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Brief article

Observing shared attention modulates gaze following

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ABSTRACT

Humans' tendency to follow others' gaze is considered to be rather resistant to top-down influences. However, recent evidence indicates that gaze following depends on prior eye contact with the observed agent. Does observing two people engaging in eye contact also modulate gaze following? Participants observed two faces looking at each other or away from each other before jointly shifting gaze to one of two locations. Targets appeared either at the cued location or at the non-cued location. In three experiments gaze cueing effects (faster responses to objects appearing at the cued location) were found only when the two faces had looked at each other before shifting gaze. In contrast, no effects of gaze following were observed when the two faces had looked away from each other. Thus, the attentional relation between observed people modulates whether their gaze is followed.

1. Introduction

Social interactions crucially depend on joint attention. Providing perceptual common ground for different co-actors, joint attention underlies the coordination of interpersonal actions (Clark & Krych, 2004; Richardson & Dale, 2005; Sebanz, Bekkering, & Knoblich, 2006) and is a central component of reading others' minds (Baron-Cohen, 1991). From early childhood on humans are highly motivated to share attention with others (Tomasello & Carpenter, 2007) and this tendency may play a crucial role in the development of capabilities like imitation and language (Hobson, 2002; Tomasello, Carpenter, Call, Behne, & Moll, 2005).

On a functional level, the direction of a person's gaze provides cues to an observer as to where s/he is attending. Seeing someone looking in a particular direction elicits rapid shifts of attention to the same location, as demonstrated by reaction time benefits for targets that appear at the gazed-at location (Driver et al., 1999; Friesen & Kingstone, 1998; Hietanen, 1999; Langton & Bruce, 1999). The tendency to follow conspecifics' gaze is often described as a reflex-like process and it has been demonstrated that gaze following occurs in several group-living species, including ravens (Bugnyar, Stowe, & Heinrich, 2004), goats (Kaminski, Riedel, Call, & Tomasello, 2005), macaques (Ferrari, Kohler, Fogassi, & Gallese, 2000), and great apes (Brauer, Call, & Tomasello, 2005). In humans, gaze following develops early in infancy (D'Entremont, Hains, & Muir, 1997; see also Caron, Butler, & Brooks, 2002; Meltzoff & Brooks, 2007), and is also found in children with autism (Kylliäinen & Hietanen, 2004). Studies addressing how characteristics of the observed face affect gaze following suggest that gaze following is quite resistant to top-down influences. The identity (Frischen & Tipper, 2004), the emotional expression (Bayliss, Frischen, Fenske, & Tipper, 2007; Hietanen & Leppänen, 2003), and the trustworthiness (Bayliss & Tipper, 2006) of faces does not modulate gaze following.

However, other studies indicate that attention sharing modulates gaze following in a top-down manner. Bristow, Rees, and Frith (2007) showed that gaze following was more pronounced for eyes that had previously looked at the observer (Bristow et al., 2007) than for eyes that had been averted from the observer. Similarly, when infants viewed videos of adults they followed their gaze only when direct eye contact had been established beforehand (Senju

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& Csibra, 2008). The authors suggested that perceiving direct eye contact may affect subsequent attentional processing (for an overview, see Senju & Johnson, 2009). In particular, eye contact may provide a social signal that can take the role of an ostensive cue. As such, eye contact communicates to the gazed-at person that she is the addressee of an informative intent and that the upcoming gaze of the other is going to be meaningful (Csibra & Gergely, 2009).

The aim of the present study was to investigate whether observing direct eye contact in others also affects subsequent gaze behavior. There is an important difference between being the addressee of someone's attention and observing others sharing attention. The observer is not addressed directly and there is no informative intent towards him. Eye contact that is merely observed lacks communicative properties and, hence, is not an ostensive signal (Csibra & Gergely, 2009). Whereas modulation of attention has been shown for the experience of direct eye contact (Senju & Johnson, 2009), there is no evidence so far that observing eye contact in others can also modulate subsequent attentional processing.

If experiencing eye contact and being the addressee of the gazer's communicative intent are crucial for subsequent following of her gaze, observing others looking at each other should not modulate gaze following. However, observing shared attention may still allow an observer to derive whether an upcoming action or gaze is meaningful. This could be achieved by mapping an observed relation between two agents and an object onto one's own previous experiences of sharing attention towards an object with another agent (Barresi & Moore, 1996). Thus even if one is not the intended addressee shared attention in others may still convey the significance of subsequent (gaze) behavior.

Three experiments tested whether gaze following is modulated by the observation of two individuals sharing attention. Participants saw two faces looking at each other or away from each other before shifting their gaze towards or away from a response target (Fig. 1). If observing two individuals sharing attention has similar effects as sharing attention with another individual, larger gaze cueing effects are expected after two observed individuals have looked at each other as compared to when they have looked away from each other.

2. Methods

Participants. Seventy-two students (mean age 22.2 years, 58 female, 65 right handed) were randomly assigned to one of the three experiments and received payment or course credits for participation.

Stimuli. In Experiment 1, schematic drawings of horizontally aligned faces were used (see Fig. 1A). Faces were turned towards each other and looked straight ahead, but not directly at participants. After looking at each other (attention shared) or away from each other (attention not shared), the two faces simultaneously gazed to the upper or to the lower side of the screen.

In Experiment 2, the faces were aligned vertically (see Fig. 1B) and directly faced each other. After looking at each other (attention shared) or away from each other (attention not shared), the two faces gazed to the left vs. right side of the screen.

In Experiment 3, photographs of two horizontally aligned faces were shown (see Fig. 1C). The faces had closed eyes before turning heads and eyes towards each other (attention shared) or away from each other (attention not shared). Subsequently, they gazed up or down.

Procedure. Participants were instructed to press one of two buttons in response to the identity of a piece of fruit (apple or pear; two-choice task).

Each trial started with the central presentation of the two faces. After 900 ms, the two faces either looked at each other (attention shared) or looked away from each other (attention not shared). After 1200 ms, a fixation cross appeared between the two faces for 500 ms in order to draw participants' attention to the center regardless of where they had looked before. Subsequently, both faces looked at one of the two target locations. Following stimulus onset asynchronies of 500, 600, or 700 ms a picture of an apple or a pear was presented at one of the locations until participants responded (up to 1200 ms). In 50% of the trials gaze cued the target position (congruent) and in 50% of the trials gaze cued the non-target position (incongruent). Participants responded by pressing one of two response keys with one of two fingers of their right hand. Response buttons were aligned orthogonally to target positions in order to exclude effects of stimulus–response compatibility. The assignment of stimuli to responses was counterbalanced across subjects. The order of trials was randomized within blocks (7 blocks of 48 trials). Stimuli were presented on a 17-inch TFT monitor, using 'Presentation' software.

After the experiment participants were asked what they thought the experiment was about, whether they thought that the two faces had affected their performance, and if so, how.

3. Results

Reaction times (RTs) and errors were analyzed by means of a repeated measures analysis of variance (ANOVA), in a $2 \times 2 \times 3$ factorial within subject design with the factors Attention (shared vs. not shared), Gaze congruency (congruent vs. incongruent), and SOA (500, 600, or 700 ms). Results are displayed in Fig. 2.

As predicted, RTs in all three experiments showed a significant two-way interaction of Attention and Gaze congruency (Experiment 1: [$F(1, 23) = 7.3$, $p < .05$], Experiment 2: [$F(1, 23) = 4.5$, $p < .05$], Experiment 3: [$F(1, 23) = 5.7$, $p < .05$]). There was a significant effect of Gaze congruency when the faces had looked at each other before the gaze shift (Experiment 1: [$t(23) = 2.8$, $p < .05$], Experiment 2: [$t(23) = 3.0$, $p < .01$], Experiment 3: [$t(23) = 4.5$, $p < .001$]) but not when the faces had looked away (Experiments 1–3: [$ts(23) < 1$]). RTs on congruent trials were significantly faster in the attention shared condition than in the attention not shared condition (Experiment 1: [$t(23) = 2.3$, $p < .05$], Experiment 2: [$t(23) = 2.8$, $p < .05$], Experiment 3: [$t(23) = 2.8$, $p < .05$]). Incongruent trials were not affected by the factor Attention [Experiments 1–3: $ts(23) \leqslant 1.1$, $ps \geqslant .27$].

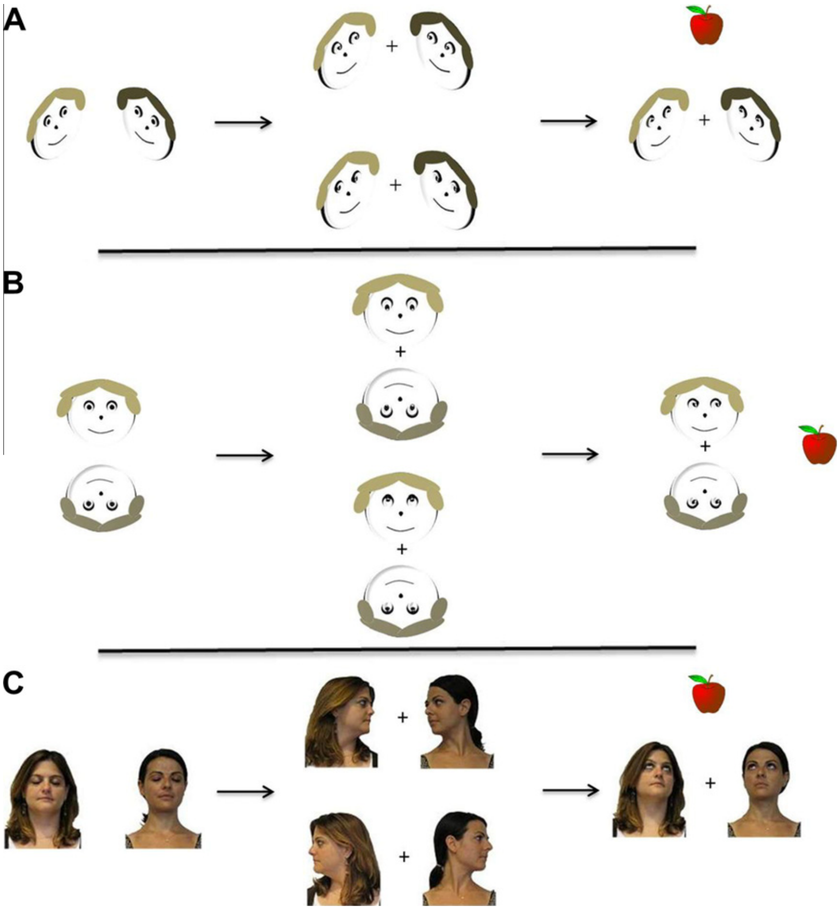

Fig. 1. Schematic illustration of the stimuli and the event sequence in Experiments 1–3. After looking straight ahead the two faces gazed at each other or away from each other, and then simultaneously shifted their gaze to a location that was either congruent or incongruent with the target location. In Experiment 1 drawings of human faces were aligned horizontally and the target objects appeared above or below the faces (Panel A). In Experiment 2 drawings of human faces were aligned vertically and the target objects appeared to the left or right (Panel B). In Experiment 3 photographs of human faces were aligned horizontally and the target objects appeared above or below the faces (Panel C).

In Experiment 1, no main effects of Gaze congruency [$F(1, 23) < 1$] and SOA [$F(1, 23) = 1.5$, $p = .22$] were found. Experiments 2 and 3, by contrast, revealed faster RTs in gaze congruent as compared to incongruent trials [$Fs(1, 23) \geqslant 7.5$, $ps < .05$] as well as decreasing RTs for increasing SOAs [$Fs(1, 23) \geqslant 10.5$, $ps < .001$].

In Experiment 1, the two-way interaction of Attention and Gaze congruency was most pronounced in the 600 ms SOA condition [$F(1, 23) = 9.8$, $p < .01$] as indicated by a three-way interaction [$F(1, 23) = 4.3$, $p < .05$]. SOA did not affect the interaction of Attention and Gaze congruency in Experiments 2 and 3 [$Fs(1, 23) < 1$].

There were no significant differences in error rates. None of the participants suspected that their performance had been influenced by whether the two faces had looked at each other or away from each other.

4. Discussion

In three experiments observing shared attention modulated gaze following. Participants showed an RT-benefit in gaze congruent trials when the two faces had looked at each other before simultaneously shifting gaze to the target location. In contrast, the effect of gaze congruency was absent when the faces had looked away from each other. In Experiment 1, the gaze congruency effect was even numerically reversed in the attention not shared condition, which may explain the absence of a significant main effect of Gaze congruency in this experiment. The decrease of reaction times with increasing SOA (Driver et al., 1999) was not significant in all experiments. This is likely due to the small range of SOAs employed in the present experiments (500, 600, and 700 ms), which may have decreased the power of this manipulation.

In the first experiment the two faces formed a triangle with the participant and could, in principle, have directed their gaze at the participant any time. In Experiment 2, by contrast, the two faces were directly facing each other without being oriented towards the participant. Moreover, faces were aligned vertically instead of horizontally to test whether the modulation of gaze cueing is bound to a particular spatial axis. The results of Experiment 2 indicate that

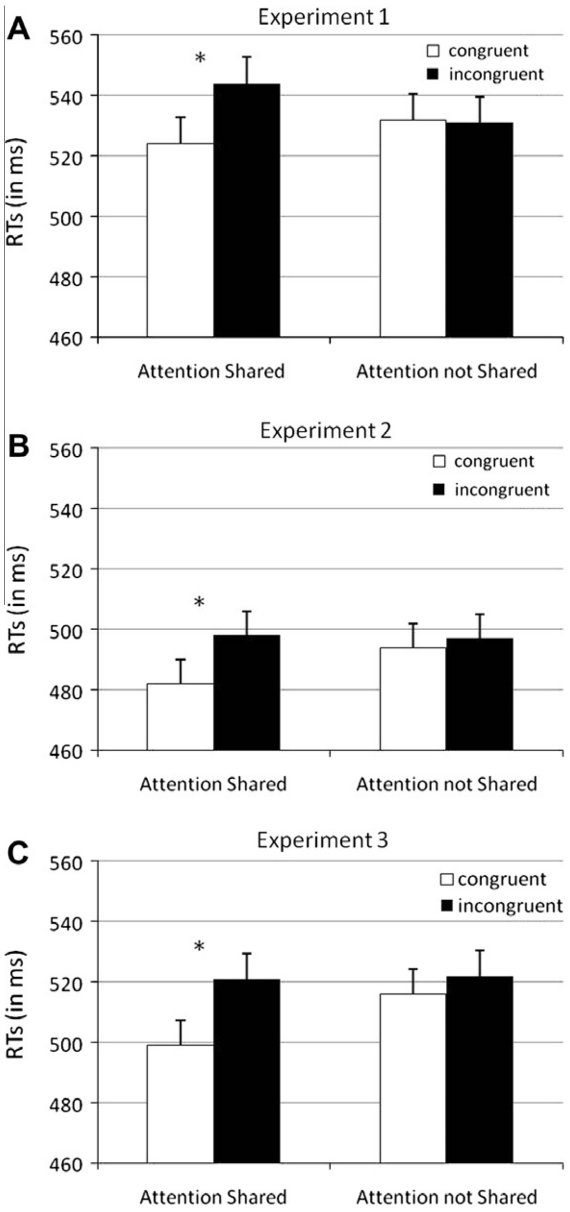

Fig. 2. Mean RTs (in ms) in Experiment 1, Experiment 2, and Experiment 3. Gaze cueing effects (faster performance on congruent trials compared to incongruent trials) only occurred in the attention shared condition and were due to a speed up on congruent trials. Error bars display within-subjects confidence intervals based on Loftus and Masson (1994).

the modulation of gaze following by prior shared attention is replicable under different spatial arrangements.

In a third experiment, the joint gaze congruency effect was generalized to more realistic biological stimuli. Photographs of human faces were used and the attentional relation was manipulated by depicting head turns towards or away from each other in addition to eye movements. This experiment showed that modulations of gaze cueing also occur after observing complex face stimuli that the 'social brain' is specialized in processing (Bristow et al., 2007; Senju & Csibra, 2008). Given that the effect was similar as in Experiments 1 and 2 where only the eyes and not the heads moved it is likely that gaze was also the crucial factor in Experiment 3.

The present results extend earlier findings in showing that gaze following is modulated not only by engaging in shared attention with another agent (Bristow et al., 2007; Senju & Csibra, 2008), but also by observing shared attention. This indicates that experiencing direct eye contact and being the addressee of communicative signaling are not necessary prerequisites for gaze following to be modulated. Even when merely observing others, their gaze was only followed when they were observed to be engaged in shared attention beforehand. The results of the debriefing session suggest that participants were unaware of any effects of observing shared attention.

However, there are two possible alternative explanations that could account for our findings. First, the observed modulation of gaze following may have been due to differences in spatial attention between the attention shared and the attention not shared condition. When looking at each other, the faces may have cued the center of the screen. When looking away from each other the faces may have cued the outside of the screen. Participants may have found it easier to focus on the center when the faces had cued this location and this may account for the larger gaze cueing effects in the attention shared condition. By contrast, the cueing of outer locations in the attention not shared condition may have spread participants' attention, thereby preventing gaze following.

Second, the faces in the attention shared condition were not merely looking at each other, but were also looking in the location of the participant's gaze. Thus, participants may have perceived the faces as jointly attending to the respective other face (or to the central fixation) with them. This might also explain why gaze following occurred in the attention shared condition but not in the attention not shared condition.

Two control experiments were designed to rule out these alternative explanations. In Control 1, non-social cues were employed to draw participants' attention to the central fixation or to the outsides of the screen before depicting gaze cues. In Control 2, a circle replaced one of the faces so that there was still joint attention between a face and the participant, but there was no attentional relation between two faces.

5. Methods Control 1 and Control 2

Participants. Thirty-two participants (mean age 21.9 years; 29 female; 28 right handed) were randomly assigned to one of two control experiments and received payment or course credits for participation.

Stimuli and Procedure. Control 1 employed the same faces as Experiment 3, except that the faces never looked at or away from each other. Instead, black squares appeared either between the faces or on their outer sides (see Fig. 3A). Subsequently, the faces gazed to the upper or lower side of the screen. The timing of events was the same as in Experiments 1–3.

In Control 2, we replaced one of the faces of Experiment 1 by a circle of the same size (see Fig. 3B). After looking at

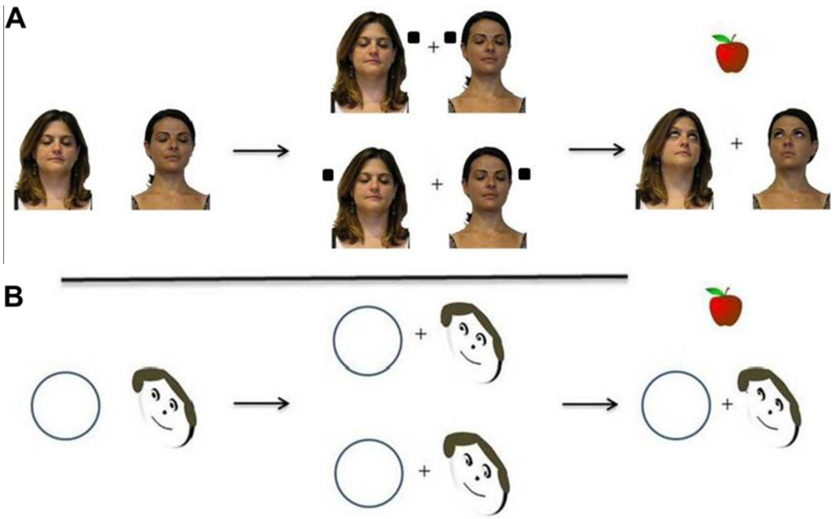

Fig. 3. Schematic illustration of the stimuli and the event sequence in Controls 1 and 2. In Control 1 photographs of human faces were aligned horizontally and little squares appeared either between them or at their outer sides. Target objects appeared above or below the faces (Panel A). In Control 2 only one face was shown while the other face was replaced by a circle of the same size. The face looked at the circle or away from the circle and target objects appeared above or below (Panel B).

vs. away from the circle, the face gazed to the upper or lower side of the screen. The position of circle and face was counterbalanced across participants.

6. Results Control 1 and Control 2

Reaction times (RTs) and errors were analyzed as in the previous experiments. The results are depicted in Fig. 4A and B. Unlike in Experiments 1–3, the two-way interaction of Attention (drawn inwards vs. outwards) and Gaze congruency (congruent vs. incongruent) was not significant (Controls 1 and 2: [$Fs(1, 15) < 1$]). Overall, RTs were significantly faster on congruent trials than on incongruent trials (Control 1: [$F(1, 15) = 12.6$, $p < .01$], Control 2: [$F(1, 15) = 8.2$, $p < .05$]). RTs significantly decreased with increasing SOA in Control 1 only [$F(1, 15) = 31.2$, $p < .001$].

An ANOVA with the additional factor Experimental setting (experiment vs. control) was conducted in order to compare the mean size of the gaze congruency effect in Experiments 1–3 with the mean size of the congruency effect in the control experiments. The gaze congruency effect was significantly larger in the attention shared conditions of Experiments 1–3 as compared to the attention drawn inwards conditions in the control experiments [$F(1, 103) = 4.8$, $p < .05$]. At the same time, the mean gaze congruency effect in the attention not shared conditions in Experiments 1–3 was significantly smaller than the mean gaze congruency effect in the attention drawn outwards conditions in the two control experiments [$F(1, 103) = 24.9$, $p < .001$]. Error rates revealed no significant effects.

7. Discussion

Control 1 was conducted to rule out the alternative explanation that spatial attention modulated gaze following. The gaze congruency effect in this experiment was not modulated by whether attention was drawn to the center of the screen or to the outsides of the screen. This supports the conclusion that the effect of shared attention observed in previous experiments was not due to participants' focused vs. spread attention.

Control 2 was conducted to address the possibility that participants' perception of jointly attending to a location with the observed faces may explain the modulation of gaze following. The gaze congruency effect was not modulated by whether or not the face had looked at or away from the circle (or central fixation) together with participants. Thus, it seems unlikely that the modulation of gaze following in Experiments 1–3 was due to participants sharing attention with the observed faces. This finding also provides more evidence that the previously observed gaze modulation effect was not due to spatial attention factors.

Relative to Experiments 1–3, gaze congruency effects in the control experiments were reduced in the attention drawn inwards condition, but increased in the attention drawn outwards condition. Thus, relative to the observation of neutral faces, observing shared attention enhanced gaze following, while observing faces looking away from each other reduced gaze following.

8. General discussion

The present study investigated whether gaze following is modulated by the observation of shared attention. A gaze congruency effect only occurred when the observed faces had looked at each other before simultaneously shifting gaze to the target location. Hence, the present results extend earlier findings in demonstrating that gaze following is modulated not only by engaging in direct eye contact oneself (Bristow et al., 2007; Senju & Csibra, 2008), but also by observing shared attention in others. The modulation of

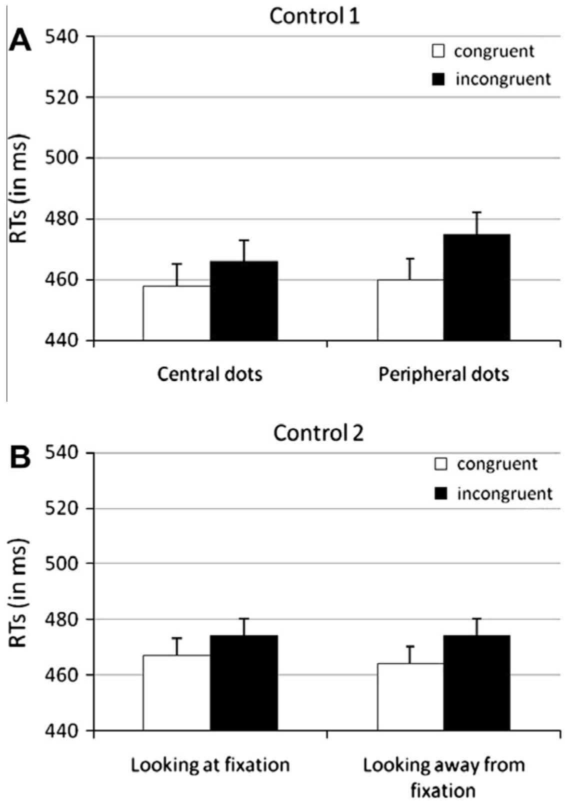

Fig. 4. Mean RTs (in ms) in Control 1 and Control 2. Gaze cueing effects (faster performance on congruent trials compared to incongruent trials) occurred in the Central dots and in the Peripheral dots condition (Control 1) and in the Looking at fixation and the Looking away from fixation condition (Control 2). Error bars display within-subjects confidence intervals based on Loftus and Masson (1994).

gaze following by observing shared attention did not depend on a particular spatial arrangement between the observed faces or their spatial arrangement in relation to the actor, and it occurred for schematic and for real faces. This demonstrates the generality of the effect of joint gaze cueing on the observer's attention.

An important difference between experiencing and observing direct eye contact is that observed eye contact lacks a direct communicative intent towards the observer. Our findings suggest that even though participants were not targets of informative intentions, observing others sharing attention increased the significance of their ensuing gaze. This may require understanding that relations between others are equivalent to relations one can be in (and has been in) with others. People may acquire this understanding by mapping an observed relation between two agents onto their own previous experiences of sharing attention with another agent (Barresi & Moore, 1996). It could prove interesting to investigate whether 'social brain' areas that are activated by the perception of direct gaze (Senju & Johnson, 2009) are also activated by the observation of others sharing attention.

The present results may have implications for the understanding of ostension in social interaction. It has been proposed that direct eye contact serves as an ostensive cue that can affect gaze behavior (Senju & Csibra, 2008), modulate learning of object properties (Yoon, Johnson, & Csibra, 2008), enhance generalization of information about the environment (Csibra, 2010), and foster imitation (Wang, Newport, & de Hamilton, 2010). It may well be that observing direct eye contact in others also acts like an ostensive cue, as the observed agents manifest a communicative intention towards each other and highlight the meaningfulness of the upcoming action. It remains to be seen whether the observation of shared attention can be equally powerful in the modulation of behavior as ostensive signals directed at oneself.

References

Baron-Cohen, S. (1991). Precursors to a theory of mind: Understanding attention in others. In A. Whiten (Ed.), *Natural theories of mind: Evolution, development and simulation of everyday mindreading* (pp. 233–251). Oxford: Basil Blackwell.

Barresi, J., & Moore, C. (1996). Intentional relations and social understanding. *Behavioural and Brain Sciences, 19*, 107–154.

Bayliss, A. P., Frischen, A., Fenske, M. J., & Tipper, S. (2007). Affective evaluations of objects are influenced by observed gaze direction and emotional expression. *Cognition, 104*, 644–653.

Bayliss, A. P., & Tipper, S. P. (2006). Predictive gaze cues and personality judgments. *Psychological Science, 17*, 514–520.

Brauer, J., Call, J., & Tomasello, M. (2005). All great ape species follow gaze to distant locations and around barriers. *Journal of Comparative Psychology, 119*, 145–154.

Bristow, D., Rees, G., & Frith, C. D. (2007). Social interaction modifies neural responses to gaze shifts. *Social Cognitive and Affective Neuroscience, 2*, 52–61.

Bugnyar, T., Stowe, M., & Heinrich, B. (2004). Ravens, Corvus corax, follow gaze direction of humans around obstacles. *Proceedings of the Royal Society B, 271*, 1331–1336.

Caron, A. J., Butler, S., & Brooks, R. (2002). Gaze following at 12 and 14 months: Do the eyes matter? *British Journal of Developmental Psychology, 20*, 225–239.
Clark, H. H., & Krych, M. A. (2004). Speaking while monitoring addressees for understanding. *Journal of Memory and Language, 50*, 62–81.
Csibra, G. (2010). Recognizing communicative intentions in infancy. *Mind & Language, 25*, 141–168.
Csibra, G., & Gergely, G. (2009). Natural pedagogy. *Trends in Cognitive Sciences, 13*, 148–153.
D'Entremont, B., Hains, S. M. J., & Muir, D. W. (1997). A demonstration of gaze following in 3- to 6-month-olds. *Infant Behavior and Development, 20*, 569–572.
Driver, J., Davis, G., Ricciardelli, P., Kidd, P., Maxwell, E., & Baron-Cohen, S. (1999). Gaze perception triggers reflexive visuospatial orienting. *Visual Cognition, 6*, 509–540.
Ferrari, P. F., Kohler, E., Fogassi, L., & Gallese, V. (2000). The ability to follow eye gaze and its emergence during development in macaque monkeys. *Proceedings of the National Academy of Sciences, 97*, 13997–14002.
Friesen, C. K., & Kingstone, A. (1998). The eyes have it! Reflexive orienting is triggered by nonpredictive gaze. *Psychonomic Bulletin & Review, 5*, 490–495.
Frischen, A., & Tipper, S. P. (2004). Orienting attention via observed gaze shift evokes longer term inhibitory effects: Implications for social interactions, attention, and memory. *Journal of Experimental Psychology: General, 133*, 516–533.
Hietanen, J. K. (1999). Does your gaze direction and head orientation shift my visual attention? *NeuroReport, 10*, 3443–3447.
Hietanen, J. K., & Leppänen, J. M. (2003). Does facial expression affect attention orienting by gaze direction cues? *Journal of Experimental Psychology: Human Perception and Performance, 29*, 1228–1243.
Hobson, P. (2002). *The cradle of thought: Exploring the origins of thinking*. New York: Oxford University Press.
Kaminski, J., Riedel, J., Call, J., & Tomasello, M. (2005). Domestic goats follow gaze direction and use social cues in an object choice task. *Animal Behaviour, 69*, 11–18.
Kylliäinen, A., & Hietanen, J. K. (2004). Attention orienting by another's gaze direction in children with autism. *Journal of Child Psychology and Psychiatry, 44*, 435–444.
Langton, S. R. H., & Bruce, V. (1999). Reflexive visual orienting in response to the social attention of others. *Visual Cognition, 6*, 541–567.
Loftus, G. R., & Masson, M. E. J. (1994). Using confidence intervals in within-subject designs. *Psychonomic Bulletin & Review, 1*, 476–490.
Meltzoff, A. N., & Brooks, R. (2007). Eyes wide shut: The importance of eyes in infant gaze following and understanding other minds. In R. Flom, K. Lee, & D. Muir (Eds.), *Gaze following: Its development and significance* (pp. 217–241). Mahwah, NJ: Erlbaum.
Richardson, D. C., & Dale, R. (2005). Looking to understand: The coupling between speakers' and listeners' eye movements and its relationship to discourse comprehension. *Cognitive Science. A Multidisciplinary Journal, 29*, 1045–1060.
Sebanz, N., Bekkering, H., & Knoblich, G. (2006). Joint action: Bodies and minds moving together. *Trends in Cognitive Sciences, 10*, 70–76.
Senju, A., & Csibra, G. (2008). Gaze following in human infants depends on communicative signals. *Current Biology, 18*, 668–671.
Senju, A., & Johnson, M. H. (2009). The eye contact effect: Mechanism and development. *Trends in Cognitive Sciences, 13*(3), 127–134.
Tomasello, M., & Carpenter, M. (2007). Shared intentionality. *Developmental Science, 10*, 121–125.
Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005). Understanding and sharing intentions: The origins of cultural cognition. *Behavioral and Brain Sciences, 28*, 675–691.
Wang, Y., Newport, R., & de Hamilton, A. F. (2010). Eye contact enhances mimicry of intransitive hand movements. *Biology Letters*. doi:10.1098/rsbl.2010.0279.
Yoon, J. M. D., Johnson, M. H., & Csibra, G. (2008). Communication-induced memory biases in preverbal infants. *Proceedings of the National Academy of Sciences of the United States of America, 105*, 13690–13695.