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Looking while eating: The importance of social context to social attention

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Recent studies have found that participants consistently look less at social stimuli in live situations than expected from conventional laboratory experiments, raising questions as to the cause for this discrepancy and concerns about the validity of typical studies. We tested the possibility that it is the consequences of a potential social interaction that dictates one's looking behaviour. By placing participants in a situation where the social consequences of interacting are congruent with social norms (sharing a meal), we find an increased preference for participants to look at each other. Dyads who were particularly interactive also looked more at the other person than dyads who did not interact. Recent landmark studies have shown that in real world settings people avoid looking at strangers, but we show that in a situation with a different social context the opposite holds true.

Recent studies have demonstrated that social attention in the real world can be radically different from the way people attend to social stimuli in traditional, impoverished, laboratory experiments[1]. For example, Laidlaw et al.[2] found that participants in a waiting room would not only look at a live confederate *less* than a videotaped confederate, but also *less* than a baseline non-social object. Similarly, studies by Gallup and colleagues[3,4] found that participants are less likely to follow the gaze of a live confederate if they are in a position that can be seen by the confederate. These studies support the idea that the potential for social interaction[2] or joint attention[3,4] are critical factors when considering how social attention operates "in the wild". Specifically, these studies consistently found that in live situations the effect of other people's eyes was the opposite of what would be expected from laboratory experiments, where participants are asked to quietly look at picture or videos of others on a computer for long periods of time. While laboratory experiments have studied social attention using social stimuli ranging from simplistic schematic diagrams (e.g., line drawings of faces[5]) to dynamic stimuli (e.g., videos of people interacting[6]), they are still impoverished in the sense they lack any opportunity for an interaction, nor do they have the "force of a real social agent"[7]. The force from a real social agent may have very real, and differential effects, based on, for example, the degree of autistic-like traits an individual posesses[8].

The underlying principle developed from live social attention research[2–4] is straightforward: put a participant in a situation where there is a potential cost for looking at someone (e.g., being judged negatively, engaging in awkward conversation, embarrassment, etc.) and participants will inhibit their natural looking behavior[1]. Critically, this basic idea brings into question the ecological validity of laboratory investigations of social attention as they suggest that past studies have, at best, grossly overestimated the effect of human eyes and faces on natural attention, and at worst, got it completely backwards.

There is no question from Laidlaw et al.[2] and Gallup et al.[3,4] that in the wild people look less at other people, and less where other people are looking, than laboratory studies would suggest. What is less obvious is whether this represents a general principle of looking behaviour in natural situations. Clearly, one possibility is that people always look less at others in a live situation than conventional studies would predict. This is certainly what the data suggest. However, it is worth noting that in the studies by Laidlaw et al.[2] and Gallup et al.[3,4] the social norm was *not* to engage in a social interaction (e.g. sitting with a stranger in a waiting room[2]). Thus, another possible overarching principle is that it is the normative social context that dictates whether one looks at another person. The studies by Laidlaw et al.[2] and Gallup et al.[3,4] presented situations where people very possibly perceived a negative social outcome (e.g., an awkward exchange followed by prolonged silence). Following this reasoning, if one reversed the context to one where engaging in social interaction may be concurrent with social norms rather than opposed, looks toward another person might be enhanced. To test between these two alternatives, we observed participants' looking behavior in a natural situation where social interaction would be concurrent with social norms (i.e., a positive consequence to social interaction) rather than opposed to social norms (i.e., a negative consequence to social interaction).

Our study also uses a situation novel to the attention literature - eating. We believe that eating, or eating together, is a situation that can be exploited easily by researchers interested in studying social attention and social cognition. Of particular advantage to this paradigm is its inherent "socialness". It is a natural social behaviour that is readily observable, and yet it can be easily controlled and manipulated. Sharing a meal is one of the few situations that have extremely social connotations, even in the company of strangers[9–11]. Other lines of studies have converged with this notion. For example, mimicry has been thought of as a way to create a social connection[12–14], and numerous studies have found that people mimic others as to when they take a bite or a drink, pointing to the pro-socialness of eating[15–18]. Along the same lines, anthropological studies have noted the pervasiveness of food-sharing in hunter-gatherer societies even among unrelated individuals[18].

In the current experiment, participants ate a small salad either alone, or with another participant (dyads). Two hidden cameras were placed in the room, one viewing each participant. We coded when participants looked at their food, or looked up away from their food. The social consequences of social interaction are reversed in this context compared to Laidlaw et al.[2] and Gallup et al.[3,4]. Unlike being in a waiting room[2], it is socially normative to engage in conversation over a meal. Indeed, one would intuitively think there is now a social cost for not engaging in interaction – staring down at your food the entire meal would seem rude. Therefore, we predicted that participants are more likely to look up when eating in dyads than when eating alone.

Results

Looking up in dyads versus singles. To normalize for the differences in the amount of time spent eating, we analyzed looking rate (how many times participants did not look at their food divided by total time of the meal). Between-subject t-tests for unequal variances found that dyads looked up significantly more frequently than singles, $t(54.35) = 3.15$, $p = .004$, Hedges' $g = 1.01$. See Figure 1.

Looking up within dyads. We also split the dyad condition into pairs who conversed throughout the meal from start to finish ("high-social") from those who did not ("low-social"). This allowed us to examine how much time was actually spent looking at the other person, a comparison that could not be meaningfully made with the singles group (since there was no other person). Bonferroni-corrected, between-subject t-tests found that high-social dyads looked significantly more at the other person than low-social dyads, $t(16) = 6.69$, $p < .001$, Hedges' $g = 3.08$, but there was no significant difference when assessing looks elsewhere (i.e., not at the other person and not at food), $t(16) = .28$, $p = .78$. See Figure 2.

Comparing the eating context versus the waiting room context. To assess whether looking rates overall are enhanced in situations where social interaction is congruent to social norms compared to a situation where social interaction is incongruent to social norms, we examined how our results compared with those we collected in a waiting room situation and reported in Laidlaw et al.[2]. Participants in Laidlaw et al.[2] were placed in a waiting room with either a live confederate, or a videotaped confederate displayed on a computer screen. Laidlaw et al.[2] found participants spent significantly less time looking at the live confederate than the videotaped confederate. Thus a live dyad situation in a waiting room appeared to inhibit natural tendencies to look at others.

We compared looking rates between participants in the live condition of the Laidlaw et al.[2] study against the looking rates at other people for the low-social dyads in the present study (Figure 3). We focus on the low-social dyads because participants in the Laidlaw et al.[2] study did not converse with the confederates. It also represented the most conservative statistical comparison, as we have found that high-social dyads have a significantly higher looking rate than low-social dyads. A between-subjects t-tests for unequal variances found that participants in our study looked significantly more at the other person than participants in the waiting-room study, $t(15.73) = 2.87$, $p = .01$, Hedges' $g = 1.18$.

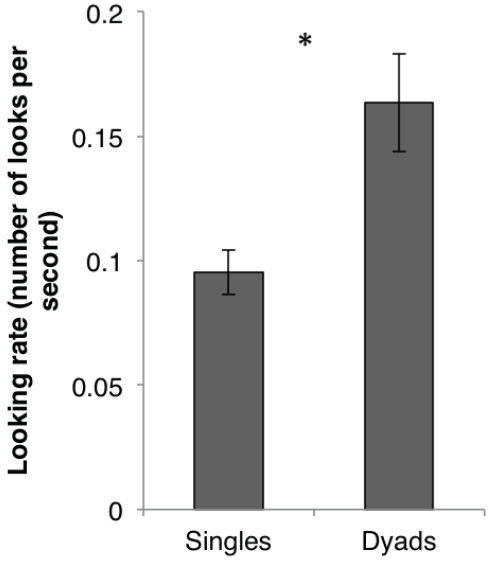

Figure 1 | The average number of looks per second in participants eating alone and in dyads. Dyads (mean = .16, SEM = .02, N = 18) looked up at a significantly higher rate than singles (mean = .095, SEM = .009, N = 26), $p = .004$. Error bars represent SEM. * denotes a significant difference, $p < .05$.

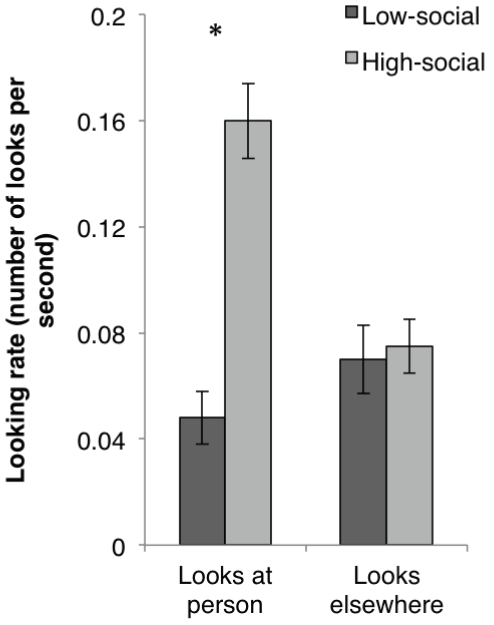

Figure 2 | The average number of looks per second in dyads that interacted minimally, "low-social", and dyads that interacted throughout, "high-social". When assessing looks at the other participant, high-social dyads looked significantly more at other people (mean = .16, SEM = .014, N = 7) than low-social dyads (mean = .048, SEM = .010, N = 11), $p < .001$. When assessing looks elsewhere (e.g., not at food and not at the other person), high-social dyads (mean = .075, SEM = .010) showed no difference compared to low-social dyads (mean = .070, SEM = .013). Error bars represent SEM. * denotes a significant difference, $p < .025$ (Bonferroni-corrected).

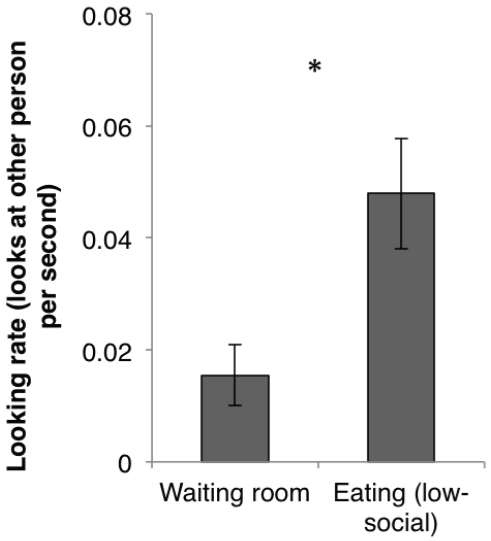

Figure 3 | The average number of looks per second in a waiting-room situation towards a live confederate in Laidlaw et al.[2] compared to the eating situation in the present study. Low-social dyads in the present study (mean = .048, SEM = .010, N = 11) looked at a significantly higher rate than participants looking towards a live confederate in the Laidlaw et al.[2] study (mean = .015, SEM = .005, N = 13), $p = .01$. Error bars represent SEM. * denotes a significant difference, $p < .05$.

Discussion

The present study demonstrates that the consequences of a potential social interaction in a given situation dictate how one looks at others. Past studies only considered situations where social interaction is not the norm and found that participants did not look at social stimuli as much as predicted by conventional studies. In contrast, we find participants look up at each other more in situations with the potential for social interaction compared to situations that lack the opportunity for a social interaction. Furthermore, we find that there are also substantial differences in looking behaviour in situations where participants enthusiastically partake in a social interaction. A high degree of social connection, as assessed by the amount of conversation, corresponds to increased social looking behaviour at the other social agent.

These results are the opposite to what would be predicted from the results of Laidlaw et al.[2] and Gallup et al.[3,4]. We find that the potential for social interaction enhanced looking behaviour between strangers, rather than inhibiting it. Indeed, a direct comparison of our relatively low socially connected dyads with data from the Laidlaw et al.[2] study found a three-fold increase in looking behaviour. A comparison with high-social dyads would result in approximately a 10-fold increase in looking rates. These data support our hypothesis that it is the perceived consequences of potential social interactions, and how congruent those consequences are to established social norms, that dictate how participants look at social stimuli.

Our results suggest that the general principle to be drawn from studies such as those by Laidlaw et al.[2] and Gallup et al.[3,4] is not that looking behaviour in real-world situations are always less than conventional lab studies[1]. In the wild, the social norms of different contexts will precipitate either negative or positive consequences to social interaction, and social attention will change correspondingly based on the specific situation. Therefore, to understand social attention in a holistic sense, experiments must be conducted in a variety of contexts with differing norms.

In addition to suggesting this overarching principle, we find it interesting to note that not all dyads in the present study established a consistent social interaction. This suggests that there are factors that will influence whether dyads move from a situation of potential social interaction into a situation of actual social interaction. Given our proposal that it is the perceived consequences of a social interaction that modulate this transition, individual differences in how one perceives the social norms of sharing a meal likely play a large role in how one allocates social attention and one's willingness to engage in conversation. For instance, factors such as culture that determines when, what, and how much people eat[19], may also influence attention and behaviour towards others while eating. Identifying the states and traits that are predictive of whether, and to what extent, people end up interacting is an exciting challenge for future researchers.

From an evolutionary perspective, there may be other explanations as to why people would look at other people more in the present study compared to a waiting-room situation. One suggestion may be that eating with strangers is inherently competitive. People may have inherent tendencies to keep an eye on what other people are doing, for example to prevent food-stealing, a behaviour associated with increased cognitive capacity[20] that would tend to occur when individuals eat in close proximity[21]. However, this competition argument does not dovetail with current understandings of human prosociality[22,23] and the widespread food-sharing that occurs in hunter gatherer societies even with unrelated individuals[18]. Non-competitive eating also does not appear to be uniquely human. For example, it has been demonstrated that chimpanzees will use food to develop social bonds[24] and common marmosets have been observed to provide food spontaneously to unrelated and non-reciprocating others[25].

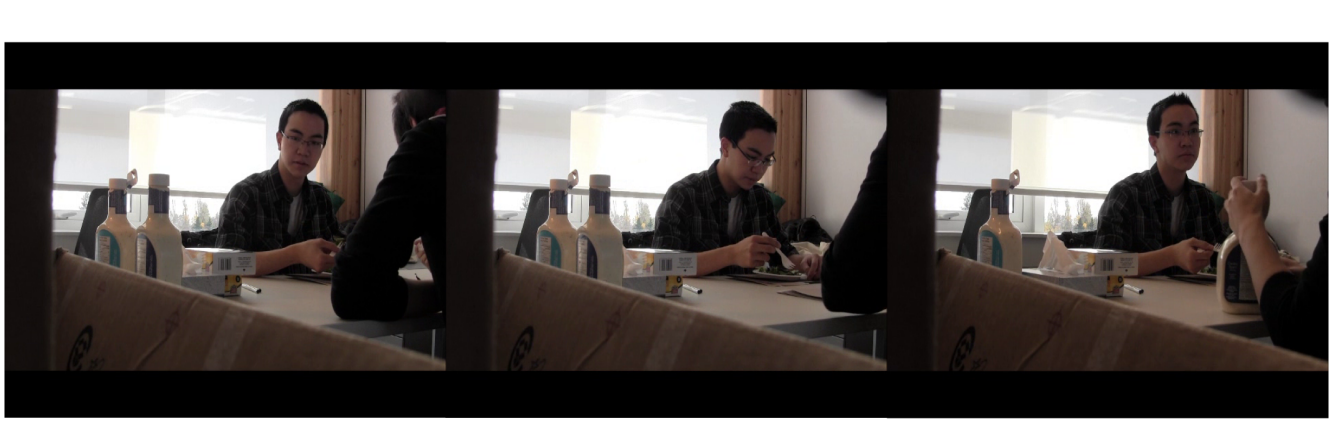

Figure 4 | Examples of different coding events. (a) The participant is coded as looking elsewhere. (b) The participant is coded as looking down at the food. (c) The participant is coded as looking at the other person. Note that for participants who ate alone, only events (a) and (b) were coded.

Furthermore, our data does not support a competition hypothesis, as high-social dyads showed significantly greater looks towards others than low-social dyads. If the eating context were truly competitive, we would expect low-social dyads to look at each other more, as presumably they would be more untrusting of individuals with whom they have not established a social connection.

We propose that using the underlying social norms of a specific context to frame the perceived cost-benefits of engaging in social attention accord more with current cultural evolutionary theories of human prosociality. Humans are very willing to punish norm-violators, even if they themselves are not directly affected by the norm-violation[21]. Prosocial behaviour must be understood not only in relation to traditional evolutionary notions of kinship and reciprocity, but also the underlying norms of a given institution or society[26]. Therefore, participants will be compelled to act congruently with established social norms, which we suggest explains why social attention is increased in an eating context compared to a waiting-room context.

In this investigation we have characterized the social context as one where the consequences of a social interaction are perceived as positive, that is, congruent with social norms. However, it could also be characterized as a situation where it is negative or incongruent with the underlying norm to not engage in social interaction, i.e. there may also be a substantial cost in not looking at each other. Future studies will be needed to dissociate the relative contributions of these two possibilities. That is, prospect theory, which proposes that people value potential gains and losses differently, may play an important explanatory role in social attention[27]. It may be that situations that possess a substantial benefit for interacting yield very different looking behaviours when compared to situations that possess a substantial cost for not interacting. Indeed, how individual participants frame the decision, as either a benefit for interacting or a cost for not interacting[28], may partly explain how often dyads looked at each other and the extent of their interaction. Factors like culture[19] may also be a major contributor to the underlying social norm that would frame the costs and benefits for the individual.

In conclusion, participants eating together look down at their food less, and look up more, compared to participants eating alone. This is contrary to recent studies that suggest potential social interaction inhibits exploration of social stimuli[2–4]. We suggest that it is the perceived consequences of specific social interactions that dictate how one looks at others, and that it is not necessarily true that traditional laboratory experiments exaggerate how much people attend to social stimuli in the wild. We also find that a subset of dyads interacted much more than others, which enhances looking behaviour between individuals when eating. The general principle that emerges from the present study is that the social norms underlying the specific social context are a critical determinant in the deployment of social attention.

Methods

Participants. 67 students from the University of British Columbia participated in this study. 27 participants ate alone, while 40 ate in random pairs. However, one single was discarded due to video issues, and two dyads were discarded because one pair knew each other, and another pair noticed the hidden cameras. This left a total of 26 participants in the single condition, and 36 participants in the dyad condition. They were reimbursed $5 or given course credit for their time. The study was done with approval from the University of British Columbia Behavioural Research Ethics Board. Informed consent was obtained from all participants.

Set-up and procedure. Two different office rooms were used for this experiment (there were no differences in results between participants who ate in one room compared to another room). Participants ate at a standard office desk, with 2 HD Sony camcorders hidden several feet back from each participant (one in a box and the other in a pile of jackets). The camcorders were placed so they could clearly see the faces of the participants.

Participants were simply told they were to eat the pre-prepared salad and answer a questionnaire afterwards. They were under the assumption that the experimenters were interested in studying taste perception. They were not told about the hidden cameras, or about the true nature of the study, until after the experiment.

Data analysis. Author D.W.-L.W. and a research assistant who was blind to the research hypothesis independently coded the moment when each participant looked up away from their food. Coding was done using the custom applescript program from Laidlaw et al.[2], which allows for events to be logged on a frame-by-frame basis. For dyads, the looking up event was further split into looks directly at the other person, and looks elsewhere (Figure 4). The video quality was high enough for the coding to be based on eye-moments, as opposed to head-movements. Values for dyads were averaged between the two individuals within each dyad. In dyads, analysis was only done when both participants were eating together. Data in which one participant had started eating earlier than the other participant, or had finished earlier, were trimmed.

A two-way mixed average measure intraclass correlation was used to determine inter-rater reliability. Absolute agreement on looking rates was high, ICC = .94, $p < .001$. All analyses were done with the average values obtained by the two coders.

Dyads were labeled separately as "high-social" if they continually engaged in conversation throughout the meal. Seven dyads were classified as high-social (mean talking count = 40.14, SD = 11.71) and the remaining 11 dyads were classified as low-social (mean talking count = 6.82, SD = 6.48). This categorization allowed us to explore how looking behaviour may change in situations that possess an actual social interaction compared to situations that possess the potential for a social interaction.

Levene's test was used to determine equality of variances before tests to compare means. Where significant ($p < .05$), tests were adjusted accordingly. All tests were two-tailed. Hedges' *g* was used to determine effect sizes for significant results because of the small and unequal sample sizes[29].

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Author contributions

D.W.-L.W. and A.K. designed the experiment. D.W.-L.W. carried out the experiment and collected the data. D.W.-L.W. and W.F.B. analyzed the data. D.W.-L.W., A.K. and W.F.B. wrote the paper.

Additional information

Competing financial interests: The authors declare no competing financial interests.

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