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Social presence and the composite face effect

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ABSTRACT

A robust finding in social psychology research is that performance is modulated by the social nature of a given context, promoting social inhibition or facilitation effects. In the present experiment, we examined if and how social presence impacts holistic face perception processes by asking participants, in the presence of others and alone, to perform the composite face task. Results suggest that completing the task in the presence of others (i.e., mere co-action) is associated with better performance in face recognition (less bias and higher discrimination between presented and non-presented targets) and with a reduction in the composite face effect. These results make clear that social presence impact on the composite face effect does not occur because presence increases reliance on holistic processing as a “dominant” well-learned response, but instead, because it increases monitoring of the interference produced by automatic response.

1. Introduction

As social beings, we are exceptionally capable of recognizing others' faces (Bruce & Humphreys, 1994). The common context where these perceptions take place is in presence of other people. The social nature of this context may be highly relevant to understand face-processing features in natural environments. Social presence is known to increase reliance in well-learned responses (Zajonc, 1965), context sensitivity (Allport, 1920) and to modulate processing by increasing executive control functions (Baron, 1986). This suggests that the process, by which we perceive a face when in isolation, may change with regard to when we perceive the same face within a social context. Such possibility has yet to be considered by face perception approaches and is of high social, methodological and theoretical relevance. If face processing changes in isolation we should expect differences between individuals looking alone at photos on their cellular phones, computer screens and magazines, which may impact face recognition processes in the future. If face processing changes in the presence of others, experimenters should control the data collection contextual features better. Also, those changes should be theoretically accounted for by both the approaches that explain face processing features (for a review, see Richler & Gauthier, 2014) and social presence effects (for a review, see Guerin, 1993).

Here we offer the first evidence to understand whether and how the presence of others may influence face recognition, by combining research developed in two different psychological fields, empirically exploring the impact of social presence (SP) in the composite face effect.

2. Social Presence Modulation of Face Holistic Processing

Since the inception of social psychology, research has demonstrated that we perform tasks differently when we are in the presence of others versus being isolated (Allport, 1920). The SP effect most commonly found is a performance improvement in the mere presence of others, named social facilitation (for a review, see Aiello & Douthitt, 2001). However, in some conditions, performance seems to be worse in presence of others (for a review, see Bond & Titus, 1983). For example, when the task to be performed is difficult or unfamiliar the effect typically observed is of social inhibition (Zajonc, 1965). These two facets of SP make it a social facilitation–inhibition effect.

Although SP effects have been studied with a variety of presence manipulations, only the presence of others (mere presence) proved necessary (Bond & Titus, 1983; Kent, 1994; Zajonc, 1965). Most effects have been found in contrasting performance of individuals in isolation with the performance of individuals in mere co-action (i.e., performing the task at the same time but independently, for a review, see Aiello & Douthitt, 2001).

Effects of SP have mainly been found with behavioral tasks (for a review, see Bond & Titus, 1983), including: turning reels (Triplett, 1898), playing sports (Forgas, Brennan, Howe, Kane, & Sweet, 1980), and road driving (Baxter et al., 1990). However, there is also evidence

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of its impact on cognitive activities, such as card-sorting (Griffin, 2001) and Stroop tasks (Huguet, Galvaing, Monteil, & Dumas, 1999).

These effects have been associated with the impact SP may exert on motivational, attentional and/or other processing features. Presence of others was shown to increase the likelihood of individuals exhibiting well-learned responses (i.e., dominant responses, Zajonc, 1965). The degree with which these responses support performance in a particular task will determine the outcome - performance facilitation or inhibition (Zajonc, 1965). SP has also shown to impact executive control functions (Huguet et al., 1999), as assumed by Baron's (1986) distraction–conflict approach. Baron assumed that presence promotes an attentional conflict resulting in more attention allocated to central cues while peripheral cues are neglected (Cohen, 1978; Geen, 1976). Depending upon task requirements of executive control, neglecting peripheral information leads to performance enhancement (e.g. in the Stroop task; Huguet et al., 1999) or impairment. In addition to evidence suggesting that SP increases reliance on well-learned responses and activity of executive control functions, there is also evidence that SP increases the "spreading out" of one's thoughts (Allport, 1920) increasing individuals' sensitivity to contextual influences (Fonseca & Garcia-Marques, 2013).

All these factors (motivation, attention and activation) - associated with SP - may impact face processing. One reason is because face perception is an easy and well-learned task. Faces are one of the most common perception targets and we seem to be highly efficient in detecting, perceiving and recognizing a face (Bruce & Young, 1998). In fact, even though faces are highly complex requiring more extensive processing than other forms of perception (e.g. Leopold & Rhodes, 2010), faces are still processed quickly (Linkenkaer-Hansen et al., 1998). This happens because face perception is built on a default cognitive representation or "schema" (Goldstein & Chance, 1980; Moore & Cavanagh, 1998) supporting a well-learned response. Thus, authors (e.g., Richler & Gauthier, 2014) have referred to face perception as a domain where we exhibit high perceptual expertise.

Although faces are defined by multiple features (i.e., nose, mouth, eyes) they are perceived as gestalts or whole units (e.g., Maurer, Lewis, & Mondloch, 2005; Tanaka & Farah, 1993) being processed holistically. Face processing is holistic in the sense that it integrates into a unit both configural and feature information (Hole, 1994; Richler, Cheung, Wong, & Gauthier, 2009). Evidence that holistic processing is a "dominate response" to face processing, is the fact that holistic processing is prevalently used in face processing and is developed rapidly with age (e.g., de Heering, Houthuys, & Rossion, 2007). The relation between holistic processing and expertise (e.g., Diamond & Carey, 1986) is so strong that it has been hypothesized to be the "cause" for faces being processed in this way (Richler, Wong, & Gauthier, 2011). Congruently, familiar objects have been shown to be also processed holistically (e.g., Bukach, Phillips, & Gauthier, 2010; Gauthier, Williams, Tarr, & Tanaka, 1998).

Evidence of the impact of SP in the degree of holistic processing activation can be assessed by its impact on the "composite face effect". This effect represents the difficulty in identifying the top half of a face as belonging to a familiar face when it is combined with the bottom half of another face (e.g., top half of George Clooney's face with the bottom half of another face; see Fig. 1). Furthermore, individuals have a greater difficulty in correctly identifying the top half of the face if the bottom half is properly aligned compared with when it is misaligned with the top half (Young, Hellawell, & Hay, 1987). Because we process faces holistically, the two halves of the face are perceptually combined to create a new, different face in our minds. Holistic processing makes it difficult for individuals to recognize a target person in the top half, even when instructed to ignore the bottom half. This composite face effect has been widely replicated (e.g., Carey & Diamond, 1994; Hole, 1994; Hole, George, & Dunsmore, 1999; Young et al., 1987), and it provides an experimental paradigm that enables the study and characterization of face recognition processes. The relative difficulty in ignoring the bottom half of the face is usually indexed by an increase in the reaction times (RTs, e.g., Hole, 1994) and/or an increase in inaccurate identifications (Young et al., 1987).

Although the composite face effect also occurs with unfamiliar faces (e.g., Hole, 1994), it is more clearly identified in the "famous faces" condition, where more holistic processing occurs (Young et al., 1987). Unfamiliar faces are essentially recognized by their external features (e.g., hair), whereas familiar faces induce reliance on all face features and more equal adherence to external and internal details, such as ears and eyes (e.g., Ellis, Shepherd, & Davies, 1979; Ross & Turkewitz, 1982; Young, Hay, McWeeny, Flude, & Ellis, 1985). Famous faces are only famous because they have been repeatedly processed, offering a context of well-learned responses in comparison to the responses involved in the processing of unfamiliar faces. These different context effects can be differently modulated by SP if we consider that it facilitates well-learned responses (Zajonc, 1965), thus increasing the familiarity effects in the composite face effect.

Social presence may also impact performance on a composite face task, if we understand it as indexing failures of selective attention, resulting in attention allocation to the irrelevant face half. In this case, presence should decrease composite face effects by increasing participants monitoring of that interference (Baron, 1986; Huguet et al., 1999). However, since the effect is dependent upon the holistic nature of the process, the mechanism hypothesized to underlie the composite face effect is not assumed to be an attentional one (Richler & Gauthier, 2013). In fact, perception of the composite is thought to be preattentive, thereby limiting the influence the subsequent allocation of attention (see ERP findings, e.g., Jacques & Rossion, 2009; Kuefner, Jacques, Prieto, & Rossion, 2010). Congruently, composite face effects were shown to occur regardless of whether the faces were previously attended or ignored (Boutet, Gentes-Hawn, & Chaudhuri, 2002).

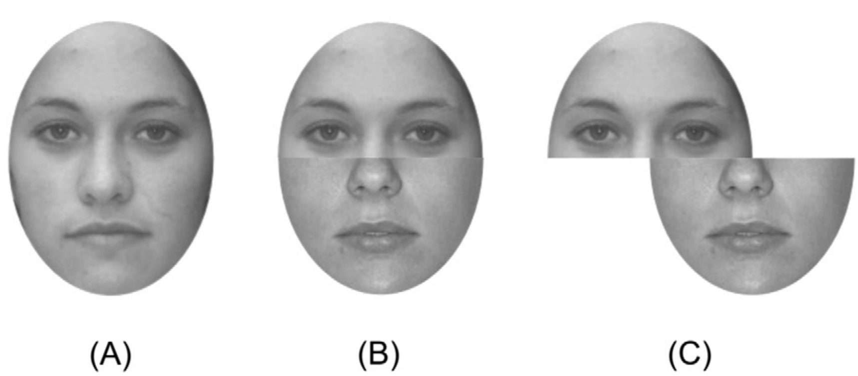

Fig. 1. Examples of facial stimuli: (A) an original face, (B) and aligned facial composite, and (C) a misaligned facial composite. Evidence of a composite face effect emerges when the top part of (B) is less likely to be perceived as the "same as (A)" than top part of (C).