

SUSCEPTIBILITY TO AFFECT-BASED FRAMING EFFECTS AS A PREDICTOR OF PSYCHIC EXPERIENCE

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Drawing on the Broughton's model of extrasensory perception that proposes that the emotional system may have been co-opted by evolution to work with memory systems to present anomalous information in a manner that would help humans to make more adaptive decisions in situations of inadequate sensory information, this study attempted to garner experimental support by using the framing effect as an individual differences measure of sensitivity to emotional input that would correlate with psychic experiences and/or ability. Framing effect sensitivity was measured using a financial risk behavioural task and a battery of 'Asian disease' style questions tailored to assessing individual differences. The Australian Sheep-Goat questionnaire was used for assessing psychic beliefs and experiences. Psychic ability was measured using the Intuitive Market Trader, a futures market share trading simulator and a computer-based precognitive Remote Viewing task. Additional personality and cognitive style data were obtained from the IPIP NEO-FFI equivalent battery, Emotion Business Decision Making Inventory, and the Rational-Experiential Inventory. Questionnaire measures were administered online followed by a laboratory session that included the financial framing task and the two psychic ability tests. One hundred fifty-five participants began the process (completing at least the online questionnaires and 125 of those completed all stages. The results indicated that both framing-effect tasks functioned as expected but neither measure showed any relationship with psychic experience or ability. As expected, the Experiential factor (only) of the REI was correlated positively and significantly with the psychic beliefs and experiences and the Experiential factor was also positively and significantly correlated with performance in the Intuitive Market Trader psychic ability test. While REI results provide promising support for emotion-based models of psychic functioning, the principal goal of developing the framing effect as a predictor of psychic experience and ability was not achieved.

A fundamental step in the cracking of the mystery of anomalous cognition or extrasensory perception (ESP) will be the elucidation of the brain systems that convert anomalous information into useful knowledge or adaptive behaviour. In a recent paper (Richard S. Broughton, 2006) I have argued that the brain systems likely to be involved in this process are the emotional and memory systems working in close concert, two systems that are intimately tied together in normal cognition and decision making and which could well have been co-opted by evolution to capitalize on anomalous information.

While the actual mechanism by which anomalous information interacts with the human mind remains a mystery, several models have been proposed that suggest the fundamental component of the ESP experience is based on memory (Irwin, 1979; Roll, 1966). In these models the anomalous information does not con-

¹ Broughton was the principal investigator and Zychowicz was a contributing research assistant. Thanks also to Raphael Underwood who was a research assistant for a short while at the start of this project.

sist of new images “transmitted” to a person, but in some manner (yet to be understood) the anomalous information causes memory images appropriate to conveying the “message” to come into consciousness. As noted by Irwin (1979), there is considerable experimental and observational support for this model. In this model the anomalous information can arrive in consciousness either directly (via recalled dreams or hallucination), or indirectly through intuitions or somatic sensations based on emotional memories (for examples, see Broughton, 2006).

In extending the memory model, I have argued that the pathway by which memory images are selected in the ESP process to convey anomalous information into consciousness, or influence decision-making processes, is the emotional system. In conventional decision-making, Damasio’s somatic marker hypothesis (Bechara, Damasio, & Damasio, 2000; Damasio, 1994, 1996) has provided an elegant explication of the manner in which memories of bodily feelings associated with past experiences (somatic markers) continually influence decision-making, largely by manipulating the images in the current decision space. Although details of the somatic marker hypothesis require further experimental support (Bechara, Damasio, Tranel, & Damasio, 2005; Dunn, Dalgleish, & Lawrence, 2006), there is a growing consensus that the emotional system, particularly affect and feelings, plays a key role in decision-making (Slovic, Finucane, Peters, & MacGregor, 2002). Considering ESP in an evolutionary context, as science demands we must, it is my contention that the main reason anomalous information is available to humans is to help them make better decisions in all realms of human endeavour (Broughton, 2000, 2006).

If the emotional and memory systems that currently subserve decision-making have been co-opted by evolution to make use of anomalous information when it is available then we should expect to find relationships between the ability to utilize effectively emotional cues and the effective use of anomalous information both in natural settings and in the laboratory. In particular we should expect individuals who demonstrate greater effectiveness at utilizing feelings and emotional biases will also demonstrate more effective use of anomalous information (Broughton, 2006).

While there has been much research on the emotions and ESP most of this has not been directly relevant to the proposed model. Prior research has looked at either the emotional valence of targets in ESP tests or the emotional relationship between the participants, typically in telepathy experiments. The research with the most bearing on the model is of the “presentiment” design in which an aspect of the autonomic nervous system shows evidence of anticipating unpleasant or threatening future events (Bierman & Radin, 1997; Bierman & Scholte, 2002; Radin, 1997, 2004). Although this is suggestive, the evidence so far has been restricted to time periods of less than one second, an interval of limited practical usefulness in evolutionary terms. Recently an alternative interpretation suggesting an experimenter influence for some presentiment effects has been advanced (May, Paulinyi, & Vassy, 2005) as well.

If ability to utilize anomalous information in the form of ESP is evolutionarily determined, then we would expect to see individual differences in that ability as we see in all other human abilities. That there are individual differences in ability has been apparent since the study of the subject began, but extensive efforts to relate these differences to other aspects of human behaviour or personality have yielded only limited results (see Irwin & Watt, 2007, chapter 4 for a review). Belief in ESP, often supported by personal experience, frequently predicts better performance in formal tests (Palmer, 1977) though only weakly in many cases. Individuals higher in extraversion typically do better in ESP tests (Honorton, Ferrari, & Bem, 1998), but no other personality characteristics show any reliable relationship with the ability to perform well in ESP tests.

Framing effects

The traditional view of decision-making in which humans were “rational actors” who weighed probabilities and assessed the utility of various options has been seriously challenged by the work of Tversky and Kahneman. Their work demonstrated that judgement frequently rests on simplifying heuristics and biases rather than rational analysis (Kahneman, Slovic, & Tversky, 1982). The context in which a decision problem is framed can strongly influence a person’s choice, often resulting in what appear to be irrational decisions or reversals of stated preferences (Tversky & Kahneman, 1981). This “framing effect” has been shown to be potent in almost all realms of judgement, especially when risk is involved, and the research findings are acknowledged to have practical consequences for areas as diverse as medicine, marketing, and economic theory.

Kahneman and Tversky advanced *prospect theory*² to account for the observed behaviour in their experiments (Kahneman & Tversky, 1979). This extensive model describes decisions as involving two phases, editing and evaluation, and predicts a number of specific behaviours, among which are that potential losses have a greater impact than gains (loss aversion) and that people will overrate small probability events and underrate medium and large probability events. Recently it has been argued that the behaviour described by prospect theory has deep evolutionary roots in evaluating the risks involved in foraging for food (Mcdermott, Fowler, & Smirnov, 2008).

Although prospect theory accounts for framing effects in a uniform manner, some researchers have argued that there are different types of framing effects. Levin, Schneider and Gaeth (1998) claim support for three distinct types of framing effect based on operational definitions of what is being framed and how the framing effect is measured. In each case the valence of the frame—its positive or negative character—influences the decision process, but how the influence plays out differs depending on whether the decision involves risk, assigns an attribute, or concerns a goal. Subsequent research (Levin, Gaeth, Schneider, & Lauriola, 2002) has shown that the risky choice framing and attribute framing are reasonably stable effects, but goal framing is not. Furthermore, the researchers observed that some participants displayed varying levels of framing sensitivity while other participants seemed resistant to framing effects.

Despite much research, finding robust relationships between susceptibility to framing effects and personality characteristics has proven elusive. (See LeBoeuf & Shafir, 2003 for a summary.) Similarly, cognitive factors such as analytic intelligence and interactional intelligence (Levinson, 1995) have produced different results according to the problem set (Stanovich & West, 1998), leading to advocacy of dual-process theories of reasoning where rational/analytic intelligence is contrasted with an alternative mode of reasoning that operate more or less in parallel. In this context individual differences in framing susceptibility may relate to differences in the relative reliance on one or the other processing system.

Of the dual-process models, that of Epstein seems most relevant to understanding the framing effect. Epstein’s Cognitive-Experiential Self Theory (CEST) (S Epstein, 1994; Seymour Epstein, Pacini, Denes-Raj, & Heier, 1996) that argues all behaviour is an interaction between the Rational system, which operates through logical principles, and the Experiential system, which is a rapidly-responding decision system driven primarily by the emotional system (Denes-Raj & Epstein, 1994).

In recent years it has become increasingly clear from other research that the principal input into the alternative reasoning system that produces the seemingly counter-rational effects in risky decision-making situations is the emotional system.

² For which Kahneman won the Nobel Prize in Economics in 2002.

Slovic et al. (2002) call this the *affect heuristic* in which feelings (conscious and unconscious) rapidly and automatically influence decision-making. Loewenstein et al. (2001) have proposed a *risk as feelings* theory which focuses on the role of *anticipatory emotions* (immediate visceral feelings) in risky decision situations. They propose that "... responses to risky situations (including decision making) result in part from direct (i.e., not cortically mediated) emotional influences, including feelings such as worry, fear, dread, or anxiety." (Loewenstein et al., 2001, p. 270) They acknowledge that their model is similar to the somatic marker hypothesis of Damasio (1994, 1996) and the affect heuristic.

Neuroimaging has confirmed that the framing effect is associated with amygdala activity indicating a role for the emotional system in risky decision-making (De Martino, Kumaran, Seymour, & Dolan, 2006). De Martino et al. also noted that there were substantial intersubject differences in susceptibility to the framing effect and these showed a robust correlation with neural activity in the orbital and medial prefrontal cortex (OMPFC), which, they note, has strong reciprocal connections to the amygdala. It is thought that the OMPFC integrates input from the amygdala in the evaluation of potential outcomes of future behaviour and De Martino et al. observe, "Our data raise an intriguing possibility that more 'rational' individuals have a better and more refined representation of their own emotional biases that enables them to modify their behavior in appropriate circumstances, as for example when such biases might lead to suboptimal decisions. As such, our findings suggest a model in which the OMPFC evaluates and integrates emotional and cognitive information, thus underpinning more 'rational' (i.e., description-invariant) behavior." (De Martino et al., 2006, p. 687)

If one takes seriously the possibility that anomalous information can be utilized by humans, as proposed by Broughton (2006), it seems not an unreasonable speculation that neural systems involved in risky decision-making may be the ones that evolution has adapted to accomplish this task. Should that be the case, then one could expect that individual differences in susceptibility to the emotional component of risky decision-making, as noted by De Martino, et al. and others, should bear a relationship with the ability to utilize anomalous information.

Taking framing effect susceptibility (FES) as an indicator of an individual's sensitivity to the emotional signals, as suggested by the affect heuristic and risk-as-feelings models, this study attempts to develop a comprehensive profile of the relationship between FES and the likelihood of having anomalous (psychic) or intuitive experiences. This is done by relating FES to inventories of experiences and psychometric measures known to correlate with the propensity to have psychic experiences. The component of the study seeks to develop the FES as behavioural (as opposed to a questionnaire-based) screening tool to identify individuals at risk for anomalous or psychic experience and to identify individuals who may be able to demonstrate significant psychic or intuitive ability in controlled testing environments.

Study objectives

1. Provide converging evidence that the emotional system plays a key role in the experience and utilization of anomalous information, in support of the model proposed by Broughton (2006)
2. Develop an *independent behavioural measure*, based on framing effect susceptibility, to identify
 - a. Individuals at risk for anomalous or psychic experiences.
 - b. Individuals capable of demonstrating significant intuitive ability in controlled tests of ESP function.
3. Test hypotheses:

- a. Based on the Framing Effect Susceptibility (as measured by the Rationality Indices of the framing tests
 - i. H_1 There will be a relationship between anomalous experiences and FES. Although based on the foregoing review, it is tempting to predict that a greater FES (more emotional input) is associated with a tendency to report anomalous experiences, the fact that this is a completely new line of research makes directional prediction premature.
 - ii. H_2 According to the directional association observed in H_1 , participants in the upper quartile will score significantly above chance in a test of ESP-based intuition. In the absence of a significant confirmation of H_1 , those in the upper quartile of FES will be used.
 - iii. H_3 Participants in the upper and lower quartiles of the FES will score significantly differently in a test of ESP-based intuition.
- b. Based on the Experiential factor of the REI as a measure of the relative reliance on emotional input to behaviour.³
 - i. There would be a positive relationship between a participant's score on the Experiential scale and their tendency to report psychic experiences.
 - ii. There would be a positive relationship between a participant's Experiencer score and their performance in the tests of anomalous intuition.

METHOD

Participants

Participants were recruited through opportunity sampling of students and staff on the university campus, as well as amongst friends and acquaintances of the research staff. Posters were used to recruit on campus. Participants were paid between £25 and £28 for full participation in the project (about 2.5 hours time commitment). The variation in amount was based on performance in one of the framing effect experiments as a motivator toward careful attention in the computer test. Participation consisted of two stages as described in the Procedure section. A small number of participants completed only the on-line survey part and despite reminders, failed to complete the laboratory-based components of the study. A total of 125 participants completed all aspects of the study with an additional 30 completing only the survey part. All useable data are reported here.

³ This was not included as one of the hypotheses of the original proposal, although the use of the REI was one of the planned instruments. At the 8th Symposium of the Bial Foundation in 2010, Seymour Epstein was the keynote speaker. In the discussion following the first author's presentation at that symposium (Broughton, 2010) Professor Epstein offered from the floor his prediction that 'Experiencers' (individuals who score highly on the Experiential scale of the REI) would report higher numbers of psychic experiences. Later in conversation he was more circumspect about psychic abilities however he allowed that the same characteristics of Experiencers may also lead them to have better psychic ability. Since data collection had only just started no data had been examined, Professor Epstein's predictions have been incorporated as hypotheses.

Design

As the major part of this study was exploratory, a correlational design was used to explore relationships between the personality measures, emotional and rationality styles, anomalous experiences and beliefs, and the framing effect. Additionally, the relationships between these factors and actual performance in two measures of anomalous intuition were examined by correlation tests. Hypothesised differences in anomalous intuition were tested by ANOVA and *t*-tests as appropriate.

Materials

The International Personality Item Pool (IPIP) 50-item equivalent of the NEO-PI-R (Goldberg et al., 2006) was used to assess personality according to the common five-factor model. This public domain test of the five-factor model demonstrates good reliability ($\alpha = .77$ to $.86$) as well as good correlations with the original NEO-PI-R test (Costa & McCrae, 1992), ($r = .70$ to $.82$) (ORI, 2012).

The measurement of emotional sensitivity is given to a variety of approaches with their own sets of advantages and disadvantages (Pérez, Petrides, & Furnham, 2005). After considerable review of the various options, we decided to use the Emotional Business Decision Making subscale (EBDM) and the Attending to Emotions subscale (ATE) of Barchard's IPIP Emotional Intelligence Scale (Barchard, 2001; Evans & Barchard, 2005). These are each 10-item scales with good reliability (EBDM $\alpha = .77$, ATE $\alpha = .81$).

Thinking styles were measured by Epstein's Rational-Experiential Inventory (REI) (Seymour Epstein et al., 1996) using a recently developed shorter form of the scale (Norris & Epstein, 2011). This test is based on Epstein's Cognitive Experiential Self-Theory (CEST) (Seymour Epstein et al., 1996) which distinguishes between rational and experiential systems of thought that are grounded in different types of information processing.

Paranormal beliefs and experiences were measured using the Australian Sheep-Goat Scale (ASGS) (Thalbourne, 1995), an 18-item questionnaire with subscales for paranormal beliefs and paranormal experiences. The ASGS has been subjected to Rasch scaling and has been found to be reliable and unbiased (Lange & Thalbourne, 2002). Compared to other instruments commonly used for measuring paranormal beliefs (e.g. Gallagher, Kumar, & Pekala, 1994) the ASGS was deemed to have the best focus on the sorts of experiences that are relevant to this study.

Two approaches were taken to assessing the effect of framing. Of the various types of framing effects (c.f. Levin et al., 2002) both tests represent 'risky choice framing' however they are in very different contexts. Blais and Weber (2006) have identified five domains in which different levels of framing effects can be elicited, two of which are represented by the tests used in this study, financial risk and health/safety risk.

Framing Effect Susceptibility I (FES I) was measured using the financial decision-making task developed by De Martino et al. (2006). A version of the test was programmed in e-Prime⁴ based on the specifications in supplementary material accompanying their publication. Following De Martino et al. the sensitivity to the framing effect was characterised by a *rationality index* calculated following their method. In the original research this task proved engaging for the participants and the rationality index provided a robust correlation with amygdala activity. The 'De

⁴ The author wishes to thank Tristan Attenborough for his programming skills in this regard.

Martino' test was presented on a computer monitor and consisted of 144 trials in which the participant was 'given' an amount of money, but with the knowledge that he would not be able to keep it all. The frame was created by an instruction "Keep £..." or "Lose £..." and a choice between taking the 'sure option' or a gamble with the chances of winning or losing shown in a pie chart. The gambling odds were the same as those presented in the frame and the participant was to respond quickly choosing either the sure option (Keep/Lose) or the gamble option. To maintain focus and motivation in this task participants were offered a small 'bonus' of up to £5 on top of the base remuneration for participation for obtaining good monetary scores in this test. In addition to the Rationality Index, the test also yielded measures of risk-taking.

For purposes of concurrent validity, and to explore the effect of a different domain of risky framing, a second test of framing effect in the health domain was employed. Mahoney et. al's (Mahoney, Buboltz, Levin, Doverspike, & Svyantek, 2011) adaptation of an earlier health risky-choice framing test. Five problems concerning dangerous diseases (AIDS, lung cancer and leukaemia, along with the classic 'Asian Disease' in two variations) were presented with positive frames and negative frames. Two counterbalanced forms (3 positive, 2 negative and 2 positive, 3 negative) were administered to the participants at least a week apart). This yielded risky-choice scores for both positive and negative problems as well as an overall framing effect susceptibility score (FES II).

Two tests were used to assess participants' actual ability to utilize precognition (or anomalous intuition). This was to provide some variety in the task to better suit participant's tastes or perceived abilities.

One test of the participant's ability to use precognition (or anomalous intuition) was a share trading market simulator called the Intuitive Market Trader, designed by the author. This is a game-like test in which the participant selects different companies (fictitious, of course) and trades their shares in a futures trading scenario on a simulated market. The test has various selection windows and a main market performance graph display. The 'market' is controlled by a random number generator based on Marsaglia algorithm (Marsaglia & Zaman, 1987). The participant's goal in the game is to make as much money as possible. In addition to a monetary 'earnings' score the participant's performance generates a z-score.⁵

The second test of precognition was a Remote Viewing task in which the participant was asked to imagine ('remote view') a location that he or she would see in a short while. The test used was developed by May and colleagues (May, 2007b; May et al., 1990) as part of the US government's funded programme the use of extrasensory perception (or Anomalous Cognition in the government terminology) for intelligence gathering. This Remote Viewing computer test is a reliable test of AC with considerable development behind it and it can be presented to participants in a convincing and engaging manner to maximize personal involvement in the task. Participants spend a period of time (determined by the participant) attempting to develop visual images of the future location and then enter use a fuzzy set encoding form to identify the key elements that were present or not in their imagery. The program yields two measures of anomalous cognition; one derived from the fuzzy set matching score and the other from visual matching.

⁵ The Intuitive Market Trader was originally developed under Bial Bursary 46/98 and additional development and improvements were supported by a grant from the Perrott-Warrick Fund of Cambridge University.

Procedure

Participants initially contacted the research team by email, telephone, or in person. In addition to a verbal explanation, participants were given an information sheet with full details of the study, including the types of tasks involved and the likely time commitment. An informed consent form was also provided. When participants indicated they had completed the consent form they were given the link to the main questionnaire that was housed on SurveyMonkey™, a commercial survey hosting service. The participant also made arrangements to visit the laboratory at a time approximately one week after completing the online questionnaires.

The online questionnaires were the IPIP NEO, EBDM and ETA, Epstein's REI, Australian Sheep-Goat scale, and either Form A or Form B of the Mahoney framing tests (FES II).

In the laboratory visit, the participant was first given a paper version of the corresponding form of the FES II and was invited to discuss their reactions to the online questionnaire. The participant was then seated in a comfortable chair (with a lap tray and computer mouse) facing a computer monitor and was presented with the De Martino financial framing task (FES I). The participant was given the detailed instructions and allowed practice trials until comfortable before beginning the task proper. Each trial consisted of a succession of screen slides beginning with a fixation point, then an amount "You receive £50" (amounts varied), and then a slide presenting both the frame, e.g., "Lose £20" and a pie chart indicating the odds of winning or losing if they gambled. The task for the participant was to indicate as rapidly as possible whether they would take the sure option ("Lose" or "Keep") or take the gamble. This was done 144 times with a break in the middle. This task took between 30 and 45 minutes.

Following a break, the participant was then presented with the Intuitive Market Trader task. On-screen instructions were supplemented by the experimenter's explanation and the participant was free to do practice trials until comfortable with the task. This task took about 15 minutes, depending on the participant's own pace. Finally the participant took the remote viewing task. This final task was explained to the participant and when they were ready the task started. The participant spent some time quietly attempting to 'remote view' the future location. In accordance with the designer's protocol, the experimenter would declare 'target' and the participant was then to describe and sketch any imagery that was in mind. As this slowed, the experimenter declared 'break' and engaged in more-or-less distracting conversation. After an appropriate interval, the experimenter again declared 'target'. This was repeated two or more times until the participant indicated that nothing more was emerging. Then the computer monitor was turned on and the participant rated the content of his or her imagery on 0–100% slider scales representing the 24 fuzzy set categories that define the targets. Following that the participant viewed all five of the potential targets and ranked them in order of likeness to their remote viewing imagery. Finally the actual target was shown to the participant who could enlarge and inspect the pictured location. This test yielded a z-score for accuracy from the fuzzy set analysis and the participant's ranking score.

Following the remote viewing experiment participants were debriefed with ample time for discussion of their participation and answering any questions.

Ethical Approval

All aspects of this study were reviewed and approved by the school's research ethics committee before it commenced. All methods and procedures com-

plied with the ethical guidelines of the British Psychological Society and The University of Northampton's Research Ethics Guidelines.

RESULTS

Description of the data set

By the nature of the recruitment process, some participants completed the on-line questionnaire part of the study, but failed to come to the laboratory to complete the laboratory component of the study. One hundred fifty-five participants (56 males, 99 females) enrolled in the process and completed the on-line questionnaires. Of those, 125 (47 males, 78 females) also completed the laboratory experiments. For the purposes of examining the reliability of the various scales all available data are used, but for all other analyses only the 125 fully engaged participants are used.

In situ reliability analyses

Since the questionnaires were presented in an online format, which was probably different from the original presentations by the developers, the reliability was examined for each questionnaire with the data gathered in this study.

IPIP NEO-PI-R equivalent factors of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness produced Cronbach alpha reliability coefficients of .84, .85, .74, .70, and .79 respectively indicating a good level of reliability for the test when applied to our population.

The Emotional Business Decision-Making (EBDM) scale produced an alpha reliability coefficient of .80 and the Attending to Emotions (ATE) scale produced a coefficient alpha of .84.

The short-form REI produced four factors, Rational Ability, Rational Preference, Experiential Ability, and Experiential Preference, which produced alpha reliability coefficients of .72, .74, .78, and .76 respectively, indicating acceptable reliability. The individual factors are combined to make the factors of Rationality and Experientiality.

The Australian Sheep-Goat Scale (ASGS) produced an alpha reliability quotient of .88 for the full scale, and the personal experience of ESP subset of questions produced an alpha reliability coefficient of .72.

Basic descriptive statistics

For the 125 completed participants the age ranged between 18 and 67 with a median age of 24.

Descriptive statistics for the IPIP NEO-PI-R equivalent factors are given in Table 1. Inspection of the distributions indicated the data were normally distributed.

**Table 1. Descriptive statistics for IPIP NEO-PI-R
 Equivalents, N=125**

| | Mean | SD |
|-----------------------|-------|------|
| NEO Neuroticism | 27.72 | 7.60 |
| NEO Extraversion | 34.69 | 6.93 |
| NEO Openness | 38.08 | 5.91 |
| NEO Agreeableness | 37.94 | 5.20 |
| NEO Conscientiousness | 34.88 | 6.16 |

Descriptive statistics for Barchard's Emotional Business Decision Making (EBMD) and Attending to Emotions (ATE) are given in Table 2. Inspection of the distributions indicated the data were normally distributed.

**Table 2. Descriptive statistics for the Barchard Emotional
 Scales, N=125**

| | Mean | SD |
|------------------------------------|-------|------|
| Emotional Business Decision Making | 33.13 | 6.02 |
| Attending to Emotions | 39.18 | 6.38 |

Descriptive statistics for the REI components are presented in Table 3. The subfactors and overall main factors were normally distributed.

**Table 3. Descriptive statistics for Epstein's REI,
 N=125**

| | Mean | SD |
|----------------------|-------|------|
| Rational Ability | 21.34 | 3.96 |
| Rational Favor | 22.18 | 3.85 |
| Experiential Ability | 22.32 | 3.61 |
| Experiential Favor | 21.44 | 4.01 |
| Rationality | 43.51 | 6.54 |
| Experientiality | 43.76 | 7.12 |

Australian Sheep-Goat Scale (ASGS) descriptive statistics are presented in Table 4. The main scale and the ESP experiences subscale were normally distributed.

Table 4. Descriptive statistics for the ASGS, N=125

| | Mean | SD |
|----------------------|-------|------|
| ASGS | 18.58 | 7.59 |
| ASGS ESP experiences | 12.58 | 4.79 |

Framing manipulations

In keeping with Prospect Theory (Kahneman & Tversky, 1979) the framing effect in the De Martino test should manifest as participants being risk-averse (not gambling) in the gain frame and risk-seeking in the loss frame. That was demonstrated in this study with the participants choosing the sure option more frequently than the gamble option in the gain frame (45.6% against 50%, $t_{124} = 3.74$,

$p = .0003$) and the gamble option more frequently in the loss frame (54.4% against 50%, $t_{124} = 2.55$, $p = .012$). The difference between the frames is highly significant, $t_{124} = 7.05$, $p = 1.1 \times 10^{-10}$. This is shown in Figure 1. Additionally, all participants were very accurate in detecting 'catch trials' (trials with clearly unbalanced choices) indicating a good level of concentration on the task.

Similarly, in the Mahoney health-based framing test the expected result would be that participants would choose the risky option fewer times in the gain frame and more times in the loss frame. This was demonstrated in the results with the mean number of risky choices in the gain frame (2.2 against 2.5, $t_{115} = 1.78$, $p = .08$) being significantly lower than the risky choices in the loss frame (3.1 against 2.5, $t_{115} = 3.66$, $p = .0004$), $t_{115} = 6.81$, $p = 4.8 \times 10^{-10}$. This is shown in Figure 2.

These results demonstrate that both of the framing tests were performing as expected, inducing a framing effect in the same manner as the original studies. For each framing test a Rationality Index (RI) as a measure of sensitivity to the framing effect was calculated in the manner of the original studies. Surprisingly the two RIs showed no relationship with one another ($r = -.11$, $N = 116$, $p = .24$) suggesting that although each individual framing effect worked as expected, participants responded individually and differently to the tests.

Figure 1. Behavioural results in the De Martino financial framing effect test.

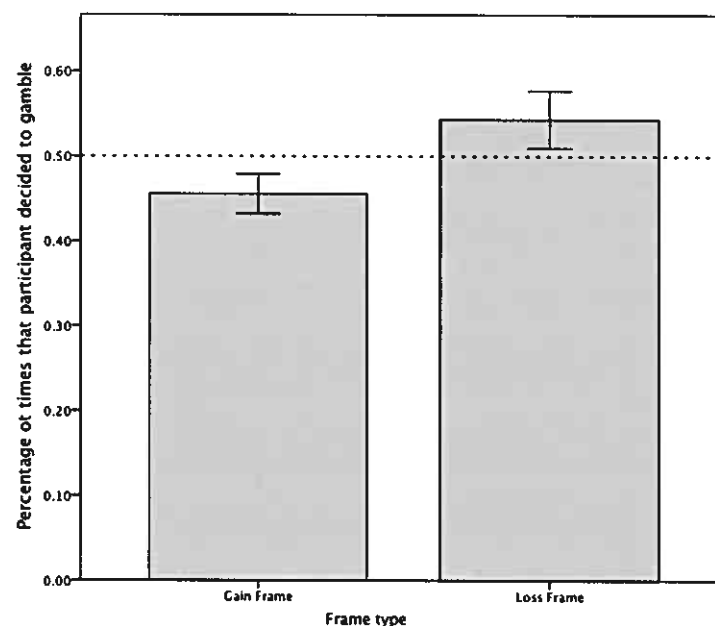
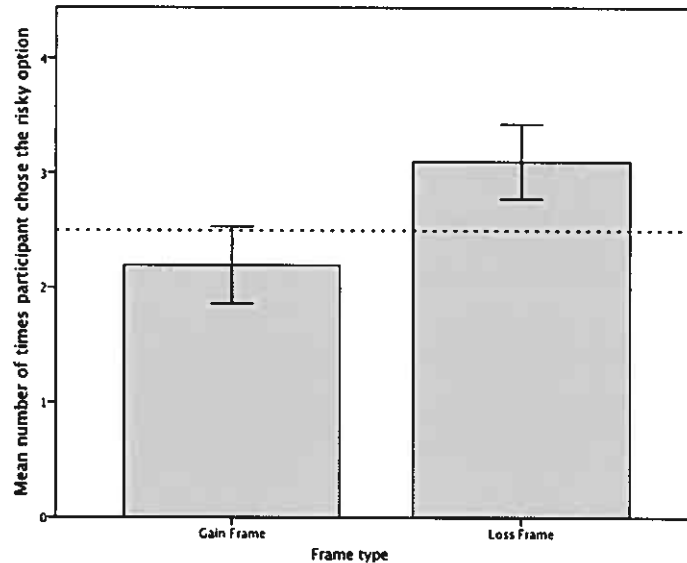


Figure 2. Risky choices in the Mahoney health risk framing task



Anomalous Intuition (precognition) results

The two tests of anomalous intuition were the Intuitive Market Trader and the Remote Viewing task. It was not expected that there would be overall significant scoring in either of the anomalous intuition tasks, but the measures would serve as the criterion measures for predictor variables.

The principle measure of anomalous intuition in the Intuitive Market Trader (IMT) is a z-score that is based on the number of binary market moves in the direction predicted by the participant (in the form of the participant's trading orders). Full details on scoring are in the original report (Richard S. Broughton & Bourgeois, 2001).

A total of 124 participants completed the IMT. The overall score was not significantly different from chance (mean z-score = -0.0238 , single-mean $t_{(123)} = -.256$, $p = .80$).

For the remote viewing task data were obtained from 113 participants (slightly fewer than for the IMT due to database problems). Successful identification of the target was measured by both a visual ranking by the participant (1=most closely like my imagery, 5=least like my imagery) and by a similar ranking based on a Figure of Merit (FoM) score derived from the participant's responses on a 24-item fuzzy set analysis. Full details are available in recent description of the technique (May, Marwha, & Chaganti, 2011). Thus lower scores indicate better success and the theoretical mean rank is 3. For both the visual ranking and the FoM the median rank was 3, and the mean rank were only slightly different (mean visual = 2.94, mean FoM = 3.14). These were not significantly different from chance.

Testing the hypotheses

The principal hypotheses in this study were primarily conjectural as there is no prior research that directly relates to the proposed relationships. It was proposed that the Framing Effect Susceptibility (FES) would be related to both the prevalence of ESP experiences, and, more speculatively, to performance in the tests of anomalous intuition. FES is measured in this study by the DeMartino Rationality Index and the Mahoney Rationality Index from the two framing studies. In each

case the RI indicates the degree to which the participant was not susceptible to the framing effect. By implication, this would mean that a lower RI was indicative of greater reliance on emotional input in the decision-making tasks of the two studies. With regard to paranormal experiences, this would lead to a prediction of a negative relationship with the Australian Sheep-Goat scores. In the case of the actual tests of anomalous intuition this would lead to a prediction of a negative relationship between the RI scores and the IMT z-score, and a positive relationship with the RV rating scores.

The DeMartino RI showed no significant relationship with the overall Australian S-G score or the ESP component of that, $r = .095$, $N = 125$, $p = .294$ and $r = .057$, $N = 125$, $p = .526$ respectively. The Mahoney RI revealed a weak but significant positive relationship with the overall S-G and the ESP component, $r = .193$, $N = 116$, $p = .038$ and $r = .189$, $N = 116$, $p = .043$. This is, unfortunately, in the opposite direction to what was predicted and suggests that people presenting as 'Sheep' and more inclined to believe in ESP actually behave more rationally in the decision-making of the Mahoney test.

Neither the DeMartino RI or the Mahoney RI showed any significant relationship with the measures of anomalous intuition, as shown in Table 5.

Table 5. Correlations between the RI measures and scores in the tests of Anomalous Intuition.

| | | IMT z-score | Visual rank | FoM rank |
|--------------|---------------------|-------------|-------------|----------|
| DeMartino RI | Correlation | .028 | .138 | .088 |
| | <i>P</i> (2-tailed) | .762 | .145 | .357 |
| | N | 123 | 113 | 113 |
| Mahoney RI | Correlation | .142 | -.045 | .056 |
| | <i>P</i> (2-tailed) | .131 | .647 | .573 |
| | N | 113 | 105 | 105 |

Note: Pearson's *r* for the IMT, Spearman's rho for the rank measures.

Given the absence of any moderate or strong relationships the quartile comparisons were not performed.

REI and psychic experiences: Professor Epstein's predictions fared better than the main predictions. The Experiential factor of the REI was significantly related to both the overall ASG and the ESP experiences subset of questions, while the Rationality factor was not, as shown in Table 6.

Table 6: REI correlations with Australian Sheep-Goat scale

| | | ASG overall | ASG ESP |
|-----------------|---------------------|-------------|---------|
| Experientiality | <i>r</i> | .335 | .364 |
| | <i>P</i> (2-tailed) | .00002 | .000003 |
| | N | 155 | 155 |
| Rationality | <i>r</i> | .023 | .077 |
| | <i>P</i> (2-tailed) | .776 | .340 |
| | N | 155 | 155 |

The Experientiality factor consists of two subfactors, Experiential Ability and Experiential Favour (preference). A stepwise multiple regression revealed that for both the ASG overall and the ASG ESP it was that Experiential Favor subfactor that was the principal (and only significant) contributor to the relationship, ($\beta = .313$, $p = .00007$ and $\beta = .350$, $p = .000008$, respectively), however the amount of variance explained was modest, 9% and 12% respectively.

REI and psychic ability: Experientiality was found to be significantly positively related to performance in the IMT. Rationality showed no significant relationships as shown in Table 7.

Table 7. Correlations between the REI measures and scores in the tests of Anomalous Intuition.

| | | IMT z-score | Visual rank | FoM rank |
|-----------------|---------------------|-------------|-------------|----------|
| Experientiality | Correlation | .243 | .025 | -.029 |
| | <i>P</i> (2-tailed) | .007 | .791 | .757 |
| | N | 124 | 113 | 113 |
| Rationality | Correlation | .059 | .063 | -.011 |
| | <i>P</i> (2-tailed) | .515 | .505 | .911 |
| | N | 124 | 113 | 113 |

Note: Pearson's *r* for the IMT, Spearman's rho for the rank measures.

In the case of psychic ability, a stepwise multiple regression confirmed that the Ability subfactor ($\beta = .268, p = .044$) was the principal contributor to the significant relationship when compared with Favour ($\beta = -.009, p = .945$), however this explained only 5.3% of the variance.

Exploratory analyses

Other predictors of Anomalous Intuition: In prior research the NEO-FFI factors have shown relationships with ESP in various forms and patterns. In our data, only the factor of Agreeableness was significantly related to the IMT scores, $r = -.213, N = 124, p = .018$. A stepwise multiple regression was performed on the five NEO factors with the IMT score as the criterion. A significant model emerged, $F(3,120) = 5.75$ explaining 10.4% of the variance. The factors of Agreeableness ($\beta = -.345, p = .0004$), Neuroticism ($\beta = -.340, p = .001$), and Extraversion ($\beta = -.193, p = .046$) were the significant predictors. The RV scores showed no relationship with any of the NEO-FFI factors.

DeMartino Rationality Index: In their relatively small sample, DeMartino and colleagues (De Martino et al., 2006) noted that there were large individual differences in their Rationality Index. Our larger study provided an opportunity to see if those individual differences could be related to some key personality variables. The five NEO factors, the EBDMS and the ATE scales, as well as The REI were examined. Only the Experiential scale showed any relationship, which was a weak positive correlation with the DeMartino RI, $r = .194, N = 125, p = .03$. Given that this is just one of a number of correlation tests this could be dismissed as mere chance variation, however it is worth noting that when the same battery of tests was tested against the Mahoney RI, again the Experiential scale was the only one to show a relationship, $r = .205, N = 116, p = .027$. Any relationship, if genuine, seems to explain a very small proportion of the variance.

Ancillary findings: A number of significant relationships between the NEO-FFI factors, the REI, and the emotional tasks suggest that further analyses might fruitfully contribute to the personality psychometric literature, however since those are not the focus of this project they will be reserved for possible additional reports.

DISCUSSION

The goal of this study was to investigate proposed functional links between the emotional system and the propensity to have anomalous experiences as well as, more speculatively, the ability to utilize anomalous information by using the fram-

ing effect as measurement proxy for emotional sensitivity. It was expected that emotional sensitivity (or reliance on input from the emotional system) as measured through the framing effect would be positively correlated with anomalous experiences and anomalous intuitive ability. Since the project was based on a speculative theoretical model that proposes that psychic or anomalous experiences may be mediated through the emotional system there were no direct experimental precursors to the novel approach of using the framing effect, so this study's originality made it a high-risk venture. Unfortunately the conclusion from this substantial study must be that we are unable to find any evidence to suggest that the framing effect in any way predicts anomalous sensitivities or abilities.

The framing effect is ubiquitous in psychology and two different implementations of the framing effect were selected for use in this study. The first test (DeMartino) involved gain or loss framing in a rapidly paced financial decision-making task. The second test (Mahoney) uses gain and loss framing in a disease/disaster context that had more moral overtones and was designed particularly for examining individual differences. The results clearly indicate that both framing tests performed as expected. Participants avoided risky decisions (gambles) when problems were framed positively or in terms of gain and favoured risky decisions when problems were framed negatively or in terms of loss.

The measure of psychic experience, the Australian Sheep-Goat Scale, and, in particular the ESP experiences component of that, was selected because of a well established track record for measuring a person's beliefs and experiences. These measures, as did all the psychometric measures, demonstrated good or acceptable reliability in the form that they were used in this study. There is, therefore, no reason to suspect inadequacies in the principle measures as a reason for the lack of any relationships emerging.

Selecting appropriate measures of psychic ability or anomalous intuition is a continuing challenge. For this project we selected two very different tests with the idea being that they might tap different skills or preferences. One was a fast-paced futures market share trading simulation and the other was a leisurely paced imagery-rich test. The Intuitive Market Trader simulation has produced useful data in prior research and generally gets good 'reviews' from the participants who typically report that it was fun or even enjoyable. The Remote Viewing imagery-based task has been used extensively with skilled remote viewing personnel of the US government's STARGATE project and has produced very good overall results when used with unselected populations (May, 2007a). This test has not, however, been used for examining individual differences as in this project and the fact that it amounts to a 'single-point' test of an individual's ability was identified as a possible weakness from the outset. Counterbalancing the weakness is that the test incorporates a 'judge-free' analysis method that is based around a figure-of-merit analysis that can capture 'degrees of accuracy' more effectively than a simple ranking method.

The fact that neither of the measures of psychic ability demonstrated overall extra-chance scoring is not, of itself, necessarily a reason for the failure to find the desired correlations. Since the early days of investigation of individual differences in extrasensory perception it was found that testing large samples of unselected participants often produced an overall chance distribution of ESP scores, yet moderate to strong correlations with other variables under investigation (Palmer, 1977). That the Experiential component of Epstein's REI demonstrated a 'predicted' relationship with the IMT scores suggests that at least the IMT may be in that position.

The positive relationship between the REI Experiential factor and the IMT conceptually replicates the findings of its original deployment where participants classified as "Intuitive" by the Personal Style Inventory (an intuitive/rational test instrument similar in objectives to the REI) obtained significantly above chance

scores in the IMT (Broughton & Bourgeois, 2001). The negative correlations with the NEO-FFI factors of Agreeableness and Neuroticism are interesting because although the NEO-FFI has been used with various tests of psychic ability, this represents the first use of the NEO-FFI with a more behavioural type test of psychic ability. The negative relationship between IMT scores and Neuroticism mirrors prior findings, however Agreeableness has not previously been noted as a correlate (Conscientiousness has). These relationships may be task-specific, however, and it is curious that the picture that emerges is that a participant who is successful in our simulated share-trading test tends to be confident but cold and lacking in empathy.

The strongest finding of the study is the very significant positive relationship between the REI Experientiality factor and the Australian Sheep-Goat Scale. A review of the questions of the respective scales confirms that there is no obvious overlap between the two instruments in content or form so this finding is not the result of similarly worded questions. The results of this study indicate that individuals who favour the experiential system are more likely to report psychic experiences and believe in psychic phenomena, which agrees with Professor Epstein's own evaluation. Given that the experiential system relies heavily on emotional drivers (Denes-Raj & Epstein, 1994) this does provide a degree of support for the basic thesis of this study, that the emotional system plays a role in psychic experiences. No other studies that we are aware of have used the REI in the context of psychic experiences and abilities and this may prove a fruitful instrument in future research.

An unexpected outcome was the lack of any personality correlates with either the DeMartino or Mahoney rationality indices of framing effect. The only individual differences variable to show a relationship with the framing effect was the Experiential factor of the REI. This is similar to the findings of Mahoney et al. (Mahoney et al., 2011) however in their study the relationship with the Experiential factor was observed only for certain items in the battery of framed questions. The framing effect has had a mixed record when seeking individual difference correlates such as personality variables (Mahoney et al., 2011) and the unexpected lack of any real relationship between the two framing tests raises the question as to just how reliable is the framing effect within participants. The data gathered in this study should permit an examination of alternate form reliability for the Mahoney test and split-half reliability for the DeMartino but these must be reserved for a subsequent report.

In summary, despite the promising arguments in favour, the framing effect failed to stand up as a useful tool in predicting susceptibility to psychic experiences or as a correlate of psychic ability. The Experiential factor of the REI did emerge as a correlate of reported psychic experiences and beliefs, which lends support to the idea that input from the emotional system features in psychic experiences and provides a useful new instrument for investigating psychic ability.

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