



## Brief article

## The dual function of social gaze

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## ABSTRACT

Ears cannot speak, lips cannot hear, but eyes can both signal and perceive. For human beings, this dual function makes the eyes a remarkable tool for social interaction. For psychologists trying to understand eye movements, however, their dual function causes a fundamental ambiguity. In order to contrast signaling and perceiving functions of social gaze, we manipulated participants' beliefs about social context as they looked at the same stimuli. Participants watched videos of faces of higher and lower ranked people, while they themselves were filmed. They believed either that the recordings of them would later be seen by the people in the videos or that no-one would see them. This manipulation significantly changed how participants responded to the social rank of the target faces. Specifically, when they believed that the targets would later be looking at them, and so could use gaze to signal information, participants looked proportionally less at the eyes of the higher ranked targets. We conclude that previous claims about eye movements and face perception that are based on a single social context can only be generalized with caution. A complete understanding of face perception needs to address both functions of social gaze.

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## 1. Introduction

You look across the card table, into the eyes of your opponent. Are you searching their eyes for flickers of information, deciding whether to call their bluff? Or by returning their stare are you letting them know that you have nothing to fear? In social interactions, people use their eyes to perceive information and also to signal their intentions. Yet, the dual functions of gaze have been studied by and large separately. While vision psychologists have focused on the information that is present and attended to in a face, social psychologists have focused on how eye contact structures social interaction. But, in any one situation of face-to-face contact, or in any one experiment on face perception, we cannot be certain whether gaze serves to encode information or to signal intentions. We aim to

understand when and how gaze is used for either function by varying the social context in which faces are viewed.

Research in vision science shows that there is plenty of useful information to perceive in the eyes of another person. The eyes are linked to many psychological processes, and so are extensively studied by researchers (Buswell, 1935; Just & Carpenter, 1976). They are a remarkably useful source of information during social interaction (Argyle & Cook, 1976; Emery, 2000; Foulsham, Cheng, Tracy, Henrich, & Kingstone, 2010; Kleinke, 1986). Following the gaze of another person, for instance, is an important requirement for social learning (Tomasello, Carpenter, Call, Behne, & Moll, 2005). Gaze attracts attention from very early ages (Batki, Baron-Cohen, Wheelwright, Connellan, & Ahluwalia, 2000), and learning to interpret what another person thinks and feels by looking at the eyes appears to be crucial to many aspects of social cognition (Charman et al., 2001; Senju & Csibra, 2008).

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Because people are looking at the eyes of each other to seek information, gaze is also a powerful tool for signaling information to onlookers. Humans are remarkably sensitive to changes in where others are looking (Gibson & Pick, 1963). Indeed, there is evidence that the bright white human sclera has been selected so that group members can perceive each other's eye movements (Kobayashi & Kohshima, 1997). Intentions, desires, obedience and dominance can all be signaled by the eyes. For example, gaze can be strategically used to cue an observer's attention (Kuhn, Tatler, & Cole, 2009), and prolonged eye contact can indicate the intention to deceive others (Mann et al., 2013), social interest (Staas & Willis, 1967), physical attraction (Mason, Tatlow, & Macrae, 2005), and nonverbal dominance (Dovidio & Ellyson, 1982). Thus, the eyes can both seek and signal information.

Previous research has not yet fully dissociated the dual function of social gaze. For example, while studies conducted in laboratories found that people tend to look predominantly to targets' eyes (e.g., Foulsham et al., 2010; Smith & Mital, 2013; Vo, Smith, Mital, & Henderson, 2012), studies conducted in real life situations found that people tend to avoid direct eye contact with targets (e.g., Gallup et al., 2012; Laidlaw, Foulsham, Kuhn, & Kingstone, 2011). Indeed, gazing behavior in real life is influenced by the potential for social interactions (Laidlaw et al., 2011), joint attention (Gallup et al., 2012), and social norms (Wu, Bischof, & Kingstone, 2013). Such critically relevant social information are often absent when examining eye movements in laboratory settings. In fact, it is possible that presenting still images or video clips activates predominantly the observational function of gazing. In contrast, in real life interactions gazing likely represents a mixture of both observational and signaling functions. Yet, interpreting eye movements from real life observations or comparing between live and prerecorded contexts is difficult. Differences in gazing might, at least partially, be explained by the fact that participants actually see different things across these situations.

In the present research, we developed an experimental paradigm to dissociate the dual function of social gaze. We combined the socially relevant information present in real life interactions with the experimental control of the laboratory. Unlike previous experiments that contrasted eye movements during real life situations to recorded stimuli (e.g., Laidlaw et al., 2011), in our experiment, participants viewed exactly the same stimuli across conditions. We presented the same faces throughout, but varied across blocks participants' beliefs about the social context.

We decided to test this paradigm in the domain of social hierarchy, because as with most of the cognitive literature on social gaze, it remains unclear why and when eye movements between people of different social ranks change. In many ways, people actively communicate their social rank through dress and demeanor, so that observers can easily perceive it and adjust their behavior accordingly (e.g., Gobel & Kim, 2014; Kraus & Keltner, 2009). Indeed, staring into other's eyes can be used as warning signal (Nichols & Champness, 1971), since prolonged eye contact is perceived as a sign of power (Dovidio & Ellyson, 1982). Yet, people also increase attention to higher ranked indi-

viduals to monitor their behaviors and learn from them. For example, the eyes of higher ranked individuals are looked at more when watching video recordings (Foulsham et al., 2010), and gaze cueing effects are greater for higher than lower ranked faces (Dalmasso, Pavan, Castelli, & Galfano, 2012). Therefore, it is possible that eye movements related to social rank could reflect the function of either signaling or perceiving social information, and previous studies have not distinguished these possibilities.

In the present study, we presented participants with faces of higher and lower ranked targets in different viewing contexts. Sometimes participants thought that they were merely observing targets' faces on the computer screen (one-way viewing), whereas other times participants thought that targets would later watch a video of them looking at targets' faces (two-way viewing). If the primary function of gaze is to perceive information about a target's social rank, then the viewing condition would not change eye movements, as the same stimuli would display the same visual information across conditions. Alternatively, if at least part of the function of gaze is to signal information about one's own social rank, then viewing condition will interact with the social rank of faces, even when people are looking at faces that are video-recorded.

We predicted that when looking at higher ranked targets, participants would look longer to their eyes when being unobserved compared to when targets could also see them, as to gain additional information without challenging targets' superior rank (Emery, 2000). In contrast, when looking at lower ranked targets, following literature on rank communication in primates (e.g., De Waal, 1989), we expected that participants would look longer into their eyes when targets could also see them compared to when being unobserved, presumably to signal their own superior rank.

## 2. Method

### 2.1. Participants

Sixty students (45 females,  $M_{age} = 23.03$ ,  $SD_{age} = 3.12$ ) took part in this study for €5 pay. Participants were French undergraduate and postgraduate students from Parisian universities. All participants had normal or corrected-to-normal vision.

### 2.2. Design

We employed a 2 (target rank: high or low)  $\times$  3 (viewing condition: baseline or one-way or two-way) mixed factor design, with the viewing condition as within-subjects factor.

### 2.3. Apparatus

Participants sat approximately 65 cm in front of a 24" LCD. A SMI 250 remote eye tracker was positioned at the base of the monitor and sampled gaze position 250 times a second, with an accuracy of approximately 0.5 degrees.

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