

Commentary on Firestone and Scholl (in press) Cognition does not affect perception: Evaluating the evidence for 'top-down' effects

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Perception, cognition, and delusion

Abstract:

Firestone and Scholl's (F&S) critique of putative empirical evidence for the cognitive penetrability of perception focuses on studies of neurologically normal populations. We suggest that a comprehensive exploration of the cognition-perception relationship should also incorporate work on abnormal perception and cognition. We highlight the prominence of these issues in contemporary debates about the formation and maintenance of delusions.

Main text:

"The matter of belief is, in all cases, different in kind from the matter of sensation or presentation, and error is in no way analogous to hallucination. A hallucination is a fact, not an error; what is erroneous is a judgment based upon it" (Russell, 1914, p. 173).

"Perceiving is believing" (Fletcher & Frith, 2009, p. 48).

Firestone and Scholl (F&S) present a stimulating critique of putative empirical evidence for the cognitive penetrability of perception. In making their case, however, they focus exclusively on research on perception and cognition in neurologically normal populations. In doing so, they neglect potentially important sources of informative data afforded by research on abnormal perception and cognition. Cognitive neuropsychology and cognitive neuropsychiatry are scientific disciplines that draw inferences about aspects of normal cognition (such as reading, object recognition, belief formation, reasoning, decision making, and theory of mind) by studying patients with cognitive deficits (Coltheart, 2007). We suggest that a comprehensive exploration of the relationship between perception and cognition should consider research from these disciplines. In particular, we demonstrate that the issue of cognitive penetrability looms large in contemporary debates about the formation and maintenance of delusions.

According to the Two Factor theory of delusions, two distinct factors are causally responsible for the formation and maintenance of delusions (Coltheart, Langdon, & McKay, 2011). The first factor explains why the content of a delusional belief comes to mind, while the second factor explains why the belief is adopted rather than rejected. To date, the Two Factor theory has focused on explaining specific monothematic delusions (delusions with one theme) associated with neurological damage, but some tentative suggestions have been made concerning how the Two Factor theory might explain polythematic delusions (delusions with multiple themes) associated with psychiatric illnesses such as schizophrenia (Coltheart, 2013).

Consider Capgras delusion, a monothematic delusion in which a patient believes that a spouse or close relative has been replaced by an impostor. This delusion is thought to stem from disruption to the autonomic component of face recognition, such that familiar faces are recognized as familiar but *feel*

unfamiliar. Empirical support for this hypothesis comes from studies that have found that, unlike control participants, patients with Capgras delusion do not show a pattern of autonomic discrimination (indexed by skin conductance response) between familiar and unfamiliar faces (e.g., Brighetti, Bonifacci, Borlimi, & Ottaviani, 2007; Ellis, Young, Quayle, & de Pauw, 1997; Hirstein & Ramachandran, 1997). Other work, however, suggests that an anomalous autonomic response to familiar faces is not sufficient for the development of Capgras delusion. Tranel, Damasio, and Damasio (1995) studied patients with damage to ventromedial frontal regions of the brain who also failed to show a pattern of autonomic discrimination between familiar and unfamiliar faces, yet were not deluded.

According to Two Factor theorists, Capgras patients and Tranel et al.'s (1995) ventromedial frontal patients share a common first factor: anomalous autonomic responses to familiar faces. What distinguishes them is that Capgras patients have a second anomaly: a cognitive deficit in the ability to evaluate candidate beliefs. Analogous Two Factor accounts have been offered for several other monothematic delusions (Coltheart et al., 2011). Importantly, all Two Factor accounts are predicated on a conceptual distinction (and empirical dissociation) between perception and cognition: abnormal perception as the first factor and a cognitive belief evaluation deficit as the second factor. Furthermore, Two Factor accounts are not committed to perception being cognitively penetrable, meaning that the Two Factor theory is consistent with the hypothesis presented by F&S.

In contrast to the Two Factor theory, the Prediction Error theory of delusions holds that delusion formation and maintenance are caused by a single factor: aberrant processing of prediction errors (mismatches between expectations and actual inputs). In particular, delusions are conceived as attempts to accommodate inappropriately generated prediction error signals (Corlett, Taylor, Wang, Fletcher, & Krystal, 2010; Fletcher & Frith, 2009). Prediction Error theorists have tended to focus on delusions associated with schizophrenia, but they have also offered accounts of monothematic delusions associated with neurological damage (Corlett et al., 2010). Whereas the distinction between perception and cognition is critical for the Two Factor theory, Prediction error theorists minimize or disavow this distinction:

“The boundaries between perception and belief at the physiological level are not so distinct. An important principle that has emerged is that both perception of the world and learning about the world (and therefore beliefs) are dependent on predictions and the extent to which they are fulfilled. This suggests that a single deficit could explain abnormal perceptions and beliefs” (Fletcher & Frith, 2009, p. 51).

“Within this framework there is no qualitative distinction between perception and belief, since both involve making inferences about the state of the world on the basis of evidence” (Frith & Friston, 2013, p. 5).

Furthermore, according to Prediction Error theorists delusions provide examples of cognition penetrating perception: there exist “interactions between perception and belief-based expectation” (Corlett et al., 2010, p. 357) and

“delusional beliefs can alter percepts such that they conform to the delusion” (Corlett et al., 2010, p. 353). This position seems to be in tension with the hypothesis presented by F&S. Consequently, we suggest it would be useful for F&S to expand the scope of their review by critically examining whether there is empirical evidence from research on delusions that cognition penetrates perception. If empirical evidence is compelling, then there exists a counter-example to F&S’s hypothesis.

In this commentary we have shown that the relationship between cognition and perception is a major point of interest in contemporary research on delusions. This suggests that evidence from cognitive neuropsychology and cognitive neuropsychiatry may play an important role in testing the hypothesis presented by F&S.

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