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# He throws like a girl (but only when he's sad): Emotion affects sex-decoding of biological motion displays

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## ABSTRACT

Gender stereotypes have been implicated in sex-typed perceptions of facial emotion. Such interpretations were recently called into question because facial cues of emotion are confounded with sexually dimorphic facial cues. Here we examine the role of visual cues and gender stereotypes in perceptions of biological motion displays, thus overcoming the morphological confounding inherent in facial displays. In four studies, participants' judgments revealed gender stereotyping. Observers accurately perceived emotion from biological motion displays (Study 1), and this affected sex categorizations. Angry displays were overwhelmingly judged to be men; sad displays were judged to be women (Studies 2–4). Moreover, this pattern remained strong when stimuli were equated for velocity (Study 3). We argue that these results were obtained because perceivers applied gender stereotypes of emotion to infer sex category (Study 4). Implications for both vision sciences and social psychology are discussed.

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## 1. Introduction

Social categorization has long been and continues to be considered a highly efficient, and arguably inevitable process (Allport, 1954; Macrae & Quadflieg, 2010; Tajfel, 1969, 1974). Faced with an abundance of visual cues and armed with fine tuned social perception skills, perceivers readily categorize others according to their social category membership. Importantly, it is well established that social categorization elicits stereotyped cognitions that bias subsequent other aspects of social perception (Brewer, 1988; Devine, 1989). Although facial cues are undeniably important for social categorization (see e.g., Bruce & Young, 1998; Zebrowitz, 1997), body motion cues compel social categorization reliably (for recent work, see e.g., de Gelder,

2006; Johnson & Tassinari, 2005; Pollick, Kay, Heim, & Stringer, 2005; Pollick, Paterson, Bruderlin, & Sanford, 2001), and their perception utilizes similar processes (Magnée, Stekelenburg, Kemner, & de Gelder, 2007). Here we examine how the perception of emotion category systematically biases the perception of sex category in biological motion displays depicting a person throwing a ball.

## 2. Social stereotypes and structural cues

The notion that sex and emotion categories may bias one another's perception is founded on a well-established link between gender<sup>2</sup> stereotypes and other social judgments. A considerable amount of research has documented the pervasiveness and consequences of gender stereotyping,

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<sup>2</sup> Throughout the current manuscript, we follow the recommendations of Unger (1979) and Unger and Crawford (1993) for the distinction of sex and gender. We use the term *sex* to refer to a target's actual or perceived biological sex category (i.e., male or female). We use the term *gender* to refer to perceptions or expectations about whether a characteristic is more typical for men versus women (i.e., masculine or feminine).

(for reviews, see Rudman & Glick, 2008; Wood & Eagly, 2010). Mere perception of a person's sex category elicits stereotyped assumptions that impact evaluations across the lifespan and in a variety of contexts (Biernat & Manis, 1994; Eagly & Mladinic, 1989; Fagot, 1977; Heilman, 2001; Johnson & Tassinari, 2007; Martin, 1990).

Gender stereotypes, for example, impact both the production and perception of emotions. Although women are presumed to both experience and express most emotions to a greater degree than men (Fisher, 1993; Grossman & Wood, 1993; Hess, Blairy, & Kleck, 1997; Johnson & Schulman, 1988; Plant, Hyde, Keltner, & Devine, 2000), two exceptions to this general rule are noteworthy. First, relative to women, men are thought to experience and express the emotions anger and pride more frequently and with greater intensity intensely (Plant et al., 2000). Second, ambiguous or mixed emotion states are disambiguated in gender stereotypical ways (Plant, Kling, & Smith, 2004; Plant et al., 2000; see also Condry & Condry, 1976). An ambiguous emotion displayed by a woman, for example, is likely to be interpreted as sadness. The same expression displayed by a man is likely to be interpreted as anger. Moreover, the perceived appropriateness for expressions of sadness and anger differs for men and women (Lewis, 2000). Collectively, prior research highlights a non-orthogonal relation between perceptions of sex and emotion. In early demonstrations, scholars argued that these effects reveal the pervasiveness of gender stereotypes – an interpretation that is consistent with much of the extant data.

Recently, however, research has demonstrated a remarkable morphological similarity between certain facial expressions of emotion, specifically anger and happiness, and sexually dimorphic facial features. Men's faces tend to have thicker brows and squared jaws, a morphology that is structurally similar to the facial expression of anger (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007; Sinor, Phillips, Barnes, & David, 1999). Women's faces, in contrast, have more neotenous features such as large eyes and rounder cheeks, a morphology that is related to judgments of warmth and approachability, themselves characteristics that are prone to gender stereotyping (Berry & Brownlow, 1989; Berry & McArthur, 1986). Moreover, the facial morphology of women and men also evoke perceptions of the stereotyped dispositions affiliation and dominance, respectively (Hess, Adams, & Kleck, 2004; see also Hess, Adams, & Kleck, 2005). These overlaps in facial appearance for sex and emotion categories called into question the exclusivity of a gender stereotype interpretation of prior research. Indeed when these factors were controlled (i.e., by removing sexually dimorphic features or equating faces for apparent affiliation and dominance), the effects that previously looked like gender-stereotyping were substantially reduced (Becker et al., 2007) or even reversed (Hess et al., 2004). Thus, data that were once interpreted as evidence for the stereotyped perception of emotion may have been obtained, at least in part, due to overlapping cues.

The insights demonstrating the conflation between the facial cues to sex and emotion categories has made it difficult to evaluate the possibility that sex stereotyping may nevertheless operate in conjunction with common appear-

ance to produce sex-specific patterns for emotion perception. Indeed, a majority of prior research has focused exclusively on face perception making the two possibilities difficult to disentangle. The overlaps in facial appearance are likely to continually frustrate efforts to examine the independent role that stereotyping may play. This suggests that it may be beneficial to examine these relations outside the domain of face processing. Additionally, a majority of prior research examined this question unidirectionally, examining the impact of sex category on perceptions of emotion. To the extent that gender stereotypes of emotion exist, their effects may be more pervasive. Sex category may affect the perception of emotion, and emotion category may also affect the perception of sex category. We propose that perceived emotion may, under some circumstances, serve as a cue to disambiguate sex category membership. We now turn our attention to which cues, other than facial cues, may provide insights into this question.

### 3. Emotional and gendered body motion

The face is not alone in its ability to reveal both sex and emotion categories to observers. Point-light displays depicting the body's motion, for example, provide sufficient cues for perceivers to categorize both sex (Barclay, Cutting, & Kozlowski, 1978; Kozlowski & Cutting, 1977; Mather & Murdoch, 1994; Pollick et al., 2005; Troje, 2002) and emotion (Atkinson, Dittrich, Gemmell, & Young, 2004; Atkinson, Tunstall, & Dittrich, 2007; Chouchourelou, Matsuka, Harber, & Shiffrar, 2007; Dittrich, Troscianko, Lea, & Morgan, 1996). Indeed, emotion perception from body cues tends to occur spontaneously (de Gelder & Hadjikhani, 2006); tends to be accurate, even when based only on the movements of isolated body parts (Pollick et al., 2001; Sawada, Suda, & Ishii, 2003); and tends to incorporate both kinematic and configural information (Atkinson et al., 2007).

Interestingly, several labs have reported that observers show a unique sensitivity to anger displays (Chouchourelou et al., 2007; Dittrich et al., 1996; Walk & Homan, 1984; see also; Grèzes, Pichon, & de Gelder, 2007). Such effects are theorized to occur because perceiving anger is relevant for one's own physical well-being. This has led some to speculate that it may be adaptive to decode the emotions of others, especially under threatening circumstances (de Gelder, 2006). Thus, it appears that perceivers can decode a range of emotions from body motion, but that anger displays are privileged.

Thus, the body's motion contributes to numerous aspects of person perception including two domains of social information, sex and emotion categories, that may be linked via gender stereotypes. In spite of the importance of the body in both emotion and sex perception, the possible influence of gender stereotypes in body perception has only recently been acknowledged for sex categorization (Johnson & Tassinari, 2005), and it has yet to be examined in the perception of emotional body movements. Because of the considerable attention recently devoted to gender stereotyping of emotional facial displays, examining such effects for the perception of body motion is timely.

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