Neuropsychologia 49 (2011) 1851–1862

Contents lists available at ScienceDirect

Neuropsychologia

journal homepage: www.elsevier.com/locate/neuropsychologia

Implicit attitudes in prosopagnosia

Kristine M. Knutson, Karen A. DeTucci, Jordan Grafman*

Cognitive Neuroscience Section, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD, United States

ARTICLE INFO

Article history:
Received 28 September 2010
Received in revised form 1 March 2011
Accepted 4 March 2011
Available online 15 March 2011

Keywords:
Prosopagnosia
Implicit attitudes
Brain lesions
Traumatic brain injury
Social cognition

ABSTRACT

We studied a male with acquired prosopagnosia using a battery of Implicit Association Tests (IATs) to investigate whether observing faces varying by social category would activate the patient's implicit social biases. We also asked him to categorize faces explicitly by race, gender, and political party. The patient, G.B., was marginally slower to categorize black compared to white faces. He showed congruency effects in the race and celebrity IATs, but not in the gender or political IATs. These results indicate that G.B. possesses an implicit social sensitivity to certain facial stimuli despite an inability to overtly recognize familiar faces. The results demonstrate that social biases can be retrieved based on facial stimuli via pathways bypassing the fusiform gyri. Thus the IAT effect can be added to the list of covert recognition effects found in prosopagnosia.

Published by Elsevier Ltd.

1. Introduction

Prosopagnosia, an inability to recognize familiar faces due to neurological damage (Bodamer, 1947; see also Ellis & Florence, 1990), can be observed in brain-damaged patients even when vision, intelligence, and cognitive abilities remain normal (Sorger, Goebel, Schiltz, & Rossion, 2007). The associated brain damage is generally found in inferior temporo-occipital regions (Barton, 2008a; Damasio, Damasio, & van Hoesen, 1982; Haxby, Hoffman, & Gobbini, 2000; Meadows, 1974), especially the fusiform face area (FFA), a region specialized for face perception (Haxby et al., 2000; Kanwisher, McDermott, & Chun, 1997; Kanwisher, Stanley, & Harris, 1999). The FFA is connected to the middle temporal lobe, which represents semantic information about other people (Gorno-Tempini et al., 1998) and to the left anterior temporal pole, which mediates name retrieval (Grabowski et al., 2001). These regions are important in recognition of familiar faces (Schweinberger & Burton, 2003). Prosopagnosia is often associated with other perceptual deficits including object recognition impairments (Barton, Cherkasova, & Hefter, 2004; Clarke, Lindemann, Maeder, Borruat, & Assal, 1997), but in general, prosopagnosic patients do not have difficulty discriminating faces from objects (Damasio et al., 1982; Orban de Xivry, Ramon, Lefevre, & Rossion, 2008; Rossion et al., 2003). For normal perception of faces, the face features are combined into a single configuration, not treated as separate units (Sergent & Signoret, 1992b). This holistic encoding of facial structures is lost in prosopagnosia (Bodamer, 1947; Ellis & Florence, 1990; Van Belle, De Graef, Verfaillie, Busigny, & Rossion, 2010).

The purpose of the current studies was to use IATs to determine whether a patient, despite an inability to overtly recognize familiar faces, could elicit implicit biases about the race, gender, political views, or likability of the person shown, and consequently display an IAT effect due to that bias. To our knowledge, no patient with prosopagnosia has been tested on IATs that use faces. We also tested the patient on his ability to categorize faces explicitly by race and gender, to recognize faces overtly, and to determine if he was faster to respond to faces already seen.

Covert face recognition has been demonstrated in prosopagnosia. As this recognition process is not consciously accessible, investigators must use methods other than verbal report to uncover it. Bruyer et al. (1983) report on a patient who made few errors when learning to associate true first names to famous faces, but made many errors when learning to associate incorrect first names to famous faces, even though the patient could not overtly identify the faces. Bauer (1984) found that during tasks of matching names to known faces, a prosopagnosic patient's skin conductance responses (SCR) were three times more accurate in matching the correct name to a face than was the patient's explicit choice. Similarly, Tranel and Damasio (1985, 1988) displayed known and unknown faces to six patients who could not overtly recognize the faces but showed larger amplitude SCRs to the known compared to unknown faces. Jones and Tranel (2001) found normal SCRs to pictures of immediate family and close friends in a child with prosopagnosia. Rizzo, Hurtig, and Damasio (1987) found that prosopagnosic patients scanned photographs of familiar faces in

* Corresponding author at: Traumatic Brain Injury Research Laboratory, Kessler Foundation Research Center, 1199 Pleasant Valley Way, West Orange, NJ 07052, United States. Tel.: +1 973 243 6995; fax: +1 973 324 3536.

E-mail addresses: knutsonk@ninds.nih.gov (K.M. Knutson), kdetucci@yahoo.com (K.A. DeTucci), jgrafman@kesslerfoundation.org (J. Grafman).

0028-3932/$ – see front matter. Published by Elsevier Ltd.
doi:10.1016/j.neuropsychologia.2011.03.009

different patterns than unfamiliar faces. Also, reaction times for prosopagnosic patients in a name classification task were longer when a distractor rather than a matching face was shown (de Haan, Bauer, & Greve, 1992; de Haan, Young, & Newcombe, 1987b). Similarly, Young, Hellawell, and De Haan (1988) demonstrated that related face primes shortened patients' mean RTs when judging familiarity of printed names while unrelated face primes lengthened mean RTs. Also, a patient was systematically faster to react to familiar compared to unfamiliar faces while deciding whether two photographs showed the same or different faces (de Haan, Young, & Newcombe, 1987a). These instances of covert recognition in prosopagnosics have been interpreted as indicating that subcomponents of the physiological process of face categorization remain intact even though they are not available to patients' consciousness (Sergent & Poncet, 1990; Tranel, 2000).

1.1. Implicit Association Tests

Attitudes have been explored extensively using IATs (Greenwald, McGhee, & Schwartz, 1998; Greenwald & Nosek, 2001). In an IAT, participants are presented two tasks: one requires categorization of images into one of two categories (e.g., white or black faces); the other requires categorization of words into one of two attributes (e.g., pleasant or unpleasant). The two response keys are mapped in either a congruent or incongruent manner according to conventional stereotypes (white = pleasant, black = unpleasant). The typical finding is that participants respond faster to stereotype-congruent than to stereotype-incongruent trials. In this way, reaction times can be used to gauge the strength of association between stimuli and the participant's implicit attitudes.

1.2. Case report

The patient, G.B., is a Caucasian male who was born in Egypt and immigrated to the U.S. at age 9 with his family. His first language was French but his primary language is English. He also speaks Spanish. He has 20 years of education, was employed pre-injury as a physician, and since his injury has worked in several medical offices, at both paid and volunteer positions. In 2003, he sustained bilateral temporal lobe lesions, including fusiform gyri, and diffuse axonal injury due to an auto-pedestrian collision. He was diagnosed with prosopagnosia and difficulties with stimulus salience, with some object agnosia and left sensory hemi-inattention. MRI results three years post-injury showed a few nonspecific small patchy foci of hyperintense signal in the supratentorial white matter for the T2 and Flair sequences. In addition, there were two large areas of encephalomalacia with volume loss inferior to the temporal horns (posterior temporal areas extending into parieto-occipital cortex including fusiform gyrus), and a small area of encephalomalacia in the right anterior temporal lobe. His brain injury is consistent with descriptions of brain damage in acquired prosopagnosia (Barton, 2008b; Barton et al., 2004; Damasio et al., 1982; Grafman, Salazar, Weingartner, & Amin, 1986; Takahashi, Kawamura, Hirayama, Shiota, & Isono, 1995). See Fig. 1.

Prior to participation in the studies, G.B. and all control subjects gave informed consent to a protocol that had been approved by the NINDS Institutional Review Board, in accordance with the Declaration of Helsinki (BMJ 1991; 302, 1194). Our testing occurred over a 2.5 year period beginning 3 years post-injury when G.B. was 53. On standard neuropsychological testing, he showed severe impairment on the Benton Facial Recognition Test (Benton and Van Allen, 1968) with a long form raw score of 35 plus 1 as a correction based on age and education for a corrected long form score of 36. Severe impairment is any score under 37. In the Remote Memory Battery Famous Faces Test (Albert, Butters, & Levin, 1979), he did not recognize any faces without at least one cue. Cuing enabled him to recognize 7 of 48 faces. He failed both the silhouettes and the progressive silhouettes portions of the Visual Object and Space Perception Battery, but passed the other subtests (Warrington & James, 1991). He was severely impaired on the Carey-Diamond Test of Facial Discrimination (Carey & Diamond, 1977; Carey, Diamond, & Woods, 1980).

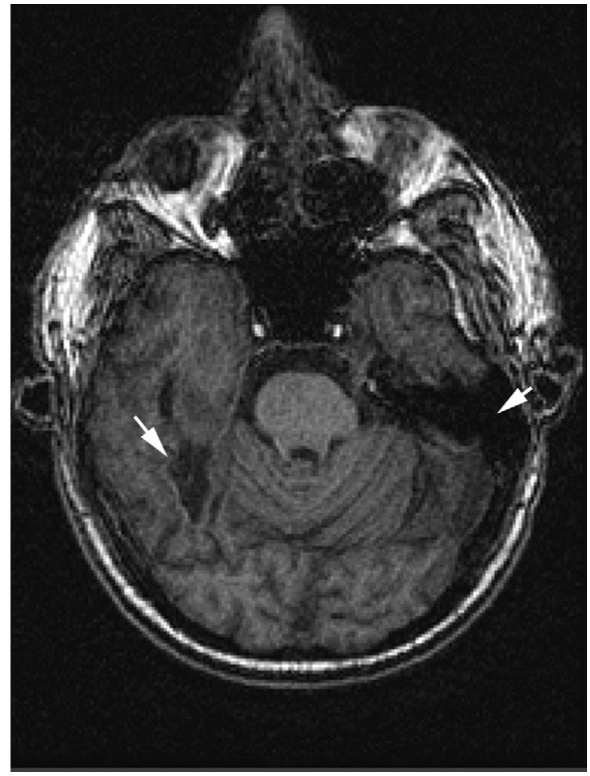

Fig. 1. Axial slice showing damage to G.B.'s bilateral fusiform gyri (arrows).

G.B.'s index scores on the Wechsler Adult Intelligence Scale-Third Edition (Wechsler, 1981) Verbal, Performance, and Full Scale were in the average range in 2008, which is consistent with his 2006 scores. These scores are lower than expected given his educational and occupational history. His primary index scores on the Wechsler Memory Scale-Third Edition (Wechsler, 1997) ranged from borderline to average in 2006, improving to average to high average in 2008. His scaled scores on the Delis Kaplan executive functions tests (Delis, Kaplan, & Kramer, 2001), where 10 is the mean and 3 is the standard deviation, were as follows: Trailing Making test (number-letter switching), 12; Verbal Fluency test (Letter Fluency total correct), 16; Design Fluency test (Switching total correct), 9; Sorting test (Confirmed Correct Sorts), 12; Twenty Questions test (Initial Abstraction score), 13; Tower Test (Total Achievement score), 18.

2. Study 1—overt recognition using objects and unknown faces

2.1. Methods

We tested G.B. and normal controls on numerous visual discrimination tasks, including speeded face versus object, and race and gender categorization tasks.

2.1.1. Participants

In addition to G.B., 10 male normal controls aged 48–64 years (*M* = 55.8, *SD* = 5.3), free of any neurological or psychiatric conditions, with an average of 18.5 years of education (*SD* = 1.6 years), completed this study.

متن کامل مقاله ← دریافت فوری

ISIArticles
مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات