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.

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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 pre-attentive, 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).
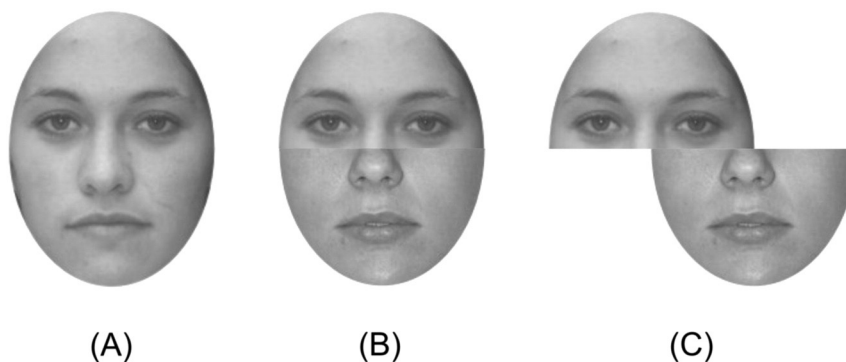

Fig. 1. Examples of facial stimuli: (A) an original face, (B) and aligned facial composite, and (C) a misaligned facial composite. Evidence of a composite face effect emerges when the top part of (B) is less likely to be perceived as the "same as (A)" than top part of (C).

Since attention mechanisms are not expected to moderate the composite face effect, we should not predict any interference of presence of others on it. However, we can find evidence suggesting that attention may be either needed (Palermo & Rhodes, 2002) or at least intervenes (Gao, Flevaris, Robertson, & Bentin, 2011) in the process by which our mind forms holistic face representations. There are even some approaches suggesting that decisional factors are also involved in the composite-face illusion (Richler, Gauthier, Wenger, & Palmeri, 2008).

Attention effects of SP can also be thought to interfere with the increase in the composite effect with famous faces. This is predicted if we assume that individuals have a higher level of expertise in processing familiar (vs. unfamiliar) faces. Evidence suggests that when people lack expertise in processing an object, processing tends to be more strategic and decisional. Processing becomes more automatic and holistic with the development of expertise (Richler et al., 2011). Thus, the presence of others, by efficiently impacting attention management, would favor non-experts over experts, because strategic processing relies more on resources. This suggests that SP is expected to decrease more the composite effect when individuals are processing non-famous faces than when they are processing famous faces. However, the level of expertise we have in dealing with faces may promote ceiling effects not allowing such impact to be detected.

The fact that SP spreads our thoughts increasing context sensibility (Fonseca & Garcia-Marques, 2013), could by itself lead us to think that configuration effects will be increased in the presence of others, since there will be an increase of attention allocation to the irrelevant face half. However, this increased allocation of attention to context does not necessarily increase holistic processing. Instead, the detection of distractor features may be easier, supporting monitoring mechanisms to occur.

3. Present Contribution

The aim of the present contribution is to help to understand if and how SP modulates face-processing features. Accordingly, the present work used a configuration task (Hole, 1994) originally designed to demonstrate the holistic nature of face processing. Participants perform this task with both unfamiliar and familiar (i.e., famous) targets. We expected the effects to be more evident in the latter condition.

It would be possible to think that SP effects are pervasive when using the composite face task, given that it requires the presentation of face photos, and SP effects were previously shown with mannequins (Rajecki, Ickes, Corcoran, & Lenerz, 1977), virtual images and avatars (Hoyt, Blascovich, & Swinth, 2003; Park & Catrambone, 2007), and robots (Riether, Hegel, Wrede, & Horstmann, 2012). However, such effects do not imply that real presence will not impact target processing. Instead, they suggest that SP effects may be less likely to be noticed. It is thus an empirical question to know if real presence may overcome possible social priming promoted by the use of face targets.

We expect SP to impact differently the composite face effect, depending upon which of three possible processes modulate the effect - motivation, attention and context sensibility - and which features of face processing are activated. The use of famous faces in a set of trials will help us set those processes apart, both for being more sensible to holistic processing and for being associated with better-learned responses. SP will increase the composite effect by increasing reliance in well-learned responses. But, SP may decrease the composite effect either because it directs attentional focus to the top-half target or because it increases sensitivity to context features that are able to support resistance to bias from automatic holistic processing.

SP should also have a positive impact on recognition levels, since it increases motivation, context sensitivity and attention to the task goal. The increase in recognition should be noticed by reducing response bias (identified by the c index of Signal Detection Theory - SDT) and increasing discrimination accuracy between old and new stimuli (identified by the d' of SDT).

4. Experiment

Our empirical approach relies on the composite-face effect paradigm (Young et al., 1987), which is considered a standard paradigm in the face processing literature (for a review, see Richler & Gauthier, 2014). We followed Hole's (1994) procedure, which allows us to compare the effect of familiar and unfamiliar faces in a simultaneous recognition, matching and discrimination task. Level of familiarity with the stimuli was manipulated by using famous and non-famous (unfamiliar) faces. The experimental paradigm consists of a series of trials in which a face is briefly presented and then compared to a subsequent presentation of a face top-half to assess whether there is a match between the two. These top halves are either similar or different from the original face, being the bottom halves always different from it. The tendency for a holistic processing of faces is reinforced by first presenting the target face without a subdivision in parts and only subsequently divide them and presenting it as either aligned or misaligned.

SP was manipulated by having several participants entering simultaneously to performing the task independently (mere co-action condition) or a participant entering alone in the lab to perform the same task and left there alone (alone condition) after receiving initial instructions.

5. Method

5.1. Participants and Design

A total 87 undergraduates (52 females, mean age: 23 years) from ISPA – Instituto Universitário volunteered to participate in the study and were randomly assigned to a 2 (alone vs. co-action) x 2 (familiar vs. unfamiliar faces) x 2 (aligned vs. misaligned trials) x 2 (same vs. different top halves) design; the first condition was a between-subjects factor, while the remaining conditions were within-subjects factors. All participants had normal or corrected-to-normal visual acuity.

5.2. Materials

A set of 100 full-front face photos of Caucasians (50 female) posing with neutral facial expressions was used. Half of the photos were familiar, depicting famous people. These images were then trimmed into an oval format (in order to remove hair), gray-scaled and equalized in brightness and contrast. These faces were presented within a surface area 7 cm wide by 9 cm high on a white background. Composite faces were created by splitting face images in half horizontally, across the middle of the nose, and then recombining the faces using the top and bottom halves from different individuals. Aligned faces had the top and bottom segments properly aligned. Misaligned faces had the top half of each face misaligned by shifting it horizontally to the left, by half a face width (see Fig. 1). Two different sets of materials were created by counterbalancing the face composites that were aligned versus misaligned.

5.3. Procedure

Upon their arrival to the laboratory, participants were requested to carefully read the instructions presented on the computer screen. Furthermore, they were told that the experimenter would not be in the room during the experiment. Those in the alone condition (i.e., without any other people in the room) were told to leave the room upon task completion. In the co-action condition, participants entered the room together and were assigned to their places, being told that they would perform the same task individually. In this condition, participants could see each other during the experiment (but not the others' computer screens), being told to wait for the experimenter to return. Both the instructions given and manipulations of social facilitation used in this study followed the literature (e.g., Huguet et al., 1999; Zajonc, 1965).

Table 1

Mean (Standard Deviation) of STD indexes, for each type of trial and presence conditions.

	d'				c				N
	Unknown faces		Famous faces		Unknown faces		Famous faces		
	Alignment	Misalignment	Alignment	Misalignment	Alignment	Misalignment	Alignment	Misalignment	
Isolation	1.560 (1.151)	1.423 (0.953)	2.050 (0.817)	1.690 (1.161)	0.262(0.3 99)	0.140 (0.450)	0.203 (0.424)	0.035 (0.408)	33
Co-action	2.107 (0.850)	1.928 (0.800)	2.207 (0.649)	2.229 (0.822)	0.109 (0.325)	0.071 (0.390)	0.124 (0.252)	-0.031 (0.302)	50
Total	1.890 (1.011)	1.727 (0.894)	2.145 (0.719)	2.015 (1.001)	0.170 (0.362)	0.099 (0.413)	0.155 (0.331)	-0.005 (0.347)	83

Each participant performed 40 trials. During each trial, a face (familiar or unfamiliar) appeared on the screen for 600 ms, followed by a 200 ms inter-stimulus interval, after which a composite face was presented until response. The composite face could be one of the following types, randomly presented: (a) aligned-same, (b) aligned-different, (c) misaligned-same, or (d) misaligned-different. Participants were asked to press a key (S or L) if the top half of the composite face was the same as the face previously seen or another key (L or S) if the top half was different. Participants were instructed to respond as quickly and accurately as possible. The two sets of materials and response keys were counterbalanced between subjects.

5.4. Dependent Measures

General recognition performance

Measures of discrimination (*d'*) and response criterion (*c*) were computed according to the classical SDT (Green & Swets, 1966; Macmillan & Creelman, 1991).

Accuracy and RT in the "same" trials

Accuracy rates associated with the trials that match the top halves ("same" trials) with their respective different bottom halves in aligned versus misaligned conditions, as well as the RTs associated with accurate responses, provide the proper contrast to infer the composite face effect.

6. Results

Four participants with mean RTs > 3SDs from the average RT per condition were removed from all the analyses.

6.1. Recognition

We first addressed if and how the presence of others impacted individuals' performance, specifically concerning their degree of accuracy on the composite face task, using the discrimination (*d'*) and bias (*c*) indexes within a mixed ANOVA model.

Evidence of a SP effect was clear when we entered *d'* as a dependent variable in our design analysis, $F(1, 81) = 7.746$, $p = .006$, $\eta_p^2 = 0.088$, suggesting that the presence of others increased individuals' ability to correctly differentiate between repeated and non-repeated face tops (*d'* presence = 2.12 vs. *d'* alone = 1.68). Participants' familiarity with the faces increased their ability to correctly differentiate between both previously presented and non-presented faces (*d'* = 2.02) in comparison to unfamiliar faces (*d'* = 1.75), $F(1, 81) = 21.737$, $p < .001$; $\eta_p^2 = .21$. A main effect of alignment suggests that, in general, participants distinguished the matching faces from the non-matching faces more accurately in the aligned trials (*d'* = 1.98) compared to misaligned trials (*d'* = 1.81), $F(1, 81) = 6.380$, $p = .013$; $\eta_p^2 = 0.073$. SP did not significantly moderate these effects - interaction with familiarity: $F(1, 81) = 2.05$, $p = .155$; interaction with alignment $F(1, 81) = 1.72$, $p = .192$; interaction with both factors $F(1, 81) = 1.57$, $p = .213$ (see Table 1).

The *c*-index analysis suggests a reduced bias toward responding "same" in the mere co-action condition ($M = 0.10$) compared to the isolation condition ($M = 0.26$), although the effect does not reach the standard levels of significance $F(1, 81) = 2.95$, $p = .08$; $\eta_p^2 = 0.035$. The main effect of familiarity suggests a higher bias toward responding "same" when perceiving famous ($M = 0.14$) compared to unfamiliar faces ($M = 0.08$), $F(1, 81) = 3.45$, $p = .066$; $\eta_p^2 = 0.04$. The main effect of alignment similarly suggests a bias toward responding "same" when composite faces are in alignment ($M = 0.17$) compared to misalignment trials ($M = 0.05$), $F(1, 81) = 12.871$, $p < .001$; $\eta_p^2 = 0.14$. No other effects were present in the data ($F < 1$).

Together the *d'* and *c* indexes suggest that, as expected, participants in the mere co-action condition performed better than those in isolation (increasing discrimination and reducing bias). Additionally, although familiarity increases discrimination, it also promotes memory bias; misalignment impairs overall memory performance.

6.2. Composite Face Effects

The composite face effect was analyzed by focusing on participants' task performance on trials that matched the *identical top halves* in misaligned faces and aligned faces. This effect was analyzed by examining both participants' accuracy and their RTs, within an ANOVA model; aligned-same versus misaligned-same, and familiar versus unfamiliar targets were defined as within-subjects factors, while the presence of others was defined as a between-subjects factor.

Accuracy

The main effect of SP suggests that participants perform better in a co-action context ($M = 4.45$) than in isolation ($M = 3.86$), $F(1, 80) = 10.217$, $p = .002$; $\eta_p^2 = 0.11$. A familiarity main effect corroborates the hypothesis that famous faces ($M = 4.34$) are recognized better than non-famous faces ($M = 3.97$), $F(1, 80) = 22.375$, $p < .001$; $\eta_p^2 = 0.22$. A non-significant main effect of alignment ($F < 1$) suggests that a composite face effect was not detected having accuracy as a dependent measure.

Reaction Times

Preliminar analysis of the mean accurate response time on the "same" trials suggests strong deviations from normality, being log-transformed to comply with ANOVA assumptions. These log-transformed means were analyzed in an ANOVA model defined by our design.[1] No main effect of SP ($F < 1$) was found. A main effect of familiarity emerged indicating that reaction times in response to familiar faces were faster ($M = 650$) compared to unfamiliar faces ($M = 687$), $F(1, 72) = 11.722$, $p < .001$; $\eta_p^2 = 0.14$. A main effect of alignment also emerged, $F(1, 72) = 18.801$, $p < .001$ $\eta_p^2 = 0.21$; the misaligned condition was associated with an increased response time ($M = 698$) in comparison to the aligned condition ($M = 639$), reflecting the composite face effect. SP seemed to moderate the composite face effect $F(1, 72) = 3.69$, $p = .058$ $\eta_p^2 = 0.05$), which is stronger in the isolation condition than in the co-action condition (see Table 2). No other interactions were significant (first order: $F < 1$ and second order $F(1, 72) = 1.874$, $p = .279$).

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[1] Eight participants failed to give a correct response in one of the trials and were excluded.

Table 2
Mean (Standard Deviation) of number of correct responses and their reaction times (ms) for "same" trials.

	Accuracy in "Same trials"				RTs			
	Unknown faces		Famous faces		Unknown faces		Famous faces	
	Alignment	Misalignment	Alignment	Misalignment	Alignment	Misalignment	Alignment	Misalignment
Isolation	3.625(1.497)	3.625 (1.314)	4.125 (1.289)	4.063 (1.523)	715 (218)	647 (125)	694 (234)	595 (121)
Co-action	4.360 (0.985)	4.280 (0.991)	4.380 (0.780)	4.800 (0.404)	716 (207)	671 (167,)	667 (216)	643 (181)
Total	4.073 (1.255)	4.024 (1.165)	4.280 (1.010)	4.512 (1.057)	716 (210)	662 (152)	677 (222)	626 (162)

7. Discussion

This study is the first to present evidence of a SP effect on a face recognition task. Such demonstration aims to stimulate the study of presence as a relevant moderation of face processing. Recognition becomes faster and more accurate (reduced bias regarding false-positive identifications and higher discrimination between presented and non-presented targets) in a mere co-action condition when compared to an isolation condition. A first implication of these findings is that simply perceiving several photos of faces does not prime the social facilitation to the same extent as co-action. Even famous faces do not seem to induce such SP effects disrupting real SP effects. In our view, this data suggests that either face photos did not prime SP or at least, that they made clear that real presence is a most powerful manipulation of SP.

In addition, the pattern of results indicates that the composite effect, although not very sensitive to the presence of others during both the isolation and co-action conditions, is still sensitive enough to examine the differences between these conditions. Findings indicate that the composite face effect is reduced in the presence of others. This seems to suggest that SP impact on face processing is not driven by increased reliance in holistic processing, as well-learned responses. For some other reason participants in presence of others are more prone to overcome the tendency to disregard detailed features of the faces. They were more able to separate top and bottom halves either because they focused their attention on the top-half (the relevant features of the task) disregarding the effects of bottom-half or because they were quicker to perceive the bottom-halves as context to be disregarded. Having the composite face effect as associated with the fact that target and irrelevant face parts are not processed independently prior to participants' response selection and execution (Richler et al., 2009), these results suggest SP to increase that independent processing.

The finding suggests that SP interferes with the composite effect through its attentional effects. Like Baron's (1986) distraction–conflict approach, as well Huguet et al. (1999) data, it suggests that the presence of others supports individuals' monitoring mechanisms, preventing them from being influenced by contextual cues. Congruently, Huguet et al. (1999) show that participants in presence of others perform better on Stroop-type tasks compared to participants in isolation. However, as it was made clear in the introduction of this paper, empirical approaches to the composite face effect have suggested it to occur regardless of whether the faces were previously attended or ignored (Boutet et al., 2002) just like the Stroop effects are expected regardless the direction of attention (Cho, Lien, & Proctor, 2006). Both tasks (i.e., Stroop and composite face) share the interpretation that interference effects are driven by automatic processes (see Brown, Roos-Gilbert, & Carr, 1995; MacLeod, 1991). In both research areas we may find evidence supporting the effects' resistance to attention manipulations, as well as claims that attention-allocation processes are critical for the composite face effect (e.g., Richler et al., 2008) and Stroop effect (e.g., Kahneman & Chajczyk, 1983; MacLeod, 1991). So, in similar ways, interference in these two tasks (which rely on activation of automatic responses) is reduced by SP suggesting increased monitoring of undesirable influence of those responses in participants' performance.

But does increased control over interference necessarily dependent upon attention being allocated to the target stimuli? Some authors

(e.g., Kane & Engle, 2003) have suggested that executive functions encompass the ability to keep task-relevant information and goal representations accessible in the face of interference from task-irrelevant information and competing responses (Engle, 2002; Kane, Conway, Hambrick, & Engle, 2008). Thus the efficiency in a Stroop type of task can rise from an increased working memory capacity of keeping the relevant goals in mind (Kane & Engle, 2003). Being so, presence of others may, in some way, help us to attend to those goals. One possible way can be the fact that it promotes more access to context features and so access to detailed features of a face (Fonseca & Garcia-Marques, 2013) which help to better detect differences between faces.

Aside from the general pattern of results, there are some details that require clarification. One is the fact that the results for the bias index c may not be what would be expected in a standard composite task. There is general bias toward participants responding "same" (both in the same and different conditions) and this bias is larger in the aligned compared to the misaligned condition. The nature of the composite illusion – making physically identical top face halves look different (just by pairing them with different bottom halves) due to holistic processing - should introduce a perceptual bias to respond "different". This bias should be stronger in the aligned than in the misaligned condition because of the presence of holistic processing. The bias toward participants responding "same" may be the reason why the composite face effect was only evident when RTs associated with correct responses were considered. Furthermore, specific details of our experiment may have contributed to this pattern of results. Our experiment mixed famous (i.e., celebrities) and non-famous faces, which may have increased the salience of different levels of familiarity. In addition, we used Hole's (1994) procedure, which makes the composite face effects rely heavily on RTs. Indeed, the RT-composite effect was generally present in our data. At any rate, the results of this study are clear in suggesting that even when participants' responses reflect a bias to perceive the target as the "same", this response is anchored in a process that makes it harder to perceive equivalent face tops as the "same" when they are paired with different face bottoms.

The main contribution of this paper is the demonstration that social facilitation effects can be observed even when the perceptual target is a social stimulus such as a photo of a face. In our view, this is highly relevant for two reasons: determining data collection experimental conditions and informing theoretical approaches to social influence and face processing research fields. Our study shows that SP (mere co-action) impacts face processing (both increasing accuracy and producing faster response times) and moderates the composite face effect by reducing it. These results point out that SP is not promoting these effects because it increases reliance on holistic processing as a "dominant" well-learned response (Zajonc, 1965), but, because it increases monitoring of interference produced by automatic response activation (see Huguet et al., 1999), which by itself corroborates the role of attentional mechanisms in face processing (see Richler & Gauthier, 2014).

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