VIEWPOINT

COVERT RECOGNITION AND THE NEURAL SYSTEM FOR FACE PROCESSING

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Abstract

In this viewpoint, we discuss the new evidence on covert face recognition in prosopagnosia presented by Bobes et al. (2003, this issue) and by Sperber and Spinnler (2003, this issue). Contrary to earlier hypotheses, both papers agree that covert and overt face recognition are based on the same mechanism. In line with this suggestion, an analysis of reported cases with prosopagnosia indicates that a degree of successful encoding of facial representations is a prerequisite for covert recognition to occur. While we agree with this general conclusion as far as Bobes et al.'s and Sperber and Spinnler's data are concerned, we also discuss evidence for a dissociation between different measures of covert recognition. Specifically, studies in patients with Capgras delusion and patients with prosopagnosia suggest that skin conductance and behavioural indexes of covert face recognition are mediated by partially different mechanisms. We also discuss implications of the new data for models of normal face recognition that have been successful in simulating covert recognition phenomena (e.g., Young and Burton, 1999, and O'Reilly et al., 1999). Finally, in reviewing recent neurophysiological and brain imaging evidence concerning the neural system for face processing, we argue that the relationship between ERP components (specifically, N170, N250r, and N400) and different cognitive processes in face recognition is beginning to emerge.

Key words: faces, covert recognition, prosopagnosia, ERPs, modelling

Introduction

The two papers by Bobes and colleagues and by Sperber and Spinnler (2003, this issue) contribute intriguing new findings to the literature on covert face recognition. The initial observation, in the early 1980s, that patients who are completely unable to recognize faces when tested overtly nevertheless can show some preserved recognition processes when tested indirectly has attracted much interest, as had similar findings of preserved implicit processing in other neurological disorders such as memory, language, or attention (Schacter et al., 1988).

Ever since the striking phenomenon of covert face recognition was first published, a key question has been whether overt and covert face recognition are produced by the same functional system (Burton et al., 1991). Alternatively, covert recognition might reflect the function of either a distinct secondary face recognition system (Bauer, 1984), or a disconnection of an intact system of face recognition from the processes that signal recognition to an awareness system (DeHaan et al., 1992). Both current papers make a contribution to this continuing controversy.

Bobes and coworkers (2003, this issue) investigated ERP correlates in identity matching for unfamiliar faces. The task was to decide whether two sequentially presented different pictures showed the same or a different person. Although FE (a 69-year old patient with prosopagnosia resulting from traumatic brain injury) performed at chance levels, his ERP response gave evidence of covert matching of unfamiliar faces, in terms of differences in the ERP for mismatching (non-repeated) as compared to matching (repeated) second faces. Importantly, these differences in FE had a very short onset latency (in fact, towards the lower limit of what was seen in 10 healthy controls matched for age and education). To Bobes et al. this suggests that FE is unimpaired in early face perception, and can extract structural codes from faces with normal speed. This finding has potentially important implications. The authors argue that the very same impairment that causes prosopagnosia may explain an impairment in sequential (but not simultaneous) matching of unfamiliar faces. While this may well be the case, we wish to make two small comments here. First, as Bobes et al. used no time delay between the sequentially presented faces, it is more difficult to exclude a perceptual matching strategy, especially as no backward masking was used to eliminate pictorial codes from the first face. A second and controversial issue (that the authors acknowledge) is whether unfamiliar and familiar faces are processed by the same mechanisms. Currently, considerable evidence favours the idea of different mechanisms in the processing of identity from familiar and unfamiliar faces (Hancock et al., 2000; Herzmann et al., 2002). In this respect, it would have been interesting to see whether ERP findings would support a normal timing of familiar face perception in FE as well. Similarly, other aspects of face processing appear to be relatively independent of identity, for example computations of sex or expression (Le Gal and Bruce, 2002), but see also Schweinberger and Soukup (1998). The question of which structural codes are being extracted here, and what information is necessary in order to make different decisions to faces, is one to which we will return.

Bobes and coworkers emphasized that in most of their participants, the difference between matching and mismatching second faces yielded two different ERP effects - an early modulation at a latency of approx. 180-300 ms, and a later modulation at a latency around 400-650 ms. Due to substantial individual variability in the topography and latency of these ERP modulations, it is not easy to ascertain their functional significance, or to relate them to known ERP components. Below we will comment in more detail on the potential significance of these interesting findings, and tentatively relate them to ERP modulations recently identified in immediate face repetition priming.

Sperber and Spinnler (2003, this issue) used the face-name relearning paradigm (Bruyer et al., 1983) to investigate covert person recognition in a patient with progressive fronto-temporal dementia. They initially observed abolished overt recognition but preserved covert recognition. However, as the disease progressed, covert recognition also faded away. These findings were taken as support for the idea that covert and overt face recognition are based on the same mechanisms, and that a partial and incomplete activation of semantic information for people may still support covert but not overt face recognition.