PHILOSOPHERS' BRAINS BRAINS neural correlates of philosophical belief

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Summary

The community that includes academic philosophers hosts a diversity of beliefs. That such a variety of beliefs exists when philosophers have similar environmental stimuli and similar methodological standards would be surprising *if* philosohers were all working with the same biological hardware. However, this is not the case. Like any population of people, biological diversity exists in the population known as philosophers. So would it be surprising if philosophers' biological diversity correlated with some of their philosophical diversity? In the paper which inspired this poster, I propose that neurobiological diversity in particular might have something to do with philosophical diversity. This poster serves as an outline of that proposal as well as a call to research the intracranial narrative behind the veil of philosophers' reported beliefs and judgments.

Fortunately, research has already begun on the intracranial correlates of *some* beliefs: there exist, for example, differential correlations of self-reported political [2, 9] and epistemological positions [5]. Should these correlations manifest in the brains of students and in the general public, then they might also manifest in the brains of philosophers. Certainly differential correlates of belief in the general public are no less interesting than the possibility of differential correlates of belief in philosophy.

"So why start with philosophers?" you ask? Because philosophers pride themselves in their ability to navigate the most intellectually treacherous terrain with austerity, impartiality, rationality and the reliable inferences of formal logic. Admittedly, their logically calculative approach can only get them so far. At some point, stalemates emerge—and philosophers can remain steadily divided despite generations of parley. What matters is that philosophers impose a certain set of standards on their own work. As a result, they are, presumably, less prone than the general public to be swayed by rhetoric, poor thinking, or emotional attachments. Thus it could be argued that their beliefs represent maximal intellectual honesty. And since we rely on philosophers to impose these controls on themselves, they are, in at least one way, the ideal subjects for experiment concerning these stalemates. For that reason, I call for research on the matter.

But there is another reason. Suppose neural correlates of the beliefs that perpetuate these philosophical stalemates exist. Say, one side of the stalemate has such-and-such a neural property in such-and-such a context and the other does not. Assuming this property is duplicated and accepted as what accounts for the division (even if only necessarily and not sufficiently), then we might have an instance of philosophers disagreeing for what I would call "pre-philosophical" reasons. And should philosophers disagree for these reasons, then there might be something deeply problematic about philosophy. After all, it is a general rule among philosophers that they ought to believe things for good philosophical reasons (e.g. the impartial, calculated, logically valid reasons above-mentioned). When philosophers believe things for other reasons, they venture into territory that has been called "bad philosophy" or "dogma." In order to assess the likelihood of this risk, it is important to learn all the possible bad philosophical reasons that philosophers' could be reporting their beliefs and judgments. Should neural differences account for some of the differences in philosophers' beliefs, and should the neural differences be discernable, then these neural differences might count among the pre-philosophical or bad philosophical reasons that threaten good philosophy.

A couple disclaimers might be in order. First, I am not suggesting that neural properties cause, unidirectionally, the beliefs and judgments with which they correlate. Second, I am not suggesting that the current set of beliefs and judgements among philosophers have been selected for.

On the remainder of this poster, I reference the conclusions of various studies and offer examples of what these conclusions might suggest about populations of philosophers. Keep in mind that with limited space, one can only fit so much detail, and with limited published research on this topic, one might need to use one's imagination. For a more robust articulation of this poster, use the QR code on the bottom right or request a copy of the paper that inspired this poster from nick.a.byrd@gmail.com.

Nick Byrd at The University of Colorado, Boulder

Temporal Parietal Junction

The right and left temporal parietal junction (TPJ-R and TPJ-L, respectively) are specially active when subjects are thinking about and reporting what they take to be the beliefs of others during theory of mind (ToM) testing [3]. However, the activity of the TPJ hemispheres is asymmetric. Both the TPJ-R and TPJ-L are sensitive to processing true and false beliefs, but the TPJ-L is also concerned with misinformation and non-ToM cases of perspective differences [1]. Since perspective differences rely heavily in the TPJ, we might wonder if philosophers who espouse solipsism would manifest differential neural correlates in their TPJ when making solipsist judgments. We might also wonder if the TPJ is saliently active when someone argues that someone else is a zombie.

Caudate & DL/VL Prefrontal Cortex

There exist positive associations between both performance on the Stroop Color Word Test and performance on logical reasoning tests and binding of the serotonin transporter (SERT) protein in the right-sided dorsolateral prefrontal cortex (DLPFC), the caudate (most prominent on the left side), and the left-sided ventrolateral prefrontal cortex (VLPFC) [11]. Level of education and IQ also showed positive associations with SERT binding in the same areas. Assuming that professional philosophers have more formal education per capita than the general population, we might expect both of the following. First, philosophers might have higher levels of SERT binding in the aforementioned areas. Second, philosophers might perform better on logical reasonsing tests.

Anterior Cingulate Cortex

Subjects reporting greater (political) liberalism showed higher levels of conflict-related activity in their anterior cingulate cortex (ACC) than subjects reporting (political) conservatism [2]. This fact might relate to the fact that subjects reporting (political) liberalism had greater gray matter volume in their ACC [9].

Also, during Go-No-Go trials conservatives were more likely to "make errors of commission" [2]. This makes sense in light of the fact that conservatives demonstrate a greater need for order (or lack of ambiguity and uncertainty) [15]. Should these findings about liberalism and conservatism be reproduced in populations of academicians, then liberalism and conservatism might manifest differential neural correlations. Also, academics who thrive in domains that involve a great deal of ambiguity might have greater gray matter volume in their ACC.

Prefrontal Cortex

Data suggest that the medial prefrontal cortex (and the posterior cingulate cortex) are a part of the neural system subserving self-reflective thought and theory of mind (ToM) [8, 13]. These suggestions are bolstered by lesion studies of impaired awareness. Without presuming that any academic has brain lesions in their prefrontal cortex, we could safely wonder if certain neural properties in these areas correlate with one's tendency to (or aversion to) identify with a sense of "self." That is to say, there is evidence supporting the possibility of differential correlations manifesting between philosophers of consciousness who identify with the concept of "self" and philosophers who do not. Such a scientific narrative about the matter would be helpful given that the debate about the existence of "self" has endured long enough to make one wonder if any amount of debate could put an end to the disagreement.

Orbitofrontal Cortex

Subjects with lesions in the orbitofrontal cortex demonstrate a lack of sensitivity to ambiguity and risk in decision-making [7]. Also, greater subjective uncertainty when evaluating evidence is associated with activity in ventromedial brain regions, even in the absence of overt risk [12]. These findings, taken in tandem with the fact that the need to avoid uncertainty and threat "contributes" to conservatism [15] implies that conservative tendencies could have something to do with certain properties in the orbitofrontal and ventromedial frontal areas. This would imply that the beliefs of both academicians and laypersons might demonstrate differential neural properties depending on their level of conservatism, liberalism, or proclivity towards uncertainty. It may also imply that we can eventually discern whether one's conservatism, liberalism, or agnosticism is grounded in neural properties or rational reasons (or some combination of both).

Dorsal Raphe Nucleus

Individuals with lower levels of serotonin in their Dorsal Raphe Nucleus (DRN) are more likely to be honest, trustful, and straightforward as well as more likely to reject unfair offers while playing the Ultimatum Game (UG) [14]. In fact, acceptance of unfair offers in UG varied from about 55% to 100% in association with on one's level of 5-HTT binding in the DRN [ibid.]. Contrarily, Machiavellian personalities, and more liberal acceptance of unfair offers in UG, associate with higher levels of 5-HTT binding in the DRN. This finding indicates a potential neural correlate of philosophical beliefs that are contingent upon trust and fairness (e.g. Machiavellian vs. Rawlsian political stances). Should this study be replicated, we might expect Rawlsians to have lower levels of 5-HTT binding in their DRN while thinking about fairness or while playing UG.

Amygdala

Subjects who reported greater (political) conservatism had greater volume in their right-hemisphere's amygdala and those who reported (political) liberalism showed increased gray matter volume in their anterior cingulate cortex (ACC) [9]. The former finding is unsurprising given that the amygdala is associated with fear and that conservatives are more likely to demonstrate death anxiety and to perceive danger or threat in the world [15]. It would also be unsurprising if an increased amygdala correlated with, say, religious beliefs, which are often associated with death anxiety. And if conservatism associates with religious belief, then we might expect larger amygdalas to coexist with other intracranial properties and their correlating behaviors, like the increased likelihood to make errors of commision among those with relatively decreased gray matter volume in the ACC [2].

Pituitary Gland

Oxytocin (OXT), a hormone stored and released in the posterior pituitary, is associated with decreased stress, mitigated fear, increased proclivity to trust, decreased aggression, and increased cooperation [4, 6, 10]. The philosophical counterparts of trust, cooperation, and aggression might be most salient in political philosophy. For instance, one's concept of the state of nature (SoN)—say, Hobbes's SoN vs. Rousseau's

SoN—could be influenced by levels of OXT release, reception, and regulation. Another example from political philosophy is the spectrum ranging from liberal to conservative. It could be that levels of OXT, which correlate with intergroup trust and cooperation, correlate differentially between liberals' and conservatives' intergroup behaviors.

