

the social dilemma when an individual with a relatively higher endowment, and therefore, capacity to contribute to a public good, expresses anger (Wubben et al. 2008). Furthermore, people report lower expectations of contributions from an angry group member, compared to a guilty group member, thereby supporting the idea that angry individuals are perceived as less trustworthy in social dilemmas. These findings, which represent one of the few published studies on communicated emotions in social dilemmas, appear to fit well in a socio-relational framework and demonstrate that emotional expression can directly impact the outcomes of social dilemmas.

The socio-relational model can also generate hypotheses to guide social dilemma research on the role of emotional expression. For example, although individuals often possess cooperative intentions, certain circumstances (termed *negative noise*) may block individuals from acting on these intentions (e.g., a computer fails, thereby preventing one of the coauthors of this article from finishing his part of the collaboration). The individual still self-perceives trustworthiness, but would display sadness, grief, or shame in response to his or her own defection if the negative noise reduces his or her self-perceived state of capacity. In fact, negative noise in dilemmas tends to result in lower cooperation, unless an individual is given an opportunity to communicate (and presumably express appropriate emotions), in which case subsequent cooperation prevails (Tazelaar et al. 2004). The socio-relational framework predicts that by expressing sadness or grief, a defector can mitigate the defection's negative effect on the defector's trustworthiness as perceived by the partner. Consequently, if the defector's partner perceives greater trust, this could result in feelings and displays of sympathy toward the defector, which in turn are related to forgiveness and the ability to sustain a cooperative relationship. Therefore, the socio-relational model can be applied to predict how emotional expression coordinates cooperation between partners in social dilemmas.

We have briefly identified two disparate research domains that may both be intimately connected to emotion displays, and therefore, could benefit from an organized study of emotion expression and the communication of capacity and trustworthiness. Although we did not consider sex differences in this commentary, sex differences tend to be ubiquitous in these and other areas, and their consideration can only increase the utility of the socio-relational framework.

On the detection of emotional facial expressions: Are girls really better than boys?

doi:10.1017/S0140525X09990161

Vanessa LoBue and Judy S. DeLoache

Department of Psychology, University of Virginia, Charlottesville, VA 22904.
vl8m@virginia.edu jdeloache@virginia.edu

Abstract: One facet of Vigil's socio-relational framework of expressive behaviors (SRFB) suggests that females are more sensitive to facial expressions than are males, and should detect facial expressions more quickly. A re-examination of recent research with children demonstrates that girls do detect various facial expressions more quickly than do boys. Although this provides support for SRFB, further examination of SRFB in children would lend important support this evolutionary-based theory.

In his socio-relational framework of sex differences in the expression of emotion (i.e., the socio-relational framework of expressive behaviors [SRFB]), Vigil proposes that there should be gender differences in the processing of affective facial expressions, and he cites several specific examples of the ways in which males and females should differ in this domain. Here we focus on one in particular – sex differences in the detection

of affective facial expressions and, in particular, whether there is evidence of such differences over the course of development.

Based on SRFB, Vigil claims that, because of their sensitivity to trustworthiness cues, females should detect affective facial expressions more quickly than males. The only exception might be in the detection of anger: since males should be particularly sensitive to dominance cues, they should detect angry facial expressions more quickly than females. The question of whether adults detect certain kinds of facial expressions more quickly than others has been of substantial interest to many researchers, making Vigil's claims easy to evaluate based on the existing literature.

Using a standard visual search paradigm, many researchers have examined the detection of threatening facial expressions, such as anger. However, with the exception of the few studies cited by Vigil, few report any gender differences. Most of these studies find that participants of both sexes are faster at identifying angry faces than happy faces overall (Calvo et al. 2006; Esteves 1999; Fox et al. 2000; Gilboa-Schechtman et al. 1999; Horstmann & Bauland 2006; Lundqvist & Öhman 2005; Mather & Knight 2006; Öhman et al. 2001; Schubo et al. 2006).

Although this research with adults offers no support for Vigil's theory, research with children might be particularly relevant to evaluating SRFB. Vigil's theory suggests an evolved or biological basis for gender differences in face detection, so it is possible that such differences would be apparent in childhood and even infancy. Recently, LoBue (2009) examined the visual detection of several affective facial expressions (e.g., happy, sad, angry, fearful) in both preschool children and adults. Participants in a series of studies were asked to find the single instance of a given category in a 3 x 3 matrix of color photographs. For example, they might be asked to identify the single angry face among eight happy ones (or vice versa).

Consistent with the adult literature, both preschool children and adults were faster to detect facial expressions that depicted threat-relevant expressions (anger, fear) than non-threat-relevant expressions (happiness, sadness). In another series of studies, LoBue and DeLoache (2008) reported that preschool children and adults were also faster at detecting pictures of threat-relevant animals (snakes) than non-threat-relevant ones (frogs or caterpillars). However, no gender differences were found in any of the experiments.

Despite the lack of significant sex differences, a slight advantage was apparent for female preschoolers in some of the studies. It is possible that the sample size in each study was too small (24 children in each study, 12 in each condition) for detecting subtle gender differences. Accordingly, we combined the data from all our visual search experiments to examine whether there was an overall advantage for females (data from LoBue 2009). There was in fact a significant effect of gender, indicating that girls detected the target faces more quickly than did boys. The advantage for females was stable across studies, and did not differ based on whether the target was threatening or non-threatening. Importantly, this advantage was significant only for the detection of affective facial expressions: When reanalyzing the data for the detection of snakes (data from LoBue & DeLoache 2008), there was no such advantage for girls.

These results indicate an advantage for young girls in the detection of affective facial expressions. Further, this advantage cannot be attributed to simple differences in motivation or compliance, since it was not found for the detection of non-facial stimuli. These results provide support for Vigil's claim that females should have an advantage over males in the detection of emotional facial expressions. However, Vigil's assertion that males should be particularly sensitive to threatening facial expressions was not supported – girls showed an advantage over boys across studies, regardless of whether or not the targets were threat-relevant.

While these findings provide some support for SRFB, whether there is a biological basis for these gender differences is still unclear. It is certainly possible that by preschool, children have

developed gender differences in face processing based on experience. This question makes research with infants, who have less experience interacting with the relevant stimuli, critical for testing Vigil's hypothesis. Recently, LoBue and DeLoache (in press) did examine the detection of affective facial expressions in 8- to 14-month-olds, but found no gender differences. Further research in this area is needed in order to examine Vigil's claims more thoroughly.

Future research in other areas of development might also be informative for the SRFB. For example, Vigil suggests that females are better at posing affective facial expressions than are males. If so, this should also be true for children. Further, gender differences in infants' preferences for different kinds of faces might be an important consideration for future research. For example, Lutchmaya and Baron-Cohen (2002) reported an important gender difference in 12-month-old infants' looking preferences. They found that when infants were presented with videos of moving cars or moving faces in a looking-preference experiment, infant boys preferred to look at the cars over faces, while infant girls preferred to look at faces over cars. This result supports Vigil's claims and may warrant further investigation.

In conclusion, developmental findings on gender differences in the detection of affective facial expressions provide partial support for Vigil's view that females should detect affective facial expressions more quickly than do males. Research with infants and young children could provide further information relevant to assessing the SRFB.

The other side of the coin: Intersexual selection and the expression of emotions to signal youth or maturity

doi:10.1017/S0140525X0999015X

George A. Lozano

Department of Zoology, Institute of Ecology and Earth Sciences, Tartu University, 51014 Tartu, Estonia.

george.lozano@ut.ee

www.georgealozano.com

Abstract: Vigil summarizes sex-related differences in emotivity, and presents a psychological model based on the restrictive assumption that responses to stimuli are dichotomous. The model uses for support the concept of intrasexual selection, but ignores intersexual selection. An alternative hypothesis might be that emotivity signals age: maturity in men and youth in women. Integration requires considering all evolutionary biology, not just agreeable concepts.

Vigil is to be applauded for tackling such a large and complex topic as the differences in emotivity between the sexes and for attempting to produce a model that reconciles psychological and evolutionary approaches. Vigil's summary of these differences (target article, sect. 3.2) is written crisply and directly, and will be a useful reference for anyone working in this area. With some adjustments and additions, his model or a derivative of it might successfully merge evolutionary and psychological approaches.

The model assumes that "approach" and "avoid" are the only possible responses to external stimuli. However, animals often respond to stimuli by taking a "wait and see" strategy to obtain more information. Second, to use Vigil's examples, food may be laden with toxins, and mates may sometimes become predators, so organisms seldom face a dichotomous choice, but rather must monitor many requirements and make the appropriate trade-offs. Third, even when it might be ultimately desirable to avoid a stimulus – for instance, a predator – there might be several viable short-term responses. The potential prey might freeze to avoid detection. If it is already being stalked, it might

simply inform the predator that it has been seen so the latter can no longer mount a surprise attack. If the predator does attack, the best response might be to stand and fight. It is even more complex when, instead of responding to predators, animals must respond to highly social conspecifics with common and conflicting interests. Hence, the model would be stronger if it recognized that most responses to social stimuli probably fall within a large grey area between "avoid" and "approach."

Vigil then applies the model to sex-related differences in emotivity, using for support the concepts of intrasexual competition (Darwin 1871) and reciprocal altruism (Trivers 1971). The model would be stronger if it also considered related concepts, such as intersexual selection (Darwin 1871) and the ensuing sexual conflict (Trivers 1972). Vigil points out that most social interactions are with members of our own sex, and women have more intimate relationships and with fewer individuals than men do, and he attributes these patterns to sex-related differences in philopatry. It might be worth also considering that variance in reproductive success is higher for males than for females, so competition among males is stronger than among women, not just different in its style and in its setting. Second, one must also wonder why displaying emotions might be more useful in more intimate situations. The opposite could be argued. Powerful leaders throughout history, who happen to have been mostly male, demonstrate that displaying emotions can be a powerful means of controlling and motivating the masses. Third, as a sexually reproducing species, there is only one way for our genes to make it to the next generation – by interacting with the opposite sex. Maybe the model could incorporate intersexual selection (a.k.a. epigamic selection or mate choice) instead of focusing solely on intrasexual competition. Finally, sexual relationships are a constant struggle between common and conflicting interests. Within every sexual relationship, there is the potential for cooperation but also for deceit, manipulation, and exploitation. An enormous body of work over the past 40 years has been based on that premise (Andersson 1994; Arnqvist & Rowe 2005; Low 2001; Majerus 2003; Trivers 1972). It is peculiar that a treatise on the differences in emotivity between the sexes would not consider the one emotion that for millennia has provided a livelihood for thespians, singers, poets, and playwrights; humanity's greatest and most wonderfully labile and complex emotion and obsession: romantic love.

When mating, men have been selected to be relatively more concerned with quantity and women with quality (Betzig 1986; 1993; Buss 2003; Helle et al. 2008; Murstein 1986). Men compete for resources mostly with other men, but they also compete for the attention of women by displaying, emphasizing, and exaggerating their strength, status, and wealth. In contrast, women compete for high-quality males by displaying, emphasizing, and exaggerating their potential fecundity, beauty, and/or youth, all of which are highly positively correlated. Emotional displays are signals, and as such, their purpose is to persuade, cajole, and manipulate the intended receivers (Maynard-Smith & Harper 2003; Searcy & Nowicki 2005). There is nothing more potentially deceptive than a simple smile. A new hypothesis suggests itself: emotivity, or lack thereof, might be yet another way to attract the opposite sex. Given that children are more emotive than adults, men might conceal their emotions as a way to display their strength and maturity. In contrast, women might express more and more variable emotions in order to display their youth. In any case, consideration of intersexual selection offers a different and more complete perspective.

Vigil's social framework of emotions consists of a two-dimensional construct with "trustworthiness" on one axis and "capacity", or, perhaps more aptly, "ability", on the other axis. This conceptualization is similar to Leary's (1957) model, which had "love" and "dominance" as the two axes. Just like Leary's model, Vigil's is reasonable, interesting, and compelling, and it could have been derived without any knowledge of evolutionary biology. In