one had better change one's reasoning commitments. (See Levi 2010 for changes in confirmation commitments upon facing disagreement and Brössel and Eder 2014 for such changes in reasoning commitments upon facing disagreement.)

A main difference between reasoning commitments and Levi's confirmational commitments is that confirmational commitments are rules that assign a set of probability functions to each logically closed set of full beliefs. I assume reasoning commitments are a single probability function, a position that Levi rejects (Levi 2010: 102).

Credences and Levi's Credal States

As mentioned several times, according to *Dyadic Bayesianism*, agents' credences are determined by the agents' reasoning commitments and their total evidence. Similarly, for Levi, agents' credal states are determined by the agents' confirmational commitments and their total evidence. However, for Levi (2010) an agent's credal state is *a set* of conditional probability functions defined for all pairs of propositions $\langle p, q \rangle$ such that p is a proposition and q is a proposition compatible with the agent's total evidence. For me, an agent's credal state is (represented by) a single probability function.

A Merit of *Dyadic Bayesianism*

Following many epistemologists engaged in this debate, I have focused on doxastic disagreement. In Section 2.2, I characterized it as a mismatch between the doxastic states of agents toward a proposition. Unfortunately, the literature tends to neglect other kinds

of relevant mismatches. Doxastic disagreement is not the only form of mismatch relevant for finding an epistemic compromise. A merit of the current approach, and of *Dyadic Bayesianism* in particular, is that it allows us to distinguish different kinds of mismatches. In addition to doxastic disagreement, agents might have different reasoning commitments; I refer to such mismatches as 'reasoning mismatches'. (Recall *Birthday Party Example II*. This example reveals a reasoning mismatch between Anma and Alma. They have the same total evidence, but they process it differently—which is reflected in different reasoning commitments—and, thus, end up having different credences.) Agents might also have different evidence. I refer to such a mismatches as 'evidential mismatches' (see similarly Brössel and Eder 2014:2373, where we use the term 'disagreement' instead of 'mismatch'). These two additional notions of mismatch allow us to more thoroughly analyze the potential reasons for doxastic disagreement. Agents are in doxastic disagreement because they are in evidential mismatch or because they are in reasoning mismatch. Note, however, that agents might be in doxastic *agreement* and still be in evidential or reasoning *mismatch*. Consider, for example, cases where we doxastically agree with a colleague with respect to a proposition but have different reasoning commitments that lead to the doxastic agreement.[35] It is not possible to do justice to such a case within *Standard Bayesianism*, and it is a merit of *Dyadic Bayesianism* that it makes it possible to model the mentioned sources of doxastic disagreement as well as the various mismatches that might underlie doxastic agreement.

4.2 The Fine-Grained Method of Aggregation

In *Dyadic Bayesianism*, the framework advocated here, an agent's (rational) evidential state and (rational) reasoning commitments together determine the agent's (rational) credences. Thus, as mentioned before, when the members of a group doxastically disagree with each other, this is so because they are either in evidential mismatch or in reasoning mismatch. These mismatches are then the source of the doxastic disagreement. Instead of merely aggregating the credences of the agents in order to find an epistemic compromise, what needs to be aggregated are their evidential states and their reasoning commitments. The epistemic compromise concerning a proposition is then the result of both aggregations.

Aggregating Evidential States

As a first step to finding an epistemic compromise, group members need to come to a compromise concerning their evidential states. Given the strong idealizing assumption that we introduced in the previous subsection, coming to such an epistemic compromise is straightforward. I assumed that the group members are fully reliable in collecting evidence. Recall that I assume that they only receive true propositions as evidence (see Sect.3.1). As

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[35]This difference in reasoning commitments may also yield doxastic disagreement about higher-order propositions, e.g., propositions about which reasoning commitments or ways of processing evidence are more adequate. However, this disagreement about higher-order propositions would be different to a disagreement with respect to the original proposition in question or to the reasoning mismatch.

a consequence, the evidential states of all agents are true and they are logically compatible with each other. Given this assumption, it is rational for the group members to accept each others' pieces of evidence (cf. *Disagreeing-Physicists Example* and *Weather Forecaster Example*). The aggregated evidential state is the conjunction of the members' evidential states.[36] As a consequence, if the members share the same total evidence, then the aggregated evidential state is just this shared evidence. The members' total evidence is not double-counted since the conjunction of the members' total evidence is logically equivalent to each member's total evidence. A further consequence is that if a group member receives a piece of evidence, then the whole group would accept this piece of evidence.

Method for Aggregating Evidential States Consider agents $s_1, \ldots, s_n$, with epistemic states $\text{ES}_1, \ldots, \text{ES}_n$ and corresponding evidential states $tev_{s_1}, \ldots, tev_{s_n}$. Then the compromise for the evidential states of the group $\text{EC}_{\text{ES}}[tev_{s_1}, \ldots, tev_{s_n}]$ is determined as follows:

$$\text{EC}_{\text{ES}}[tev_{s_1}, \ldots, tev_{s_n}] = tev_{s_1} \wedge \ldots \wedge tev_{s_n}$$

The idealizing assumptions that lead to this method for aggregating evidential states are strong. They need to be relaxed, and this would lead us to use a more nuanced method for aggregating evidential states. Konieczny and Pino Pérez (2011) introduce and discuss various merging operators that deal with conflicting bodies of evidence. To my knowledge, probability-based methods for aggregating evidential states have not been discussed in literature on disagreement.[37] To discuss them, however, is a task for another time.

Aggregating Reasoning Commitments

In addition to a method for aggregating evidential states, we need a method for aggregating reasoning commitments. Following Brössel and Eder 2014, I propose to aggregate reasoning commitments as follows:

Method of Aggregating Reasoning Commitments Consider agents $s_1, \ldots, s_n$, with epistemic states $\text{ES}_1, \ldots, \text{ES}_n$ and corresponding reasoning commitments $\text{Pr}_{R_{s_1}}, \ldots, \text{Pr}_{R_{s_n}}$: the epistemic compromise concerning the reasoning commitments $\text{EC}_{\text{R}}[\text{Pr}_{R_{s_1}}, \ldots, \text{Pr}_{R_{s_n}}]$ for all propositions p is determined as follows:

$$\text{EC}_{\text{R}}[\underset{R_{s_1}}{\text{Pr}}, \ldots, \underset{R_{s_n}}{\text{Pr}}](p) = \sum_{i=1}^{n} w_i \times \underset{R_{s_i}}{\text{Pr}}(p)$$

where $w_i \in \mathbb{R}^+$ and $\sum_{i=1}^{n} w_i = 1$.

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[36]Things are more complicated when we do not assume that the evidence is true. Unfortunately, here is not the room to develop a formally precise account of aggregation of evidential states that works without this assumption.

[37]Such methods should be able to deal with uncertain evidence, that is, evidence we are not certain of. The latter kind of evidential input is the input required for Jeffrey conditionalization.

The weights w_i in this method are best understood as reflecting the level of relative competence of an agent concerning how the agent reasons on the basis of various possible evidential states. As an example of someone who is highly competent in this regard, consider our (theoretical) physicist who can judge the evidential import of various pieces of evidence better than her colleagues. Such a physicist might be assigned a high weight regardless of whether she collects evidence herself.

According to the method, the reasoning commitments of the group members are aggregated into a single probability function. The result is considered to be the epistemic compromise concerning how to reason on the basis of various potential evidential states.[38]

Epistemic Compromise

The two aggregation methods together provide us with an epistemic compromise concerning the epistemic states of the group members. It is determined as follows:

Fine-Grained Method of Aggregation Consider agents $s_1, \ldots, s_n$, with epistemic states $\mathrm{ES}_{s_1}, \ldots \mathrm{ES}_{s_n}$: the epistemic compromise $\mathrm{EC}[\mathrm{ES}_{s_1}, \ldots, \mathrm{ES}_{s_n}]$ is determined as follows:

$$\mathrm{EC}[\mathrm{ES}_{s_1}, \ldots, \mathrm{ES}_{s_n}] = \langle \mathrm{EC}_{\mathrm{R}}[\Pr_{R_{s_1}}, \ldots, \Pr_{R_{s_n}}], \mathrm{EC}_{\mathrm{ES}}[tev_{s_1}, \ldots, tev_{s_n}] \rangle$$

In what follows, I discuss how the new method for finding an epistemic compromise deals with the mentioned objections.

4.3   Respect for Evidence

A challenge that the *Standard Method of Aggregation* does not adequately meet is to respect the evidence of the disagreeing members of a group. It cannot respect it because it focuses only on the (rational) credences of the agents. This is so because it is based on *Standard Bayesianism*, which does not differentiate between evidence, (rational) reasoning commitments, and (rational) credences.

The *Fine-Grained Method of Aggregation* is based on a framework for representing epistemic states that is fine-grained in the sense that it differentiates between evidence, reasoning commitments, and credences, i.e., *Dyadic Bayesianism*. Consequently, the method allows us to take the difference between evidence, reasoning commitments, and credences

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[38]Lasonen-Aarnio 2013 briefly considers views such as the one presented here and in Brössel and Eder 2014, and a similar view by Rosenkranz and Schulz 2015; however, she ultimately rejects them, among other reasons because she believes "the resulting views raise a plethora of technical worries. For instance the kinds of updates may not leave [the agents] with a probabilistically coherent function" (Lasonen-Aarnio 2013: 782). At least some of the technical worries can be overcome by the view presented here and in Brössel and Eder 2014. I leave a discussion of her arguments against positions such as ours for another occasion, and here concentrate on demonstrating the merits of our view.

into account. One can aggregate the evidence of the agents who are required to find an epistemic compromise while considering their competence in acquiring evidence. At the same time, one can separately aggregate the reasoning commitments of the agents, taking into account their competence in responding to the evidence. Once one has the evidence and the reasoning commitments aggregated, one also has the epistemic compromise as a result.

As a further consequence, the *Fine-Grained Method of Aggregation* can be employed to find an epistemic compromise even when the disagreeing members of a group do not share the same total evidence. If, as we assumed, the group members' evidence only includes true propositions, they can accumulate their evidence to obtain a larger body of evidence. This method respects the evidence of each group member.

4.4   No Synergy

The second challenge is to answer the question of how agents can rationally increase their probability above their initial credences in the face of disagreement, and the answer should not exclusively depend on the agents' credences. The *Standard Method of Aggregation* cannot meet the challenge, because it is built on a framework for representing epistemic states that focuses solely on credences. According to it, the new probability (i.e., the epistemic compromise) is between the initial credences. Contra the *Standard Method of Aggregation*, the answer to the challenge should not depend exclusively on the agent's credences. In Section 3.4, I presented two examples of disagreement that involve the same credence distributions: *Birthday Party Example I* and *II*. Only in one of them did increasing the probability above the initial credences seem rational for the agents.

Based on the *Fine-Grained Method of Aggregation*, I propose the following to meet the challenge: the differentiating feature between both examples is the evidence. In some situations, if a member of a group learns that the other members have additional pieces of evidence in support of a proposition that the member does not have, the member acquires extra evidence in support of the proposition: evidence of evidence. According to Feldman's slogan, evidence of evidence is evidence. Although the slogan is not always correct,[39] in those cases in which evidence of evidence is evidence (for some proposition), it can provide a reason to agree to an epistemic compromise above the initial credences of the group members. This evidence of evidence would provide extra evidence for the proposition in question. The resulting evidential states are aggregated and allow for a synergetic effect.

In contrast, imagine members of a group who disagree concerning a proposition and share the same total evidence. Imagine furthermore that by revealing the doxastic disagreement, the members do not receive any evidence of evidence in support of the proposition. Since the members share the same total evidence and have different credences in the proposition

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[39]See Eder and Brössel 2019.

in question, they just learn that the reasoning commitments are different. However, that the members judge the evidential support provided to the proposition in question differently provides no reason for adopting more extreme reasoning commitments that assign an even higher credence to the proposition. There is no reason to change the evidential states. The result of the aggregation of the evidential states is the same as the members' initial total evidence. And according to our *Method for Aggregating Reasoning Commitments*, the result of the aggregation of the different initial reasoning commitments is between them. Consequently, the epistemic compromise is also between the group members' initial credences.[40] I cannot think of a reason that allows for a synergetic effect in such a case.

In the following, I illustrate the answer to the second challenge by applying it to our two examples: *Birthday Party Example I* and *II*.

First, consider *Birthday Party Example I*. For both agents, Anma and Alma, it is each one's memory that is the relevant evidence that supports high credence in the proposition that Peter will attend their joint birthday party at the weekend. In disclosing the disagreement, the agents receive evidence that the other agent also remembers Peter making the promise: this is the relevant evidence of evidence. The fact that they both remember him making the promise is what provides extra evidence for assuming that Peter indeed promised he would come to the party. And since they know that Peter keeps his promises, it is rational to increase the probability of Peter's attendance above both initial credences. Learning that different pieces of evidence, i.e., different memories, support the same proposition is why it is rational for both agents to increase the probability above their initial credences. Imagine there were more group members who remembered Peter making the promise: this would provide more evidence for the group in support of Peter's attendance. Since he always keeps his promises, the group would be rational in assigning a very high probability, a probability higher than the group member's initial credences, in the proposition that Peter will attend Anma and Alma's joint birthday party.

Now consider *Birthday Party Example II*. Here, both agents have the same total evidence—a few seconds ago, Peter promised he would come to Anma and Alma's joint birthday party. Anma and Alma do not fully rely on Peter's promise. They know that circumstances might prevent him from attending the party. Their predictions differ only slightly. In disclosing the disagreement, the agents do not receive relevant evidence of evidence in support of the proposition in question. There is no reason to add something to their evidential states that supports the proposition. The aggregation of the shared evidential state results in the same evidential state. That Anma has reasoning commitments that assign a credence of .7 to the proposition that Peter will attend Anma and Alma's joint birthday party at the weekend, and that Alma assigns a credence of .9, is not a reason for them to assume reasoning commitments that commit them to an even higher probability. And even if more and more agents had similar reasoning commitments, this would not be a reason to adopt reasoning

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[40]See Brössel and Eder 2014:2380.

commitments that make it certain that Peter will come—after all, everyone agrees that Peter does not always keep his promises. The result of the aggregation of the reasoning commitment is between the initial reasoning commitments, and the same holds for the credences (recall there is no change in evidential states). No synergetic effect arises.

5 Conclusion

In this paper, I have focused on revealed, fine-grained disagreement among members of a group who are required to find a rational epistemic compromise. A promising way of finding such a compromise is by aggregating the members' epistemic states. *Standard Bayesianism* focuses on the agents' credences and represents the credences as probabilities; and the *Standard Method of Aggregation* aggregates the credences, or probabilities. I discussed challenges to that method: first, it does not respect the evidential state of agents, which, however, is crucial for finding an epistemic compromise. Second, it is not able to account for cases with synergetic effects, where the epistemic compromise is not to be found between the agents' credences. The method that I propose, the *Fine-Grained Method of Aggregation*, is able to meet the challenges adequately.

References

[1] Brössel, P. 2012. *Rethinking Bayesian Confirmation Theory*. PhD thesis, University of Konstanz.

[2] Brössel, P. and Eder, AM.A. 2014. How to resolve doxastic disagreement. *Synthese* 191:2359-2381.

[3] Carnap, R. 1950. *Logical Foundations of Probability*. University of Chicago Press.

[4] Christensen, D. 2004. *Putting Logic in its Place*. Oxford University Press.

[5] Christensen, D. 2007. Epistemology of disagreement: The good news. *Philosophical Review* 116:187-217.

[6] Christensen, D. 2009. Disagreement as evidence: The epistemology of controversy. *Philosophy Compass* 4:756-767.

[7] Easwaran, K. et al. 2016. Updating on the credences of others: disagreement, agreement and synergy. *Philosophers' Imprint* 16:1-39.

[8] Easwaran, K. and Fitelson, B. 2015. Accuracy, coherence, and evidence. *Oxford Studies in Epistemology* 5:61-96.

[9] Eder, AM.A. 2019. Evidential probabilites and credences. *The British Journal for the Philosophy of Science*. URL = <https://doi.org/10.1093/bjps/axz043>.

[10] Eder, AM.A. and Brössel, P. 2019. Evidence of evidence as higher order evidence. In: M. Skipper and A. Steglich-Petersen (eds.), *Higher-Order Evidence: New Essays*, Oxford University Press:62-83.

[11] Elga, A. 2007. Reflection and disagreement. *Noûs* 41:478-502.

[12] Enoch, D. 2010. Not just a truthometer: taking oneself seriously (but not too seriously) in cases of peer disagreement. *Mind* 119:953-997.

[13] Feldman, R. 2007. Reasonable religious disagreements. In: L. Antony (ed.), *Philosophers Without God: Meditations on Atheism and the Secular Life*. Oxford University Press:194-214.

[14] Frances, B. and Matheson, J. 2019. Disagreement. In: E.N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2019 Edition), URL = <https://plato.stanford.edu/archives/win2019/entries/disagreement/>.

[15] Genest, C. and Zidek, J. 1986. Combining probability distributions: A critique and annotated bibliography. *Statistical Science* 1:114-135.

[16] Goldman, A. and O'Connor, C. 2019. Social Epistemology. The Stanford Encyclopedia of Philosophy (Fall 2019 Edition), E.N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2019/entries/epistemology-social/>.

[17] Grundmann, T. 2013. Doubts about Philosophy? The Alleged Challenge from Disagreement. In: T. Henning and D. Schweikard (eds.), *Knowledge, Virtue, and Action: Putting Epistemic Virtues to Work*, Routledge:72-98.

[18] Grundmann, T. 2019. How to respond rationally to peer disagreement: The preemption view. *Philosophical Issues* 29:129-142.

[19] Hájek, A. 2019. Interpretations of Probability. In: E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Fall 2019 Edition), URL = <https://plato.stanford.edu/archives/fall2019/entries/probability-interpret/>.

[20] Hawthorne, J. 2005: Degree-of-belief and degree-of-support: why Bayesians need both notions. *Mind* 114:277-320.

[21] Jehle, D. and Fitelson, B. 2009. What is the "Equal Weight View"? *Episteme* 6:280-293.

[22] Kelly, T. 2010. Peer Disagreement and Higher Order Evidence. In: R. Feldman and T. Warfield (eds.), *Disagreement*. Oxford University Press:111-174.

[23] Kelly, T. 2014. Evidence can be permissive. In M. Steup et al. (eds.), Contemporary Debates in Epistemology. Blackwell Publishers:298-312.

[24] Konieczny, S. and Pino Perez, R. 2011. Logic based merging. *Journal of Philosophical Logic* 40:239-270.

[25] Kopec, M. and Titelbaum. M. 2016. The uniqueness thesis. *Philosophy Compass* 11:189-200.

[26] Lackey, J. 2010. What should we do when we disagree? In: T. Szabó Gendler and J. Hawthorne (eds.), *Oxford Studies in Epistemology* Vol.3. Oxford University Press:274-293.

[27] Lange, M. 1999. Calibration and the epistemological role of Bayesian conditionalization. *The Journal of Philosophy* 96:294-324.

[28] Lasonen-Aarnio, M. 2013. Disagreement and evidential attenuation. *Noûs* 47:767-794.

[29] Leitgeb, H. and Carus, A. 2020. Rudolf Carnap. In: E.N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2020 Edition), URL = <https://plato.stanford.edu/archives/spr2020/entries/carnap/>.

[30] Levi, I. 1974/2016. On indeterminate probabilities. In: H. Arl–Costa, V.F. Hendricks, and J. Van Benthem (eds.), *Readings in Formal Epistemology*. Springer:107-129.

[31] Levi, I. 1979. *Serious possibility. Essays in Honour of Jaakko Hintikka*. Reidel.

[32] Levi, I. 1980. *The Enterprise of Knowledge: An Essay on Knowledge, Credal Probability, and Chance*. MIT Press.

[33] Levi, I. 2010. Probability Logic, logical probability, and inductive support. *Synthese* 172:97-118.

[34] Lewis, D. 1980. A subjectivist's guide to objective chance. In: R.C. Jeffrey (ed.), *Studies in Inductive Logic and Probability* Vol. 2. University of California Press:263-293.

[35] List, C. 2012. The theory of judgment aggregation: an introductory review. *Synthese* 187:179-207.

[36] List, C. and Pettit, P. 2002. Aggregating sets of judgments: an impossibility result. *Economics and Philosophy* 18:89-110.

[37] List, C. and Pettit, P. 2004. Aggregating sets of judgments: two impossibility results compared. *Synthese* 140:207-235.

[38] MacFarlane, J. 2009. Varieties of Disagreement. http://johnmacfarlane.net/varieties.pdf. (Accessed March 20, 2020.)

[39] Maher, P. 2006. The concept of inductive probability. *Erkenntis* 65:185-206.

[40] Moss, S. 2011. Scoring rules and epistemic compromise. *Mind* 120:1053-1069.

[41] Pettigrew, R. 2019. On the accuracy of group credences. *Oxford Studies in Epistemology* 6.

[42] Rosa, L. 2018. Uniqueness and permissiveness in epistemology. *Oxford Bibliographies.*

[43] Rosenkranz, S. and Schulz, M. 2015. Peer disagreement: A call for the revision of prior probabilities. *Dialectica* 69:551-586.

[44] Schurz, G. 2012. Tweety, or why probabilism and even Bayesianism need objective and evidential probabilities. In: D. Dieks et al. (eds.), *Probabilities, Laws, and Structures. The Philosophy of Science in a European Perspective, vol 3.* Springer.

[45] Titelbaum, M. 2015. Rationality's fixed point (or: in defense of right reason). In: T. Szabó Gendler and J. Hawthorne (eds.), *Oxford Studies in Epistemology* Vol.5. Oxford University Press:253-294.

[46] Unterhuber, M. and Schurz, G. 2013. The new tweety puzzle: Arguments against Monistic Bayesian approaches in epistemology and cognitive science. *Synthese* 190:1407-1435.

[47] Van Fraassen, B. 1984. Belief and the will. *The Journal of Philosophy* 81:235-256.

[48] Wagner, C. 2010. Jeffrey conditioning and external Bayesianity. *Logic Journal of the IGPL* 18: 336-345.

[49] Weatherson, B. 2008. Deontology and Descartes's Demon. *The Journal of Philosophy* 105:540-569.

[50] White, R. 2005. Epistemic permissiveness. *Philosophical Perspective* 19:445-459.

[51] White, R. 2014. Evidence cannot be permissive. In: M. Steup et al. (eds.). *Contemporary Debates in Epistemology.* Wiley Blackwell:312-323.

[52] Williamson, T. 2000. Knowledge and Its Limits. Oxford University Press.