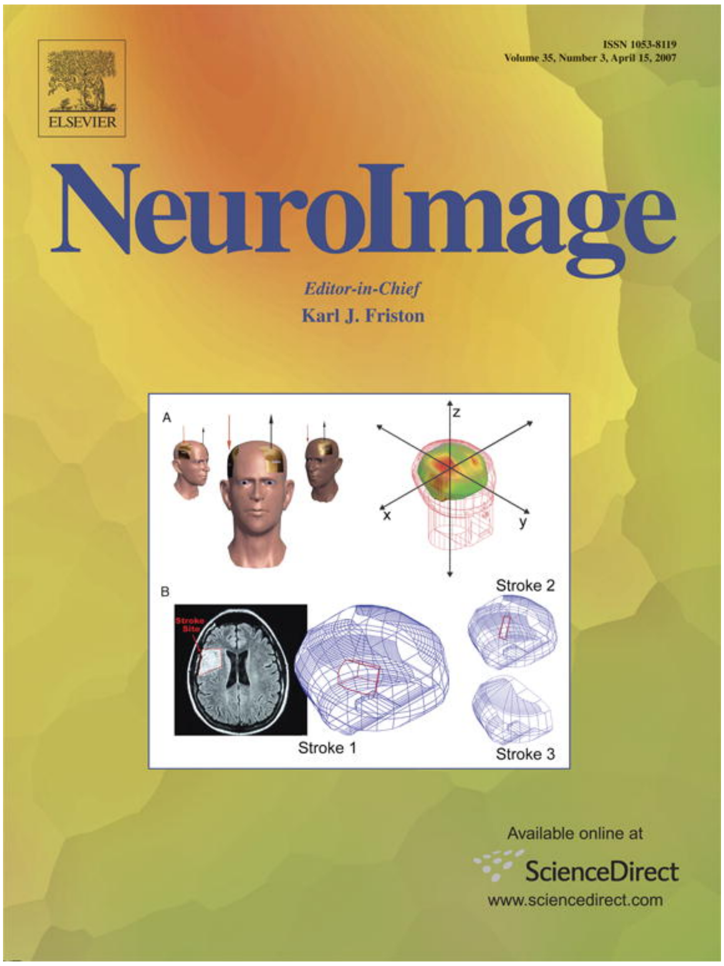
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Emotional Intelligence predicts individual differences in social exchange reasoning

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When assessed with performance measures, Emotional Intelligence (EI) correlates positively with the quality of social relationships. However, the bases of such correlations are not understood in terms of cognitive and neural information processing mechanisms. We investigated whether a performance measure of EI is related to reasoning about social situations (specifically social exchange reasoning) using versions of the Wason Card Selection Task. In an fMRI study (N=16), higher EI predicted hemodynamic responses during social reasoning in the left frontal polar and left anterior temporal brain regions, even when controlling for responses on a very closely matched task (precautionary reasoning). In a larger behavioral study (N=48), higher EI predicted faster social exchange reasoning, after controlling for precautionary reasoning. The results are the first to directly suggest that EI is mediated in part by mechanisms supporting social reasoning and validate a new approach to investigating EI in terms of more basic information processing mechanisms.

Emotional Intelligence (EI) is the ability to monitor one's own and others' emotions and to use the information to guide thinking and actions (Salovey and Mayer, 1990). Performance measures of EI have been related to social interactions, stress management, overall academic performance, and effective communication (Brackett and Mayer, 2003; Brackett et al., 2004; Mayer et al., 2004), suggesting that individual differences in EI play a role in building and maintaining successful social relationships. Furthermore, recent studies have found EI to correlate positively with interpersonal social competence (Brackett et al., 2006). However, little is known about EI in terms of basic information processing mechanisms, a central concern in a recent in-depth critique of research on EI (Matthews et al., 2003). Given the relationship between EI and socially relevant outcomes, we thought it likely that EI might also predict specific aspects of engaging in reasoning about situations involving social exchange. Such a result would validate a new approach to EI research using cognitive neuroscience methods.

There are many forms of social reasoning; we focused exclusively on social exchange reasoning, or reasoning about the mutually beneficial exchange of goods or benefits between individuals. Social exchange is characteristic of human societies and found in only a few other species (Cosmides and Tooby, 2004). Communities depend upon the exchange of goods, services, acts of helping, and sharing of resources. In situations of social exchange, one party provides goods or services that require some degree of effort or sacrifice to another party. This exchange occurs within the context of some mutual agreement that the recipient will respond with a good or service in kind. These interactions require the ability to discern others' motives and intentions because it is necessary for individuals to be able to detect those who receive benefits but fail to meet their obligations to avoid wasting one's resources on those who take advantage of others. Reasoning about social exchange has proven to be a conceptually rich topic across the social sciences: it is an important problem faced over evolutionary time and an ability that develops without requiring effort or understanding of formal logic (Cosmides and Tooby, 2004; Fehr and Gachter, 2002).

We investigated the relationship between EI and social exchange reasoning using behavioral and neuroimaging methods. We hypothesized that higher EI would be associated with better performance and the recruitment of brain areas thought to be important for social reasoning. Specifically, we predicted that individuals with higher EI should have an easier time engaging in reasoning tasks concerning social exchange scenarios, using an established paradigm for studying conditional reasoning, the Wason Card Selection Task (Wason, 1968). In the Wason task, participants are presented with a rule of the generic form "If P then Q" along with four cards containing information about P on one side and Q on the other side. The participant is instructed to indicate only the cards that definitely must be turned over to determine if the rule is being broken. Performance is typically poor when rules are of an abstract or descriptive nature, but markedly better when problems involve

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potential transgressions of social exchange norms, which are implicit social contracts, or precautionary reasoning about avoiding physically dangerous situations (Cosmides, 1989; Fiddick et al., 2000; Gigerenzer and Hug, 1992). In one study (Stone et al., 2002), healthy participants followed this pattern of performance; however, a patient with bilateral damage to his limbic system showed expected improvements on precautionary problems but impaired performance on social exchange problems, indicating a single dissociation. This finding is intriguing and suggests that reasoning about social exchange may be a specialized ability relying on unique neural processes.

On the face of it, both social exchange and precautionary scenarios have the potential to evoke distinct affective responses. Anger is easily provoked when one is the unwilling recipient of a deliberate violation of a social exchange. Fear or anxiety is readily evoked by the prospect of physical danger (Fiddick, 2004). When reasoning about such situations, subtle affective responses may be triggered that help guide performance adaptively (cf. Bechara et al., 1997; Maia and McClelland, 2004). In this way, while reasoning tasks in and of themselves are unlikely to evoke full-blown emotional responses, the affective nature of the situations may support reasoning processes and allow individuals to draw adaptive conclusions more effectively. Because reasoning about social exchange is likely to draw upon sensitivity to affective social cues (in contrast to precautionary reasoning, which does not involve social interactions), higher-EI individuals might perform better on these problems as a result of being more attuned to affective implications of social situations.

In both studies, we used three variations of Wason card task problems. Social exchange problems concerned the mutual exchange of goods or services between individuals. Importantly, the conditions of these exchanges were not universal social rules, but terms pertaining to a specific situation. The rule involved detecting if one party might be taking a benefit without fulfilling an obligation (e.g., “If you borrow my motorcycle, then you have to wash it”). Precautionary problems involved rules related to avoiding potential physical danger (e.g., “If you surf in cold water, then you have to wear a wetsuit”). Descriptive problems had arbitrary rules (e.g., “If the soda is diet, then it has to be in a purple container”). To meet the demands of the scanning environment, and because response times are important to assess when interpreting imaging data, we developed a computerized version of the Wason task. We assessed EI using a performance measure, the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002). We chose an analogous individual difference measure for precautionary performance, Harm Avoidance (defined as the degree to which an individual is cautious or careful), measured with the Temperament and Character Inventory (TCI; Cloninger et al., 1994). In the subsequent neuroimaging study, we used fMRI to measure block-related hemodynamic activity while participants completed the same series of reasoning tasks.

Based on the demonstrated importance of EI in social relationships, we hypothesized and found that EI predicts better behavioral performance (indicated by response time) and hemodynamic activity in areas involved with emotion–cognition interactions, namely the frontal polar cortex (BA 10), during social exchange reasoning. Based on a patient with impaired social reasoning (Stone et al., 2002), we also expected and found that engaging in reasoning about social exchange activated a specific group of regions including the frontal cortex and anterior temporal lobe.

Materials and methods

Participants and procedure

In the behavioral study 48 undergraduate students in an introductory psychology course at Yale University participated for course credit. Participants were told that they would be participating in an experiment on decision-making styles and gave informed consent. For the neuroimaging study 16 right-handed healthy participants (10 female) aged 18–27 (mean age = 21.7 years) with no history of psychiatric illness or neurological disorder volunteered (none of whom had participated in the behavioral study). These participants responded to posted advertisements and gave informed consent according to Yale University's Human Investigation Committee.

All participants completed the State-Trait Anxiety Inventory (Spielberger, 1983), were given a brief tutorial about the Wason task, and completed three practice problems to familiarize them with the task and clarify any questions (no feedback on performance was given). The Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002) was administered by computer in a separate session. The MSCEIT provides five scores, one for each domain of EI (perception, use, understanding, and management of emotion) and a total score. As a predictor of social exchange performance, we used the total score (split half reliability = .93). The reliability and validity of the MSCEIT are established (see Brackett and Salovey, 2004). To assess threat sensitivity, we used the Harm Avoidance (HA) scale (36 self-report questions) from the Temperament and Character Inventory (Cloninger et al., 1994). People who score high on Harm Avoidance tend to be cautious, careful, inhibited, and shy in most situations, taking greater care in anticipating danger and engaging in careful planning if danger is likely. Because precautionary problems concern physically dangerous scenarios, we focused on subscale Harm Avoidance-2 (which focuses primarily on physical dangers).

Behavioral study participants then performed a nonstandard implementation of the Wason task (computerized, time-limited, card-by-card presentation) intended to allow the collection of both response time (RT) and accuracy. (In a preliminary validation study, we verified that accuracy did not differ between untimed and time-limited versions of the task.) Participants completed 30 problems, with a short break halfway. For each problem, participants read a brief scenario describing both a situation and a rule of generic form “If P, then must Q” or “If P, then have to Q”. They then saw cards presented individually along with the rule. (For each scenario, there was one rule and four different cards: P, not-P, Q, not-Q.) For each card, participants had to indicate either “definitely turn over” (press the o key; required for P and not-Q) or “no need to turn over” (press the p key; required for not-P and Q) to be able to tell whether the rule was being broken. The rule remained on the screen throughout the card response period. Based on pilot testing, participants were given 20 s to read each scenario and 4 s to respond to each individual card. If a response was not made within 4 s, an error was scored and the computer automatically advanced to the next card. No feedback was given about performance. Accuracy scores were computed on a card-by-card basis and reflected the total number of correct responses divided by the total number of cards. It is worth noting that our accuracy levels were higher than those typically obtained in previous literature, a discrepancy that is likely a result of this scoring method. In previous literature, accuracy was computed on a scenario-by-scenario basis—thus a participant had only to choose both of the correct cards for a given scenario to receive credit for the problem.

There were three categories of problems (Stone et al., 2002): descriptive, social exchange, and precautionary rules. Twenty-four scenarios were taken from Stone et al. and slightly adapted, with six new problems added. Scenarios were pseudorandomly ordered to ensure that problems of the same type were not repeated. The four card types were presented sequentially (card by card) in pseudorandom order on the computer screen. Participants responded to each card presented alone. Accuracy for a given problem type was taken as the percentage of individual cards responded to correctly of that problem type. RT for each card was measured as the time elapsed from when the card was displayed until the response was made. RT for a problem type (descriptive, social exchange, precautionary) was computed as the mean of the RTs for all cards responded to correctly, regardless of card type (P, not P, Q, not Q). To avoid confounding RT with time spent reading each card, we matched the length of text shown on the cards: mean 21.1 text characters for social exchange, 21.0 for precautionary, and 19.8 for descriptive.

fMRI acquisition

We used a 3-Tesla Siemens Trio scanner to collect structural (T1-weighted MPRAGE: 256×256 matrix; FOV=240 mm) and functional images (gradient echo EPI sequence; TR=2000 ms; TE=25 ms; FOV=240 mm; flip angle=80°; matrix=64×64; slice thickness=4.2 mm). Thirty contiguous oblique axial slices parallel to the anterior commissure–posterior commissure (AC–PC) line were obtained. The first three volumes (6 s) were discarded to allow for T1 equilibration effects. During the scan session, participants completed four runs of 12 reasoning problems in the format described above. Each run lasted 8 min and 32 s. Foam pads were used to minimize head movement. Stimuli were presented using a laptop running PsyScope (Cohen et al., 1993). Subjects viewed stimuli projected onto a screen through a mirror mounted on the head coil. Responses were made using a fiber-optic response buttons, using the right index and middle fingers.

fMRI analysis

Data were analyzed using Statistical Parametric Mapping 2 (SPM2) software (http://www.fil.ion.ucl.ac.uk/spm). Motion correction was performed for each participant using INRIAlign, a six-parameter, three-dimensional realignment procedure. The mean functional image for each participant was spatially normalized to Montreal Neurological Institute (MNI) stereotaxic space using a 12-parameter affine transformation followed by nonlinear warping using basis functions, which was then applied to all the functional images. Images were then smoothed with an 8-mm FWHM isotropic Gaussian kernel.

We performed random-effects, block design analyses on the functional data for the decision period of each scenario in a two-stage procedure. The decision period was a 20-second block following the reading period during which subjects were presented with 5 cards and asked to make decisions about whether each card is needed to be turned over, following the procedures used in the behavioral study. In the first stage, effects for each reasoning condition were estimated separately for each subject at each voxel according to the general linear model (GLM). The BOLD responses to social, precautionary, and descriptive reasoning periods were modeled separately by convolving onset times with a canonical hemodynamic response function. For each subject, contrasts comparing reasoning versus baseline (fixation) and versus other reasoning conditions produced statistical parametric maps of the t statistic at each voxel. In the second stage of analysis, these maps were analyzed at the group level with subjects as the random effect. Individual differences in activation were then assessed with regression/correlation analysis.

Based on a priori predictions from the literature (Stone et al., 2002), we conducted region-of-interest analyses using prefrontal and temporal Brodmann areas. Both areas showed high negative correlations with EI (BA 10=−0.89; BA 20=−0.75). Given the individual variability in Brodmann areas, we further localized ROIs by extracting values from peak voxels in these areas for our main statistical analyses. We also analyzed whole-brain patterns of activation using a voxel-wise threshold of $p<0.001$ on summary statistics, uncorrected for multiple comparisons with a cluster extent threshold of 10 contiguous voxels. The same thresholds were used for the individual difference analyses.

Results

Behavioral study

As predicted, higher EI (i.e., MSCEIT total scores) specifically predicted faster RT on social exchange problems, Fig. 1a, pr(42)=−0.39, $p=0.008$ (controlling statistically for precautionary RT to assess variance unique to social exchange reasoning; and descriptive RT, HA, and state anxiety to control for baseline ability). In contrast, individual differences in Harm Avoidance predicted faster RT on precautionary reasoning problems, Fig. 1b, pr(42)=−0.32, $p=0.036$ (controlling for social exchange RT to assess variance specific to precautionary reasoning; and also for descriptive RT, MSCEIT, and state anxiety). EI and HA were not related, $r(46)=-0.02$. EI did not predict RT on precautionary problems, pr(44)=−0.15, $p=0.33$ (controlling for descriptive RT and state anxiety). Likewise, HA did not predict RT on social exchange problems, pr(44)=−0.15, $p=0.33$ (controlling for descriptive RT and state anxiety).

As expected, participants performed faster and more accurately on reasoning problems related to social exchange and precautions than descriptive problems (Fig. 2). RTs were only analyzed for correct trials. RTs were normally distributed with good reliability (α's 0.89 to 0.90 for the three problem types). A repeated-measures ANOVA (problem type within-subject; RT dependent) yielded the expected difference among social exchange, precautionary, and descriptive conditions, $F(2,94)=59.45$, $p<0.001$. The social exchange and precautionary conditions were well-matched, with nearly identical means at a group level for both accuracy and RT, F's $(1,47)<1.85$, p's>0.15. There was no speed–accuracy tradeoff in any condition as higher accuracy was always associated with faster responding.

The social exchange and precautionary problem types were far from statistically independent. There were strong zero-order correlations for RT, $r(46)=0.87$, $p<0.001$, and accuracy, Spearman's rho(46)=0.51, $p<0.001$. The correlation between social exchange and precautionary RT remained strong when controlling for descriptive RT, pr(45)=0.74, $p<0.001$, indicating that the tasks we sought to dissociate were exceptionally well-matched even at an individual level.

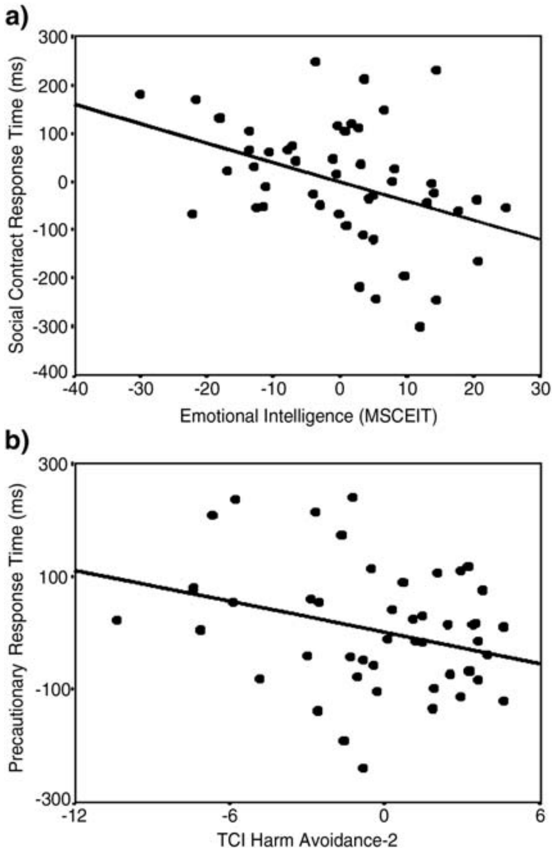

Fig. 1. Individual differences predict response times. (a) Emotional Intelligence (MSCEIT) predicts faster response time on social exchange reasoning, controlling for precautionary RT, descriptive RT, and STAI-S (partial regression plot, centered scores). (b) Harm avoidance-2 (TCI) predicts faster precautionary reasoning, controlling for social exchange RT, descriptive RT, and STAI-S (partial regression plot, centered scores).

The key behavioral finding was that higher EI was related to faster social exchange reasoning, even when controlling for reasoning performance on well-matched tasks. In fact, we found a double dissociation between social exchange and precautionary reasoning, based on the selective associations with different personality variables (EI with social exchange reasoning and HA with precautionary reasoning).

Neuroimaging study

Neural activations predicted by Emotional Intelligence

Our primary interest was whether individual differences in EI would predict neural activity during a social reasoning task. Using a block design, we analyzed fMRI data separately for each of the reasoning periods using a random-effects general linear model (GLM) with each condition (social, precautionary, and descriptive problem types) as a predictor. The baseline condition for comparison was fixation, which occurred at the beginning and end of each block. We did not use the descriptive reasoning condition as baseline because there were large differences in behavioral performance for social and precautionary versus descriptive reasoning. These differences precluded the descriptive condition from serving as an informative control condition due to the likely confound with difficulty. As in the behavioral study, participants performed considerably worse on descriptive problems than either social or precautionary problems, both in terms of accuracy (mean accuracy on descriptive = 0.83; social = 0.95, precautionary = 0.96) and RT (mean RT descriptive = 1707 ms, social = 1436 ms, precautionary = 1340 ms), p's < 0.001 for both accuracy and RT.

In sixteen healthy adults, EI predicted neural activity during social reasoning in two key areas (Stone et al., 2002). In the left frontal polar region (BA 10; MNI coordinates = −30, 63, 18), the zero-order correlation between EI and activity during social reasoning (versus baseline) was $r = -0.89$ ($p < 0.001$); in the left temporal cortex (BA 20; −42, −18, −21) the zero-order correlation was $r = -0.75$ ($p = 0.001$) (Fig. 3). After controlling for precautionary reasoning, the relationship between EI and activity during social exchange reasoning remained statistically significant (pr = −0.77, $p = 0.001$). We used a partial correlation analysis because this approach enabled us to be more specific in the conclusions we could draw. That is, while the social versus precautionary difference might seem to be the more intuitive comparison to use in the correlation, this approach would confound social exchange

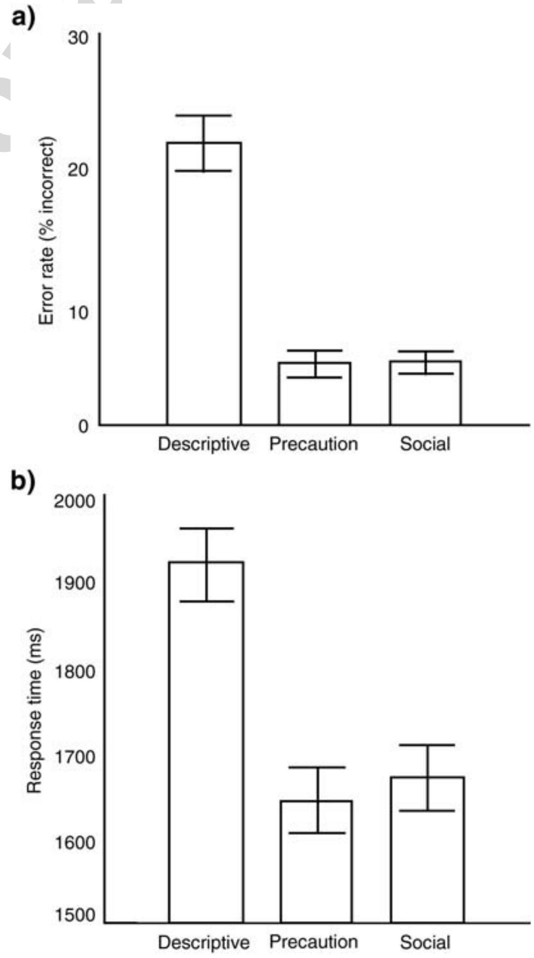

Fig. 2. Mean behavioral performance by condition: mean (S.E.) error rate and response time. (a) Error rate (% incorrect): descriptive, 22 (14)% correct, range 0 to 60%; precautionary, 5 (7)%, range 0 to 43%; social exchange, 5 (6)%, range 0 to 25%. (b) RT (ms) mean (SD) for descriptive: 1922 (291) ms, range 1169 to 2808 ms; precautionary: 1647 (267) ms, range 1072 to 2285 ms; social exchange: 1674 (267) ms, range 1120 to 2340 ms.

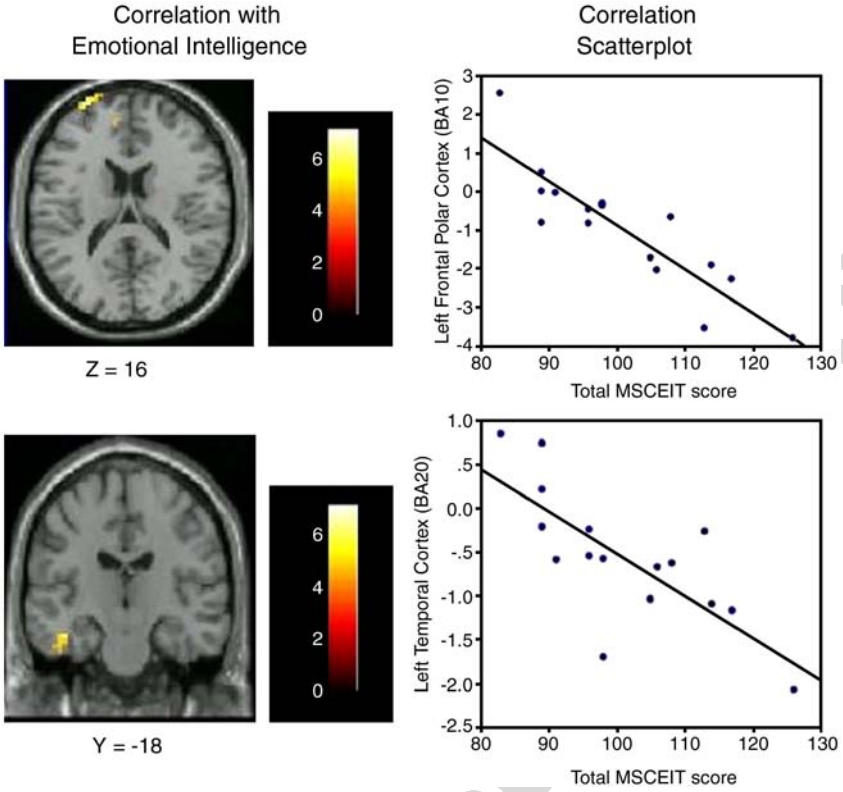

Fig. 3. Emotional Intelligence (EI; measured by the MSCEIT) correlated with activation during social reasoning. Units of the axis are zero-centered percent change relative to the mean global signal. Bars represent *t*-scores. (a) Left frontal polar cortex (BA 10) and temporal cortex (BA 20) activations correlate with EI during social reasoning. (b) Participants' mean activations during social reasoning > baseline as a function of EI from the peak voxels in region BA 10 (top) and BA 20 (bottom).

with precautionary activity. Instead, by controlling for precautionary activity, we disentangled activity during social exchange reasoning from activity during a closely matched non-social condition, enabling us to isolate the relation between social exchange activity and EI from extraneous variability (Table 1).

Distinct neural activations for social versus precautionary reasoning

A secondary interest in the current study was what neural mechanisms might distinguish social and precautionary reasoning given the similarity in behavioral performance on these types of problems. Across the whole brain, we tested for areas that were selectively activated during social versus precautionary reasoning. Our predictions for these analyses were based on patient data suggesting that the frontal polar cortex would be critical for social reasoning (Stone et al., 2002). Random-effects analysis indicated that social as opposed to precautionary reasoning activated regions including the right medial frontal gyrus (BA 46/9; 57, 27, 33), temporal lobe (BA 21; 72, −24, −12), a portion of the occipital cortex (BA 18; −33, −96, 6), and frontal cortex (BA 9; −3, 63, 30). Precautionary reasoning (in contrast to social reasoning) activated the posterior cingulate cortex (BA 23; 3, −30, 21), the anterior cingulate cortex (BA 24; 12, 30, 15), and the parahippocampal gyrus (BA 37; 39, −39, −6). We also used RT as a parametric covariate in an additional analysis to remove variance potentially explained by differences in performance, which did not change the findings (Table 2).

Table 1
Brain areas in which Emotional Intelligence predicted neural activity during social exchange reasoning

Region of activation	MNI coordinates			Cluster size	*t* statistic
Prefrontal cortex					
L BA 10	−30	63	18	20	7.20
L BA 9	−9	48	18	11	4.43
Temporal lobe					
L BA 20	−42	−18	−21	19	5.50
R BA 21	54	−30	−3	39	5.11

All *p*-values <.001.

Discussion

In two studies, we found evidence that Emotional Intelligence (EI) is systematically related to social exchange reasoning more strongly than it is to reasoning on a closely matched non-social reasoning task. The relationship between EI and hemodynamic activity during social reasoning in the left frontal polar and temporal cortices is in accordance with findings suggesting that these areas are necessary for successful social exchange reasoning (Stone et al., 2002). Similarly, portions of the prefrontal cortex are activated when people cooperate with others (Rilling et al., 2002). Activations in frontal polar areas have also been associated with working memory, executive control, and emotion–cognition interactions (Gray et al.,

Table 2
Brain areas activated during social and precautionary reasoning

Region of activation	MNI coordinates			Cluster size	*t* statistic
Social exchange > Precautionary reasoning					
Medial frontal gyrus					
R BA 46/9	57	27	33	29	5.56
Medial temporal gyrus					
R BA 21	72	−24	−12	11	5.16
Occipital gyrus					
L BA 18	−33	−96	6	19	5.02
Frontal gyrus					
L BA 9	−3	63	30	11	5.02
Precautionary > Social exchange reasoning					
Posterior cingulate					
R BA 23	3	−30	21	12	5.68
Anterior cingulate					
R BA 24	12	30	15	13	5.56
Parahippocampal gyrus					
R BA 37	39	−39	−6	17	5.52

All p-values $<.001$.

2002). The negative correlation between EI and brain activity suggests that individuals with lower EI may have more difficulty reasoning about social exchange and so compensate with greater activation in these areas to solve the same problems. It is possible that individuals with higher EI are better at detecting when social exchange situations are present, and thus have an easier time processing the relevant information to make decisions in the reasoning task. Moreover, the data not only connect EI to a wider literature, but also directly address a major concern about the construct of EI (Matthews et al., 2003). While we do not claim to have addressed all concerns about EI, the current report illustrates a successful approach using cognitive neuroscience methods that, in combination with psychometric studies, could greatly clarify the nature of EI, particularly its relation to cognitive, affective, and social functioning.

We chose to use the Wason task in part because it also allowed us to test a secondary prediction: that social reasoning is distinct from a closely matched domain (precautionary reasoning). Our results indicate distinct patterns of hemodynamic activity during social versus precautionary reasoning, which supports prior research suggesting separability of these processes. In a single lesion patient, the frontal polar/orbitofrontal region and the temporal cortex were necessary for social reasoning as the patient was unable to successfully reason about social exchange (Stone et al., 2002). Our results are the most definitive support to date for separable reasoning processes because we found a selective, specific relationship between reasoning performance and individual differences in both behavioral and neuroimaging data, and our social and precautionary tasks were exceptionally well-matched both in accuracy and RT. The regions of the anterior cingulate activated during precautionary reasoning have been implicated in emotional and pain processing (Bush et al., 2000), which might suggest that while reasoning through precautionary problems, individuals mentally simulate the problem and consider the implications of dangerous situations.

While our behavioral results demonstrated a relationship between harm avoidance and precautionary reasoning, we did not find areas where HA predicted activation during precautionary reasoning in our imaging study. One potential reason for this discrepancy is the overall lower HA scores in the imaging subjects. In the behavioral sample, average HA was 18 with a median of 19. The imaging sample size was smaller, with an average HA score of 16 and a median of 16. An independent samples t-test of HA scores trended towards significance, $t(62)=1.90$, $p=0.06$, suggesting that these participants were different in HA measures.

At the behavioral level, higher EI selectively predicted faster social exchange reasoning. In a similar way, higher HA selectively predicted faster precautionary reasoning. This result, in conjunction with the distinct neural activations observed during social and precautionary reasoning in the imaging data, provides a strong confirmation of the hypothesis that social exchange is partly independent of precautionary reasoning—a conclusion hinted at in considerable previous works (Cosmides, 1989; Fiddick et al., 2000; Fiddick, 2004; Gigerenzer and Hug, 1992; Stone et al., 2002; Cosmides and Tooby, 2004; Ermer et al., 2006), but not shown definitively (e.g., for having single dissociations or for not being able to rule out speed–accuracy tradeoffs). It has been proposed that an adaptive psychological mechanism specialized for reasoning about social exchange may have evolved over time (Cosmides and Tooby, 2004; Fiddick et al., 2000). One prior imaging study of the neural mechanisms associated with reasoning about social exchange and precautions found distinct activations for the two domains (Fiddick et al., 2005). However, these results are difficult to interpret because response times were not assessed and the social exchange problems were significantly more difficult than the precaution problems; thus the differing activation may reflect differences in task difficulty rather than distinct reasoning processes. In our study, performance on the social and precautionary problems was nearly identical, allowing us to draw more definitive conclusions. A recent imaging study also found distinct mechanisms for reasoning about social exchange versus precautionary reasoning, including some activation results that converge with our own—particularly in the anterior temporal cortex (Ermer et al., 2006). Taken together, these results indicate that, while reasoning about social exchange and precautions share many features and elicit similar behavioral performance, there are distinct neural mechanisms underlying each type of reasoning performance.

Our results do not bear on whether such specialization of function is due to dedicated information processing modules, nor whether such processes are the result of evolution by natural selection (Cosmides, 1989; Cosmides and Tooby, 2004). As in previous studies, participants performed better on social exchange and precautionary problems than the descriptive problems, suggesting that higher EI and HA are useful but not essential for enhanced performance. To our knowledge, these findings are the first to link individual differences in emotion-related abilities to the cognitive and neural mechanisms of a critical form of social reasoning, validating a new approach to investigating EI.

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