For love or money? What motivates people to know the minds of others?

Kate L. Harkness*, Jill A. Jacobson*, Brooke Sinclair*, Emilie Chan* & Mark A. Sabbagh*

*Department of Psychology, Queen's University, Kingston, ON, Canada

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BRIEF REPORT

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Department of Psychology, Queen’s University, Kingston, ON, Canada

Mood affects social cognition and “theory of mind”, such that people in a persistent negative mood (i.e., dysphoria) have enhanced abilities at making subtle judgements about others’ mental states. Theorists have argued that this hypersensitivity to subtle social cues may have adaptive significance in terms of solving interpersonal problems and/or minimising social risk. We tested whether increasing the social salience of a theory of mind task would preferentially increase dysphoric individuals’ performance on the task. Forty-four dysphoric and 51 non-dysphoric undergraduate women participated in a theory of mind decoding task following one of three motivational manipulations: (i) social motivation (ii) monetary motivation, or (iii) no motivation. Social motivation was associated with the greatest accuracy of mental state decoding for the dysphoric group, whereas the non-dysphoric group showed the highest accuracy in the monetary motivation condition. These results suggest that dysphoric individuals may be especially, and preferentially, motivated to understand the mental states of others.

Keywords: Theory of mind; Depression; Motivation; Social cognition.

Theory of mind refers to the everyday ability to decode others’ mental states (e.g., emotions, beliefs, intentions) to understand and predict their behaviour (Wellman, 1990). Theory of mind decoding forms the basis of social cognition and is apparent in all cultures that have been tested. Despite this universality, there are clear individual differences in the everyday engagement of theory of mind (e.g., Sabbagh & Flynn, 2006). Generally, these differences are attributed to cognitive and perceptual factors such as frontal lobe functioning and visual feature integration. The goal of the current study was to ask whether individual differences in theory of mind performance can also be attributable to emotional and motivational factors.
With respect to emotion, an emerging body of literature supports a dissociation in theory of mind decoding abilities between individuals with clinical levels of major depressive disorder (MDD) and those with sub-threshold depression, or “dysphoria”. Specifically, MDD is associated with significant deficits in theory of mind decoding (e.g., Lee, Harkness, Sabbagh, & Jacobson, 2005; Wang, Wang, Chen, Zhu, & Wang, 2008). The symptoms most strongly associated with impaired theory of mind decoding in MDD include anhedonia, psychomotor retardation, and depressed mood, suggesting that a lack of motivation to attend to the mental states of others may, at least in part, account for these individuals’ poor performance (Lee et al., 2005). In contrast, several studies have found that dysphoria is associated with more accurate theory of mind decoding, especially when individuals are presented with very subtle social features such as eye expressions (e.g., Harkness, Jacobson, Duong, & Sabbagh, 2010; Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005). Further, sad mood induction has been found to enhance theory of mind abilities (Converse, Lin, Keysar, & Epley, 2008), whereas happy mood induction decreases theory of mind accuracy (Harkness et al., 2010).

Taken together, the results above suggest that dysphoric individuals may have an exquisite sensitivity to others’ mental states, which is eclipsed when their depression becomes more severe by the amotivational symptoms of the syndrome (Lee et al., 2005). The findings above are consistent with a growing body of research proposing that depression promotes an analytical style of processing that selectively enhances accuracy on complex tasks that have a social component (see Andrews & Thomson, 2009). Indeed, dysphoria is associated with enhanced performance on tasks similar to subtle theory of mind decoding, such as detecting deception (e.g., Lane & DePaulo, 1999) and social decision making (e.g., Forgas, 1995). According to some theorists, this hypersensitivity to subtle social cues may have adaptive significance in terms of solving interpersonal problems and/or minimising social risk (Allen & Badcock, 2003; Andrews & Thomson, 2009). In contrast, researchers have not detected such enhanced patterns of performance in more severe MDD (see Allen & Badcock, 2003).

Despite dysphoric individuals’ enhanced accuracy in decoding others’ mental states, and success in achieving certain social goals (see Andrews & Thomson, 2009), these individuals suffer from profound deficits in their actual social skills (e.g., Segrin, 2000). For example, dysphoric individuals have fewer social contacts and less integrated social networks relative to non-depressed individuals (e.g., Billings & Moos, 1984; Gotlib & Lee, 1989), and they engage in negative interpersonal behaviours that can lead to rejection by others (e.g., Joiner, 1995). Indeed, the social and interpersonal difficulties exhibited by dysphoric individuals may be what motivates them to seek an understanding of others’ minds (Allen & Badcock, 2003; Harkness et al., 2010). Alternatively, having a hypersensitive social cognition may cause the very interpersonal rejections and conflicts that trigger more severe depression (e.g., Potthoff, Holahan, & Joiner, 1995). As such, the above research raises the intriguing possibility that superior theory of mind may not translate into superior social functioning. Understanding the motivational underpinnings of this profile, then, becomes relevant to understanding the social cognitive basis of depression.

The above research suggests, therefore, that depressed mood may be associated with a specific and preferential social motivation to know others’ minds. The effect of motivation on social cognition and theory of mind has now been examined in a number of studies. For example, in both clinical and non-clinical samples, performance on theory of mind and facial emotion recognition tasks is more accurate when participants are provided with monetary rewards for correct answers than in conditions of no reward (e.g., Klein & Hodges, 2001). Further, studies in non-clinical samples have shown that social motivation also has effects on social cognition. For example, Pickett, Gardner, and Knowles (2004) found that individuals high in a measure of social connectedness (need to belong) were more accurate at decoding emotion in vocal tone and facial expressions, and showed higher empathic accuracy, than those low
in social connectedness. A number of additional studies have found that a motivation to connect with others induces a tendency to, and increases accuracy of, mental state identification (see Waytz, Gray, Epley, & Wegner, 2010).

For their part, dysphoric individuals may engage in theory of mind to better understand their social relationships. Therefore, we might expect that dysphoric individuals would be more strongly motivated by the social rewards inherent in attending to others’ mental states, and, thus, increasing their social motivation to attend to others’ mental states may preferentially increase dysphoric individuals’ accuracy in decoding those mental states. Dysphoria is a potentially powerful individual difference framework within which to examine this question because it characterises a unique population who evince superior theory of mind skills.

In the current study dysphoric and non-dysphoric individuals were randomly assigned to complete a theory of mind decoding task under conditions of social motivation, monetary motivation, or no motivation. Only women were recruited in the current study because evidence suggests that sex differences exist in theory of mind decoding skills (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). We recognised that our projected sample size would not be powerful enough to permit including gender as a further moderator, particularly in the context of the 2:1 sex ratio in the prevalence of depression and dysphoria that makes recruitment of men very difficult. Following the hypothesis of a dissociation in theory of mind motivation, we predicted that dysphoric women would be more accurate on a theory of mind decoding task under conditions of social motivation than under conditions of monetary or no motivation. In contrast, we predicted that non-dysphoric women would be most accurate in their theory of mind decoding under conditions of monetary motivation.

METHOD

Participants
Participants were 95 female undergraduate students recruited from an introductory psychology class (age range = 17–21; \( M = 18.2; SD = 0.7 \)). They received course credit for their participation. Initial recruitment was based on participants’ score on the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) obtained during a pre-screening session held at the start of term. The pre-screen was employed to ensure that we would be able to recruit sufficient numbers of dysphoric women into the study.

We initially contacted and recruited 98 women for the study: 63 women from a list of students with pre-screen BDI-II scores at or below 12, and 35 from a list of students with pre-screen BDI-II scores above 12. Pre-screen BDI-II scores of our sample ranged from 0–36 (\( M = 9.1, SD = 8.4 \)). Three participants were excluded from our final sample due to anomalies during the experiment (e.g., did not understand instructions, took a cell-phone call during the task). This left a final sample of 95.

Measures

Beck Depression Inventory (BDI-II; Beck et al., 1996). The BDI-II is a 21-item questionnaire that assesses the presence and severity of depressive symptoms on a scale from 0 to 3, with higher scores indicating greater severity (Cronbach’s \( \alpha = .95 \)). Group membership in the current study was based on BDI-II scores assessed at the time of the study. Study BDI-II scores ranged from 0–43 (\( M = 12.5, SD = 10.4 \)), and were highly correlated with the pre-screen BDI-II scores, \( r(94) = .71, p < .001 \).

Based on the study BDI-II scores, we derived two groups: dysphoric (BDI-II > 12; \( n = 44; M = 20.8, SD = 9.7 \)), and non-dysphoric (BDI-II \( \leq 12; n = 51; M = 5.3, SD = 3.4 \)). A cut-off of 12 was used on the BDI-II because this is the score below which denotes “minimal” depressive symptomatology according to Beck et al. (1996).

Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991). The MASQ is a 90-item questionnaire that assesses depression and anxiety symptoms on a scale from 1 (not at all) to 5 (extremely). The MASQ comprises three subscales: Anhedonic Depression (AD), which includes symptoms unique to depression; Anxious Arousal
(AA), which includes symptoms unique to anxiety; and General Distress (GD), which includes symptoms common to both depression and anxiety. The AA scale was included in the current study to control for the effect of anxiety on theory of mind decoding (Cronbach’s α for AA = .91).

Reading the Mind in the Eyes Task, Revised ("Eyes task"; Baron-Cohen et al., 2001). The Eyes task is the most widely used test of theory of mind decoding in adults and can be used with individuals of normal intellectual capacity. The task consists of 36 black-and-white photographs of the eye region of the face taken from slightly above the eyebrows to midway down the bridge of the nose. Participants made a forced choice between four adjectives (the standardised correct response and three distracters) that describe the mental state portrayed by the eyes. Each photograph was standardised to the same size (14.5 cm × 5.5 cm) and centred on the computer screen with the four adjectives placed at the four corners of the photograph at an equal distance from the centre of the screen. Participants responded by pressing one of four keys (S, X, K, M) that are spatially analogous to the location of the adjectives. The computer digitally recorded responses and response latencies. Median response latency was chosen as the measure of central tendency for analysis because individual item response latencies within participants were positively skewed. The target adjectives are categorised into three emotional valence categories: positive (e.g., "Playful"), neutral (e.g., "Reflective"), and negative (e.g., "Upset"). These valence categories have now been used in several studies (Harkness et al., 2005, Harkness et al., 2010; Lee et al., 2005). See Figure 1a for a sample item.

Motivation. Participants were randomly assigned to one of three motivation conditions: social (15 dysphoric, 17 non-dysphoric), monetary (14 dysphoric, 16 non-dysphoric), or no motivation (15 dysphoric, 18 non-dysphoric). Social motivation was induced by having participants read the following paragraph adapted from Baumeister and colleagues’ social exclusion manipulation (e.g., Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007):

Animals task (Harkness et al., 2005). The Animals task consists of 12 black-and-white photographs of different animals. Each photograph is surrounded by four adjectives (the standardised correct response and three distracters) that were equidistant from the centre of the computer screen. Participants were required to select the adjective that best described the animal. Because the response demands are similar to the Eyes task, the Animals task serves as a control for the surface characteristics of the task, namely finding and selecting the most appropriate adjective from the array of four. The Animals task has been used in several studies (Harkness et al., 2005, Harkness et al., 2010; Lee et al., 2005). See Figure 1b for a sample item.

Figure 1. Sample items from (a) Eyes task (panicked is the target), and (b) Animals task (ferocious is the target).
The next task is a measure of how well you’re able to read other people’s emotions. Researchers have found that the better a person can read emotions, the more successful he/she is in social situations. This correlates very highly with how satisfying a person finds his/her social interactions. People who read emotions well tend to have rewarding relationships throughout life. They are more likely to have long and stable marriages and friendships that last into later years. On the other hand, people who read emotions poorly are more likely to end up alone later in life and to have relationships that don’t last as long. At the end of study, you will receive feedback on how well you did compared to other people.

In the monetary motivation condition, participants read a paragraph stating that for each correct response they would receive a ticket for a monetary draw for $250 to be held at the end of the study. Participants in the control group received no additional instructions. All participants were fully debriefed of the deception at the end of the study.

**Procedure**

Ethical approval for this study was obtained by the General Research Ethics Board at Queen’s University. All participants provided written informed consent after a complete description of the study procedures. Tasks were completed individually on a computer. Participants first viewed instructions for completing the Eyes and Animals tasks. They then read their vignettes, if in the social or monetary motivation conditions. Next, they viewed a sample item from the Eyes task and completed a practice trial. They then completed the Eyes and Animals tasks. Photographs for both the Eyes and Animals tasks were randomly interspersed and presented in a single block of 48 randomly ordered photographs (36 photographs for the Eyes task and 12 for the Animals task). Finally, participants completed the BDI-II and the MASQ.

**RESULTS**

**Preliminary analyses**

In the present sample, more participants selected the target than would be expected by chance for all items on the Eyes task and all items on the Animals task (binomial tests, all ps < .0005). Accuracy on the Eyes and Animals tasks was defined as the percentage of items on which participants matched the photograph stimulus to the standardised correct adjective (Baron-Cohen et al., 2001). Sample mean accuracy was 74.2 (SD = 9.3) for the Eyes task, and 78.1 (SD = 14.7) for the Animals task. Eyes task accuracy was not significantly correlated with age (r = .05, p = .64), BDI-II scores (r = .05, p = .66), AA scores (r = -.06, p = .57), or median response time on the Eyes task (r = .11, p = .31). Inclusion of these variables in the models below as covariates did not change the pattern of results. Therefore, the uncontrolled results are presented below for ease of interpretability.

Eyes task performance was not significantly related to performance on the Animals task (r = -.02, p = .86). Further, a 2 (Group: dysphoric vs. non-dysphoric) × 3 (Condition: social motivation vs. monetary motivation vs. control) analysis of variance (ANOVA) on Animals task accuracy revealed no significant effect of Group, F(2, 89) = 1.23, p = .27, η² = .01, or Condition, F(2, 89) = 2.18, p = .12, η² = .05, nor did the Group by Condition interaction approach significance, F(2, 89) = 1.16, p = .32, η² = .02.

**Accuracy analyses**

For the dependent variable percent accuracy on the Eyes task, we conducted a general linear model analysis that included an effects-coded Group (dysphoric vs. non-dysphoric) variable and two contrast-coded Condition variables plus the interaction between Group and each coded Condition variable (see Cohen, Cohen, West, & Aiken, 2003). We specified a priori orthogonal contrasts to test our hypothesis regarding the interaction of group and condition. Specifically, the first contrast-coded variable (Contrast 1) compared the average effect of the social and monetary motivation conditions against the control condition, and the second contrast-coded variable (Contrast 2) compared the monetary motivation condition against the social motivation condition. According to our hypotheses stated
above, we expected that Group would not interact with Contrast 1 but should interact with Contrast 2. That is, for the latter, social motivation should be associated with better performance than monetary motivation in the dysphoric group, whereas the reverse should be true for the non-dysphoric group.

The main effects of Group, $F(1, 89) = 0.03$, $MSE = 114.91$, $p = .88$, $\eta^2 < .001$, and Contrast 2, $F(1, 89) = 0.24$, $MSE = 114.91$, $p = .63$, $\eta^2 = .003$, failed to reach significance. However, Contrast 1 was significant, $F(1, 89) = 8.03$, $MSE = 114.91$, $p < .01$, $\eta^2 = .08$. Overall, participants were more accurate when provided with a motivation ($M = 76.83$, $SD = 11.15$) than not ($M = 70.30$, $SD = 9.98$). Further, as expected, the interaction of Group with Contrast 1 comparing the combined motivation conditions against control was not significant, $F(1, 89) = 0.11$, $MSE = 114.91$, $p = .74$, $\eta^2 = .001$. However, consistent with our hypotheses, the interaction between Group and Contrast 2 comparing the social against the monetary motivation conditions was significant, $F(1, 89) = 4.48$, $MSE = 114.91$, $p < .05$, $\eta^2 = .05$.

To follow up this significant interaction, the social and monetary motivation conditions were compared separately for the dysphoric and non-dysphoric participants (See Figure 2a). As predicted, dysphoric participants were more accurate in the social motivation condition than the monetary motivation condition, $F(1, 89) = 3.19$, $MSE = 114.91$, $p < .05$, one-tailed, $\eta^2 = .04$, but the opposite pattern was found for the non-dysphoric participants who were more accurate in the monetary motivation condition than the social motivation condition, although not significantly so, $F(1, 89) = 1.42$, $MSE = 114.91$, $p = .12$, one-tailed, $\eta^2 = .02$.

**Response time analyses**

The effects reported above suggest that dysphoric participants were most accurate in their performance on the Eyes task when provided with socially motivating cues. In contrast, non-dysphoric participants show greatest accuracy when provided with monetary motivation. We next sought to determine whether better performance in these groups was associated with longer response times in a general linear model analysis that again included an effects-coded Group (dysphoric vs. non-dysphoric) variable and two contrast-coded Condition variables plus the interaction between Group and each coded Condition variable. The same *a priori* orthogonal contrasts as above were specified to examine the interaction of Group and Condition. In this model, there was a trend for a main effect of Group, $F(1, 94) = 2.98$, $MSE = 1,531,813.45$, $p = .09$, $\eta^2 = .03$, such that the dysphoric participants took longer on the task than the non-dysphoric participants ($Ms = 4864.94$, $4425.09$; $SDs = 186.68$, $173.51$). However, none of the remaining effects approached significance (all $Fs < 1.2$, $ps > .30$, $\eta^2$s < .02). Further, the
The current study demonstrated that people can attain very high levels of accuracy on a difficult theory of mind task when they are motivated to do so. Broadly speaking, our findings suggest that individual and group differences in theory of mind performance may stem from underlying differences in what motivates people to deploy and sharpen their theory of mind skills. In particular, we found evidence for a dissociation in the motivational factors that promoted theory of mind accuracy. Individuals with dysphoria performed best when led to believe that their performance had implications for the success of their interpersonal relationships. In contrast, non-dysphoric individuals only improved their accuracy when money was at stake. These findings were robust when controlling for anxiety, response times, and performance on a control task. In addition, we found that social motivation increased the accuracy of mental state decoding similarly across eyes of a positive, negative, and neutral valence.

These findings are consistent with previous research showing that individuals' accuracy in complex skills such as decoding others' mental states or intentions can be improved by increasing the reward salience of the task (e.g., Klein & Hodges, 2001; Waytz et al., 2010). Further, they extend these results by showing that dysphoric individuals, in particular, find social reward to be an especially powerful motivator. In addition, our results suggest that differences in motivation rather than ability may underlie the enhanced pattern of theory of mind performance in dysphoric versus non-dysphoric individuals. By making the social relevance of this skill explicit by experimentally increasing the social salience of the task, the performance of dysphoric individuals, and only the dysphoric individuals, is enhanced even further.

The current results are preliminary and need to be replicated. Nevertheless, they are consistent with a growing body of evidence that supports a profile of enhanced social cognitive abilities in individuals with sub-threshold depression. Researchers have postulated that depressed mood encourages a hypersensitive, analytical, and detail-oriented approach to complex social problems that is motivated by a desire to regain control over the social world (e.g., Allen & Badcock, 2003; Andrews & Thomson, 2009; Forgas, 1995). In the current study we also found that the dysphoric group was significantly more accurate across motivation conditions when decoding eyes of a positive valence than eyes of negative or neutral valence. This result is consistent with some studies of basic facial emotion processing, more generally, which have found deficits in the accurate recognition of sad faces...
in depressed individuals (e.g., Rubinow & Post, 1992). It is also consistent with studies showing that depressed individuals are more likely than non-depressed individuals to judge ambiguous or neutral faces as negative (see Bourke, Douglas, & Porter, 2010).

The present results should be considered in the context of the following limitations. First, this study only examined women, thus future studies are required to determine whether the phenomenon revealed here generalises to men. Second, the sample comprised undergraduate students who may not be representative of the population of dysphoric individuals. Third, our study examined only one aspect of theory of mind judgement—the decoding of mental states based on eye expressions. Therefore, future research is required to examine the hypotheses of the present study in relation to other aspects of theory of mind decoding (e.g., tone of voice, body posture) and reasoning (e.g., reasoning about false beliefs).

Our findings confirm that increasing people’s motivation to attend to mental states can increase their accuracy in decoding those mental states. Most intriguingly, we discovered that there are significant individual differences in the motivational power of “love” versus “money” on theory of mind. The ecological significance of this dissociation requires further research. For example, our results may suggest that non-dysphoric individuals are primarily instrumental in their approach to social relationships (e.g., Paal & Berezkei, 2007; see also Galinsky, Magee, Inesi, & Gruenfeld, 2006). In contrast, dysphoric individuals may have an intrinsic motivation to understand the minds of others. This is intriguing given that individuals with dysphoria show impairments in their interpersonal functioning and are vulnerable to developing more severe depression (Potthoff et al., 1995). This raises the paradoxical possibility that dysphoric individuals’ strong motivation to understand other minds comes at a cost to their actual social functioning. Future research, then, should potentially refocus on how dysphoric individuals’ difficulties in social relationships stem not from social cognitive deficits, but rather from maladaptive strengths.

REFERENCES


