



Review article

Watching Eyes effects: When others meet the self



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ABSTRACT

The perception of direct gaze—that is, of another individual's gaze directed at the observer—is known to influence a wide range of cognitive processes and behaviors. We present a new theoretical proposal to provide a unified account of these effects. We argue that direct gaze first captures the beholder's attention and then triggers self-referential processing, i.e., a heightened processing of stimuli in relation with the self. Self-referential processing modulates incoming information processing and leads to the Watching Eyes effects, which we classify into four main categories: the enhancement of self-awareness, memory effects, the activation of pro-social behavior, and positive appraisals of others. We advance that the belief to be the object of another's attention is embedded in direct gaze perception and gives direct gaze its self-referential power. Finally, we stress that the Watching Eyes effects reflect a positive impact on human cognition; therefore, they may have a therapeutic potential, which future research should delineate.

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1. Introduction

Direct gaze (i.e., another individual's gaze directed at the self) provides a foundation for communication and social capabilities in humans (see [Baron-Cohen, 1994](#) for a review; [Csibra & Gergely, 2009](#)). Understanding the processes involved in direct gaze perception is of paramount importance for understanding the basis and the development of social cognition and for characterizing the psychiatric and neurobiological disorders where social functioning is affected, such as social anxiety ([Horley, Williams, Gonsalvez, & Gordon, 2003](#)), schizophrenia ([Tso, Mui, Taylor, & Deldin, 2012](#)), and autism ([Jones & Klin, 2013](#)). Interestingly, there is a growing body of evidence from different lines of research showing that direct gaze perception has diverse effects on cognition in adults. However, these effects have never been fully delineated within a cohesive framework.

Here, we present the first overview of the pervasive effects of direct gaze on human cognition. We identify five types of effects: attention capture ([Senju & Hasegawa, 2005](#)), enhancement of self-awareness (e.g. [Baltazar et al., 2014](#); [Pönkänen, Peltola, & Hietanen, 2011](#)), enhancement of memory for self-relevant information (e.g. [Conty & Grezes, 2012](#); [Mason, Hood, & Macrae, 2004](#)), promotion of pro-social behaviors (e.g. [Baillon, Selim, & van Dolder, 2013](#); [Wang, Newport, & Hamilton, 2011](#)), and, finally, positive appraisals of others (for a review, see [Kleinke, 1986](#)). The overview of these effects reveals that the mechanisms that have been previously proposed to underlie the direct gaze effects do not provide an exhaustive account of these effects. In complement to these models, we demonstrate that self-referential processing can provide the missing piece in understanding the diverse effects of direct gaze on human cognition. We propose a two-stage model of gaze processing by which direct gaze first captures the beholder's attention and then triggers self-referential processing, i.e., a heightened processing of stimuli in relation with the self, which leads to the so-called Watching Eyes (W.E.) effects.

2. The five types of direct gaze effects on human cognition

2.1. Effects of attention capture by direct gaze

The morphology of the eyes has changed through the course of evolution so that the human eye region, with the large exposed white sclera contrasting with the dark iris, forms a major source of information in the human face ([Kobayashi & Kohshima, 1997](#)). This converges with the robust empirical findings that, during interaction, the eyes are the first and the most explored region of the face ([Pelphrey et al., 2002](#); [Spezio, Adolphs, Hurley, & Piven, 2007](#); [Yarbus, 1967](#)). Some researchers argue that the human brain has evolved in parallel to be equipped with innate mechanisms devoted to detecting eyes in the environment, with a particular sensitivity for self-directed gaze orientation ([Baron-Cohen, 1994](#); [Perrett & Emery, 1994](#)). In particular, several lines of evidence have led to the view that direct gaze captures attention and receives prioritized visual processing. Newborn babies have a visual preference for faces with direct gaze as compared to faces with other gaze directions ([Farroni, Csibra, Simion, & Johnson, 2002](#)) suggesting that attention capture by direct gaze may be innate. Direct gaze induces automatic attention orienting towards faces ([Aya, 2012](#); [Doi, Ueda, & Shinohara, 2009](#); [Senju & Hasegawa, 2005](#); [Von Grünau & Anston, 1995](#)) and results in enhanced heart rate deceleration response during the few seconds following the stimulus onset ([Akechi et al., 2013](#)), an index of attention orienting to external stimuli ([Graham & Clifton, 1966](#)). Attention capture by direct gaze does not require focused attention ([Yokoyama, Sakai, Noguchi, & Kita, 2014](#)) and there is evidence that attention capture may even occur before conscious gaze perception, subsequently favoring the access of faces with direct gaze to consciousness ([Stein, Senju, Peelen, & Sterzer, 2011](#); [Yokoyama, Noguchi, & Kita, 2013](#)). Moreover, direct gaze seems to capture and hold attention onto the face for 500 ms–900 ms after onset of direct gaze exposure ([Senju & Hasegawa, 2005](#); [Böckler, van der Wel, & Welsh, 2014](#)).

At the behavioral level, the attention capture and hold elicited by direct gaze is typically revealed through two types of effects. First, seeing a face with direct gaze increases performance in tasks requiring attentional focus onto the face. For example, identification of a visual target is facilitated when appearing at the location of direct as compared to averted gaze ([Böckler et al., 2014](#)). Direct gaze is categorized faster than averted gaze ([Conty, Dezechache, Hugueville, & Grezes, 2012](#);

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