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**Attention: Daniel Bessa**

**FINAL SCIENTIFIC REPORT TO THE BIAL FOUNDATION**

**GRANT No. 340/14**

**PROJECT: “A QUESTION OF BELIEF: AN ANALYSIS OF ITEM CONTENT IN  
PARANORMAL BELIEF QUESTIONNAIRES”**

**PROJECT LEADER: DR. LANCE STORM**

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The Bial Foundation financially supported me, Dr. Lance Storm, as principal investigator over the course of the quantitative study (Part 1 of the two-part study)—March 1, 2015 to October 31, 2015. The School of Psychology, University of Adelaide, provided amenities for the conduct of this part of the research. The laboratory work involved in Part 1 was completed, and the first paper was written by myself and my co-researchers Ken Drinkwater and Anthony Jinks, and was submitted to the *Journal of Scientific Exploration*. The paper is titled: “A Question of Belief: I. An Analysis of Item Content in Paranormal Belief Questionnaires”. Reviews of the paper were received January 12, 2017, and I am currently working on a revised draft.

The Bial Foundation financially supported Ken Drinkwater (Manchester, UK) over the course of the qualitative study (Part 2)—November 1, 2015 to October 31, 2016. The School of Psychology, Faculty of Health, Psychology and Social Care, University of Manchester (UK), provided amenities for the conduct of this part of the research. This paper will also be submitted to the *Journal of Scientific Exploration*. The paper is titled: “A Question of Belief: II. The Differences in Gambling Approaches between Informed Believers and Quasi-Believers”.

The final report includes:

1. A nine-page report of the project (Parts 1 & 2), describing aims, methods, and findings (these reports are reduced versions of the original papers submitted to the *Journal of Scientific Exploration*)—pp. 2-10.
2. A table highlighting the differences between expected and achieved output indicators and publications (p. 11). Original submissions (PDF) have been uploaded to Bial’s website. Both submissions duly acknowledge the Bial Foundation’s support.
3. A template with information to be posted at the Bial Foundation web page concerning the final results of the project (p. 12).

## PART I

### A Question of Belief: I. An Analysis of Item Content in Paranormal Belief Questionnaires

Lance Storm, Ken Drinkwater, and Anthony L. Jinks

#### Aims

The purpose of Part 1 of the study was to examine the degree to which paranormal believers, who profess ‘strong’ belief in the popular expression of a topic known as the *primary item* (e.g., *There is such a thing as extrasensory perception*), disagree with related items and/or the putative ‘cause’ of the topic, known as *secondary items* (e.g., *Some people have an unexplained ability to predict the future*).

It was theorised that scoring differences between primary and secondary items might indicate certain kinds of paranormal believer, which might then allow us to conduct deeper analyses of paranormal belief and its putative relationships with deficits and dysfunctions (specifically, reality testing deficits and depression, respectively).

Some PB research fails to address the possibility that some paranormal believers *per se* might ‘believe’ in concepts they do not actually understand—circumstances that do not correspond to *informed beliefs*, or the type of beliefs PB researchers believe they are measuring. Rather, these believers may hold *quasi-beliefs*—semi-propositional representations of the world superficially believed to be true prior to any truth evaluation (Recanati, 1997). Individuals may often hold quasi-beliefs indefinitely, never migrating them to the status of an informed belief, casually expressing agreement with a given proposition in such a way that their answer is indistinguishable from another individual who is better informed (Jinks, 2012a). Without a clearer understanding of the nature and diversity of PB (i.e., the qualitative, not just quantitative, degrees to which these beliefs are held and maintained), the proposition that PB indicates deficits and/or dysfunctions may likely be unwarranted, or at the very least, may not apply to some *subsets* of paranormal believers.

#### Method

##### *Participants*

Initially, a ‘ballot box’ and invitation letters were placed in various locations on the University of Adelaide campus. Participants dropped contact slips into the box, and these were collected on a daily basis by Dr. Storm. Participants were contacted via SMS so that a suitable day and time for testing could be arranged. First-Year Psychology students, who signed-up online, were also tested and they received credit for participation as part of their curriculum program.

Other recruitment techniques were adopted. Ultimately, the initial sample ( $N = 387$ ) was comprised of: (i) First-year psychology students from the School of Psychology, University of Adelaide (Adelaide, South Australia), who received credit for physical (laboratory) participation in School experimental or questionnaire studies ( $n = 71$ ); (ii) students and staff from various disciplines from the University of Adelaide, including non-credited School of Psychology students ( $n = 36$ ); and (iii) online respondents ( $n = 280$ ) who were informed of the study by word of mouth or via various websites, including the Australian Institute of Parapsychological Research, Inc. (AIPR), a number of Facebook pages, and APD Performance Pty Ltd, a market research service. All of the student-participants in (i) above, and most of the participants in (ii) above, completed the questionnaires in Lance Storm’s (L.S.) laboratory. The research was approved by the School of Psychology Ethics Sub-Committee.

##### *Measures*

Both the ‘pencil-and-paper’ and the ‘online’ versions consisted of 13 test instruments: (1) *Anomalous Experiences Inventory* (AEI; Gallagher, Kumar, & Pekala, 1994); (2) *Australian Sheep-Goat Scale* (Thalbourne, 1995, 2010); (3) *Basic Limiting Principles Questionnaire* (Thalbourne, 2010); (4) *Belief in the Paranormal Scale* (Jones, Russell, & Nickel, 1977); (5) *Extraordinary Beliefs Inventory* (EBI; Otis & Alcock, 1982); (6) *Jinks’ Belief Questionnaire* (Jinks, 2012a); (7) *Magical Ideation Scale* (Eckblad & Chapman, 1983); (8) *Survey of Scientifically Unaccepted Beliefs* (Irwin & Marks, 2013); (9) *Paranormal Short Inventory* (Randall, 1977); (10) *Paranormal Belief Scale-Revised* (Tobacyk, 2004); (11) *Reality*

Testing subscale of the *Inventory of Personality Organization* (Lenzenweger et al., 2001); (12) *Beck Depression Inventory II* (Beck, Steer, & Brown, 1996); (13) *Conformity Scale* (Mehrabian & Stefl, 1995).

### *Procedure*

The over-arching aim of the first part of the present study was to develop and administer a question-set of PB items drawn from extant PB measures to determine whether participants who self-report strong belief in primary items maintain this level of belief when responding to secondary items. We constructed a paranormal belief instrument (the so-called Paranormal Belief Informedness Scale) by which we endeavoured to identify subsets of believers who may or may not exhibit varying levels of reality-testing deficits and depression.

We (i) determined the primary and secondary items within standard scales; (ii) ran a Factor Analysis, the highest factor loadings of which were used to construct a Paranormal Belief Informedness Scale (PBIS) comprised of 10 primary items, and 10 secondary items from those standard scales; (iii) identified subsets of believers in the sample: (a) ‘primary believers’ who responded at any level of agreement to *all* 10 primary belief items of the PBIS; (b) ‘primary non-believers’ who responded at any level of disagreement to *all* 10 primary belief items of the PBIS, and (c) ‘mixed believers’; a heterogeneous group who *agreed* or *disagreed* with any number of the 10 primary items in the PBIS, and (d) other smaller groups (informed believers and quasi-believers); (iv) compared response rates on primary and secondary items; and (v) differentiated mean-scoring and correlational differences between various believer types on reality testing deficits and depression.

## **Hypotheses and Results**

**Hypothesis 1.** Mean scores for primary belief items, by psi categories extrasensory perception (ESP), psychokinesis (PK) and life after death (LAD), are higher than mean scores for secondary belief items.

### *Primary Non-believers, Mixed Believers, and Primary Believers*

*Repeated-Measures ANOVA test on items  $\times$  believer group (ESP, PK, and LAD).* Our IV was believer group. The DV is the ‘excluded’ set of items. For ESP and LAD, results were significant, and in the directions expected for two main effects (Items and Believers), and a significant interaction effect. For PK, results were significant, but only in the direction expected for one main effect (Believers), whereas the Items effect was not in the direction expected. There was a significant interaction effect in the direction expected.

### *Informed believers vs. quasi-believers*

We formed suitably matched pairs of lesser numbers of primary and secondary items from the PBIS using the factor loadings for PBIS items to guide us. For ESP, for IVs, we formed one informed-believer group ( $n = 117$ ), and a corresponding quasi-believer group ( $n = 22$ ) using a primary item and a secondary item (ebi10: “*Psychics possess a mysterious ability to know things about a person’s past and future*”, and ebi23: “*Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations, etc.*”, respectively), and another informed-believer group ( $n = 137$ ), and a corresponding quasi-believer group ( $n = 22$ ) using another primary item and another secondary item (ebi19: “*There is such a thing as extrasensory perception*”, and pbs26: “*Some people have an unexplained ability to predict the future*”, respectively). The DV is the same set of ‘excluded’ items. The first and second Repeated-Measures ANOVA tests resulted in significant Items effects in the directions expected, and significant Believer effects in the direction expected, but the interaction effects were not significant.

For PK, we formed an informed-believer group ( $n = 64$ ), and a corresponding quasi-believer group ( $n = 19$ ) using three items—two primary items (ebi1: “*There is a real phenomenon known as psychokinesis (the ability to move objects by the power of the mind)*”, + blpq24: “*I believe that psychic healing occurs*”), and one secondary item (pbs16: “*A person’s thoughts can influence the movement of a physical object*”). The Repeated-Measures ANOVA was similar in outcome to the PK test above—a significant Items effect though not in the direction hypothesized, a significant Believer effect in the direction expected, but the interaction effect did not reach significance.

Finally, for LAD, we formed an informed-believer group ( $n = 98$ ), and a corresponding quasi-believer group ( $n = 21$ ), using a primary item (bps8: “*Through psychic individuals it is possible to communicate with the dead*”) and a secondary item (ebi12: “*There is such a thing as astral projection (where the body remains behind while the spirit travels)*”). The Repeated-Measures ANOVA test resulted in a significant Items effect

in the direction expected, a significant Believer effect in the direction expected, and a significant interaction effect.

**Hypothesis 2.** There is a relationship between paranormal belief and (a) reality testing deficits (IPO-RT), and (b) depression (BDI-II), both between and within believer groups (i.e., full sample, primary non-believers, mixed believers, primary believers).

(a) A Jonckheere-Terpstra test for ordered alternatives showed that there was a statistically significant trend of higher median RT scores with higher levels of PB (from primary non-believer, mixed believer, to primary believer). A significant Kendall's tau-b showed a weak-to-moderate effect (RT tended to increase with PB group). We then ran nine sets of tests for each of five believer groups (primary non-believers, mixed believers, and primary believers, informed believers, and quasi-believers). All nine of nine correlations were significant for the full sample, across psi and item category, but the trend tended to dissolve across believer groups. Bonferroni correction did not alter the outcomes. The hypothesis of relationships between paranormal belief and reality testing deficits was supported for the full sample across psi categories and item types, but not generally across believer types. In other words, significant relationships could barely be demonstrated for precisely defined believer types. We ruled out the arguments from low-*n* and reduced variance.

(b) A Jonckheere-Terpstra test for ordered alternatives showed that the trend of higher median BDI-II scores with lower levels of PB was not significant. Kendall's tau-b shows no effect (BDI-II is effectively constant across groups). Non-significant outcomes evident for other believer types.

A discriminant functions analysis was conducted to find a model that might predict membership in the three groups based on reality testing deficits and depression. The assumption of equal group variance was met, as Box's *M* test was not significant ( $\alpha \leq .001$ ),  $F(6,179044.94) = 2.48$ ,  $p = .021$ . The discriminant functions 1 through 2 were significant, as indicated by a Wilks' Lambda of 0.80,  $p < .001$ . As there were three groups, two functions were extracted. The first function, with an Eigenvalue of 0.25, accounted for 100% of the explained variance between groups. Function 2 had an Eigenvalue of zero, explaining 0% of variance.

Membership of Mixed Believers was predicted with the greatest accuracy (80.0%), followed by primary non-believers (53.9%). Primary believers were predicted with least accuracy (2.1%). Note that 60% of the grouped cases were correctly classified leaving 40% unclassified under this model. To be successful, the model should predict actual classifications, but it fails for primary believers, which means the predictors do not apply for primary believers.

## Discussion

As hypothesized, we found primary/secondary differences for ESP and LAD in the directions hypothesized, and although we found a primary/secondary difference for PK, it was not in the direction hypothesized. We note that levels of PB did increase across believer types. We also found that designation of PB items as either primary or secondary aided us in identifying two types of paranormal believer—we have shown that there is evidence that respondents in our sample can hold *quasi-beliefs* (semi-propositional representations of the world superficially believed to be true prior to any truth evaluation), and they can hold *informed beliefs* (which indicate greater knowledge of the topic). For ESP, we showed that secondary items were endorsed significantly less often than primary items thus indicating the prevalence of quasi-beliefs amongst quasi-believers compared to informed believers. The difference between the two types of believer (on ebi10 vs. ebi23) may lie in the failure of quasi-believers to extend their belief about "*psychics ability*" to specific 'predictions'. Also for ESP, we showed that secondary items were endorsed significantly less often than primary items thus indicating the prevalence of quasi-beliefs amongst quasi-believers. The difference between the two types of believer (ebi19 vs. pbs26) would lie in the failure of quasi-believers to understand that the concept of *extrasensory perception* embraces the long-held understanding that ESP includes an "*unexplained ability to predict the future*" (amongst other abilities). For life after death, we showed that secondary items were endorsed significantly less often than primary items thus indicating the prevalence of quasi-beliefs amongst quasi-believers. The difference between the two types of believer (bps8 vs. ebi12) would seem to lie in the assumption that quasi-believers tend not equate "*the dead*" with the "*spirit*".

It would appear that quasi-belief implies no deep understanding. Responses are either fashioned during the test session itself, or they are outwardly believed in, and have existed as part of a belief structure for a very

long period of time. Thus, we cannot assume with certainty that beliefs quantified by items in a paranormal questionnaire are stable constructs, or are well-formed and logically consistent, yet these are the very assumptions that are often being made by researchers.

Also, the tendency for the number of significant PB/IPO-RT correlations to decrease across believer types suggested some kind of ceiling effect, either in paranormal belief, or reality testing deficits, or both. We found no evidence of significant correlations of PB with depression (as measured on the BDI-II). We suggest that such relationships are not necessarily linear but may only be monotonic, and researchers need to give attention to possible ‘ceiling effects’ rather than assume that a significant outcome implies a trend across all levels of paranormal belief. Some paranormal beliefs may not be mere expressions of a cultural trend, or fanciful or popular notions that embody contradictions evident in, for example, scoring differences between primary and secondary items. It may be the case that an informed, or sufficiently informed, albeit small subset of paranormal believers have a genuine understanding of the phenomena not entirely (if at all) governed or brought about by some number of deficits, dysfunctions, or disorders. Conventional procedures do not identify this type, possibly because the designers of such procedures and corresponding measures do not concede its likelihood. Our findings suggest that if researchers continue to make generalizations from samples and measures that are clearly heterogeneous, gains will be slow in our understanding of paranormal belief.

In Part 2, it is planned that the sample will be comprised of gamblers found through various gambling establishments in the Manchester area, UK ( $N = 10$ ). Five gambling categories will be covered: horses, bingo, slots, cards, sports-betting. For the interviews, for each of the five gambling categories, there will be two interviewees—one participant will be ‘high-scoring’ on the so-called Paranormal Belief Informed Scale (PBIS), and one will be ‘low-scoring’ on the PBIS. We expect that this quantitative identification of two types of gamblers (with clear paranormal belief distinctions) will aid us in finding qualitative differences between the two types that go beyond paranormal belief. It is hypothesized that the gambler’s fallacy, the level of gambling experience, luck involved in gambling, specific gambling strategies, play against opponents, and levels of wager (high- or low-risk), (a) all relate to level of paranormal belief; and (b) vary according to degree of ‘informedness’ in paranormal believers (measured on the PBIS).

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## PART II

### A Question of Belief: II. The Differences in Gambling Approaches between Informed Believers and Quasi-Believers

Ken Drinkwater, Lance Storm, and Anthony L. Jinks

#### Aims

The purpose of Part 2 of the study is to explore gambling attitudes and behaviours in relation to the paranormal beliefs held by gamblers (Morris & Griffiths, 2013). In particular, we argue that cognitive and behavioural differences exist between two types of gamblers—both are paranormal believers, but one type is more informed than the other—this latter type tend to hold *quasi-beliefs* (Jinks, 2012a; Storm, Drinkwater & Jinks, submitted). Purely for the sake of convenience, we will refer to the two types as ‘informed believers’ and ‘quasi-believers’, respectively.

A qualitative approach was taken in the present study involving semi-structured interviews with gamblers (Drinkwater, Dagnall, & Bate, 2013) in order to discover the degree to which knowledge and understanding of psi concepts influence gambling styles. We hypothesized that level of experience, luck involved, and specific gamblers’ strategies, all relate to level of paranormal belief, and each of these varies according to degree of ‘informedness’ about paranormal issues. We evaluated paranormal belief using the PBIS, and classified interviewees as informed believers or quasi-believers (at least in relative terms).

#### Method

##### *Participants*

Selection was therefore made on the basis of gambling experience from 85 respondents from Manchester (UK) who completed the PBIS measure (Storm et al., submitted), and agreed to participate in a follow-up interview. A final six (three males and three females) were selected, based on full-scale scores and subscale scores on the PBIS (see *Procedures* for details). Following the transcription process, respondents’ names were changed to pseudonyms to assure anonymity. Ages ranged from 23 to 53 years for the six interviewees (Mean Age = 35 years; *SD* = 13 years).

##### *The Interviewer*

First author and lead investigator, K.D. (a 48-year-old man), conducted all the interviews. He has an interest in probabilistic reasoning, gambling behaviours and paranormal beliefs.

##### *Adjudication of Transcripts*

Several transcripts were assigned to each of four independent adjudicators in order to reduce bias. A fifth adjudicator (Dr. Jennifer Watson) was assigned to compile sub-themes and major themes for all the ten transcripts and assist K.D. in compiling a suitable list of emergent/major themes for analysis. Interviewee accounts encompassed a variety of subjective gambling and paranormal experiences. Random assignment of completed interviews allowed impartial adjudication of the transcripts.

##### *Materials*

*Interview schedule.* Consistent with previous research (Drinkwater et al., 2013) an interview schedule was prepared. The schedule contained a list of the main areas/topics to be covered, including an outline of the purpose of the research, its aims, and approximate duration (an explanation of the recording equipment was included), the procedure (including explanations about confidentiality, discontinuance, and withdrawal from the study, and other ethics details). Interviewee demographics were recorded.

*Paranormal Belief Informedness Scale (PBIS; Storm, Drinkwater, & Jinks, submitted).* The PBIS is a 24-item self-report measure of informedness about beliefs and alleged experience of the paranormal. Items were drawn from five extant belief scales: Two items from the Basic Limiting Principles Questionnaire (Thalbourne, 2010); eight items from the *Extraordinary Beliefs Inventory* (Otis & Alcock, 1982); three items from the *Paranormal Belief Scale-Revised* (Tobacyk, 2004); four items from the *Belief in the Paranormal*

*Scale* (Jones, Russell, & Nickel, 1977); and three items from the *Paranormal Short Inventory* (Randall, 1977). There are 10 primary items, and 10 secondary items, scores of which can be used to identify three major paranormal belief types: ‘primary believers’ (who believe in *all* 10 primary items), ‘primary non-believers’ (who believe in none of the 10 primary items), and ‘mixed believers’ (who believe in some primary items). Primary believers and mixed believers are informed to varying degrees insofar as both also believe in some number of secondary items (quasi-believers endorse few or no secondary items). Example of a primary item: “There is such a thing as *extrasensory perception* (ESP).” Example of a secondary item: “*Some people have an unexplained ability to predict the future.*” Item responses are made on Likert scales. There are four control items to determine the extent of participant cooperation (these items are not used in full-scale and subscale scores). Raw min. = 20; raw max. = 125. Storm et al. reported a Cronbach  $\alpha = 0.96$  for the full scale.

### *Procedure*

All interviews (conducted from June 2016 to the end of July 2016) were semi-structured, participant-led, using an empathic approach. At the commencement of each interview, interviewees read an information sheet, and listened to the brief outline of the research before signing the consent form to express their approval that interviews were to be recorded. It was explained that data (interview recordings and transcripts) would be anonymised, transcribed, reproduced in part in research publications, and stored securely.

Prior to analysis, fully transcribed conversations produced by a professional transcriber included full interviewer speech, all spoken words and speech sounds, together with any notable events that occurred during each interview. These data would then be analysed using thematic network analysis (see Attride-Stirling, 2001). (For brevity, most relevant transcriptions are not presented here.)

## **Discussion**

One of the major aims of the present study was to use the semi-structured interview technique to garner material that could be analysed so that gambling attitudes and behaviours of two groups (informed paranormal believers and quasi-believers) could be compared. It was proposed that informed paranormal believers do not conform to the general patterns typified by gamblers—that is, they do not necessarily apply ineffectual gambling strategies, or commit the gambler’s fallacy.

The newly-constructed measure of paranormal belief, the Paranormal Belief Informedness Scale (PBIS; Storm et al., submitted) was devised for this study. PBIS subscale scores were used to form the two groups. We were particularly interested in whether certain kinds of gambling experiences could be determined from paranormal belief (see Lange & Houran, 2001; Drinkwater et al., 2013, Drinkwater et al., submitted).

We identified four interviewees whom we classified as informed believers (Adam, Gary, Martina, and Penny), and two interviewees whom we classified as quasi-believers (Melissa and Richard). Although, they had much in common, we were able to show that there are also some marked differences in perceptions and understandings about gambling (i.e., opinions, attitudes) and, accordingly, differences in *how* the two types play (i.e., reason, behave) when they gamble.

Thematic analysis from the six interview transcripts revealed a range of meaningful and coherent themes. Controlling the basic and organising themes, are the five original gambling themes—Bingo, Cards, Horses, Slot Machines, and Sports Betting—used as major categorising themes. Thirty-nine basic themes emerged comprising a range of beliefs about gambling, social aspects, playing the odds, winning vs. losing, perception of the player being in control, strategies, etc. In turn, seven organising themes emerged: Life Histories, Emotions, Control, Motivations, Human Interactions, Morals, and Paranormal Belief.

Questions asked of the interviewees were framed around the following topics and served as prompts to gather information and guide the process: (1) Level of gambling experience; (2) Gambling strategies (including decisions based on luck); (3) Gambler’s fallacy; and (4) Paranormal belief.

### *1. Level of Gambling Experience*

Three interviewees (Gary, Melissa, and Richard) regarded themselves as “frequent” gamblers, or played from an early age, and were quite “familiar” with various types of gambling, though none regarded

themselves as professional. The other three (Adam, Martina, and Penny) expressly stated that they were not really or “not actually” gamblers. There appeared to be unpredictability and uncertainty regarding what constitutes gambling. Specific types of gambling were invariably not thought of as gambling (e.g., bingo and slot machines), whilst card games (e.g., poker, blackjack in casinos), betting on horses, and sports betting (online) were thought of as traditional forms of gambling.

Melissa, Adam, and Martina appear to contradict themselves; specifically when explaining their lack of interest in gambling, or not gambling at all. For example, Adam proposed that he is “not actually much of a gambler ... I do play cards.”

Some respondents employed strategies (discussed below), indicating that they had learned and understood the rules of the games they play—as Gary stated: “you have to know what to do”. This led to sharing of strategies with family and friends, though they had (and no doubt passed on) certain ill-informed beliefs about the games. They also described how play can be controlled to effect a win, or at least lose less often. These themes emerged as factors that seemed to influence all the players.

## 2. *Gambling Strategies*

The belief that strategies (such as superstitious behaviour, sustained play to recoup losses, doubling up, etc.) can be applied successfully (i.e., to effect a win, or reduce losses), in cases where those strategies have no bearing in fact, highlights the misperceptions of typical gamblers, especially the quasi-believers (QB). The fact that apparently miniscule amounts of money are placed in machines by Richard (QB) suggests he has a clear amount he is willing to risk simply because that tactic serves to avoid guilt feelings, angst, and/or qualms about losses. A strategy of sorts, the practice of low-stakes gambling shows an admission to the fact that losing is a foregone conclusion, made easier to bear because the stakes are low.

Melissa (UB) referred to repeated placement of money/chips on red (during roulette) in order to double and recoup her losses. Some players have strategies related to the size of the wager. Melissa (QB) for instance appears to wager about £100 as a maximum (albeit considerable) bet. She advocates an ‘algorithmic’ system for winning (see next section), which includes doubling up while she counts cards and spins of the roulette wheel. In this context, the levels of wager are also important in terms of the types of gambling and game played. For instance, Melissa is prepared to make her wagers dependent upon the current state of a game or a race. She appears much more flexible than Gary, Adam, and Richard.

Informed believers (IB) appear to be more deliberate and controlled than their lesser informed cohorts. Penny (IB) has no strategies *per se*, and she only ever dabbled (“I did put money on that horse”, and “I had a go at roulette”): “if you look at all those numbers, and the chances of you actually going to come out as a winner, well it’s just not going to happen, you’re going to lose it in the end”. Martina (IB) accepted the reality of “pure chance”, and spends no more than £20 at Bingo, again revealing a more measured approach, suggesting that gambling can be controlled, but only in terms of cash outlay. Adam (IB) recognises, in Poker, the tactic of “bluff and counter bluff” employed by professional card players to win, not with chance on their side, but purely by caution, misdirection, and deception. However, ‘problem gambling’ *per se* has arguably occurred for at least one informed believer: Gary (IB), who has been “on the lucky end once or twice”, lost nearly £3000, and considered a strategy for making increased bets in order to recoup his losses. He also spoke naïvely of thinking he “could control the machine” in the amusement arcade. He did, however, refer to success as “a matter of it being a skill”, and demonstrated a more rational approach in his card playing by giving heed to “controlled probability”.

We may also consider the use of lucky numbers as a strategy of sorts, though equally bound to fail, but nevertheless commonly used by quasi-believers. Richard (QB) refers to the number 24 being his “lucky number”. He selects specific horses/races and jockeys based on names that directly linked to this number. He also makes reference to a “lucky win” on the slot machines, and often does place bets on the number 24. Melissa (QB) professes that she doesn’t believe in lucky numbers (she talks about there not being a pattern in lottery numbers), and yet number 16 is her lucky number, and she refers to specific ‘patterns’ or consistencies in the number coming up in her life.

Informed believers also make reference to luck in its various forms. Martina (IB) spoke of how she feels “unlucky”, whereas her sister is “lucky”, but she ultimately gave up using lucky numbers because she “didn’t win anything”. Adam (IB) thought the idea of luck works as a foil to the reality of “pure probability”, but he did not describe how this view is applied in practical terms to how he gambles. Interestingly, and demonstrating a somewhat superstitious bent, Gary (IB) thought the slot-machine play and outcome could be



altered by “pressing the button” quickly. Penny (IB) thought wearing, say, a certain “pair of socks” might bring her luck (but for her, luck was only a euphemism for a “positive mental attitude”).

Notwithstanding the idiosyncratic views of some informed believers, their gambling decisions were never *consistently* influenced by notions of luck, if at all. More generally, strategies seem to be favoured more by quasi-believers.

### *3. Gambler’s Fallacy*

The gambler’s fallacy is considered a statistical illusion (Ayton & Fisher, 2004; Clotfelter & Cook, 1993), characterized by an individual’s perception of a non-autocorrelated random sequence, or simply a positive recency effect in serial fluctuations in human performance (Ayton & Fisher, 2004; Croson & Sundali, 2005; Rabin & Vayanos, 2009; Sundali & Croson, 2006). Thus, while the gambler’s fallacy is clearly a reinforced belief based on previous wins, which in turn will seem to increase the probability of winning at a later date, losing too seems to promote the gambler’s fallacy, as gamblers simple revert to the belief that it will be their turn next, and a win could just be around the corner (Sharpe & Tarrier, 1993).

There was a marked variation across respondents in applying the gambler’s fallacy. Quasi-believers, Richard and Melissa, appeared to commit the gambler’s fallacy. Melissa (QB) outlined specific beliefs about particular strategies, which appear reliable to her. So-called algorithms—“play odd or even or black and red”; ‘counting’ cards and numbers, and doubling up an original stake/amount—are all examples of the gambler’s fallacy (Croson & Sundali, 2005; Sharpe & Tarrier, 1993; Sundali & Croson, 2006).

Informed believers were less likely to make the gambler’s fallacy: Gary (IB) thought that belief in winning might influence the pay out on slot machines, but he did not have a “strong conviction” in such a belief (see next section on paranormal belief). Penny (IB) thought “it’s just probability”, as did Adam (IB). Although Martina (IB) thought ‘signs’ might help, her attitude does not outrightly suggest she was a victim of the gambler’s fallacy.

### *4. Paranormal Belief*

In this section, we review statements about paranormal belief by informed and quasi-believers, and determine differences in the perceptions (misconceived or otherwise) about gambling insofar as they relate to paranormal ideation. All interviewees effectively conceded having paranormal beliefs and/or experiences. Adam, Martina, Penny, and Richard all believe in luck and/or lucky numbers; Gary expressed a “belief in winning” that could influence slot pay-outs; Melissa had a precognition of the exact time she would give birth; Martina believes in astrology; Penny “grew up in a haunted house”; and Richard believes in UFOs. However, slight discrepancies in paranormal belief are detectible between most informed believers and quasi-believers:

First, informed believers—they rarely make the kinds of concessions quasi-believers make. For example, the only reason Adam believes in luck is because it makes the game more enjoyable, otherwise “it’s just pure probability” (i.e., uninteresting). However, Gary’s, Martina’s, and Penny’s convictions are deep-seated and quite strong. Perhaps, with that one exception (i.e., Adam), informed believers (the highest scoring on paranormal belief, who therefore have the strongest convictions) should be the most likely to deploy ineffectual gambling strategies and make the gambler’s fallacy most often. But quite the opposite is indicated (as shown in the two previous sections). Indeed, the quasi-believers (the lowest scoring on paranormal belief, who therefore have the weakest belief) demonstrate just those cognitive deficits of which paranormal believers are generally accused.

Second, quasi-believers—they tend to qualify their statements more often, almost apologetically, and explained that they had no real experience of paranormal incidents or phenomena; nor did they endorse such beliefs. Richard’s belief in the existence of life (aliens) on other planets is certainly a rational thought based on scientific consensus. Melissa actually believes she has had a paranormal experience, but she also says she is not a ‘follower’, nor a believer.

### *Summary*

The present research aimed to find differences between informed believers and quasi-believers in their gambling attitudes and behaviours. At this early stage, it appears that quasi-believers seem more likely than informed believers to commit the gambler’s fallacy and employ ineffectual gambling strategies—or at the

very least, the statements made by our interviewees suggest these conclusions. We would argue that these findings, if genuine, conflict with the assumptions made or implied in quantitative studies that paranormal believers tend to have cognitive deficits and dysfunctions (for a review, see Irwin, 2009). Should these differences be replicated, a clearer more-informed understanding about paranormal belief may be effected.

As we said in our previous paper, it may be the case that an informed, or sufficiently informed, albeit small subset of paranormal believers have a genuine understanding of the phenomena not entirely (if at all) governed or brought about by some number of deficits, dysfunctions, or disorders. Conventional procedures do not identify this type, possibly because the designers do not concede its likelihood. As Jinks (2012a) has said “. . . items in paranormal and anomalous belief questionnaires are not necessarily homogenous devices successfully extracting ‘informed’ beliefs possessing a rational basis” (p. 148). Our findings suggest that if researchers continue to make generalizations from samples and measures that are clearly heterogeneous, gains will be slow in our understanding of paranormal belief.

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