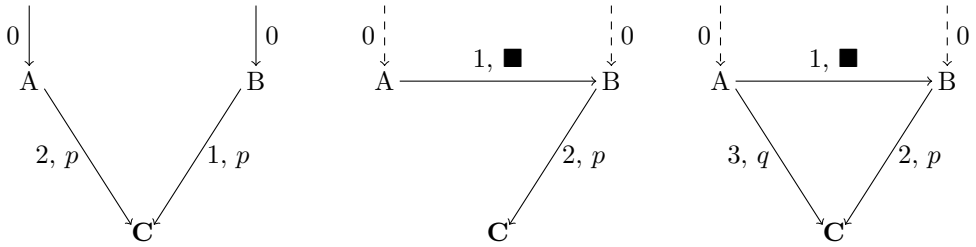
Some puzzles concerning the credences of others

Information aggregation is a booming field. The fundamental question is how one should update one's beliefs given the judgments of others. The literature has developed a range of pooling mechanisms, the best known of which is taking the weighted average of judgments, where the weights represent a level of expertise (Easwaran et al., 2016; Feldbacher-Escamilla and Schurz, 2019). So far, the literature mainly relied on techniques from information theory and computer science. I explore how far one gets by approaching them as logical puzzles. This perspective switch turns out to be a philosophically fruitful way of approaching Bayesian epistemology.

Let us set the stage for some puzzles. Consider Alice, Bob and Cecil. They have common priors and there is common knowledge about this. Suppose that the issues under consideration are fully determined by a Borel space $(\Omega, \mathfrak{X})$. $\mathbb{P}_A$, $\mathbb{P}_B$ and $\mathbb{P}_C$ are the respective credences of Alice, Bob and Cecil over this Borel space and which are the same at the outset –as mentioned above. We will use diagrams to represent the testimonial flow.

A diagram outlines the perspective of the protagonist, the agent represented by the bold letter. *In casu*, this is Cecil. Lines coming out of nowhere denote observations, with dashed lines denoting uncertain observations and full lines denoting classic, crisp observations. We assume moreover that agents acquire their evidence independently. Full lines between agents represent the passing of testimony in the direction indicated by the arrow. Their testimonies concern honest judgments with regards to events, which are indicated by 1) a label indicating the content of the testimony and 2) a number indicating the order of the unfolding events. Lines with the same numbers occur simultaneously. We use a black box to mark when the contents of a testimony are hidden from the protagonist. The diagrams in Figure 1 exemplify the goings-on.



(a) Alice and Bob testify to Cecil independently of each other.

(b) Alice testifies to Bob and Bob testifies to Cecil afterwards.

(c) First Alice testifies to Bob, then Bob testifies to Cecil and finally Alice testifies to Cecil

Figure 1: Some puzzles

I argue for the following analyses.

1. The first example (from Figure 1a) can easily be analyzed by expanding the σ-algebra $\mathfrak{X}$. Examples such as these seem to indicate that we need Bayesian accounts with memories as suggested by Skyrms (1983).

2. This scenario can be understood by something I call *vicarious updating*. The key idea is that one agent can reason about the process by which another agent learns and subsequently uses this information to update their credences. For instance in Figure 1b, Cecil

can reason as follows: given that Bob had a prior identical to mine, I should always draw the same conclusions as Bob when confronted with the same evidence. This means that I should copy Bob's new credences.

3. The is scenario can be understood through *outdated evidence*. Consider Figure 1c. By the time we get direct access to Alice's credences, that information is already fully incorporated into our credences via Bob's testimony –more specifically, by updating vicariously on Bob's testimony. This means that it would be irrational for Cecil to change his beliefs in any way based on Alice's testimony. This is why the evidence is outdated.

On a more philosophical note, I argue that a plurality of perspectives on these issues is the best way to go. In reality there is cornucopia of ways in which we are confronted with the credences of others. The background information at our disposal for drawing conclusions from the revealed information also varies wildly. We might, for instance, only have an estimate of the level of expertise of the forecasters, or we might have an idea about how they have acquired their information. Hence, it would be strange to expect one method that covers them all.

References

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