COVERT FACE RECOGNITION IN PROSOPAGNOSIA: A DISSOCIABLE FUNCTION?

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Abstract

Covert face recognition was investigated in a patient with prosopagnosia without object agnosia. This patient performed well in various face processing tasks like expression analysis and feature processing and had relatively preserved semantic knowledge about persons, but was slightly impaired in the visual matching of unfamiliar faces. In a face-name paired-associate relearning task, covert face recognition was demonstrated to be above-chance. However, as this task cannot be meaningfully applied to control subjects, results do not necessarily indicate that the *degree* of covert face recognition is normal. In fact, in contrast to control subjects, the patient showed significantly reduced associative priming of names by face primes as compared to name primes, suggesting a quantitative reduction of covert face recognition. It is argued that these results support the view that overt and covert face recognition are brought about by the same functional system (Farah, O'Reilly and Vecera, 1993).

Introduction

Prosopagnosia is the inability to identify well-known persons by their faces. Prosopagnosic patients can usually distinguish faces from other stimuli, and are often able to recognize common objects. They also remain able to recognize familiar people by voice, gait, or distinguishing features (clothes, glasses), and can correctly describe persons if presented with their names. Thus, it is not the knowledge about familiar people that is lost — it is only the access to this knowledge from the face that is impossible. Moreover, other aspects of face processing, apart from recognizing facial identity, may be relatively intact, for example recognition of emotion displayed by the face (Hécaen, 1981), lipreading (Campbell, Landis and Regard, 1986), or matching of simultaneously presented face portraits taken from different perspectives (Bruyer, Laterre, Seron et al., 1983; Malone, Morris, Kay et al., 1982).

While prosopagnosic patients will not recognize people by their faces, covert knowledge for overtly unrecognized faces can be demonstrated in some of these patients. Perhaps the earliest evidence was reported by Cole and Perez-Cruet (1964). Among other results, these authors briefly mention a classical conditioning procedure, where presentations of the patient's own face but not of other faces were paired with brief electric shocks. The patient was reported to have developed differential autonomic responses (e.g. changes in heart rate and skin conductance) contingent on his own face. However, differentiation was judged as poor, and the effect could not unequivocally be ascribed to covert

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recognition since explicit recognition of his own face could not be excluded. Recently, covert face recognition has been studied more systematically with a number of different experimental techniques (see Bruyer, 1991, for review). Bruyer et al. (1983) showed that their patient could learn to associate correct names with familiar faces better than false names, demonstrating that face identity — although not recognized overtly — continued fo influence behaviour. Rizzo, Hurtig and Damasio (1987) found that their patients' visual scanning behaviour, although not completely normal, was different for familiar and unfamiliar faces. In a series of experiments, De Haan, Young and Newcombe's (1987) patient P.H. showed covert knowledge of faces at the level of face familiarity, personal semantics, and names. P.H. also showed associative priming of name recognition. That is, he was faster in deciding whether, say, "Nancy Reagan" is a familiar name when preceded by Ronald Reagan's face rather than by Helmut Kohl's face — although he was unable to overtly recognize these faces (Young, Hellawell and De Haan, 1988).

Psychophysiological studies have provided further evidence for covert face recognition in prosopagnosic patients. For example, Bauer (1984) showed to his patient L.F. familiar faces along with spoken names which could be correct or incorrect. Although L.F. could not identify the correct names, electrodermal responses (EDRs) were larger for correct than incorrect names. Tranel and Damasio (1985, 1988) observed larger EDRs to familiar than to unfamiliar faces even though their patients were unable to overtly discriminate them. Renault, Signoret, Debruille et al. (1989) measured the P300 component of the event-related brain potential (ERP) while their patient made facial familiarity decisions. The P300 is usually larger in response to rare than frequent stimulus categories. When familiar and unfamiliar faces were equiprobable, P300 amplitude did not discriminate between these face categories. However, when the probability of familiar faces was reduced to 33%, P300 amplitude was larger to familiar than unfamiliar faces, demonstrating a covert categorization.

Several hypotheses have been offered in order to explain covert face recognition in prosopagnosia. Bauer (1986) suggested that EDR discrimination is based on a dorsal visual–limbic pathway, whereas damage of ventral occipitotemporal projections was held responsible for overt face recognition deficits. This model of independent brain systems for overt and covert face recognition implies that performance in overt and covert tests may, in principle, be completely independent of each other. De Haan, Bauer and Greve (1992) suggested that covert face recognition might be brought about by a single, normally functioning face recognition system which is, however, disconnected from a "conscious awareness system" necessary for overt recognition. A rather different explanation was recently put forward by Farah, O'Reilly and Vecera (1993), who assumed that prosopagnosia always involves an impairment, although to varying degrees, in visual processing of faces. Most generally, they hypothesize that covert face recognition tests are more sensitive than overt tests to the residual information encoded in a damaged visual recognition system. These authors showed by computer simulations that a single lesion in the visual recognition module of a neural network may produce dissociations between covert and overt tests similar to those that have been observed in several