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Eyes keep watch over you! Competition enhances joint attention in females

Francesca Ciardo [a,*], Paola Ricciardelli [b,c], Luisa Lugli [d], Sandro Rubichi [a], Cristina Iani [a,*]

[a] Department of Communication and Economics, University of Modena and Reggio Emilia, Viale Allegri, 9, 42121 Reggio Emilia, Italy
[b] Department of Psychology, University of Milano-Bicocca, Edificio U6, Piazza dell'Ateneo Nuovo 1, 20126 Milan, Italy
[c] Milan Centre for Neuroscience, Piazza dell'Ateneo Nuovo 1, 20126, Milan, Italy
[d] Department of Philosophy and Communication, University of Bologna, University of Bologna, Via A. Gardino 23, 40122 Bologna, Italy

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ABSTRACT

The present study investigated if the gaze-cuing effect (i.e., the tendency for observers to respond faster to targets in locations that were cued by others' gaze direction than to not-cued targets) is modulated by the type of relationship (i.e., cooperative or competitive) established during a previous interaction with a cuing face. In two experiments, participants played a series of single-shot games of a modified version of the two-choice Prisoner's Dilemma against eight simulated contenders. They were shown a fictive feedback indicating if the opponents chose to cooperate or compete with them. Opponents' faces were then used as stimuli in a standard gaze-cuing task. In Experiment 1 females classified as average in competitiveness were tested, while in Experiment 2 females classified as high and low in competitiveness were tested. We found that only in females classified as low and average in competitiveness the gaze-cuing effect for competitive contenders was greater than for cooperative contenders. These findings suggest that competitive opponents represent a relevant source of information within the social environment and female observers with low and average levels of competition cannot prevent from keeping their eyes over them.

1. Introduction

Orienting attention in the same direction where other individuals are looking at, known as joint attention, is a foundational ability guiding social interactions and communication (Langton, Watt, & Bruce, 2000). The gaze-mediated orienting of attention allows the observer to infer other people's mental states (i.e., the focus of their attention; e.g. Baron-Cohen, 1995), and to understand and predict their future actions (e.g., Innocenti, De Stefani, Bernardi, Campione, & Gentilucci, 2012; Pierno et al., 2006).

Even though there are several indications of the automatic and reflexive nature of the mechanisms underlying the gaze-mediated orienting of attention (e.g., Galfano et al., 2012; Hayward & Ristic, 2013; but see Frischen, Bayliss, & Tipper, 2007 for a review), recent studies suggested that joint attention orienting may not be purely bottom-up driven, but it is rather influenced by top-down processes that interpret the averted gaze based on its relevance for the task (e.g., Ricciardelli, Carcagno, Vallar, & Bricolo, 2013), and in comparison to other stimuli in the environment (e.g., Greene, Mooshagian, Kaplan, Zaidel, & Iacoboni, 2009; Ristic & Kingstone, 2005).

Furthermore, there are recent reports that joint attention is influenced by implicit and explicit social information associated to the seen person, such as age (Ciardo, Marino, Actis-Grosso, Rossetti, & Ricciardelli, 2014), facial emotional expression (e.g., Bonifacci, Ricciardelli, Lugli, & Pellicano, 2008), gender (Ohlsen, van Zoest, & van Vugt, 2013), race (Pavan, Dalmaso, Galfano, & Castelli, 2011), social status (e.g., Dalmaso, Pavan, Castelli, & Galfano, 2012) and political affiliation (Liuzza et al., 2011). For instance, Liuzza et al. (2011), using an oculomotor task, reported that political affiliation enhanced joint attention for in-group voters while it inhibited it for out-group voters. Similar results have been reported by Pavan et al. (2011) who investigated the impact of racial group membership on covert orienting of joint attention and reported that White participants selectively shifted their attention in response to the averted gaze of own-race individuals only. Therefore, person categorization seems to regulate joint attention.

The way we perceive and categorize others may depend on the type of relationship we have with them. Group membership acts as a strong categorization cue. There are indications that the need to cooperate or to compete leads to in-group/out-group differentiations, with individuals perceiving themselves as part of the same social group when they need to cooperate with each other. On the contrary, when the others represent an obstacle toward the attainment of a goal, they are more likely perceived as out-group members (e.g., Rabbie & Horwitz, 1969). In general, competitive interactions

* Corresponding authors.
E-mail addresses: francesca.ciardo@unimore.it (F. Ciardo), cristina.iani@unimore.it (C. Iani).

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have been shown to increase perceived intergroup and interpersonal differences (e.g., Toma, Yzerbyt, & Corneille, 2010) and to disrupt the emergence of shared task representations in joint action (e.g., Iani, Anelli, Nicoletti, Arcuri, & Rubichi, 2011). Interestingly, the effects of competition may be long lasting and transfer from one task to a subsequent one (e.g., Iani, Anelli, Nicoletti, & Rubichi, 2014; Sassenberg, Moskowitz, Jacoby, & Hansen, 2007).

To note, competitors are a special kind of out-group members as the achievement of their goals often coincides with the impossibility to reach ours. For these reasons, in competitive situations it appears fundamental for the observer to monitor their progress toward their goals (Poortvliet & Darnon, 2010). Evidence indicates that social interactions characterized by cooperation differently affect individual cognitive processes, such as attention, face recognition and memory, with faces of non-cooperative individuals attracting more automatic attention (e.g., Vanneste, Verplaetse, Van Hiel, & Braeckman, 2007) and being memorized more accurately (e.g., Chiappe et al., 2004; Mealy, Daood, & Krage, 1996; Oda, 1997; Yamagishi, Tanida, Mashima, Shimoma, & Kanazawa, 2003) than those of cooperative individuals.

Given the above considerations, the present study aimed to better clarify how social information, in particular person categorization, influences joint attention. Since previous studies indicated that females show stronger gaze cuing effects (Bayliss, Di Pellegrino, & Tipper, 2005) and higher sensibility to social cues (e.g., Deaner, Shepherd, & Platt, 2007; see Geary, 2010 for a review) than males, to avoid additional sources of variability in the data, only female participants were included in the present study (see Bayliss, Schuch, & Tipper, 2010). Specifically, we run two experiments to investigate whether the gaze-cuing effect is modulated by the cooperative and competitive behavior associated to a cuing face during a prior interaction. In Experiment 1, we included only individuals classified as average in competition, as measured through the Competitiveness Index Questionnaire developed by Smither and Houston (1992). In Experiment 2, participants rated as high and low in competitiveness were included.

In both experiments, we employed a standard gaze-cuing paradigm (Driver et al., 1999) and manipulated the relationship between the participant and the cuing faces via a preliminary learning phase in which participants associated faces of simulated opponents with a cooperative or competitive behavior. In this phase, participants were required to play a series of single-shot games of a modified version of the two-choice Prisoner's Dilemma against eight simulated contenders. After participants had indicated their response at the social dilemma game, they were shown a fictive feedback indicating if the opponents chose to cooperate or compete with them. Opponents' faces were then used as stimuli in the subsequent standard gaze-cuing task.

2. Experiment 1

The present experiment aimed at investigating whether the gaze-cuing effect (i.e., the tendency for observers to respond faster to targets in locations that were cued by others' gaze direction than to not-cued targets) is modulated by the type of relationship (i.e., cooperative or competitive) established during a previous interaction with a cuing face. Since individuals' competitiveness levels may affect how situations and others are perceived (e.g., Houston, Kinnie, Lupo, Terry, & Ho, 2000), in this experiment we included only individuals classified as average in competition.

We hypothesized that cooperative and competitive interactions between the observer and the seen face differently affect joint attention. Specifically, if a cooperative behavior associated with the seen face influences joint attention by increasing group membership, as suggested by the results of previous studies on joint attention (e.g., Liuzza et al., 2011; Pavan et al., 2011), then the gaze-cuing effect should be magnified for cooperative individuals which tend to be classified as in-group members. On the contrary, the gaze-cuing effect should not be evident for faces associated with a competitive behavior, since they are classified as out-group members (Rabbie & Horwitz, 1969). Alternatively, if competition affects joint attention by increasing the salience of some averted gazes more than others, then the gaze-cuing effect should be magnified for faces associated with competitive outcomes, since they represent a privileged source of information in the environment. In both cases, we expected these modulations to affect longer response times since information about the prior interaction with the cuing face has to be retrieved from memory. To this aim, response times were analyzed by means of the bin distributional analysis (e.g., Ratcliff, 1979). The distributional analysis of reaction times (RTs) consists in rank ordering individual RTs as a function of the experimental conditions and in dividing them into a number of intervals or bins so that it can be seen whether a variable influences different portions of the RT distribution (e.g., De Jong, Liang, & Lauber, 1994; see Balota & Yap, 2011 for a review). In the present study we used this technique to assess the time course of the social manipulation (i.e., the type of interaction) on the gaze-cuing effect. Specifically, if the modulation of the gaze-cuing effect is due to the retrieval from memory of the social information, then the difference between competitive and cooperative relations on the gaze-cuing effect should emerge for slower responses (i.e., the longer intervals of the distribution).

2.1. Methods

2.1.1. Participants

Twenty-four female undergraduate students (1 left-handed; M = 21.08 years, SD = 2.21 years) from the University of Modena and Reggio Emilia received course credit to participate to the study. All had normal or corrected-to normal vision and were naïve as to the purpose of the experiment. The study was conducted in accordance with the ethical standards laid down in the Declaration of Helsinki, and fulfilled the ethical standard procedure recommended by the Italian Association of Psychology (AIP). Written consent was obtained for all of them and they were debriefed about the study at the end of the experiment.

They were selected from a larger sample (n = 95) based on their scores at the Competitiveness Index (CI) questionnaire (Houston et al., 2000; Smither & Houston, 1992). To be included in the study, they had to score in the average competitiveness range (4–12). Mean scores for the participants included in the study were 8.17 (SD = 2.55).

2.1.2. Apparatus and Stimuli

Each participant was tested in a single session, lasting about 45 min. All tasks were performed on a computer. Participants sat approximately 55 cm from a 17″ CRT screen driven by a 700 MHz processor computer. Stimulus presentation and data collection were controlled by a PC running E-Prime version 2.0 software system (Psychology Software Tools, Inc).

Simulation of social interactions was achieved using a modified version of the two-choice Prisoner's Dilemma game (i.e., Poundstone, 1992), that provides one of the most widely used way to induce cooperative and competitive outcomes (Chan & Ybarra, 2002; Vonk, 1998). The dilemma (translated here from Italian) was presented as follows: *"You and another student have copied the final test of the Psychology class. The Professor has noticed that your tests are identical and he convenes separately both of you into his office with no means of speaking to or exchanging messages between the two of you. The Professor tells you that: a) If both of you confess that you have copied the test, then you will have to wait for 6 sessions before taking the test again; b) If neither of you confesses, then both of you will have to wait for 1 session before taking the test again; c) If only one of you confesses, he/she will pass the exam without taking the test again, while the other has to wait for 7 sessions before taking the test again".*

Stimuli used in the social dilemma, in the memory test and in the gaze-cuing task were grayscale photographs (7.98° × 15.76°) depicting 8 young adults (4 females and 4 males) bearing a neutral expression. All photographs were taken from the Productive Aging Lab Face Database