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Review

Accounting for the phenomenology and varieties of auditory verbal hallucination within a predictive processing framework

Sam Wilkinson *

Department of Philosophy, Durham University, 50 Old Elvet, Durham DH1 3HN, UK

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ABSTRACT

Two challenges that face popular self-monitoring theories (SMTs) of auditory verbal hallucination (AVH) are that they cannot account for the auditory phenomenology of AVHs and that they cannot account for their variety. In this paper I show that both challenges can be met by adopting a predictive processing framework (PPF), and by viewing AVHs as arising from abnormalities in predictive processing. I show how, within the PPF, both the auditory phenomenology of AVHs, and three subtypes of AVH, can be accounted for.

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* Fax: +44 191 334 6551.
E-mail address: sam.wilkinson@durham.ac.uk

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0. Introduction

The positive symptoms of schizophrenia include delusions of control ("somebody else is controlling my actions"), thought insertion ("somebody is putting their thoughts into my head") and auditory verbal hallucination (AVH) (hearing voices in the absence of a speaker). Perhaps the most popular theories for understanding these disparate symptoms are self-monitoring theories, which attempt to explain them as the product of one abnormality, namely, a problem with self-monitoring. According to these theories, our nervous systems distinguish self-generated from externally generated stimuli, through a process of self-monitoring. When this monitoring goes awry, self-generated stimuli are erroneously attributed to an external cause. The various positive symptoms all involve faulty monitoring and simply differ insofar as that which is failing to be properly monitored differs. In delusions of control it is bodily action, whereas in AVH and thought insertion it is widely thought to be inner speech (Feinberg, 1978; Frith, 1992; Jones & Fernyhough, 2007; Seal, Aleman, & McGuire, 2004). Although ingenious, the breadth of application of SMTs has recently been questioned by several theorists (Gallagher, 2004; Jones, 2010; Stephens & Graham, 2000; Wu, 2012). Such criticisms tend not to take issue with the application of SMTs to symptoms involving bodily action, like delusions of control and (their merely experiential analogue) illusions of passivity. Rather, they claim that SMTs struggle to account for AVH and thought insertion. In this paper, I will focus on AVH, and on two challenges in particular. They are:

The Auditory Phenomenology Challenge – How do you explain the auditory phenomenology of AVH if it is misattributed inner speech?
The Varieties of AVH Challenge – How do you account for the varieties of AVH if it is (always) misattributed inner speech?

In this paper, I suggest that both challenges can be met if we adopt a recently popular general framework for thinking about what the brain does (e.g. Clark, 2013; Friston, 2005, 2010; Hohwy, 2013) which we could call the predictive processing framework (PPF).

It is worth mentioning that the application of predictive processing to psychosis is not new. Indeed, Chris Frith, perhaps the best-known proponent of SMTs, has suggested something along these lines in Fletcher and Frith (2009). Since then, Adams, Shipp, and Friston (2013) have also suggested accounts of psychosis within the PPF. This work, however, does not focus on AVHs to the extent that I do, nor does it focus on the two challenges that I address here.

I proceed as follows. I start by presenting SMTs and show why they have been found attractive and plausible. I present the two challenges facing the application of SMTs to AVHs. I then introduce, motivate and clarify the PPF. I then present evidence suggesting that predictive processing might be disrupted in psychosis. Finally, I end by applying the PPF to voice-hearing, and show how it can, first, address the auditory phenomenology challenge, and second, nicely account for the three subtypes of AVH I present.

1. Self-monitoring theories

In this section I characterise SMTs, and describe the evidence that has been used to support them.

1.1. Introducing self-monitoring theories (SMTs)

Perhaps the first theorist to make use of self-monitoring was Helmholtz (1866). His concern, however, was not with psychopathology, but with the following problem presented by healthy visual cognition. When an image moves across the retina, how does our brain know whether it is the world moving across our eyes or our eyes moving across the world? Helmholtz suggested that our brain can tell the difference because when our eyes move there is a motor command. More specifically, information about the motor command, which Sperry (1950) later dubbed the "corollary discharge", is used by the brain to predict the sensory consequences that would be produced by the eye movement. If the predicted and actual sensory consequences match then the brain infers that the change was self-generated and the conscious percept is adjusted accordingly. We can see exactly what happens when there is no such motor command, and hence no such adjustment, when we press on our eye with our finger. When we do this, the world itself seems to tilt and shake.

It took more than a hundred years for Helmholtz's ideas to be applied to psychosis (Feinberg, 1978). Although Feinberg's initial paper was on thought (which he took to involve 'motor mechanisms') and thought insertion, the easiest symptoms for