Research Article

The Look of Love

Gaze Shifts and Person Perception

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ABSTRACT—*Gaze direction is a vital communicative channel through which people transmit information to each other. By signaling the locus of social attention, gaze cues convey information about the relative importance of objects, including other people, in the environment. For the most part, this information is communicated via patterns of gaze direction, with gaze shifts signaling changes in the objects of attention. Noting the relevance of gaze cues in social cognition, we speculated that gaze shifts may modulate people's evaluations of others. We investigated this possibility by asking participants to judge the likability (Experiment 1) and physical attractiveness (Experiment 2) of targets displaying gaze shifts indicative of attentional engagement or disengagement with the participants. As expected, person evaluation was moderated by the direction of gaze shifts, but only when the judgment under consideration was relevant to participants. We consider how and when gaze shifts may modulate person perception and its associated behavioral products.*

Detecting and interpreting gaze-related information is a finely tuned human skill. That people are highly responsive to gaze cues reflects the importance of the eyes in social communication (Argyle & Cook, 1976). When gaze direction can signal the potential behavioral intentions of conspecifics, it is clearly useful to have an information processing system that is capable of understanding the nonverbal language of the eyes (Baron-Cohen, 1995; Emery, 2000). Knowing, for example, whether you are the target of another person's gaze because you are a possible date, adversary, or tennis partner is valuable information as it facilitates the generation of a contextually appropriate behavioral response (e.g., flirt, argue, backhand return). Put simply, decoding the language of the eyes streamlines the complex process of everyday social interaction.

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Inspection of the available evidence confirms that people are highly adept at using gaze cues to decode the behavioral intentions of others (Baron-Cohen, 1995). The precursors of this ability appear in early infancy and continue to develop until adulthood. Almost from birth, infants show a fascination with the eyes over other regions of the face (Morton & Johnson, 1991). By the age of 4 months, they can discriminate direct from averted gaze (Vecera & Johnson, 1995), and between the ages of 9 and 18 months, they can discern that the eyes convey valuable information when the intentions of an adult are ambiguous (Phillips, Baron-Cohen, & Rutter, 1992). Supporting this ability to decode the language of the eyes is a specialized processing system that deals with the problem of gaze detection and interpretation (Allison, Puce, & McCarthy, 2000; Haxby, Hoffman, & Gobbini, 2000). Although initial electrophysiological work revealed that critical aspects of this system are localized in regions of the superior temporal sulcus (Perrett, Rolls, & Cann, 1982), recent neuroimaging investigations have shown that the amygdala and medial prefrontal cortex also play a prominent role in gaze processing (Calder et al., 2002; George, Driver, & Dolan, 2001; Hoffman & Haxby, 2000; Kawashima et al., 1999).

Despite noteworthy advances in the neuroscience of gaze processing (Haxby et al., 2000; Langton, Watt, & Bruce, 2000), surprisingly little is known about the manner in which gaze cues may affect basic behavioral aspects of person perception. In one of the few studies to consider this issue to date, we (Macrae, Hood, Milne, Rowe, & Mason, 2002) speculated that gaze direction may modulate the efficiency of categorical thinking, notably the ease with which people can classify others (in terms of sex) and extract associated knowledge from semantic memory (Macrae & Bodenhausen, 2000). As the most relevant social targets are usually those with whom eye contact has been established (Baron-Cohen, 1995; Emery, 2000; von Grünau & Anston, 1995), we anticipated that individuals would be categorized more rapidly when they displayed direct rather than averted gaze (see also Campbell, Wallace, & Benson, 1996). Our results supported this prediction, thereby demonstrating that gaze direction can influence fundamental aspects

of the person perception process (see also Mason, Hood, & Macrae, 2004).

Gaze direction likely influences person construal through its effects on the allocation of social attention (Driver et al., 1999; Farroni, Johnson, BrockBank, & Simion, 2000; Friesen & Kingstone, 1998; Hood, Willen, & Driver, 1998). If, for some reason or another, an object is interesting or salient, then a person's gaze will naturally be directed toward the environmental location at which the object resides. Through such a cuing mechanism, gaze direction reveals the identity and status of the current objects of attention. In this regard, of course, gaze direction is only part of the story; an equally important component of the cuing process concerns the pattern or history of gaze shifts among objects in the environment. Such gaze shifts are informative as they signal people's engagement or disengagement with specific environmental stimuli (Baron-Cohen, 1995). Our intuition is that when these stimuli are other people, the social meaning conveyed by gaze shifts (i.e., attentional interest vs. attentional disinterest) may play an important role in shaping the products of person construal. Specifically, evaluations of other people may be influenced by the direction of their gaze shifts. For example, as Goffman (1963) has noted, "one gives to another enough visual notice to demonstrate that one appreciates that the other is present (and that one admits openly to having seen him), while at the next moment withdrawing one's attention from him so as to express that he does not constitute a target of special curiosity or design" (p. 84).

Consider, for example, the following illustrative scenario. On entering a bar, you notice an attractive individual sitting by the pool table. Suddenly his or her gaze shifts from a couple in the corner to you. How would this make you feel? Probably quite excited. Now contrast this with an almost identical situation. As soon as you enter the bar, you notice that an attractive stranger is looking in your direction, but then his or her gaze suddenly shifts toward a couple in the corner of the room. Is this version of events as thrilling as the previous scenario? Is the stranger as attractive or likable as before? Our hypothesis is that gaze shifts modulate people's evaluations of others, and that these effects are shaped by the interplay of several factors, including the status of the target (i.e., cue provider), the identity of the perceiver, and the nature of the judgment under consideration. What this suggests is that identical gaze shifts may elicit quite different reactions depending on the judgment that is required or the relationship that exists between the perceiver and target (i.e., person evaluation is sensitive to the judgmental context in which gaze cues are detected and interpreted). We explored these possibilities in the current investigation.

In a person-evaluation task, participants (men and women) were required to rate either the likability (Experiment 1) or the physical attractiveness (Experiment 2) of female targets (i.e., cue providers) displaying different gaze shifts (toward or away from the raters). Recent research has demonstrated that static gaze cues elicit distinct patterns of neural activity. In an imaging study, Kampe, Frith, Dolan, and Frith (2001) showed that gaze direction modulated the impact of facial attractiveness on the ventral striatum, a brain region associated with the prediction of reward and punishment. In the current context, we expected that gaze-related effects would also extend to behavioral evaluations of targets, but that the direction of gaze shifts (rather than gaze direction per se) and the relevance of the judgments to be undertaken would moderate people's evaluations of others.

EXPERIMENT 1: HOW LIKABLE ARE YOU?

Method

Participants and Design

Forty-three undergraduates (24 women, 19 men) from Dartmouth College completed this experiment in return for course credit or $5. The experiment had a 2 (sex of participant: male or female) × 2 (social attention: toward or away) between-subjects design.

Procedure and Stimulus Materials

Participants arrived at the laboratory individually, were greeted by a female experimenter, and were told that the study was an investigation into person perception. The experimenter informed participants that they would view a series of female faces on the computer screen (Dell Optiplex). They were told that their task was to rate the likability of each target, a judgment we believed was equivalent in social relevance for both male and female participants. Following the presentation of each face, ratings were furnished by means of a key press on the computer keyboard. The relevant keys were numbered from 1 (*likable*) to 5 (*extremely likable*). The stimuli were presented using Presentation software (Version 0.70)

Each trial began with a fixation cross that appeared in the center of the screen for 1,000 ms. The screen then went blank 30 ms before the onset of each face, which appeared at fixation and remained on the screen for 2,000 ms. Following the erasure of the face, a 5-point rating scale appeared on the screen and remained until participants made a response. The stimuli were 38 female faces (young adults scanned from advertisements in fashion magazines), each conveying a neutral facial expression. The images were standardized to 500 × 600 pixels in size and matched for contrast and luminance. For each face, two animations were created, one displaying the target shifting her attention away from the viewer (the *attention-away* condition) and the other displaying the target shifting her attention toward the viewer (the *attention-toward* condition). In the attention-away condition, each face was displayed with direct gaze for the first 1,000 ms of the trial and averted gaze (left or right) for the remaining 1,000 ms. In the attention-toward condition, the pattern was reversed (i.e., averted-to-direct gaze). Thus, the duration for which the faces displayed averted (1,000 ms) or direct (1,000 ms) gaze did not vary across conditions; all that

differed was the direction of gaze shifts.[1] Participants were randomly assigned to one of the experimental conditions. On completion of the task, participants were debriefed and dismissed.

Results and Discussion

Ratings of likability were averaged across the faces for each participant. A 2 (sex of participant: male or female) × 2 (social attention: toward or away) between-subjects analysis of variance (ANOVA) was performed on the data. This revealed a main effect of social attention on participants' responses, $F(1, 39) = 4.30$, $p < .05$, such that ratings of likability were elevated when social attention was directed toward rather than away from the raters (respective *M*s = 2.93 vs. 2.72). No other significant effects emerged in the analysis.

These results, then, provide preliminary evidence for the effects of gaze shifts on person evaluation. Targets were evaluated more favorably when gaze shifts signaled attentional engagement rather than disengagement with the raters. But would such an effect emerge for any evaluation undertaken with the same female targets? The crux of our thesis is that the judgmental relevance of targets should moderate the effects of gaze shifts on person construal (Argyle & Cook, 1976). As likability is a relevant judgmental dimension for both male and female raters, comparable effects emerged for the two sexes. A quite different pattern of effects might emerge, however, when the requested judgment is disproportionately relevant to only one sex, as may be the case for ratings of physical attractiveness. In such a task context, the effect of gaze shifts (i.e., attentional engagement vs. disengagement) on ratings of the female targets might be restricted to the judgments of male participants. We considered this possibility in our second experiment.

EXPERIMENT 2: HOW ATTRACTIVE ARE YOU?

Method

Participants and Design

Thirty-four undergraduates (16 women, 18 men) from Dartmouth College completed the experiment in return for course credit. The experiment had a 2 (sex of participant: male or female) × 2 (social attention: toward or away) between-subjects design.

Procedure and Stimulus Materials

The experiment was a replication of the previous study, but with one important modification. Following the presentation of each face, participants rated the physical attractiveness (from 1, *attractive*, to 5, *extremely attractive*) of the target. On completion of the task, participants were debriefed and dismissed.

[1]Each of the animations was created by displaying a series of frames (static images—20 depicting the target with direct gaze, 20 depicting the target with averted gaze) for 50 ms each. In this way, participants were accustomed to any flickering that might occur during shifts in the target's gaze direction.

Results and Discussion

Ratings of attractiveness were averaged across the faces for each participant. A 2 (sex of participant: male or female) × 2 (social attention: toward or away) between-subjects ANOVA was performed on the data. This revealed a main effect of participant's sex, $F(1, 30) = 10.97$, $p < .002$, such that targets were deemed to be more attractive by male than female raters (respective *M*s = 2.94 vs. 2.43). In addition, the analysis revealed a marginally significant Sex of Participant × Social Attention interaction, $F(1, 30) = 2.85$, $p < .10$. Given our a priori predictions, we performed planned comparisons (social attention toward vs. away) on the ratings of male and female participants (Rosenthal & Rosnow, 1985). The results showed that ratings of attractiveness were elevated when social attention was directed toward rather than away from male raters, $t(16) = 2.44$, $p < .03$ (*M*s = 3.13 vs. 2.75). A comparable effect was not observed among female raters, $t(14) < 1$, n.s. (*M*s = 2.51 vs. 2.55). Thus, when the requested judgment was more relevant to men than women, only men were influenced by gaze shifts when evaluating the targets.[2]

GENERAL DISCUSSION

As predicted, gaze shifts modulated the products of person construal (Argyle & Cook, 1976). Across two experiments, evaluations were elevated when female targets displayed gaze shifts that were indicative of attentional engagement rather than disengagement with the raters. However, these effects were sensitive to the context in which the evaluations were furnished. Whereas gaze cues elevated ratings of likability among both male and female participants, only the men displayed gaze-related effects on person evaluation when the physical attractiveness of the targets was assessed. These results confirm that the social meaning associated with different gaze shifts can have a pronounced impact on person evaluation, an impact that is sensitive to the judgmental context in which the gaze cues are detected and interpreted (Baron-Cohen, 1995). One task for future research will be to establish the generality of the current effects across different types of targets (e.g., male faces), social judgments (e.g., negative evaluations), and task settings. Of particular importance is the extent to which the current results extend to face-to-face interactions between social agents. Work of this kind will establish the ecological validity of the effects reported here.

Our finding that gaze-induced shifts in attentional engagement modulate the products of person construal is consistent with a recent model of social perception. According to Baron-Cohen (1995), decoding the significance of gaze cues is a pri-

[2]To establish that the observed effects were driven by gaze shifts and not gaze direction per se, we asked 18 additional male participants to rate the female faces. For half of the participants, the targets were depicted with direct gaze; for the other participants, the targets were depicted with averted gaze. The results revealed that ratings of attractiveness were not moderated by static gaze cues, $t(16) < 1$, n.s. (*M*s = 2.45 and 2.67 for direct and averted gaze, respectively).

mary objective of the social brain (Brothers, 1990). In this respect, gaze shifts provide a valuable source of information. If one suddenly becomes the object of another person's attention, this is likely to trigger a variety of processes that may shape the products of person construal. For example, direct gaze is known to increase arousal (Nichols & Champness, 1971). Thus, arousal-related shifts in the efficiency of cognitive functioning may guide the process of person evaluation. Direct gaze has also been shown to activate neural circuits that are associated with the appraisal (e.g., threat, reward value) of social stimuli. Recent imaging investigations have demonstrated increased activity in the superior temporal sulcus, amygdala, and ventral striatum when people view faces displaying direct gaze (George et al., 2001; Haxby et al., 2000; Kampe et al., 2001). This increased activity may index the affective significance of eye contact in social interaction, which in turn may influence people's evaluations of others.

Decoding the language of the eyes is an ability that lies at the very heart of human social cognition (Baron-Cohen, 1995). As Emery (2000) has argued, "the eyes provide very subtle signals to other individuals, and information transferred by this manner is dependent largely on the ability to understand that the eyes capture information about the world" (p. 582). Noting the importance of gaze cues in everyday interaction, researchers have recently attempted to chart how gaze-related information may influence the process and products of person construal (Macrae et al., 2002; Mason et al., 2004). Extending this work, the present study shows that it is not only gaze direction that shapes person construal; gaze shifts that signal the current attentional status of others also guide people's evaluations of them. At least where social attention is concerned, out of sight may really mean out of mind.

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