Accuracy and Projection in Perceptions of Partners' Recent Emotional Experiences: Both Minds Matter

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In 2 studies involving 96 married couples (Study 1) and 118 romantic couples (Study 2), we investigated partners' perceptions of each others' recently experienced emotions. In both studies, both individuals within each couple independently provided reports of (a) their own recently experienced emotions, (b) their perceptions of their partners' recently experienced emotions, and (c) the extent to which they had expressed the emotions they had experienced to their partner. We then assessed the extent to which perceptions of partners' emotions were (a) accurate (i.e., in agreement with partners' independent reports of their own feelings) and (b) a function of the perceiver's own emotions (i.e., projected). Significant evidence for both accuracy in perceiving emotions (4 of 7 emotions in Study 1; 8 of 9 emotions in Study 2) and for projection of perceivers' own emotions onto partners was obtained (5 of 7 emotions in Study 1; 9 of 9 emotions in Study 2). Effects for all remaining emotions trended in the same directions. There was almost no moderation of these effects by targets' having knowingly expressed the emotions. Implications of the patterning of findings for different emotions for the social functions of accuracy and projection in perceiving emotions are discussed.

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Understanding others' emotions is important for predicting how people will behave and for guiding one's own behavior toward others (Salovey & Mayer, 1990). Accurately perceiving and responding to others' emotions are, furthermore, key processes in the building of intimacy in relationships (Graham, Huang, Clark, & Helgeson, 2008; Reis & Shaver, 1988)—a crucial skill for a social species. With only a few exceptions (e.g., Wilhelm & Perez, 2004; Overall, Fletcher, Simpson, & Fillo, 2015), however, little research exists on the nature of close relationship partners' judgments of each others' emotional experiences.

In the present research, both members of married couples (Study 1) and romantically involved couples (including dating and married couples; Study 2) reported on (a) their own recently experienced emotions, (b) whether they knowingly had expressed those emotions to their partners, and (c) their perceptions of their partners' recently experienced emotions. Our primary goals were to gain insight as to the degree to which intimate partners accurately perceive each other's recent emotions (meaning here that perceivers agree with partners on what the partners are feeling) and the degree to which people project their own recently felt emotions onto their partners.

We also explored two additional questions of importance to perceiving emotion in the context of naturally occurring close relationships: the first was whether the targets' knowing expression of an experienced emotion heightened the degree to which their partners were accurate in perceiving the expressed emotion and dampened the degree to which the partners projected their own emotion onto the targets. Research on person perception suggests that people should be more accurate in judging others to the extent that they have high-quality information relevant to the qualities they are trying to discern (Zaki, Bolger, & Ochsner, 2008). Hence, people may have more accurate perceptions of their partner's emotions when their partners report expressing them. The second question was whether emotions differ in the degree to which they tend to be accurately perceived versus projected, in ways that make functional sense for close relationships. Most emotion theorists assume that specific emotional states, such as anger, sadness, and fear are qualitatively different experiences (e.g., Ekman, 1992; Scherer, Schorr, & Johnstone, 2001). We wished to explore possibilities that people might be especially likely to accurately perceive or to misperceive specific emotions in ways that promote and protect close relationships.

Emotion Perception Studies to Date

Strikingly, almost all research on emotion perception to date has utilized paradigms in which participants judge the emotions of people whom they do not know, whom they do not expect to get to know, and about whom they have little information. For example, these judgments are very often based solely on brief displays of pictures or videos of a stranger, in which the stranger has been asked to enact an emotion or to pose a specific expression (understood a priori to reflect a given emotion). (See Castro & Boone, 2015; Mehu & Scherer, 2015; Suess & Abdel Rahman, 2015 for three recent examples of such work—there are many such examples; see also Russell, 1994 for a review of a great deal of such work.) Such research paradigms have considerable value as they can tap the degree to which people can accurately read emotion in strangers' faces, voices, and bodily postures. Yet it is important to note that they also have significant limitations in terms of the information they can provide about emotion perception as it occurs within relational context.

Context influences emotion perception (Barrett, Mesquita, & Gendron, 2011). We believe it is important to explore the nature of emotion perception as it occurs within close relationships, where emotions are most commonly felt (Berscheid, 1983; Berscheid & Ammazzalorso, 2001; Csikzentmihalyi & Hunter, 2003), are most commonly shared (Clark & Finkel, 2005; Clark, Fitness, & Brissette, 2001; Reis & Shaver, 1988; Rime, 2010), and within which people are most commonly called upon to judge others' emotions in ways that are consequential. Indeed, there are many reasons to suspect that the process of perceiving emotion and findings regarding accuracy of perceiving emotion as well as projection of emotion will diverge as a function of whether researchers ask participants to judge pictures or videos of strangers versus known partners.

First, relational partners' have accumulated knowledge of each others' preferences, goals, and past experiences, which may aid in their ability to understand how their partner may feel in any given situation (Wilhelm & Perez, 2004). For example, a person may know that his partner has been nervous about how a dinner with her boss will go. When sea bass is served at the boss's dinner party, this person's knowledge of his partner's long-standing distaste for seafood, coupled with her earlier nervousness, is likely to shape his judgment of her emotions. He even may require little or no visible expressive signals from her to come to a clear judgment of her felt emotions. The boss, lacking this knowledge, may be comparatively poor at detecting her emotions.

Second, relationship partners, far more so than strangers, are likely to be motivated both to see certain emotions in partners at times and motivated not to see other emotions at times. For instance, they might not wish to perceive partners to be angry with them or to think they caused sadness or anger in partners. They may wish to perceive that their partner feels compassion and happiness when with them. Indeed, many extant studies suggest that relationship goals often bias perceptions of others' motives, desires, and thoughts in important ways. (See, for instance, Beck & Clark, 2010; Lemay & Clark, 2008; Lemay, Clark, & Feeney, 2007; Maner et al., 2005; Simpson, Ickes, & Blackstone, 1995).

Third, in relationships, perceivers are often emotional themselves at the time they are observing partner emotions. Their own emotional state, therefore, may shape their perception of partner emotion. For instance, a person who loves jazz and is happy while listening to it may assume their partner has similar tastes, and, consequently, a similar reaction. Two mechanisms could explain such an effect: First, emotional states are known to bias judgments, generally (Forgas, 1995). Second, relationship partners' beliefs that they are similar in many ways (e.g., Murray, Holmes, Bellavia, Griffin, & Dolderman, 2002) may cause them to assume that their partners' states resemble their own, at any given time (see Ames, 2004).

Existing Work on Emotion Perception in the Context of Ongoing Relationships

There are a few studies of emotion perception in which relational context has been varied and, in these, relational context has been shown to have an impact on perception of emotion. Specifically studies have shown that knowledge of partners generally increases the accuracy of judgments of expressed emotion (Parmley & Zhang, 2015; Stanley & Isaacowitz, 2015; Sternglanz & DePaulo, 2004), although, in one case, knowledge appeared to decrease the ability to detect concealed sadness and anger (Sternglanz & DePaulo, 2004).

Moreover, two sets of researchers have previously assessed both accuracy and projection of emotion as it naturally occurs in close relationships. One relevant article by Wilhelm and Perez appeared in 2004. They investigated perceptions of partners' feelings when perceivers were separated from their partners, for instance, one being at home; the other at work as well as when they were together. Not all feelings investigated would be considered emotions by most researchers (e.g., feeling dissatisfied vs. satisfied), but three of the feelings measured clearly did tap emotion—namely measures of feeling sad/depressed versus happy; anxious/concerned versus confident; and angry versus peaceful. The results are complex, both because they varied somewhat by each person's location and gender and because each measure tapped more than one emotion. However, that said, Wilhelm and Perez (2004) found considerable evidence for projection (which they termed *assumed similarity*) on all three emotion measures just mentioned whether partners were together or apart. Far less evidence for accuracy was obtained when partners were apart relative to when they were together. Husbands' and wives' perceptions of sadness versus happiness and anger versus peacefulness and wives' perceptions of anxiety versus confidence were more accurate when they were together.

Overall et al. (2015) recently reported another relevant set of studies. They conducted studies on perceptions of negative emotion (including anger, frustration, hurt feelings and sadness) during a conflict discussion in the laboratory (Study 1) and in the course of day-to-day life (Study 2). Overall et al. found clear evidence that close relationship partners can detect partner's negative emotions with some accuracy as those emotions occur during conflict discussions in a laboratory session as well as on a daily basis. They also observed that people project their own experience of negative emotion onto their partners, and that people who were avoidantly attached (i.e., uncomfortable with intimacy) showed an overall bias to see partners as feeling negatively (i.e., feeling angry, frustrated, hurt and sad) even as they tracked changes in negative affect with some accuracy across time). Overall et al. (2015) did not report accuracy and

bias in perceptions of each of the specific emotional experiences measured and did not include measures of perceiving positive emotion. We turn now to the purpose of our present studies. We had both specific hypotheses and some exploratory goals.

Specific Predictions for the Present Work

Our first prediction was that members of close relationships would be able to perceive recent partner emotion experience with some accuracy. This prediction was based on prior work demonstrating that people can infer emotion from visual cues of emotion state (e.g., facial expressions and gestures; cf. Carroll & Russell, 1996; Ekman & Friesen, 1971; Matsumoto & Ekman, 1989; Elfenbein, 2006; Scherer, Clark-Polner, & Mortillaro, 2011; Scherer & Grandjean, 2007), on findings showing that people who feel emotion very commonly report intentionally sharing it with others (Rime, 2010), on evidence that people in close relationships are more empathically accurate than people who do not share a close relationship (Hodges, Lewis, & Ickes, 2015; Stinson & Ickes, 1992; Zhang & Parmley, 2011), and on the idea that optimal responsiveness to close partners requires being attentive to their emotional states suggesting motivation to perceive emotions correctly should often be high in caring relationships (Clark et al., 2001). Our prediction that people would show some accuracy in perceiving partner's recently experienced emotion also fits well with recent evidence (Overall et al., 2015) that close relational partners can identify partner emotions as those emotions occur (i.e., during conflict discussions [Overall et al., 2015, Study 1]) and in daily life (Overall et al., 2015) with some accuracy and with some older research showing that people can infer current partner anger, frustration, hurt feelings and sadness with some accuracy even when partners are in different locations (Wilhelm & Perrez, 2004).

At the same time, we also predicted that people's judgments of recently felt partner emotions would be a function of projecting their own emotions onto their partner.[1] This prediction was based jointly on two literatures: First, it is based on an early body of research, not conducted with close relationship partners, demonstrating that one's moods and states of arousal can influence one's judgments of both objects and other people to be congruent with the valence of those emotions (e.g., Isen, Shalker, Clark, & Karp, 1978; see also Clark & Isen, 1982; Blaney, 1986; Clark & Williamson, 1989; Forgas, 1995 for reviews), with the appraisals associated with those emotions (Lerner & Keltner, 2000, 2001), and with levels of arousal associated with the emotions (Clark, Milberg, & Ross, 1983; Clark, Milberg, & Erber, 1984). This may be due to priming (Clark & Isen, 1982), because of one's own affect serving as information used to interpret one's experiences (Schwarz & Clore, 2003) or, quite possibly, because of both processes.

Second, our hypothesis is based on studies done with close relationship partners but not with regard to emotion that show that people often engage in projection of their own internal states onto relationship partners. For instance, those who are motivated to have (or not to have) a caring communal relationship project these motives onto relational partners (Lemay & Clark, 2008; Lemay et al., 2007; Lemay, Clark, & Greenberg, 2010). Likewise, sexually

aroused individuals have been found to project their sexual interest onto partners (Maner et al., 2005).

Also fitting with our projection hypothesis is prior empirical evidence that moods bias attention toward mood congruent stimuli (Berker & Leinenger, 2011) and that people's affective states lead to perceptions of congruent states in other people (e.g., Clark et al., 1984; Voelkle, Ebner, Lindenberger, & Riediger, 2014 for older participants). Importantly, we note that this prediction about projection fits well with very recent findings reported by Overall et al. (2015). In the same two studies mentioned earlier, these authors found significant projection of negative emotions (anger, frustration, hurt, and sadness) in the moment. Our projection findings also fit well with findings reported by Wilhelm and Perrez (2004) of there being considerable assumed similarity (their term for projection) by married persons of their partner feeling the same emotions as they, themselves, are feeling (i.e., sadness/depression vs. happiness, anxiety/concern vs. confidence, anger vs. peacefulness). This occurred in their work even when the perceiver and target were in distinct locations.

Two Exploratory Questions

In addition to predicting accuracy and projection effects we explored two other questions without setting forth hypotheses. The first was whether having a partner who knowingly expresses his or her emotions might heighten the accuracy of emotion perception and dampen projection of the perceivers' own emotions. Statements of what one is feeling would seem to be especially clear signals of emotion and, as such, should increase the accuracy of judgments perhaps through heightening the perceiver's empathy for the emotional person (cf. Zaki et al., 2008). At the same time, we recognized that even when emotion is not intentionally expressed, signs of it might be emitted by the person experiencing emotion even when that person is unaware of this "leakage" allowing people to infer the presence of emotion, which is not intentionally expressed. In addition, people can infer emotion on the basis of knowledge of partner likes, dislikes, fears and aspirations and knowledge about the situations in which partners are embedded, even in the absence of emotion signals, including information from which emotions can be inferred (Barrett et al., 2011; Gendron, Mesquita, & Barrett, 2013; Hareli, Zohar, Shlomo, Lasalle, & Hess, 2014; Hassin, Aviezer, & Bentin, 2013). For instance, if an explosion is heard people are likely to infer that others are at least startled and probably fearful. Thus, even though, at first, it may seem obvious that a person telling a partner what he or she is feeling ought to increase accuracy and decrease projection, we felt that this was a question well worth exploring. We also recognized that people may overestimate the extent to which they have expressed emotions (Gilovich, Savitsky, & Medvec, 1998).

Our second exploratory question was whether there might be some patterning in participants' accuracy in detecting and projection of emotion in their close relationships, which would make

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[1] Note that we do not use the term projection in the psychoanalytic sense of it being an unconscious defense mechanism but more simply and descriptively to mean that people see others as feeling the same feelings they are experiencing. Others have used the term assumed similarity to refer to the same phenomenon (cf. Kenny & Acitelli, 2001; Wilhelm & Perrez, 2004).

sense from a functional perspective. That is, we asked, might emotion projection and accuracy occur in motivated ways that help to maintain and to protect close relationships?

Although we did not have firm specific predictions in this regard, from the start we believed this to be a question worth exploration for two straightforward reasons. First, it was salient to us that accurately perceiving emotions might, at times, promote relationship maintaining behaviors and might, at other times, interfere with such behaviors. For example, the ability to accurately perceive a partner's sadness and fear is likely to be functional for relationship maintenance because prior research had demonstrated that perceiving a partner's anxiety (cf. Graham et al., 2008) and sadness (Clark, Ouellette, Powell, & Milberg, 1987) motivates people to provide support to their partners. At the same time, accurately perceiving other emotions, such as a partner's anger toward the self, might be harmful if it led to defensiveness (Lemay, Overall, & Clark, 2012). The same points can be made with regard to the functions of projection. For example, projection of one's felt compassion onto a partner might result in feeling more connected to and positive about one's partner enhancing the quality of the relationship in much the same way that projection of strong communal feelings onto partners has been shown to occur and to be beneficial for relationships (cf. Lemay & Clark, 2008; Lemay et al., 2007). On the other hand, projection of one's fear or sadness onto a partner might be dysfunctional if it causes a partner to seem less capable of providing one with support just when one needs it most.

Overview of Studies

We asked both members of couples (married couples in Study 1; married and dating couples in Study 2) to report on their feelings over the immediately preceding 2 weeks (Study 1) or 3 months (Study 2), the extent to which they had knowingly expressed those feelings to their partners, and their perceptions of their partners' felt emotions across the same time period. Our goal was to determine whether people perceive their partners' emotions with some accuracy, whether their perceptions are predicted by their own emotions, and whether or not their having knowingly expressed those emotions increased the accuracy of their partners' perceptions and/or decreased the degree to which their partners were projecting their own emotions onto them.

In the first study we included measures of happiness, sadness, fear, anger, disgust, guilt, and compassion. In the second study we included measures of happiness, anxiety, sadness, anger/irritability, disgust, guilt, compassion, gratitude, and hurt.

Study 1

Method

Participants. Data were gathered from 192 individuals, both members of 96 mixed-sex couples. Participants were part of a 10-year longitudinal marriage study; the data analyzed here were captured at measurement Wave 3 (approximately 3.5 years into marriage). Average age for participants was 26.59 years. Average relationship length before engagement was 34.39 months; participants had been engaged for an average of 14.44 months. Most participants were Caucasian (92%) and had completed college

(80%). No participant had been previously married or had had a child prior to the start of the study. Participants had been recruited originally shortly before their wedding using a variety of means, such as advertising at bridal fairs, inviting people who used a bridal registry at a local department store, placing advertisements in local newsletters and using flyers, electronic bulletin boards, and word of mouth.

Measures.

Perceptions of one's partner's recent emotions. Respondents independently answered questions regarding their perception of their partners' recent experiences of seven emotions: Sadness, happiness, anger, fear, disgust, guilt and compassion. The question posed for each emotion was: "How often does your partner personally experience (name of the emotion)? Ratings were made on 7 point Likert scales with higher numbers indicating greater recent experience of each emotion. The low ends of the scales were labeled "never" and the high ends were labeled "several times per day."

Reports of one's own recent emotions and whether each emotion was expressed to the partner. Respondents independently rated their own recent experiences of the same seven emotions in response to the question, "How often do you personally experience [name of the emotion]? They also indicated the extent to which they had expressed each emotion to their partner by answering the question, "When you do experience (name of emotion), how likely are you to express the [name of the emotion] (verbally or by clear facial and vocal tone) to your partner?" All ratings were made on 7 point Likert scales with higher numbers indicating greater recent experience or expression of the emotions. The low ends of the scales were labeled "never" for both the participants' own experience and expression of emotion and the high ends were labeled "several times per day" for the participants' own experiences of emotion and were labeled always for the participants' own expressions of emotion to the partner.

Results and Discussion

Descriptive statistics for experienced emotion, perception of spouse's emotion, and expression of emotion are presented in Table 1. To test our hypotheses, we estimated a series of multilevel models that accounted for dyadic interdependence. A compound-symmetry error structure estimated the covariance of the outcome variable across the two dyad members (Kenny, Kashy, & Cook, 2006). Analyses were carried out such that each individual pro-

Table 1

Mean Levels of Emotions Experienced by the Self, Perceived in Partners, and Expressed by Partners (Study 1)

Emotion	Experienced emotion	Perception of partner's emotion	Expression of emotion
Sadness	2.61 (1.57)	3.10 (1.63)	4.28 (1.98)
Happiness	5.65 (1.28)	5.30 (1.35)	5.92 (1.19)
Anger	4.02 (1.69)	3.89 (1.76)	4.76 (1.66)
Fear	2.26 (1.47)	2.49 (1.49)	4.15 (2.20)
Disgust	2.63 (1.53)	3.03 (1.68)	4.19 (2.05)
Guilt	2.77 (1.64)	2.45 (1.40)	3.71 (2.00)
Compassion	5.06 (1.42)	4.99 (1.59)	5.42 (1.37)

Note. Standard deviations appear in parentheses.

vided data both as a perceiver (of his or her partner) and as a target (of the partner's perception.). These analyses used the actor-partner interdependence model (Kenny & Acitelli, 2001; Neyer, Banse, & Asendorpf, 1999) to simultaneously examine accuracy and bias. In particular, we examined the predictive effects of both targets' and perceivers' self-reported emotion on perceivers' perceptions of targets' emotion; in Figure 1, this is indicated by Path A and Path B, respectively. Path A represents the extent to which perceivers' perceptions of targets' emotions are related to targets' self-reports of their actual, experienced, emotions. This path represents accurate perception. Path B represents the extent to which perceivers' perceptions of targets' emotions independently are related to perceivers' own emotional experiences. This path represents projection of perceivers' own emotions onto their partners.

This model was tested with regard to each of the specific emotions. The unstandardized coefficients and significance levels are reported in the Model 1 section of Table 2. Perceptions of sadness and fear were significantly predicted by targets' actual experienced emotion and not by perceivers' experienced emotion, suggesting accurate detection, but not projection, of these emotions. Perceptions of disgust, anger, and compassion were predicted by perceivers' own emotion states and not by the targets' actual experienced emotion, suggesting projection of these emotions, but not accuracy. Both targets' experienced emotion and partners' experienced emotion significantly predicted perceptions of targets' happiness and guilt, suggesting a blend of accuracy and projection.

We also examined the degree to which targets' self-reported tendencies to express each emotion when it was felt acted as a moderator of these accuracy and projection effects. We computed models with products representing the interaction of the target's expression of emotion with targets' emotional experiences, as well as with perceivers' emotional experiences. This was designed to tell us whether accuracy and/or projection depended on the target's outward expressions. Results of these interaction tests are presented in the Model 2 section of Table 2. Targets' self-reports of their outward expression moderated only the accurate detection of guilt. Perceivers detected targets' guilt when targets were high (1 standard deviation above the mean) in self-reported expression of guilt ($b = .35$, $p < .001$), but not when they were low (1 standard deviation below the mean) in self-reported expression of guilt ($b = .06$, $p < .001$). For all other emotions targets having knowingly expressed the emotion did not moderate accuracy or projection.

Our final set of analyses examined discrepancies between perceivers' perceptions of the target's emotional experiences and the target's self-reported experiences. That is, do perceivers overestimate or underestimate targets' emotions relative to targets' self-
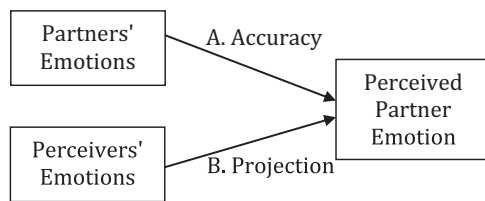
Table 2

Results of Multilevel Models Testing Main and Moderating Effects (Study 1)

| | Model 1 | | Model 2 | |
| | | | Moderation of projection by partner's expression | Moderation of accuracy by partner's expression |
Emotion	Projection	Accuracy		
Sadness	.11	.32***	.04	.02
Happiness	.32***	.31***	.08	.02
Anger	.32***	.12	−.07	.0
Fear	.14	.23**	.03	.03
Disgust	.53***	.14	.04	−.02
Guilt	.23**	.25***	.01	.07*
Compassion	.32***	.13	.0	−.02

* $p < .05$. ** $p < .01$. *** $p < .001$.

reports? Analogous to prior research on accuracy and bias (Lemay, Pruchno, & Feild, 2006; West & Kenny, 2011), we centered perceivers' perceptions of the target partner's emotion on the target partner's self-reported emotion and then retested the models. This changes the meaning of the intercept so that the intercept reflects the predicted discrepancy between perceivers' perceptions of targets' emotion and targets' experienced emotion when all predictors in the model have a value of zero. Initially, we centered predictors on their sample means to assess discrepancies in judgments when participants and their partners report average levels of emotion. These analyses revealed that, at average levels of perceiver and target experience, perceivers exaggerated their partner's sadness ($b_0 = .49$, $t = 4.56$, $p < .001$), fear ($b_0 = .23$, $t = 2.07$, $p < .05$) and disgust ($b_0 = .40$, $t = 3.41$, $p < .01$), underestimated their partner's happiness ($b_0 = −.35$, $t = −3.88$, $p < .001$) and guilt ($b_0 = −.32$, $t = −3.28$, $p < .01$), and had perceptions that did not significantly deviate from partner's experiences for anger ($p = .28$) and compassion ($p = .68$).

For all emotions that exhibited a significant projection effect (happiness, anger, disgust, guilt, and compassion), we then examined how these discrepancies between perceptions of the partner's emotion and the partner's self-reported emotion changed as a function of perceivers' own felt emotion. That is, we reexamined the intercept, which reflects deviations between perceivers' perceptions and targets' experiences, after recentering perceivers' emotion on low (1 standard deviation below the mean) and high (1 standard deviation above the mean) values (see Lemay et al., 2006). These results are presented in Table 3. Perceivers who rarely experienced happiness, anger, disgust, guilt, and compassion (i.e., 1 standard deviation below the mean) tended to underestimate their partner's experiences of these emotions relative to their partner's self-reports. However, perceivers who frequently experienced anger, disgust, and compassion (i.e., 1 standard deviation above the mean) tended to overestimate their partner's experiences of these emotions relative to their partner's self-reports.

These results are consistent with our predictions regarding the existence of accuracy and bias, and they also suggest that accuracy effects dominate emotion perception when discerning emotions that communicate immediate needs (i.e., sadness and fear). Projection effects were found for many of the other emotions, which appeared to result in perceivers overestimating or underestimating

Figure 1. Model to be tested: Accuracy and projection bias in perception of emotion.

Table 3

Discrepancies Between Perceivers' Perceptions of Target's Emotion and Target's Self-Reported Emotion at Low, Average, and High Levels of Perceivers' Emotional Experience (Study 1)

Emotion	Low perceiver experience	Average perceiver experience	High perceiver experience
Happiness	−.76 (−5.60)***	−.35***	.06 (.44)
Anger	−.66 (−3.68)***	−.13	.41 (2.27)*
Disgust	−.42 (−2.50)*	.40**	1.21 (7.28)***
Guilt	−.70 (−4.82)***	−.32**	.05 (.36)
Compassion	−.50 (−2.87)**	−.05	.40 (2.26)*

Note. Low and high values represent 1 standard deviation below and above the mean, respectively. Positive coefficients indicate perceivers' overestimation of targets' emotion relative to targets' self-reported emotion. Negative coefficients indicate perceivers' underestimation of targets' emotion relative to targets' self-reported emotion. Values in parentheses are t values.
* $p < .05$. ** $p < .01$. *** $p < .001$.

the frequency of their partner's emotional experiences (to be in accord with their own levels of feelings these emotions) relative to their partner's self-reports. Self-reported expression of emotion was not a reliable moderator of accuracy and projection.[2]

Study 2

Method

Participants and study structure. Participants were 118 couples in long-term exclusive romantic relationships. Participants were recruited through flyers posted throughout the New Haven, Connecticut community seeking couples in long-term relationships. They were paid $5 each to separately complete copies of the online survey from which the current investigation draws data. Of the participating couples, 112 were heterosexual, and 6 were homosexual (4 lesbian couples, 2 gay couples). Approximately 37.7% of the couples were married, and the rest were unmarried but in a dating relationship (46.6%), engaged to be married (9.3%), or did not report their relationship status (5.9%). On average, female participants were 28 years old and male participants were 29 years old, with ages ranging from 18 to 76 years old. The average length of participating couples' relationships was 66 months (5 years, 6 months), with a range from three months to 650 months (54 years, 2 months). Some couples also went on to complete a second study session in the laboratory (no data collected during this session are included in the current investigation) and were paid an additional $30.

Measures.

Perceptions of one's partner's recent emotions. Respondents independently answered questions regarding their perception of their partners' recent experiences of nine emotions: sadness, happiness, anger/irritability, disgust, guilt, compassion, gratitude, hurt, and anxiety. More specifically, at the start of this survey section participants first were directed to consider how often per week their partner experienced each emotion by answering the question, "How often does your partner personally experience [name of the emotion]?" Ratings were made on 7 point Likert scales with higher numbers indicating greater recent experience of

each emotion. The low ends of the scales were labeled "never" and the high ends were labeled "several times per day."

Reports of one's own recent emotions and whether each was expressed to the partner. Respondents independently answered questions regarding their own recent experiences of the same nine emotions. More specifically, at the start of this survey section participants first were directed to consider how often per week they experienced each emotion and how often per week they had expressed each emotion to their partner by answering the questions, "How often do you personally experience [name of the emotion]?" and, "When you do experience [name of the emotion], how likely are you to express the [name of the emotion] (verbally or by clear facial and vocal tone0 to your partner?" Ratings were made on 7 point Likert scales with higher numbers indicating greater recent experience of each emotion.

Results and Discussion

Descriptive statistics are presented in Table 4. As in Study 1, to test our hypotheses, we estimated a series of multilevel models that accounted for dyadic interdependence. A compound-symmetry error structure estimated the covariance of the outcome variable across the two dyad members.

Once again, this model was tested with regard to each of the specific emotions. All effects including coefficients and significance levels are reported in the Model 1 section of Table 5. In Study 2 the patterning of results was much like that in Study 1 with somewhat stronger results for both accuracy and projection emerging. That is, in Study 2 significant projection effects emerged for all emotions: sadness, happiness, anger/irritability, anxiety, disgust, guilt, compassion, gratitude, and hurt. In addition, significant accuracy effects emerged for all these emotions except disgust.

Again, as in Study 1 we also examined the degree to which targets' self-reported tendencies to express each emotion when it was felt may have acted as a moderator of these accuracy and projection effects. Specifically, we computed models with products representing the interaction of the target's self-reported expression of emotion with targets' emotional experiences, as well as with perceivers' emotional experiences. Again, this was designed to tell us whether accuracy and/or projection depended on the target's outward expressions (see Model 2 section of Table 5). In accord with Study 1, most interactions involving self-reported expression did not reach significance. The exceptions were that anger accuracy was greater ($b = .45$, $p < .001$), and, surprisingly, disgust and gratitude projection effects were greater ($b = .66$, $p < .001$; and $b = .59$, $p < .001$; respectively), when partners reported higher expression of these emotions (1 standard deviation above the mean), relative to when they reported lower expression (1

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[2] In ancillary analyses, sex (0 = male; 1 = female) was added as an additional predictor to the accuracy and projection models. Relative to men, women perceived their partners to feel less sadness ($b = −.97$, $t = −3.43$, $p < .01$; less anger, $b = −.88$, $t = −3.09$, $p < .01$; less fear, $b = −1.08$, $t = −4.65$, $p < .001$; less disgust, $b = −.52$, $t = −2.25$, $p < .05$; less guilt, $b = −.55$, $t = −2.46$, $p < .05$; and more happiness, $b = −.97$, $t = −3.43$, $p < .01$). In additional analyses, sex was added as a moderator of all projection and accuracy effects. Despite the large number of tests, no interaction with sex reached conventional significance levels ($ps > .05$).

Table 4

Mean Levels of Emotions Experienced by the Self, Perceived in Partners, and Expressed by Partners (Study 2)

Emotion	Experienced emotion	Perception of spouse's emotion	Expression of emotion
Sadness	3.61 (1.38)	3.70 (1.40)	3.70 (1.40)
Happiness	5.87 (1.17)	5.70 (1.13)	5.70 (1.13)
Anger/Irritability	3.78 (1.36)	3.87 (1.47)	3.87 (1.47)
Anxiety	4.43 (1.82)	4.25 (1.76)	4.25 (1.76)
Disgust	2.87 (1.33)	3.10 (1.47)	3.10 (1.47)
Guilt	3.57 (1.53)	3.18 (1.53)	3.18 (1.53)
Compassion	5.41 (1.34)	5.27 (1.26)	5.27 (1.26)
Gratitude	5.49 (1.25)	5.12 (1.29)	5.12 (1.29)
Hurt	3.37 (1.38)	3.59 (1.41)	3.59 (1.41)

AQ: 8 *Note.* Standard deviations appear in parentheses.

standard deviation below the mean; $b = .03$, $p = .81$; $b = .22$, $p < .05$ and $b = .28$, $p < .01$, respectively).

Once again, we conducted a final set of analyses to examine discrepancies between perceivers' perceptions of the target's emotional experiences and the target's self-reported experiences. We used the same modeling approach described in Study 1. Results are presented in Table 6. At average levels of perceiver emotion, perceivers significantly underestimated their partner's happiness, anxiety, guilt, and gratitude relative to their partner's self-reports, they significantly overestimated their partner's disgust and hurt relative to their partner's self-reports, and their perceptions of their partner's sadness, anger, and compassion did not significantly deviate from their partner's self-reports. More relevant to our predictions, we found that perceivers who rarely experienced an emotion (1 standard deviation below the mean) underestimated the frequency of their partner's emotional experiences relative to their partner's self-reports for nearly all emotional experiences (with the exception of anger). However, when perceivers frequently experienced an emotion (1 standard deviation above the mean), they overestimated the frequency of their partner's experiences relative

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Table 5

Results of Multilevel Models Testing Main and Moderating Effects (Study 2)

	Model 1		Model 2	
Emotion	Projection	Accuracy	Moderation of projection by partner's expression	Moderation of accuracy by partner's expression
Sadness	.22***	.47***	−.04	−.01
Happiness	.33***	.40***	.07	.04
Anger/Irritability	.17**	.30***	.04	.13**
Anxiety	.21***	.56***	−.01	.02
Disgust	.46***	.13	.12**	−.01
Guilt	.20**	.38***	.07	.04
Compassion	.35***	.37***	.01	−.04
Gratitude	.44***	.24***	.14*	−.07
Hurt	.55***	.19**	−.03	.02

Note. These analyses were based on data from both members of the 106 dyads who provided valid responses on the emotional experience and perception measures.
** $p < .01$. *** $p < .001$.

Table 6

Discrepancies Between Perceivers' Perceptions of Target's Emotion and Target's Self-Reported Emotion at Average, Low, and High Levels of Perceivers' Emotional Experience

Emotion	Low perceiver experience	Average perceiver experience	High perceiver experience
Sadness	−.22 (−1.93)†	.09 (1.24)	.40 (3.63)***
Happiness	−.56 (−6.05)***	−.17 (−2.79)**	.21 (2.32)*
Anger/Irritability	−.17 (−1.28)	.06 (.73)	.30 (2.31)*
Anxiety	−.63 (−4.69)***	−.25 (−2.75)**	.13 (.98)
Disgust	−.36 (−2.91)**	.26 (3.23)**	.87 (7.22)***
Guilt	−.72 (−5.32)***	−.41 (−4.38)***	−.10 (−.76)
Compassion	−.59 (−5.56)***	−.11 (−1.49)	.36 (3.45)**
Gratitude	−.92 (−8.03)***	−.37 (−4.62)***	.18 (1.62)
Hurt	−.55 (−5.02)***	.21 (2.70)**	.96 (8.79)***

Note. Low and high values represent 1 standard deviation below and above the mean, respectively. Positive coefficients indicate perceivers' overestimation relative to targets' self-reports. Negative coefficients indicate perceivers' underestimation relative to targets' self-reports. Values in parentheses are t values.
† $p = .055$. * $p < .05$. ** $p < .01$. *** $p < .001$.

to their partner's reports for most emotions (with the exception of anxiety, guilt, and gratitude). These results generally replicate findings from Study 1 and provided stronger support for the robustness of projection effects. Once again, and consistent with predictions, sadness and, this time anxiety, showed stronger accuracy effects relative to projection effects, and, overall, self-reported expression of emotion was not a reliable moderator of accuracy and bias. Projection effects were found for all emotions, and these projection effects appeared to lead perceivers who frequently experienced an emotion to exaggerate the frequency of their partner's experience (relative to their partner's self-reports) and perceivers who rarely experienced an emotion to underestimate the frequency of their partner's experience (relative to their partner's self-reports).[3]

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General Discussion

Accuracy Effects

Clear evidence for accuracy in perceiving close partners' emotions emerged in both studies. Accuracy effects were significant

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[3] Once again, in ancillary analyses, sex (0 = male; 1 = female) was added as an additional predictor to the accuracy and projection models. Relative to men, women perceived their partners to feel less sadness ($b = −.49$, $t = −2.97$, $p < .01$; less anger, $b = −.47$, $t = −2.34$, $p < .05$; less anxiety, $b = −.76$, $t = −3.91$, $p < .001$; less disgust, $b = −.66$, $t = −3.47$, $p < .01$; less guilt, $b = −.58$, $t = −3.20$, $p < .01$; less compassion, $b = −.28$, $t = −1.96$, $p = .052$; and less hurt, $b = −.60$, $t = −4.03$, $p < .001$). In additional analyses, sex was added as a moderator of all projection and accuracy effects. Despite the large number of tests, only one interaction with sex reached conventional significance levels. Women were less likely to project their hurt feelings ($b = .45$, $t = 5.97$, $p < .001$, relative to men, $b = .72$, $t = 8.93$, $p < .001$). Overall, results from both studies suggest that sex does not play a critical role in moderating accuracy in detection nor in projection of emotion but that women perceivers (relative to male perceivers) are less likely to perceive a wide variety of negative emotions in their partners (all of whom were males in Study 1 and almost all of whom were males in Study 2).

for sadness, happiness, fear, and guilt in Study 1 and sadness, happiness, anger/irritability, anxiety, guilt, compassion, gratitude, and hurt in Study 2. Although the accuracy effects for two emotions (anger and compassion) did not reach significance in Study 1, they did in Study 2, and the direction of the effects was the same in both cases. Standing out is the lack of accuracy in either study in the perception of disgust. We can only speculate as to why. Disgust was the least frequently experienced and expressed emotion in Study 2 and one of the less frequently experienced and expressed emotions in Study 1. Perhaps people are not sufficiently practiced in identifying it in partners.

Projection Effects

Strikingly, significant evidence for the projection of every emotion examined in Study 2 and of five of the seven emotions examined in Study 1 emerged. Whereas projection of both sadness and anger failed to reach significance in Study 1, they did reach significance in Study 2 and the results fell in the same direction in Study 1. This suggests to us that projection of all these emotions truly does occur. Still, some caution in that conclusion for projection of sadness and anger is in order. Analysis of discrepancies between perceptions of the partner and the partner's self-reports suggests that these projection effects result in both exaggeration and underestimation errors. Projection produced exaggeration of partner emotion when perceivers themselves frequently felt an emotion and underestimation of partner emotion when perceivers rarely felt an emotion. Perceivers who themselves frequently felt an emotion tended to believe that their partners felt the emotion more often than what their partners reported, just as perceivers who rarely felt an emotion tended to believe that their partners experienced an emotion less often than what their partners reported.

The finding of pervasive projection effects fits well with the fact that both Overall et al. (2015) and Wilhelm and Perez (2004) found projection of emotion effects in their work. The projection of disgust effect also fits well with other recent findings indicating that people who are likely to experience disgust frequently (i.e., people who have obsessive–compulsive disorder and specific concerns with cleanliness) project those disgust feelings onto faces **AQ: 5** with ambiguous expressions (Jhung et al., 2010) and the projection of happiness effects also fit well with recent findings of parents' (mis)perceptions of their adolescent children's happiness reported by Lopez-Perez and Wilson (2015).

Differences Across Specific Emotions

Interestingly, in both studies there was evidence for stronger accuracy than projection effects for fear (Study1) and anxiety (Study 2) and for sadness (both Studies). After this patterning emerged in Study 1, we interpreted it from a social functional point of view. In particular, we noted that people perceived to be feeling sadness, fear, or anxiety are seen as particularly dependent (Clark & Taraban, 1991) and likely, as a result, in need of support (Graham et al., 2008) especially from others who feel a communal responsibility toward them (Clark et al., 1987). Thus, accuracy in perception of these emotions seems needed for optimal provision of support in close relationships. At the same time, projecting one's own sadness, fear, or anxiety onto a partner would cause

those partners to seem less capable of providing support just when support is needed (cf. Bloom, 2015). Hence, projection could prevent people from turning to and depending on their partners for support. That possibility, combined with the fact sadness is known for causing people to slow down and analyze external situations with greater than normal care (Storbeck & Clore, 2005) and anxiety is associated with vigilant and narrowed attention to the external social environment (Mathews & MacLeod, 1985; Wegbreit, Franconeri, & Beeman, 2015), may result in sad and anxious people being less likely to use a heuristic like projection than people experiencing other emotions. The idea that sadness can reduce biases in perceptions fits well with past work showing that sadness reduces people's tendencies to stereotype (Park & Banaji, 2000). The results of Study 1 and this reasoning, therefore, led us to predict that the same patterning of low projection and high accuracy would emerge in Study 2—and it did, increasing our faith in this interpretation of the patterning.

A Striking Lack of Effects of People Having Knowingly Expressed Emotion on Accuracy or Projection

We began this research thinking that a person having knowingly expressed emotions to a perceiver-partner would increase accuracy and decrease projection of emotion. Initially, we expected that targets who knowingly expressed their emotions to perceivers would have provided diagnostic information about their emotions to perceivers, resulting in greater perceiver accuracy. Indeed, models of accuracy in person perception propose that the quality of information available to perceivers about targets' qualities should shape perceivers' accuracy (see Funder, 1995).

Yet, only a small amount of evidence emerged for such an effect. In particular, Study 1 offered support for the accuracy of just one emotion (guilt) of seven emotions investigated improving when partners reported they had openly expressed the emotion and Study 2 offered support for the accuracy of just one emotion (anger) of nine emotions investigated improving when partners reported they had openly expressed the emotion. These two findings are in accord with findings reported by Zaki et al. (2008) that indicated that clear signals of emotion are necessary for accurate detection of emotion to emerge. Yet neither of these two findings emerged in both studies and, strikingly, these moderating effects did not reach significance for the six other emotions investigated in Study 1 or for eight other emotions examined in Study 2.

Absent a person knowingly expressing emotion, of course, there are many sources of information from which emotions might be both accurately inferred (e.g., the person's nonverbal behaviors, knowledge of the person's likes and dislikes in combination knowledge of the situation, knowledge of one's own emotions when in a similar situation, which may be accurately extended to knowledge of their emotions). With this knowledge, it may be possible to make accurate predictions and inferences as to the subjective state of one's partner, even with little or no expression of emotion on the target's part (cf. Colvin, Vogt, & Ickes, 1997). This possibility was emphasized by Wilhelm and Perez (2004) who observed some accuracy in their participants' judgments of spouse's emotions (as well as in feelings of such things as satisfaction), even when those spouses were not together. Indeed, there is considerable evidence that the ability to make empathically

accurate inferences increases with increasing familiarity between partners (see Friesen & Kammrath, 2011; Funder & Colvin, 1988; Paulhus & Bruce, 1992). These findings suggest that earlier work showing that accurate detection of a stranger's emotions depends on the stranger's clear expression of emotion (e.g., Snodgrass, Hecht, & Ploutz-Snyder, 1998; Zaki et al., 2008) may not apply as well to emotion perception in close relationships.

Aside from participants having knowingly expressed anger being associated with increased accuracy in perceiving anger in Study 2, the only other moderating effects of partners having knowingly expressed emotion emerged for disgust and gratitude on projection and were in the opposite direction from that predicted. That is, expressions of disgust and gratitude were associated with increases in perceivers' projection. These results may be due to chance, but they at least raise the interesting possibility that, at least for some emotions, knowing for sure that one's partner has expressed the emotion at some time effectively "opens the door" for perceiver projection that goes beyond what accurate perception of that emotion justifies. That is, perceivers who usually experience disgust or gratitude may use their partner's expressions of these emotions, even if infrequent, to bolster the perception that the partner also frequently experiences these emotions. This interpretation remains speculative, of course, and additional research is needed.

Placing the Results in the Context with Extant Work

In accord with past work, as predicted, in both studies' couples show evidence of being able to perceive partners' emotions with some accuracy and of projection. Accuracy effects are, of course, easily explained. They are consistent with extant work on emotion perception showing much agreement on what facial displays, bodily postures, and verbal statements likely mean (Scherer et al., 2011). They are also consistent with work in neuroscience, demonstrating what appear to be multiple mechanisms for accurate interpersonal perception, including perceivers mimicking partner expressions (which may contribute to accurate perceptions; Schulte-Rüther, Markowitsch, Fink, & Piefke, 2007) and also imagining oneself in a partner's position and considering what one would think and feel (Waytz & Mitchell, 2011). In addition, they are consistent with findings of significant tracking accuracy of negative emotions in romantic partners in the moment by Overall et al. (2015), for negative affect, and with some findings reported by Wilhelm and Perrez (2004), regarding accuracy in people detecting sadness/depression (vs. happiness), anxiety/concern (vs. confidence) and anger (vs. peacefulness) when couples are together in time and place.

As others have noted, accuracy effects may emerge through accurate perceptions of emotions in the moment yet other mechanisms including reliance on knowledge of how one's partner has reacted to situations in the past and to accurate assumptions that one's partner must be feeling similar feelings to those one is feeling.

Finally, we note that although accuracy in detecting emotions from strangers' faces has been observed previously, as has accuracy in detecting partners' emotions during conflict, the present studies have demonstrated that people can accurately judge a wide variety of specific, recently experienced emotions (except for disgust) of close partners during day-to-day events and even while a partner is absent. These may be separate phenomena. Knowledge of the regularities in partners' emotional experiences suggests that people are aware of how their partner generally functions, potentially helping them interact most effectively with that partner, even if they may be wrong about their partner's experiences in particular situations.

More striking than the accuracy results is the clear evidence found in both studies that perceivers' own happiness, guilt, compassion, anger/irritability, disgust, guilt, and gratitude were all projected onto partners. That is, perceivers who tended to feel these emotions also thought their partners tended to feel these emotions, independent of their partners' self-reports. Consequently, people who often felt a particular emotion consistently overestimated this emotion in their partner, relative to what their partner reported feeling. Such emotion projection onto close partners has been reported in the literature on emotion perception within relationships Lopez-Perez & Wilson, 2015; Overall et al., 2015; Wilhelm & Perrez, 2004) albeit never for recently experienced emotions or the range of specific emotions examined here. Moreover, these findings are consistent with long-standing theory and empirical work demonstrating that emotions can shape judgments in emotion-congruent ways (Clark & Waddell, 1983; Clark, Milberg, & Erber, 1984) and theoretical accounts that this may occur as a result of priming (Isen et al., 1978) and/or as a result of people using affect as information (Schwarz & Clore, 2003).

The projection results are also compatible with more recent studies on the projection of relationship motivations onto partners (see Maner et al., 2005, for demonstrations of how goals of self-protection and of finding a mate can bias perception of people to be in line with one's goals.). For instance, the finding that compassion toward another results in the projection of that compassion onto the other fits very well with other relationship studies which have demonstrated that people's own felt care for a partner's welfare (or lack thereof) is projected onto that person. In this work, controlling for accuracy in perceptions of the partner's care, research participants projected their own communal caring onto partners, seeing those partners' care for them (or lack thereof) as being congruent with their own care (or lack thereof) for their partners (Lemay et al., 2007; Lemay & Clark, 2008; Lemay et al., 2010). Indeed, the results for feelings of compassion reported here would seem to be a specific manifestation of the same effect. Projections of one's own happiness, anger/irritability, and gratitude can be explained in a similar manner. Even the projected feelings of guilt and hurt can be explained in this way. For instance, a tendency to feel guilt often reflects strong concern for a partner's welfare (Baumeister, Stillwell, & Heatherton, 1994), and a tendency to feel hurt often indicates that people strongly desire a communal relationship (Lemay et al., 2012). Hence, the projection of these emotional states onto partners may reflect a broader projection of desire for a communal relationship.

One overarching message that our results convey is that studies of judgments of others' emotions should move beyond judgments of static photographs or films of strangers into the context of ongoing relationships. It is now clear that, in coming to understand judgments of emotion within the context of close relationships, both minds matter. Perception of partner emotion was as much a function of what the perceiver was feeling as it

was of the target partner's feeling. Moreover, it is also clear that it is not at all safe for members of close relationships to assume either that having knowingly expressed emotion guarantees that that emotion was perceived nor that avoiding expressing emotion guarantees that the emotion went undetected.

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