3. Summary of accomplishments

During this grant period two theory-building papers were published related to the core research topics of this bursary, namely paranormal belief, intuitive thinking and transliminality. These works substantiate with quantitative and qualitative data that these perceptual-personality variables, which can be psychometrically measured, are psi-conducive and are influenced by context or situational effects. These context effects can seemingly be manipulated to enhance or suppress psi functioning, which we then aimed to test in two additional studies.

First, we developed a new psi-screening method, i.e., a computerized imagery task that estimates levels of the perceptual-personality variables mentioned above but in game-like and innocuous way. Essentially, participants are shown images such as the Mona Lisa, Sphinx, or The Thinker sculpture and asked to write about what these "subjects" might be thinking about. That is, it is a projective imagery task. This method has the advantage of protecting against fatigue effects in psychological assessment. Second, we conducted a pilot study to understand the level of task difficulty of a psi-intuition task as recently described by Houran and Lange. See:

Houran, J., & Lange, R. (2013). Applying the Theory of Reasoned Action to a computerized test of intuition: Part II: Decision-making in a hidden test of psi. *Journal of the Society for Psychical Research, 77*, 236-151.

Houran, J., Lange, R., & Lange, X. (2013). Applying the Theory of Reasoned Action to a computerized test of intuition, Part I: Methodological Note. *Journal of the Society for Psychical Research, 77*, 178-189.

We found that self-reported anomalous experiences and hit rates on a computerized test of psi formed a probabilistic hierarchy and that this hierarchy corresponds to a probabilistic hierarchy of trait level for perceptual-personality variables. In other words, different anomalous experiences are associated with varying levels of Transliminality, Paranormal Belief and Intuitive Thinking. This result is consistent with well-known effects in educational psychology known as Trait Ability and Task Difficulty. This means in practice that participants in experimental studies will only be successful if their trait abilities are matched to the inherent difficulty of psi tasks. Otherwise, participants will be unsuccessful since their skill level falls below what is required to achieve the task. The predictive validity of this finding was tested in a follow-up study, whereas respondents screened for psi ability based on outcomes from the imagery task and then administered Houran and Lange's computerized test of psi. Suggestive results were found, indicating the general concept and the methodological approached hold promise for better refinement and stronger effect sizes.

Works Produced

- Houran, J. (2013). Anomalous experiences as transliminal drama: the case of Wasney De Almeida Ferreira. *Australian Journal of Parapsychology, 13*, 169-185.
- Houran, J., & Lange, R. (2012). Reflections on paranormal beliefs as informed vs. pseudo beliefs: comment on Jinks (2012). *Australian Journal of Parapsychology, 12*, 159-167.
- Lange, R., & Houran, J. (submitted). "A picture is worth a thousand words:" perceptual-personality profiling via a free-response imagery task. *Personality and Individual Differences.*
- Lange, & Houran, J. Technical report. Matching psi ability to task difficulty: a methodological approach and pilot study.

4. Enclosures

Copies of submitted and accepted works from Bursary #54/12. Copies of final published versions will be forwarded to the Bial Foundation as soon as completed.

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Anomalous Experiences as Transliminal Drama: The Case of Wasney De Almeida Ferreira

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Abstract: Social psychologist Wasney de Almeida Ferreira (Ferreira, 2013) recently reported an unusual set of anomalous experiences with the deceased that he deliberately induced via an internal attention state. Only one such episode was detailed, and its content and thematic progression compared favourably to the progression of transliminal experiences as documented in the hierarchical (Rasch scale) content of the Revised Transliminality Scale (Lange, Thalbourne, Houran, & Storm, 2000). The findings suggest that Ferreira's psychical experiences may be dramatic examples of psychological content accessed and released through transliminal processes, a hypothesized mechanism inherent in anomalous experiences regardless of a psychological or parapsychological nature.

Keywords: entity encounter experiences, internal attention state, psychical research, Rasch scaling, transliminality.

INTRODUCTION

Wasney de Almeida Ferreira may be unique in psychical research—Ferreira (2013) has reportedly been actively using an internal attention state called "projection of consciousness" in order to "observe, interact, and interview dead people directly as a social psychologist" (p. 37). To my knowledge, these types of detailed, purposeful and sustained episodes have never before been published and therefore they are novel and intriguing additions to the spontaneous case literature. He discussed at length his analysis of the psychological content gleaned from these episodes. In essence, he positions himself as a participant observer in the afterlife. This approach has prompted him to conclude that the deceased continue their patterns of living, may not realize they are dead, and often exhibit psychological distress related to the trauma of dying. Readers must decide for themselves whether Ferreira's methods and conclusions are pseudo-scientific, but it is undeniable that the experiences affected him emotionally and intellectually—similar to other experients who have reported dramatic episodes like near-death experiences, apparitions and general contact with anomalous entities, poltergeists and precognitive dreams.

At this point, we cannot evaluate Ferreira's (2013) experiences more objectively to gain a fuller understanding of what they may mean, since he did not provide any narratives for readers and researchers to scrutinize *qualitatively* or *quantitatively* (e.g., Danielson, 1979; Machado, 2001; Houran, 1998, 2000). But, we can explore some ideas based on the general structure of the experiences and his subsequent interpretations. This leads to an aspect of the field perhaps best called "clinical parapsychology" (Kramer, Bauer, & Hövelmann, 2012) that examines anomalous beliefs and experiences beyond their ontological reality and focuses on the psycho-social variables (e.g., age, gender, and context effects) that contribute to the content and interpretation of the experiences, as well as the extent to which anomalous/paranormal beliefs and experiences influence other attitudes and behaviour. Many journals like the *British Journal of Psychology*, *Journal of Abnormal Psychology*, *Omega: Journal of Death and Dying*, *Journal of Nervous and Mental Disease*, and *Personality and Individual Differences*, often publish studies that take these approaches, so these aspects of parapsychology are already well absorbed within mainstream academia and the health sciences.

That said, anomalous reports are typically discussed in terms of psychosocial motivations like external locus of control, reduction in anxiety, self-actualization, suggestibility, fantasy/daydreaming, avoidance of boredom and psychological coping of intense physiological experiences that ultimately may have conventional medical explanations (e.g., sensed presences, NDEs, or out-of-body experiences). Inherent to many of these hypotheses is the idea that paranormal beliefs and experiences reflect psychological dysfunction (or disruption) on some level, including deficits in working memory and reasoning ability, poor tolerance of ambiguity, or schizotypal ideation.

The purpose of this commentary is not to dismiss Ferreira's (2013) experiences as psychological disruptions, but rather to view his experiences as another challenging case study in clinical parapsychology that is relevant to my ongoing research on the perceptual-personality characteristics of paranormal believers and experients, as well as the contextual factors attending the specific content of anomalous experiences (cf. Houran, 2002; Houran & Thalbourne, 2001a,b; Houran, Wiseman, & Thalbourne, 2002; for integrated summaries, see Lange & Houran, 2001; Houran, Hughes, Thalbourne & Delin, 2006). My position based on the cumulative evidence is that spontaneous experiences like those reported by Ferreira are wholly or in part expressions of "transliminal drama."

Roots of Transliminal Drama

Transliminality is the "hypothesised tendency for psychological material to cross (*trans*) thresholds (*limines*) into or out of consciousness" (Thalbourne & Houran, 2000, p. 853), and is a recent example of psychology's long-standing interest in understanding mental boundaries as a perceptual-personality variable in facilitating anomalous belief and experience, both in spontaneous cases and laboratory experiments (e.g., Houran, Ashe, & Thalbourne, 2003; Houran & Lange, 2009, 2010, 2012; Houran et al., 2002; Thalbourne & Houran, 2003). Houran et al. (2006) summarized most of the published research on transliminality and argued that its major correlates are syncretic cognitions—that is, the fusion of perceptual qualities in subjective experience. Common examples of syncretic cognitions include *physiognomic perception* (fusion of perception and feeling), *synesthesia* (fusion of sensory modalities), and *eidetic imagery* (fusion of imagery and perception). Therefore, Houran and colleagues (Thalbourne, Crawley, & Houran, 2003; Thalbourne, Houran, Alias, & Brugger, 2001) presented a neurological hyperconnectivity hypothesis that describes transliminality as enhanced interconnectedness between brain hemispheres, as well as among frontal cortical loops, temporal-limbic structures, and primary or secondary sensory areas and/or sensory association cortices.

On a perceptual and behavioural level, the research to date characterizes 'high transliminals' (i.e., individuals who score high on the Transliminality Scale—see Thalbourne and Houran, 2000) as individuals who:

- Have marked indicators of temporal lobe lability with dissociative and hallucinatory tendencies.

- Have schizotypal tendencies, with overtones of Eysenckian Psychoticism and to some extent Extroversion (Eysenck, 1947).

- Have propensities to think abstractly, be intuitive and open-minded, and to some extent follow their urges and exhibit warmness towards others.

- Endorse unconventional thinking and a broad range of paranormal and religious-oriented beliefs.

- Report a correspondingly wide variety of anomalous experiences, including Kundalini, altered states of consciousness, and paranormal, transcendent and mystical experiences.

- Have productive mental activity over a range of mental events, including the sense of being high, sense of mental potency, daydreaming, and introspection.

- Have enhanced forms of some types of creativity and report slightly higher levels of vividness of visual imagery.

- Have to some extent more frequent illicit drug use.

- Have tendencies to want to learn more about the limits of their own minds and to participate in future psychological studies.

Ferreira's (2013) writings strongly suggest he has a high *trait* level of transliminality based on the indicators above. Yet, transliminality also seems to be partly a *state* variable, meaning that certain contextual, environmental or psychosocial conditions that impact on psychophysiological thresholds (e.g., temporal lobe lability, childhood abuse, or internal attention states) are expected to heighten transliminality (Houran, Kumar, Thalbourne, & Lavertue, 2002; Thalbourne, Crawley, & Houran, 2003; Houran & Thalbourne, 2001b; Thalbourne, Houran, & Crawley, 2003; Persinger & Koren, 2001). It seems reasonable to expect that Ferreira was especially susceptible to transliminal phenomena because in addition to a likely high baseline of transliminality, he was deliberately and repeatedly immersed within a physical and physiological context that was conducive to the production and experience of large amounts of imagery, ideation, affect, and perception. Assuming this, the main question comes down to what are the implications for understanding Ferreira's episodes.

Sigmund Freud, and theorists that followed such as C. G. Jung, viewed human behaviour as the manifestation of an underlying drama within the unconscious mind. The unconscious is the seat of suppressed impulses, ideations, and emotion, and without our awareness, it can express itself through everyday behaviour, dreams and mental illness (Benjamin, Hopkins, & Nation, 1987). Unconscious motivations and processes likely underlie some parapsychological phenomena as well. For the purposes of this paper, let us limit our focus to the types of experiences that Ferreira (2013) reported—namely, entity encounter experiences. I use this term rather than apparition (or deceased individuals) because contact with ghosts, spirits or apparitions is merely one variety within a range of anomalous interactions with beings perceived variously as ghosts, angels, demons, extraterrestrials, Marian apparitions, physical poltergeists and folklore-related entities (elves and fairies). These are not unrelated phenomena;

several studies support Hilary Evans' (1986, 1987, 2001) hypothesis that entity encounter experiences are ordered along a shared statistical dimension (Houran & Lange, 2001; Houran & Thalbourne, 2001a). This means that individuals who experience one type of entity are likely to experience other types of entities as well—the suggestion being that a core "encounter" experience is at play that is variously interpreted according to contextual factors at the time of the experience (Houran, 2000).

The idea that images, visions, and apparitions are manifestations of unconscious or preconscious material can be found in nineteenth-century texts (e.g., De Boismont, 1853). Likewise, parapsychological theories of apparitions (see e.g., Tyrrell, 1942/1963) emphasize the influence of psychological factors on the perception of apparitions. Regardless of the ultimate source of entity encounters, the psychology of the experient cannot be dismissed. For example, Zeanah (1988) discussed the effects of unresolved mourning as a source of imagery during hypnogogic states. In more extreme instances, it is not difficult to imagine how such psychological dramas might produce bereavement apparitions and deathbed visions (Persinger, 1988). Anomalous experiences may also occur during normal waking states. A case study by Sabatini, Gaud, and Guillemarre-Alzieu (1987) detailed a woman who was hospitalized after a suicide attempt prompted by an argument with her lover. In telling the attending psychiatrists her life history, the woman described her place of employment as haunted by a presence connected with an old family secret. Hess (1988, 1990) similarly characterized haunts and poltergeists as idioms of distress. Apparently, themes related to ghosts and entities are universal personifications of troubled psyches (cf. von Franz, 1995)—Siegel and Marion (1973) even noted that some psychiatric patients perceive images of ghosts on the projective Rorschach psychological test (Siegel & Marion, 1973; see Houran, Kumar, et al., 2002, for a deeper review of these ideas.)

Contextual variables such as beliefs and expectations, psychophysical states, embedded cues, and symbolic-metaphorical references clearly help experients interpret ambiguous stimuli in entity encounters (Houran, 2000) and thus account for the backdrop and stage of the perceptualizations and emotions that stem from a psychological drama needing to be worked out. Thus, reports of apparitions, haunts and poltergeists are in part a complex mixture of psychodynamic motivations and cognitive processes related to visual imagery and fantasy. In fact, the study of apparitions led to the concept of waking dreams and metachoric experiences (i.e., the whole of an environment is replaced by a hallucinatory one, although it may provide a precise replica of the physical world and appear to be completely continuous with normal experience—see Green, 1990).

Based on these insights, we should expect entity encounter experiences, like those reported by Ferreira (2013), to be facilitated by transliminality. As an initial test of this prediction, Houran and Thalbourne (2001a) found that items on the Poltergeist subscale (Kumar & Pekala, 2001) from the *Anomalous Experiences Inventory* (AEI: Kumar, Pekala, & Gallagher, 1994) showed a moderate positive correlation with scores on the *Revised Transliminality Scale* (RTS; Lange, Thalbourne, Houran, & Storm, 2000; cf. Houran, Thalbourne & Lange, 2003). Transliminality is not unlike other previously proposed concepts such as "openness to experience," "flexibility of repression," "ego-permissiveness," and most notably Hartmann's (1991) notion of "boundaries in the mind." It could therefore be tempting to dismiss transliminality as a vague and empirically unmeasurable construct, but there is strong supporting evidence for the reliability and construct validity of the RTS.

In particular, the RTS was developed with Rasch (1960/1980) modelling and analyses to remove age and gender bias. Thus, the RTS defines a probabilistic hierarchy of experiences (that do not show bias) associated with increasing trait levels of transliminality. Recently, Houran and Lange (2001) applied similar methodologies to the AEI's Poltergeist subscale (Kumar & Pekala, 2001). Rasch analysis revealed that the Poltergeist subscale also constitutes a unidimensional continuum. It is now possible to compare the respective hierarchies. The argument that the contents of apparitional or entity encounter experiences derive from transliminality (Houran & Thalbourne, 2001a,b) would be bolstered if the two hierarchies were congruent in terms of the progression of their general themes and specific experiential content.

Datasets

Table 1 (Column A) shows the Rasch hierarchy of items from the Revised Transliminality Scale[1] (Lange et al., 2000). The Rasch analyses were based on a sample of 318 people (Mean Age = 36 years [*SD* = 14 years]; Range: 17 to 84 years). Column B of Table 1 gives the Poltergeist (or Haunt) Hierarchy originally published by Houran and Lange (2001). The Rasch analyses used to construct this hierarchy were based on a sample of 865 people (age data not available) and were obtained through the generosity of V. K. Kumar.

[1] In Table 2 and Figure 6 in the original paper (Lange et al., 2000, pp. 600, 607), the content of item #22 of the Transliminality Scale was mistakenly stated to be "At times I somehow feel the presence of someone who is not physically there" (which is actually item #23 in the Transliminality Scale and is not included in the Rasch scoring).

Table 1
Thematic Comparison of Transliminality and Haunt Rasch Hierarchies

Transliminality Hierarchy (Lange et al., 2000)	Haunt Hierarchy (Houran & Lange, 2001)	Shared Content or Themes
Oneness with Music; Feeling of Another Place and Time[a, b]	Perceived a ghost[a]	[a] Perceive external agents
Thoughts come too quickly[b]	Feel Possessed[b]	[b] Feel overcome or overwhelmed by stimuli
Clearly imagine thoughts[b]	Have Communicated with dead[c]	[c] Personal connection to stimuli
Immersion in stimuli[b]	Frightening Psychic Experience[d]	[d] Frightening perceptions
Concerned with dream content[b, c]	Object Movements[e]	[e] Attentiveness to external stimuli
Good at make-believe/imagining[b]	Object Levitations[e]	[f] Communication with external forces or stimuli
Smells seem stronger[b]	Able to communicate with dead[f]	
Understand mystical experiences[c]	Perceived Elves and Fairies[f]	
Perceive changes in personal energy[d]		
Perform rituals to ward off negative influences[d]		
Sensed evil presence[d]		
Feeling of levitation[e]		
Cosmically enlightened[f]		
Altered state and self-image[f]		
Overwhelmed by indoor lights[e]		
Received special wisdom[f]		
Heightened awareness of sights and sounds[e]		

Note: Superscripts denote the pairings of content across hierarchies. The third column indicates the contents or themes that these paired experiences are hypothesized to share.

Interpretation

The Poltergeist Hierarchy arguably compares well to the Transliminality Hierarchy (see Table 1). Note that in terms of general themes, both hierarchies involve perceptions that first originate within the person (internal attention states) and then gradually extend to the external environment. The specific experiential contents of the two hierarchies may seem diverse, but a close examination reveals interesting correspondences. Let us examine these parallels with special reference to Ferreira's (2013) account of interacting with a murdered individual who seemingly displayed indications of post-traumatic stress disorder (PTSD). This account was the closest example of a full spontaneous case narrative given by Ferreira (2013).

Step 1: Perceiving an Entity

Similar to some shamanic trance rituals (Houran, Lange, & Crist-Houran, 1997), Ferreira (2013, pp. 42-44) used a structured method of breathing, imagery and visualization to induce an altered or internal attention state (i.e., "projection of consciousness"). Once in this state, Ferreira consistently experienced being in contact with deceased individuals. This is entirely consistent with the first step. In particular, both hierarchies arguably begin with dissociative-like experiences of coming into contact with an external entity. In the case of haunt-poltergeists the content of the experience is lucid—one perceives a ghost or visual apparition. However, in the case of transliminality the experience is more metaphorical—one's present emotions and ideations are overcome by emotions and ideations of another place and time.

It may seem questionable to equate these two experiences, but in fact, the transliminal feeling of 'another time and place' has been implicated in experiences of ghosts (Ember & Ember, 1988). For example, certain physical stimuli can arouse the strong perception or memory of loved ones. The effect is similar to synesthesia, which Marks (2000) described as the situation where "an inducing stimulus produces, at the same time, two kinds of sensory response: the primary sensory experience that is normally associated with that stimulus and, anomalously, a secondary experience in another modality" (p. 121), such as seeing a color in response to a sound. In addition, there are "weak" forms of synesthesia, which pertain to cross-sensory correspondences expressed through language, perceptual similarity, and perceptual interactions during information processing (Martino & Marks, 2001). This is consistent with Abraham's (2000) conclusion that "synesthesia . . . probably reflects heightened connectivity between adjacent cerebral regions" (p. 1018) and Ramachandran and Hubbard (2001) recently presented a highly detailed model of synesthesia that was similarly based on the notion of hyperconnectivity among relevant brain regions.

Step 2: Overcome by Stimuli

Next, note that transliminality progresses to a type of 'imaginative involvement'—the notion of being overcome with thoughts and feelings (Ferreira, 2013, pp. 45-47). One might refer to this as a 'flooding of information'. Likewise, once in the altered or dissociative state, Ferreira's (2013) account mentions that he was "very lucid and aware, when I had the intuition of visiting a person who was murdered some years before . . . . I did not know why I had this idea; actually, it suddenly came up into my mind and then I just followed this transcendental intuition . . ." (p. 47).

Step 3: Awareness and Personal Connection to Stimuli

This phase is somewhat ambiguous, but my take is that the experient feels a deep understanding of the stimuli that have flooded his/her awareness; a revelation of sorts. Ferreira's (2013) account shows, at best, mixed consistency with this step. Upon receiving an intuition, Ferreira stated that he

> . . . did not have any expectations about this intuition, and I sincerely decided to go there just to understand what my intuition was 'telling' me, which was "Go to John's house now!"; I was not waiting for anything important (p. 47).

This could be my bias at work here, but it seems that Ferreira felt like something was in the process of being revealed to him and that the meaning of his perceptions and intuition was actively unfolding. I suggest that this is reasonably consistent with the basic idea of an awareness, connection and understanding of the flood of stimuli.

Step 4: Frightening Perceptions

It is striking to me how well Ferreira's (2013) account conforms to this next step shared by the two hierarchies—the onset of threatening or frightening content. In his account, Ferreira speaks of being directed to his deceased childhood friend, without any preconceived expectations according to him. Actually, he did have an expectation of sorts as he describes this friend favourably, "Based on [the] past, I hoped he would be generous and kind to me" (p. 48). However, the mood of the encounter changed markedly. He states that,

> . . . but when I called him, he came out extremely angry and agitated. His skin was black, the whites of his eyes were yellow, and he screamed at me "Go away from here! Go away!" (p. 48).

He summed up his appearance as being in a "terrible state" (p. 48).

Step 5: Attentiveness to External Stimuli

Ferreira's (2013) account becomes much more general and vague at this point, so it is questionably whether this step applied to his episode. In the hierarchies, it seems that the experient becomes more in tune with the immediate physical environment, and possible reasons for this are discussed later. However, it is curious that Ferreira's encounter to some extent continued into his waking state. He writes that,

> Immediately after [meeting the friend in a terrible state], I woke up and stayed in bed trying to understand why I had those experiences because in those days I was not thinking or talking about him. . . . For days after this experience, I had dreams or semi-lucid projections of consciousness involving John, as if they were a continuation of the last experience . . . (p. 48).

Ferreira did not explicitly mention paying closer attention to his surroundings in the physical environment, but I would be interested to know more about what Ferreira experienced or focused on during his waking state after coming out of the induction.

Step 6: Communication with External Forces

Finally, the two hierarchies converge on a sense of communicating with external forces or entities—a connection that goes beyond awareness and understanding to one of personal connection. In other accounts, Ferreira (2013) reports actual conversations with the deceased, and while there was a brief exchange in the encounter with his childhood friend with PTSD, no such meaningful communication(s) during the episode were mentioned. The closest thing in the account was a final moment of wisdom—inherent to this stage of transliminal experience—whereby he says, "At that moment, I had the intuition that he was reliving his own death, like many PTSD sufferers who relive their traumatic experiences . . . I believe John was reliving his own death publicly" (p. 48).

DISCUSSION

This comparison of the experiential hierarchies has been a qualitative exercise on quantitative data, and an admittedly subjective one at that. Still, it seems reasonable to me that the progression of the content of entity experiences (as measured by the AEI subscale) follows a progression similar to that of transliminality (as measured by the Revised Transliminality Scale). Accepting my interpretations, this qualitative analysis complements the quantitative data (Houran et al., 2003; Houran & Lange, 2001; Thalbourne, 1998) that characterizes some entity encounter experiences, in part, as dramatic transliminal experiences. Even if readers agree with my conclusions, it is of course unclear how well those conclusions generalize. It is also uncertain how valid the reported haunt-poltergeist experiences are from a parapsychological perspective. Perhaps cases with strong evidential value will show stronger or weaker correspondences to the transliminality hierarchy. It should be stressed that a transliminal basis for entity encounters does not *prima facie* favour either a parapsychological or psychological perspective. Both orientations can incorporate transliminality into their theory building. However, the available evidence does not favour the simplistic idea that apparitions, haunts, and poltergeists (or arguably any anomalous experiences) are objective, physical forces that we can easily understand independently from ourselves. Rather, experients seem to be active participants in the construction of their experiences in much the same way that characters in fictional ghost stories are complex, emergent products of the interplay between narrative design and narrative processing (Edwards, 2001; Herman, 2000).

In my opinion, the comparison of the hierarchies suggests that there is a general narrative structure underlying encounter experiences. That is, there could be a 'script' to the overall episode that is used by our psyches to systematically release or purge unconscious material. Following from Table 1, experients initially report perceiving the presence of external agents, which leads to feeling possessed by outside forces or stimuli, and ultimately, that one has a personal connection to such forces. The experiences subsequently alter to more frightening content. It is unclear why the perceptions should become more disturbing. There are at least three possible reasons: (i) the increasing intensity of the perceptions emotionally overwhelms experients; (ii) the experient thinks that personal forces responsible for the perceptions can be malevolent as well as benevolent; or

(iii) the ambiguous nature of the experiences typically elicits anxiety unless the experient has more perceptions and eventually becomes comfortable with them (cf. Barbato, Blunden, Reid, Irwin, & Rodriguez, 1999; Lange & Houran, 1998, 1999, 2000).

Regardless of the reason for the experient's emotional state, the disturbing nature of these intermediate experiences likely lead the individual to pay closer attention to what is happening in the physical environment—an adaptive form of paranoia. This might explain why disturbances or changes in the experient's physical environment are perceived at this stage. Lastly, experients come to feel they have the ability to communicate on a personal level with outside agents—even to the point of obtaining special messages or information from them. This element is particularly strong and stirring in Ferriera's (2013) set of experiences. Psychodynamic-oriented theorists might regard the content of such 'special messages' as the psychological material or unconscious drama that needed expression in the first place. And from the standpoint of comparative literature (e.g., Evans, 1986, 1987, 2001), this progressive 'storyline' that could be easing unconscious material into the experient's conscious awareness might be the 'core' experience spoken of by Hilary Evans to explain the underlying similarities among various entity encounter experiences around the world and throughout historical periods.

Ferreira's (2013) experiences as presented obviously raise more questions than answers, but he would seem to be an ideal subject for controlled studies that examine the ideas raised in this paper, as well as research grounded more squarely in psychical research such as the recent work on channelers or even the experimental study of temporal lobe function by Michael Persinger (e.g., 1984, 2001). While his particular experiences stand out for their frequency, potency and content, the general *structure*, *context* and *interpretation* of his episodes are frankly nothing new and, in my estimation, they parallel well what we know to date about the interplay of transliminal phenomena and contextual variables to produce anomalous experiences. Moreover, the one somewhat detailed account he did provide about the childhood friend with PTSD also seemed to match reasonably well the phenomenology of transliminal encounter experiences, as outlined in Table 1.

Whatever their ultimate source or ontological reality, the field should applaud Ferreira (2013) for coming forward to share his experiences with others. The clinical content and symptoms of the deceased reported by Ferreira are not unexpected, since his psychological background would lend significant context to his perceptions. That said, Ferreira also anticipates the criticism that may come from others. He writes that, "Before presenting my results, neuroscientists, neurologists, physicists, and psychiatrics should not seek to explain these narratives in terms of illusions, illness, etc." (p. 44).

Indeed, it is lazy and unproductive thinking to dismiss his experiences and conclusions simply as fantasy and imagination. There's nothing simple at all about fantasy and imagination—as the contents revealed during internal attention states may be richer and more complex than Freud, Jung, Ferreira, and the present author could ever conceive. This author hopes Ferreira will continue in his putative interactions with the deceased and that his experiences are fully and properly documented and studied. After all, there are many tantalizing questions to ask both the entities encountered as well as Ferreira himself, and transliminality and psychological drama may go only so far in explaining the responses they offer in return.

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Reflections on Paranormal Beliefs as Informed vs. Pseudo Beliefs: Comment on Jinks (2012)

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Abstract: Jinks (2012) proposes that complementary and alternative medical beliefs, and other anomalous beliefs, exhibit the characteristics of quasi-beliefs versus informed beliefs, and therefore past research on paranormal belief may not accurately represent the socio-psychological tendencies and traits of strong believers. However, we outline conceptual, psychometric and methodological issues that arguably limit Jinks' main conclusions, which may have inherent merit but that require substantial refinements and replications before a revised typology of paranormal believers should be accepted as established and meaningful.

Keywords: informed belief, paranormal belief, quasi-belief, Revised Paranormal Belief Scale (RPBS), Rasch scaling, test bias.

INTRODUCTION

Attitudes and beliefs of all kinds are complex and tricky combinations of emotional and cognitive evaluations. The psychology of paranormal belief is no different. Decades of research have produced a reasonably consistent picture of the correlates and functions of such beliefs (for reviews, see: Irwin, 1992; Lange & Houran, 1998, 1999, 2000, 2001; Kumar & Pekala, 2001), and this body of work is important in at least two major ways. First, from a parapsychological perspective it has allowed us to select more carefully those research participants who may sometimes exhibit stronger scoring patterns on tests of putative psi. This hopefully helps us to explain eventually what putative 'psi' is. Second, even in the absence of an ontological reality to psi, paranormal beliefs are an intrinsically interesting topic since many people in the general population across the world believe in and act on such beliefs (cf. Irwin & Watt, 2007). Their influence and impact on everyday human behavior in both normal and clinical contexts is undeniable. Thus, we side with Ross and Joshi (1992) who long ago challenged mainstream academia that no theory of human behavior which fails to take paranormal beliefs into account could ever be complete.

Tony Jinks' (2012) recent paper is to be commended for challenging the assumptions underlying academia's present understanding of what it means to be a 'paranormal believer'. His premise that past research (including ours) might have confused 'informed' or 'justified' believers with 'pseudo' or 'unjustified' believers harkens to work on *explicit beliefs* (what one says publicly) and *implicit beliefs* (what one believes privately). It is a welcome and constructive debate that should be explored since the ramifications extend to both parapsychological and psychosocial studies of paranormal belief. That said, we do not think Jinks' main conclusions are supported or 'justified' by the methodology and analyses. This is not to say that the ideas are inherently misguided or wrong—only that we do not feel his approach was sophisticated enough to draw any firm conclusions. Therefore, this paper summarizes our reflections on Jinks' work, as well as the broader conceptual and methodological issues his paper raises.

Conceptual Issues

Jinks (2012) focused only on one phenomenon that has any direct relevance to paranormal belief measures, namely the topic of ghosts. The remaining questionnaire items he tested concern complementary medicine and popular unexplained (or Fortean) phenomena. Most research on paranormal belief has used either Tobacyk's (1988, cf. Lange, Irwin & Houran, 2000) Revised Paranormal Belief Scale (RPBS) or the Australian Sheep-Goat Scale (Thalbourne & Delin, 1993, cf. Lange & Thalbourne, 2002), and while these scales do include some items about the Loch Ness Monster, Bermuda Triangle, etc., they are not included in the scoring of the questions. In other words, general unexplained phenomena are not necessarily constituent aspects of paranormal beliefs as operationally defined by the popular research scales. Jinks constructed his own paranormal belief questionnaire, although it was one that predominantly addressed topics unrelated to the core issue of paranormal belief. Readers are left questioning whether any of his findings have any relevance to parapsychological or psychological studies of paranormal belief *per se*. In fact, it is quite confusing why Jinks chose not to use either of the gold standards of paranormal belief measurement to test his ideas, given that the context of his research is squarely aimed at paranormal belief.

Now, speaking directly to the one topic relevant to paranormal belief (ghosts) we found the wording of his questionnaire statements too vague and imprecise to be effective measures of paranormal belief. In particular, the questionnaire statements "*Some places are haunted by the ghosts of* *dead people*" and "*When people die, part of them still remains on earth in another form*" (Jinks, 2012, p. 141; Jinks' wordings, respectively) can both be answered reliably and validly in the affirmative without assuming any paranormal interpretations. In particular, respondents can believe in ghosts simply as socio-psychological constructions similar to other social inventions like art, music, language and even money (as we believe, see Lange & Houran, 2001). Anthropologists Ember and Ember (1988) envisioned such a process to account for ghosts:

> There are many cues in everyday experience that are associated with a loved one, and even after . . . death those cues might arouse the feeling that the dead person is still somehow present. The opening of a door, the smell of tobacco or cologne in a room, may evoke the idea that the person is still present, if only for a moment. Then, too, loved ones live on in dreams. Small wonder, then, that most societies believe in ghosts. (p. 420)

Furthermore, common sense compels even the most hardened skeptics or atheists to agree that "*When people die, part of them*" does still remain "*on earth in another form*" (p. 141)—nothing paranormal with that, earthly remains (corpses or ashes) are left after death. So perhaps the wordings of his questionnaire statements did not represent or measure what he thought or intended. To be sure, several were certainly ambiguous to us. This is why it is so confusing why Jinks failed to utilize scales that have been validated over time and with different samples to ensure internal and content validity of the questionnaire items. This point naturally brings us next to the fundamental issue of psychometric quality.

Psychometric Issues

Jinks' (2012) succinct but pertinent introduction cited our benchmark study on the conceptualization and measurement of paranormal belief (Lange et al., 2000) based on Tobacyk's (1988) seminal research. Surprisingly, however, Jinks seemed not to apply any critical learnings from that work to his study. Rather, he developed an 89-item questionnaire . . .

> . . . for hypothesis testing purposes only, and was not intended to measure the structure of paranormal belief (e.g., determining inter-correlations amongst items). Categories were therefore developed for the purpose of independent examination, and items for each category were arranged together in a single instrument purely for convenience. This also allowed the rationale of the study to be more successfully hidden from the participants. (Jinks, 2012, p. 133)

Readers are therefore faced with statistical findings based on questionnaire items with unknown psychometric properties. This is a fatal error in Jinks' (2012) methodology, and one that undermines any and all interpretation of his data. How do readers know whether the respondents' ratings to specific questionnaire items were due to quasi-beliefs, or rather resulted from response or test biases, or poor psychometric quality of his instrument, as we discussed at length in Lange et al. (2000)? After all, we already demonstrated above that the only questionnaire items relevant to paranormal belief could be answered 'Yes' without actually measuring paranormal belief. The answer is simply readers do not know.

We are therefore left with another mystery—that is, Jinks (2012) refers to a decisive paper on response biases to specific questions on paranormal belief measures but then fails to control for this important confounding variable in his own analyses. This is not a trivial criticism, as the analyses are based on Jinks' very subjective interpretations and wordings of the phenomena in question. Indeed, he never asked the respondents to explain why they believe or do not believe in the phenomena being addressed. Maybe his "secondary items" were not to the liking of the respondents or phrased precisely enough. Frankly, as long standing researchers of apparitional and haunt experiences, we found the ghost questionnaire items to be uninterpretable.

Methodological Issues

Because the paper aims to extend the field by introducing quasi-beliefs, it is strange that Jinks (2012) does not want to give a . . .

> . . . detailed discussion of the philosophical complexities of quasi-beliefs; suffice it to say that the empirical study of paranormal beliefs as potential quasi-beliefs is an area that has to this point received no attention. Of particular concern is the possibility that paranormal belief questionnaires in their current format are unable to differentiate between informed beliefs and quasi-beliefs. (Jinks, 2012, p. 130)

The latter possibility is of course precisely the reason why the distinction between informed beliefs and quasi-beliefs should be made very explicit. Jinks does give some hints about the distinction by hypothesizing that . . .

> 'quasi-believers' . . . have not fully considered the implications of their beliefs? And if an 'informed believer' is a legitimate typology, might these individuals display different psychological traits to (arguably more prevalent) quasi-believers? (Jinks, 2012, p. 130)

Unfortunately, no "traits" other than anomalous beliefs were being measured, and perhaps the term really refers to quasi-beliefs?

Jinks (2012) classifies paranormal beliefs as "authentic" only when individuals "hold an internally consistent set of propositions regarding an anomalous topic, its putative causes, and/or alternative examples of the topic" (pp. 131-132). Beliefs are said to be "internally consistent" when they:

> (a) represent the standard anomalous explanations for the primary items; (b) offer an alternative example of the primary item; or (c) re-word the primary item to exclude specific reference to any anomalous location, occurrence, entity, or associated personality. (p. 131)

The author (Jinks, 2012) then proceeds to create "primary" and "secondary" items, as well as "control" items relying entirely and exclusively on his own judgment. It is admittedly difficult to find good sets of primary and secondary statements, but why not elicit such statements from a sample of knowledgeable believers? Contrary to Jinks' expectations, it would almost certainly be found that there are very few agreed upon "standard" anomalous explanations to be had. For example, the well-known Bermuda Triangle enigma has been variously attributed to anomalous weather conditions, magnetic fields, alien abductions, time warps and portals to parallel universes. And even within parapsychology, there are many competing conventional and paranormal explanations for haunt and poltergeist-like experiences (for a review, see Houran & Lange, 2001b).

Two basic problems further arise from the fact that Jinks (2012) assumes that informed beliefs and quasi-beliefs can be distinguished. First, Fishbein and Ajzen (1975) found over 35 years ago that only beliefs that are salient will contribute to the judgments we make. In this context, saliency is defined as a basic prior awareness of the belief content. Thus, one might agree with a statement like "*People have been abducted (taken or 'stolen' by aliens*" (Jinks, 2012, p. 135), but this does not mean that one ever considered whether "*Aliens contact people to tell them important information, such as the damage humans are doing to the earth*" (p. 135). When the issue of damaging the earth never occurred to a person, it is unlikely to be believed, and in any case such ratings are essentially meaningless as the person has no true opinion and "don't know" or "does not apply" would be the respondent's true answer.

Second, Jinks paired each primary belief with several secondary beliefs. This begs the questions as to what happens if not all of these secondary beliefs are salient? The subset of non-salient beliefs will receive mostly low ratings, whereas salient beliefs may also receive higher ratings.

Accordingly, if a people have strong primary belief then there will be a contrast between the salient and non-salient quasi-beliefs. Given that individuals have different sets of salient and non-salient beliefs, the ratings of the secondary beliefs will thus appear to be lower when averaged over a sample of individuals. This is of course precisely what Jinks found.

Finally, while we certainly do not question Jinks' integrity or motives, we note that the issues raised above are further complicated by the fact that the same issue can be worded so as to elicit different average responses. An extreme example would be phrasings like "*It has been proven that X*" vs. "*It is not impossible that Y*". Noticeable effects are sometimes achieved due to slightly different wording. Instead, Jinks' analyses rely on the assumption that all ratings reflect intensity with a common zero point, and that ratings mean the same regardless of the belief concerned. So, the answer "possibly" has the same intensity in response to "*Horoscopes written by trained astrologers can come true*" (Jinks, 2012, p. 141) and "*An individual's personality is influenced by their sun-sign*" (p. 141). His analyses further assume that the rating categories are equally spaced so that, for instance, "possibly" vs. "definitely not" reflects the same difference in belief intensity as "definitely" vs. "probably". We note that some of these problems might perhaps be corrected using Rasch scaling because it creates measures at the interval level (see Lange & Houran, 2001; Lange & Thalbourne, 2002). But, while in the article's introduction Jinks refers to studies containing a rationale for, and successful application of, the Rasch scaling of paranormal belief, these methods are strangely not being used.

Discussion

Given the plethora of issues left unaddressed or unsatisfactorily answered, we are in a quandary over what, if anything, Jinks' (2012) data ultimately mean. We regard his study as an intriguing and novel pilot study that requires substantial refinement and replication before anyone can justify the conclusion that past research has confused quasi-beliefs with informed beliefs, or that a new typology of believers should be accepted as established (cf. Irwin, 1997). Our opinion is that the informed vs. quasi distinction does not yet deserve to be taken seriously within parapsychological or psychological theory.

That said, it seems safe to say that we *do* know some things about paranormal beliefs:

- They can be reliably and validly measured on an interval scale (Lange, Irwin & Houran, 2000, 2001; Lange & Thalbourne, 2002), and that the aforementioned scales are known to be unbiased with respect to respondents' age and/or gender.

- They are on a continuum rather than being "all or nothing". Indeed paranormal beliefs and experiences alike form statistical hierarchies (Houran & Lange, 2001a, 2010; Houran, Wiseman & Thalbourne, 2002; Lange et al., 2000; Lange, Greyson, & Houran, 2004; Lange & Thalbourne, 2002).

- They do predict psychological and ostensibly parapsychological outcomes in both questionnaire research and laboratory research, making paranormal beliefs a robust variable in parapsychology (cf. Irwin & Watt, 2007).

While we applaud Jinks' (2012) thinking and initial effort, we submit that his findings are controversial at best. Hopefully, his effort will inspire new work to explore all of the conceptual, psychometric and methodological issues touched on here. Indeed, paranormal beliefs are tricky constructions, and continued analysis and collaboration from all perspectives will get us closer to a comprehensive understanding.

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"A Picture is Worth a Thousand Words:"

Perceptual-Personality Profiling via a Free-Response Imagery Task

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Running Head: LANGUAGE, IMAGERY, AND PERSONALITY

Abstract

We explored the applicability of latent semantic analysis in predicting Rasch-scaled traits levels of various perceptual-personality variables that influence the interpretation of ambiguous stimuli. An online sample of 588 respondents viewed a set of three iconic images one at a time. Respondents' verbal impressions of illustrations of the Mona Lisa, Giza Sphinx, and Rodin's Thinker significantly predicted low vs. high scores on Age, Agreeableness, and Conscientiousness ($p < .05$). When the Rasch Outfit of respondents' answers is used to define low vs. high categories, the semantic coordinates of their textual answers successfully predicted Age, Extraversion, and Transliminality. The percentage of correct classifications did not exceed 65%, but they gain in importance by the fact that this reflects the findings' generalizability, rather than the values reached upon convergence on the training set. The findings lend support for pursuing the use of computerized content analysis of free responses in psychological assessment.

Keywords: Big 5 personality traits; assessment; Latent Semantic Analysis; imagery; profiling; free-response; transliminality; paranormal belief

"A Picture is Worth a Thousand Words:"
Perceptual-Personality Profiling via a Free-Response Imagery Task

The idea that patterns in writing style reveal an individual's personality structure or even hidden affect, imagery, ideation, or perception has a checkered history in social science. For example, *graphology* has been controversial for more than a century but continues to be taught in some academic settings and advocated by various clinicians and personnel managers. While handwriting analysis can aid in the diagnosis and tracking of diseases of the brain and nervous system (e.g., Kopp et al., 1970; Ludewig et al., 1992), its ability to assess personality and job performance is primarily rooted in anecdotal evidence as opposed to rigorous objective testing, which has consistently shown negative results (e.g., Neter & Ben-Shakhar, 1989, Driver et al., 1996; King & Koehler, 2000; Schmidt & Hunter, 1998; for a review see Beyerstein & Beyerstein, 1992).

Content analysis of text, on the other hand, has been successful enough to have reasonable applicability. Starting in the 1940s, "projective" tests, including the classic Rorschach inkblots and word association tasks, have come into common and large-scale use (e.g., Harrower-Erickson, 1945). Projective tests have their origins in psychoanalytic psychology, which assumes that we have attitudes and motivations that are beyond or hidden from conscious awareness. Advocates of projective tests stress that ambiguous stimuli allow respondents to express thoughts that originate on a deeper level than are tapped by text-based questions. One of the best-known content analysis approaches is the scoring of the "picture-story" exercises of Murray's Thematic Apperception Test (TAT), which involves the "coding" or "scoring" of verbal material (or "thought sampling") for content and style. It is widely used for research into dreams, fantasies, mate selection and career choice, and to a lesser degree to assess personality or thought disorders. In a forensic context, Statement Validity Analysis (SVA) is a systematic procedure to assess the credibility of memory reports and has been used with child witnesses for decades in Germany.

SVA analyzes verbal reports uses nineteen criteria which reflect qualitative and quantitative differences between credible and non-credible reports (for a detailed description, see Yuille, 1988). Trained raters showed good inter-rater reliability, and SVA yielded a mean classification accuracy of 78.3% (Porter & Yuille, 1996).

Content analyses like those described above have the disadvantage of being labor intensive, because defining appropriate stimuli and scoring the verbal or written responses is extremely time consuming. Our present study aims to overcome these disadvantages through the use of *Latent Semantic Analysis* (LSA), as first proposed by Deerwester et al. (1990), and we present an overview of this approach below. Here we note that LSA has proved useful in a variety of contexts, including essay grading in educational contexts (Shermis & Burstein, 2003), as well as psychological applications aimed at inferring emotion, deception, charisma, and sentiment analysis from textual information (for a review, see e.g., Mairesse et al., 2007; Luyckx & Daelemans, 2008). The power of LSA derives from the fact that vocabulary-based semantic spaces can be constructed using unsupervised learning, i.e., with minimal intervention by researchers. A disadvantage of LSA that it essentially creates a black box without a clearly interpretable interpretation.

Latent Semantic Analysis

LSA provides an effective method for knowledge induction and representation by automating the process for determining the similarity of meaning of words and passages of written text (for an overview, see Deerwester et al. 1990). Based on word and context co-occurrences LSA represents the words, sentences, paragraphs used in it as points in a very high dimensional “semantic space”. Singular value decomposition (SVD), a mathematical matrix decomposition technique closely akin to factor analysis, is then used to simplify this space. While SVD itself has long been known, its application became technically feasible only after the development of efficient computer algorithms capable of dealing with large data sets.

LSA revolves around the concepts of *corpus*, *tokens*, *vector space*, and *model*. A *corpus* is a collection of text units (e.g., electronic documents, typed answers) that are traditionally referred to as documents. Words inside documents that represent useful aspects of the answers' semantics are said to define of a series of *tokens*. The Vector Space Model (VSM) approach represents the tokens combined with their frequencies, while word order is ignored. For instance, some document dealing with fishery might be represented by the vector:

[("boat,3),("fisherman",1), ("weather",2)],

indicating that the word "boat" occurred three times, "fisherman" once, and "weather" occurred twice. It seems likely that the document contained other words as well, but these were omitted. VSM assumes that documents' meaning is captured by the space defined by the token vectors, such that similar answers will have similar vectors and that vector similarity reflects similarity in meaning.

Assuming that we have d documents and t relevant terms one can construct a matrix X whose rows $1, ..., i, ..., t$ represent a dictionary of selected terms (or "tokens"), and whose columns $1, ..., j, ... d$ represent the documents containing these terms. Each entry X_{ij} reflects the weighted frequency with which dictionary term i occurs in document j. SVD is used to write X as as the product of three matrices:

$$X = TSD', \tag{1}$$

where T has size $t \times d$ and D has size $d \times d$, both with orthonormal columns (i.e., $T'T = I$ and $D'D = I$), while S is a $d \times d$ diagonal matrix. The matrices T, D, and S are referred to as the left and right singular vectors and the diagonal matrix of singular values, respectively, and together these define X's Singular Value Decomposition (SVD). By convention, the diagonal elements of S are positive and ordered in decreasing magnitude.

The utility of SVD lies in the fact that keeping just the k largest singular values (i.e., setting $S_{k+1} = S_{k+2} = ...S_d = 0$) yields a matrix X* approximates X with increasing precision for greater

k. Doing so produces two useful results: First, X^* is a matrix of rank k which is closest to X in a least-square sense. Second, since the corresponding columns in T and D will be multiplied by 0, they can simply be deleted, yielding T^* and D^* with sizes $t \times k$ and $d \times k$, respectively. The optimal number of factors will vary between applications (Letsche & Berry, 1997; Landaur, 2007) but the use of 100-500 factors is typical. The present research uses Řehůřek's (2010) versatile Python based Gensim software for all LSA and SVD related computations.

Throughout the following we use document vectors (X) as the basic unit of analysis. This relies on the fact that a vector of tokens can be processed based on known T and S through post-multiplication by the product TS^{-1}. This yields a more manageable, but approximately equivalent, representation that can be used as input to the classification algorithms. While many predictive approaches are possible, including logistic regression and discriminant analysis (e.g., Hastie et al., 2009), we have found that Support Vector Machines (SVM) often are the preferred method of analysis (for a discussion, see Bennett & Campbell, 2000). Further, prediction often benefits from first transforming the raw frequencies using a log entropy weighting function, and this is the procedure followed here (see, e.g., Landauer et al. 2007).

Method

Respondents. Data derived from a large convenience sample of respondents (N = 588) who were members of a survey website and subsequently compensated to complete a lengthy online questionnaire. Of the 243 respondents with known age/sex, there were 92 women and 151 men (M_{age} = 32.7 yrs., SD = 9.5, *range* = 19-53 yrs.).

Measures. A set of three illustrations was used in the imagery-interpretation task: the Mona Lisa by Leonardo da Vinci, the Sphinx at Giza, and Rodin's sculpture of The Thinker. In addition to the images we administered four perceptual-personality instruments in counterbalanced order:

The Ten Item Personality Inventory (TIPI: Gosling et al., 2003) as a brief but valid measure of the Big Five dimensions (or Five-Factor model). The TIPI was designed to measure the broad domains of Conscientiousness, Agreeableness, Emotional Stability, Openness, and Extraversion with only two items per dimension and using items at both the positive and negative poles. Consequently, some researchers have pointed out that alphas are misleading when calculated on scales with small numbers of items (Kline, 2000; Wood & Hampson, 2005).

Tobacyk's (1988) Revised Paranormal Belief Scale (RPBS) consists of 26 statements that are to be rated on seven-point Likert-type scales. Lange, Irwin et al. (2000) found that the RPBS comprised only two, moderately correlated Rasch-scaled belief subscales, representing different control issues. New Age Philosophy appear beneficial to individuals by instilling a greater sense of control over interpersonal and external events (e.g., belief in psi), whereas Traditional Paranormal Beliefs seem to be more culturally-transmitted and beneficial in maintaining societal control via a belief in magic, determinism, and a mechanistic view of the world. Scores on New Age Philosophy are more consistently and strongly related to the experience and report of anomalous experiences than Traditional Paranormal Belief scores. Several studies support the internal reliabilities and construct validities of these subscales (Houran, Thalbourne, & Ashe, 2000; Houran & Lange, 2001; Houran, Irwin, & Lange, 2001).

The Revised Transliminality Scale (RTS: Lange, Thalbourne et al., 2000) is a Rasch version of Thalbourne's (1998) original 29-item, true/false scale (Form B). Twelve items from the original scale are excluded from the scoring due to age and gender biases. However, the remaining seventeen test items constitute a unidimensional Rasch (1960/1980) scale. These 17-test items, which share a common underlying dimension, span seven domains: Hyperesthesia, (fleeting) Hypomanic or Manic Experience, Fantasy-Proneness, Absorption, Positive (and perhaps obsessional) Attitude Towards Dream Interpretation, Mystical Experience and Magical Thinking. The Rasch reliability of the RTS is .82 (Lange, Thalbourne et al., 2000) and the test-retest reliability is .82 ($p < .001$) over seven weeks (Houran et al., 2003).

Finally, we administered a 17-item, Rasch scaled questionnaire on self-reported experiences of intuitions in workplace settings called the Business Intuitions Inventory (BII: Lange & Houran, 2010). Questions were designed by a panel consisting of social and industrial-organizational psychologists and professionals who claimed to have had frequent and accurate intuitions in their careers. Items cover content related to the phenomenology of intuitions identified by Sinclair and Ashkanasy (2005). The response format was a four-point Likert Scale anchored by "Disagree Completely" and "Agree Completely." Lange and Houran (2010) reported a Rasch reliability of 0.83, as well as initial validity data for the scale.

Rasch Scaling. Each of the instruments referred to above were subjected to separate Rasch scaling runs. Using Linacre's (2012) versatile Winsteps software, rating scale models were estimated in which the probability of each answer is modeled based on P_{ijk}, the probability that respondent i on item j gives rating k. According to this formulation,

$$\ln(P_{ij(k-1)} / P_{ijk}) = R_i - T_i - F_k \qquad (1)$$

where R_i denotes the intensity of respondent's i trait level, T_i reflects the trait level addressed by item j, and F_k indicates the point where rating k has the same likelihood as rating k-1, given R and T. In Eq. 1, R, T, and F are all expressed in the same metric, i.e., the log-odds (or, logit) of observing rating k rather than k-1. We note that binary answers, as used for the transliminality items, are a special case of this model.

The extent to which respondents' answers fit the above model is quantified by their Outfit. For each person *i* and item j, Eq. 1 allows the computation of a standardized residual z_{ij}, whose distribution is approximately unit normal. Assuming there are *n* items, the person (respondent) Outfit is defined as:

$$\text{Outfit}_i = \text{©}\, z_{ij}^2 / (n-1) \qquad (2)$$

In other words, the Outfit index is a scaled $|^2$ statistic with a theoretical optimal value of 1.0. Values below 1.0 reflect answer patters that over-fit the model (i.e., a lack of noise), whereas noisy (idiosyncratic) answers result in Outfit values greater than 1.0. For details we refer to Wright and

Masters (1982), but for our purposes it is sufficient to note that Outfit values allows us to order respondents in terms of the degree of noise in their answer patterns.

Answer Preprocessing. Standard to LSA applications, the text material to be analyzed need "purification" (e.g., Berry & Browne, 2005) to determine which tokens should be used to best capture their semantic contents. Here, tokens are defined as series of letters and "|", encoded in all lower case letters, together with end-of-sentence markers (i.e., "!", "?", or ".") and word combinations (e.g., "well-defined"). Thus, a sentence like "The fisher fishes for crab." has tokens "the", "fisher" "fishes", "for", "crab", and "#', where "#" denotes the end of the sentence. Some concepts are captured by a sequence of two or more words, rather than a single word (e.g., New York, morning-after pill). Therefore, all possible pairs of two adjacent tokens in the sentence, called bigrams, were added as well. Thus, in "The fisher fishes for crab." we add: "the|fisher", "fisher|fishes", "fishes|for", "for|crab", "crab|#' - where the non-letter "|" is used to ensure that any two words will have a unique bigram. The present corpus was deemed too small to also include sequences of more than two words.

To eliminate spelling errors, all answers were corrected manually using the dictionary in MSOffice. Also, words deemed to have limited impact in discriminating among concepts (so-called "stopwords") were removed, as were words that occurred either very frequently or very infrequently. To further reduce the number of different tokens, words were normalized down to their essential roots by a process also known as *stemming* (Landauer, 2005). For example, and depending on the exact stemming method being used, the words "fishing," "fished," and "fisher" would reduce to the root "fish." Stemming does not intend to find words' morphological root, rather it assumes that words with a common stem will usually have strongly related meanings. Such stems need not be part of the language to be useful. For instance, the words "argue," "argued," and "argues" might reduce to the stem "argu." In this research we use the well-known Porter stemming algorithm as is included in Řehůřek's (2010) Gensim software.

Classification using Support Vector Machines (SVM). The SVM approach finds the optimal separating hyperplane between two classes of vectors by maximizing the margin between the classes' closest points (Hastie et al., 2009). Points on the wrong side of this hyperplane are weighted down to reduce their influence. When a linear separator cannot be found, transformations can be applied to create new spaces to increase separability. This approach can be formulated as a quadratic optimization problem that can be solved by standard techniques (Vapnik, 1998). We use the R interface to *libsvm* in package *e1071*, which implements the radial basis function kernel method to achieve optimal linear separation (Meyer, 2012).

The e1071 software also performs *n*-fold cross-classification on the training data (e.g., Geisser, 1993). In this approach, (1/n) th of the data is randomly omitted during model-fitting, and the model is then applied to the remaining data to determine its' generalizability. Our experience indicates that using n = 7 for smaller samples is close to optimal. The software computes the predication accuracy for each of the n predictions, as well as the total accuracy. In this context, accuracy is defined as the proportion of low respondents categorized as low and high respondents categorized as high. Thus, when the top and bottom half of the respondents (on some variable) are compared, successful generalizability requires proportions over 0.5. Although the 7 runs are not independent, an approximate test of statistical significance is obtained via the binomial distribution. We note that the Type I error falls below 5% whenever the accuracy in 6 or 7 out of 7 runs exceed 0.5.

LSA Analyses. All LSA analyses reported here rely on Řehůřek's (2010) Gensim software, which can be downloaded from http:// http://radimrehurek.com/gensim/install.html. In addition to implementing the LSA computations described in the introduction, Gensim contains a general library for topic modeling, document indexing and similarity retrieval for large corpora of texts, as well as the Porter stemming algorithm.

Results

Preliminaries

Combining the data for the Sphinx at Giza, Mona Lisa, and the Thinker, yielded a total of 2,352 typed answers. The purification rules outlined earlier identified 5,390 different tokens, among those were 3,818 bigrams, which defined 86,731 token occurrences. The Gensim software (Řehůřek, 2010) was used to approximate the Singular Value Decomposition of the 2,352 x 5,390 sparse data matrix, by a 2,352 x 200 array of vectors. These vectors are extracted such that each subsequent vector explains less variation than the preceding one, as quantified by their associated singular values.

SVD essentially creates more compact and less noisy data, but – analogous to factor analysis without any rotation – without regard of structure. Hence, no serious attempts were made to interpret tokens' loadings across the 200 vectors. However, as is usual, the first few factors (about 10) reflect syntactical features, whereas later ones start to address the answers' semantics. For instance, the first five largest loadings on Factor 14 reflect that "happy" and "serious" (and all other words that reduce to these stems) are seen as opposites because their loadings have different signs:

0.27*happy - 0.25*serious|# - 0.24*serious + 0.21*#|happy + 0.19*happy|#

Classification

Respondents were classified as either high or low on each of the four questionnaire-based variables (Big 5 personality profile, Transliminality, Intuitive Thinking, and Paranormal Belief), where low and high scores are defined in relative to these variables' respective median values. Respondents were also categorized as either high or low based on the Outfit of their responses to the Rasch model. Analogously, respondents' age (i.e., above/below the median) and sex were used as classifiers as well. Except for sex, in case of ties, the tied respondents were randomly classified as either high or low so as to obtain approximately equal group sizes. Some trial runs indicated that using more than 40 LSA coordinates was counterproductive.

Respondents' sex and age, as well as the classification of their questionnaire scores (low vs. high) were generated using the SVM method as mentioned above. To establish whether the fitted model generalizes, n-fold cross-classification was used, with $n = 7$ runs. In Table 1, classification results are marked as statistically significant whenever at least 6 of the 7 runs yielded over 50% correct predictions. The base rate for sex is different because 6x% of respondents are women.

The first column in Table 1shows the success of SVM-based classifications of low vs. high levels of the variables listed in the margin using 40 LSA coordinates. It can be seen that respondents' impressions of the Mona Lisa, the Giza Sphinx, and Rodin's Thinker, can be used to predict whether they score low vs. high on Age, Agreeableness, and Conscientiousness ($p < .05$). Similarly, when the Outfit of respondents' answers is used to define low vs. high categories, the 40 coordinates of their textual answers successfully predict Age, Extraversion, and Transliminality. Although the percentage of correct classifications does not exceed 65%, they gain in importance by the fact that this reflects the findings' generalizability, rather than the values reached upon convergence on the training set.

Discussion

Several constraints limit the generalizability of our results. For instance, the sample was not representative, and we only measured a few perceptual-personality variables that previous research demonstrated were involved in the interpretation of ambiguous stimuli (Houran & Lange, 2004; Lange & Houran, 2000). Most important to note was our use of "stemming" to reduce the size of the vocabulary, given the relative small sample on which to base the semantic space. Landauer and Dumais (http://www.scholarpedia.org/article/Latent_semantic_analysis) noted that "stemming often confabulates meaning, e.g., flower becomes flow." However, we believe that such instances are rare in our case as inspection of 10% of the data indicted no clear confabulations, while combining the different words into a single token was unobjectionable.

Moreover, we argue that our stemming process benefitted the statistical quality of the token frequency estimations.

Notwithstanding these caveats, the present findings are promising and provide additional support for content analysis approaches in general, and more specifically, the core premise that free-response text to sets of standardized imagery can efficiently and significantly predict trait levels of at least some key variables relevant to studies of perceptual-personality and individual differences. On a methodological level, refinement and validation of LSA for perceptual-personality profiling could offer many potential advantages over standard questionnaire approaches, including:

- Enhancing the internal validity of data by reducing any temptation to fake responses;
- Reducing reliance on a respondent's verbal abilities;
- Tapping both conscious and unconscious motivations;
- Reducing test fatigue for studies that require the measurement of many traits and characteristics that normally would require a multitude of separate assessments;

Of course, future work needs to build on these preliminary results in order to explain the nuances we observed in how certain features of the free-response text predicted the variables of Age, Agreeableness, Extroversion, Conscientiousness and Transliminality. This latter variable is especially curious to us, as Transliminality reflects the tendency for psychological material to cross (*trans*) thresholds (*limines*) into and out of consciousness. Reviews show that, in addition to paranormal belief and sometimes self-reported and laboratory-based paranormal experience (Thalbourne & Houran, 2003), the major correlates of transliminality are syncretic cognitions (Lange et al., 2000; Houran et al., 2006) - i.e., the fusion of perceptual qualities in subjective experience such as: *physiognomic perception* (the fusion of perception and feeling); *synesthesia* (the fusion of sensory modalities) and *eidetic imagery* (the fusion of imagery and perception). Accordingly, transliminality is conceptualized as enhanced interconnectedness between brain hemispheres, as well as among frontal cortical loops, temporal-limbic structures and primary or secondary sensory areas or sensory association cortices (Thalbourne et al., 2001; Thalbourne, Crawley & Houran, 2003; Houran et al., 2006).

Studies of perception, imagery and memory all provide evidence for a threshold that mediates unconscious-conscious awareness, and findings from several experiments are consistent with the neurological interconnectedness model of transliminality in particular (Crawley, French & Yesson, 2002; Houran et al., 2006; Fleck et al., 2008). The prospect that free-response text from imagery tasks may prove to be a reliable indicator of the level of such brain-based functionality is conceptually consistent with and may extend current uses of handwriting analysis in the diagnosis and tracking of diseases of the brain and nervous system (Kopp et al., 1970; Ludewig et al., 1992),

At the theoretical level, the results give further credence to an interactionist framework that emphasizes the links between the person and the environment (cf. Buss, 1987; Swann et al., 2002; Rentfrow & Zilca, 2010). According to this approach, personality and individual differences inherently encompass a mixture of self-attribution and stimulus-attribution variables, such that personality structure can be inferred indirectly from one's external (physical) activities and appearance and vice versa. For instance, Rentfrow and Gosling (2003) found that music preferences are related to basic personality characteristics, values, self-esteem, intelligence level, and even political orientation. Personality structure can also be inferred reliably from leisure activities like movie and reading preferences (Rentfrow, Goldberg, & Zilca, 2010). Interestingly, even people without formal training can form reasonably accurate impressions of people based solely on such cues. Our preliminary findings suggest that the interactionist framework can be extended and adapted in new and promising ways that push the boundaries of psychological assessment.

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Table 1: Prediction of Demographics and Personality Variables

	Measure	Outfit
Demographics		
Age	60.8*	60.1*
Sex (63%=female)	62.8	62.1
Personality - Big 5		
Openness	53.1	53.5
Neuroticism	52.4	50.1
Agreeableness	57.3*	52.8
Conscientiousness	58.7*	54.5
Extraversion	52.8	57.9*
n=260		
Transliminality	56.3*	64.2*
jobintuition	54.6	53.8
paranormal	49.5	47.3

Technical Report. Matching Psi Ability to Task Difficulty: A Methodological Proposal and Pilot Study

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Abstract

We conducted two studies to investigate whether "task difficulty" was a moderator variable in experimental psi research, similar to its mediating role in educational psychology and traditional learning theory. In Study 1, 124 hospitality professionals completed measures of Transliminality, Paranormal Belief (New Age Philosophy), Intuitive Thinking, and self-reported paranormal abilities and experiences (Anomalous Experiences Inventory), along with one run of 25 trials of a previously published computerized intuition (psi) task (Houran & Lange, 2013). Rasch scaling analyses revealed that the perceptual-personality variables (except intuitive thinking) conformed to a probabilistic hierarchy, which subsequently corresponded to a probabilistic hierarchy of self-reported paranormal abilities, experiences, and hit rate on the computerized task. Those scoring above mean-chance expectations on the computer task also scored suggestively higher on the Rasch perceptual-personality measure of psi ability than those scoring at or below mean-chance expectations. The results suggest that manifestations of psi involve an inherent trait ability matched to task difficulty. Study 2 tested the predictive validity of these conclusions in a convenience sample of 153 hospitality professionals who were independent from Study 1. Participants completed the same perceptual-perceptual measures from Study 1 and then completed the computerized intuition (psi) task. Those with expected trait ability as inferred from the Rasch perceptual-personality measure ("targets") scored significantly higher on hit rate on the computer task than did "controls," those with non-expected trait ability as inferred from the Rasch perceptual-personality measure. Furthermore, overall hit rate of the "targets" on the computer task was suggestive and in the predicted direction, albeit non-significant. Results were discussed in terms of refining future studies in order to better understand and apply classic learning theory to experimental psi research in order to potentially overcome the replication issue facing parapsychology.

Keywords: Psi, intuition, Rasch scaling, sheep-goat effect, moderator variables, task difficulty

Running Head: PSI TASK DIFFICULTY

TECHNICAL REPORT.
MATCHING PSI ABILITY TO TASK DIFFICULTY: A METHODOLOGICAL PROPOSAL AND PILOT STUDY

Introduction

Replication in parapsychology has been a stubborn issue. Addressing the topic, statistician Jessica Utts (1991a) concluded that "The recent focus on meta-analysis in parapsychology has revealed that there are small but consistently nonzero effects across studies, experimenters and laboratories . . . It may be that the nonzero effects observed in the meta-analyses can be explained by something other than ESP . . . Nonetheless, there is an anomaly that needs an explanation" (p. 377). Utts basically contends that meta-analyses demonstrate statistical replicability; a conclusion bolstered by more recent meta-analyses across various parapsychological domains (Mossbridge et al., 2012; Schmidt, 2012; Storm et al., 2012). However, the field needs to continue to advance methodologically and strive to better elicit and document psi within individual experiments.

Utts (1991b) further summarized very effectively the main challenge to producing such a *repeatable experiment* – "Most modern parapsychologists...recognize that demonstrating the validity of their preliminary findings will depend on identifying and utilizing 'moderator variables' in future studies" (p. 402). Traditionally, moderator variables have often focused on various characteristics of those able to exhibit putative psi, with the classic "sheep-goat effect" being most popular. The sheep-goat variable derives from the work of Gertrude Schmeidler (1943, 1952, 1959, 1997; Schmeidler & McConnell, 1958), who characterized believers in the possibility of ESP in the context of the experiment at hand as "sheep" and disbelievers in the possibility of ESP in the context of the experiment at hand as "goats." She reported that sheep demonstrated a tendency to score significantly above mean chance expectation on ESP tests whereas goats score significantly below chance level. This effect is one of the more successfully replicated relationships in experimental ESP research (Palmer, 1977), even though the overall effect size is very small (Lawrence, 1993). More recently, the concept of Transliminality – the tendency for psychological material (ideation, affect, imagery and perception) to cross thresholds into or out of consciousness – has proved promising as well (see e.g., Thalbourne & Houran, 2003). In particular, our work indicates that Transliminality is related to Paranormal Belief, Intuitive Thinking and Psi Ability – all of which seem to work together to produce an optimal "psycho-social milieu" for psi to manifest, especially when an individual is faced with a situation that is ambiguous and spontaneous but the outcome of which is highly relevant to the individual (see Houran & Lange, 2009, 2012, 2013; Lange & Houran, 2010, 2013).

Such motivational and situational factors might therefore be strong complements to the basic sheep-goat principle. For instance, Charles Tart (1966) was the first to hypothesize that immediate feedback following the results of a guess could improve the human ability to make correct 'guesses', i.e. that it was possible to train psi ability. In a series of theoretical and experimental studies published from 1960 to 1980, he established methods and strategies for this type of training. In particular, he reported several positive variables related to a person's ability to train their intuitive psi ability (Tart, 1977): high (but not excessively high) motivation; high general learning ability; absence of specific conscious or (inferred) unconscious resistances to psi; good memory skills; ability to quiet one's mind; non-attachment; ability to drop strategies that are not adaptive in spite of emotional investment in them; and an ability to ignore sensory distractions. Assuming psi is an ability that can be trained, then we would further expect success on tests of psi to be impacted by other established variables in learning theory.

Rationale for Exploring a New Moderator Variable in Psi Research

The set of consistent moderator variables in experimental psi research is predicted to include a previously unmeasured factor – namely the *difficulty level of a specific psi task.* In other words, this perspective emphasizes hit rates on tests of psi as a direct function of (i) the psi trait ability of a research participant and (ii) the difficultly or skill level represented by a particular test of psi. There are good reasons to expect this to be a valid formula for a replicable experiment. First, taking a cue from educational psychology, tasks of an inappropriate difficulty hinder learning, whereas tasks situated in a student's zone of proximal development (cf. Vygotsky, 1978) will facilitate learning more quickly. For example, McGrath and Noble (2010) suggested that the tactful allocation of challenging work to more able students, and of simpler work to less able students is paramount for a positive classroom environment. Moreover, a cooperative learning approach could keep everybody motivated on the task (Slavin, 2011). This is reminiscent of the assertion that successful psi tasks involve a supportive, versus skeptical, social milieu. In educational settings it has shown to be successful (Johnson & Johnson, 2009) and it is applied in classrooms all over the world (Sharan, 2010).

Instructions or motivational set also matter. For instance, research by Stajkovic and Luthens (1998) suggested that work which is pitched at an appropriate level has a much higher level of engagement than work that is pitched at a more difficult level. This observation is arguably consistent with Schmeidler's original sheep-goat work whereby the respective labels were based on the participant's attitude toward a psi test at hand. Second, *paranormal beliefs* (Lange, Irwin & Houran, 2000; Lange & Thalbourne, 2002), *transliminality* (Lange, Thalbourne, Houran & Storm, 2000; Houran, Thalbourne, & Lange, 2003), and *intuitive thinking* (Lange & Houran, 2010) have been shown to conform to a probabilistic Rasch (1960/1980) hierarchy. Third, several putative *paranormal experiences* can also be modeled per a Rasch model (Houran, 2002; Houran & Lange, 2001; Houran, Wiseman, & Thalbourne, 2002; Lange, Greyson & Houran, 2004). Conforming to a Rasch model implies that a construct (skill set, knowledge areas, or even psycho-social phenomena) involves a probabilistic hierarchy of components. Finally, we have some preliminary evidence that matching psi experiment participants on similarly high levels of Paranormal Belief and Transliminality yields effective outcomes compared to control conditions in which senders and receivers are mismatched on traits levels of these variables (e.g., Houran & Lange, 2012; Lange & Houran, 2013).

The Present Research

Taken all together, we aim to combine the above premises by studying difficulty levels of various manifestations of putative psi via a Rasch (1960/1980) scaling approach (Study I) and subsequently examining whether hit rate increases when difficulty level of a psi task is matched to ability levels of participants (Study II). Interested readers are referred to our previous works for detailed statistical descriptions of Rasch (1960/1980) scaling and specifically its application to parapsychological theory-building (see e.g., Lange, Irwin, & Houran, 2000; Lange, Thalbourne, Houran, & Storm, 2000; Houran & Lange, 2001; Houran, Wiseman, & Thalbourne, 2002; Lange & Thalbourne, 2002; Lange & Houran, 2010; Houran, Greyson, & Houran, 2004;

STUDY I

Method

Participants.

Data derived from a convenience online sample (n = 124) gathered via a snowball sampling approach (M_{age} = 51.2 yrs, SD = 12.7, range = 28-80 yrs.). Sample consisted of 18.7% men and 81.3% women drawn from a proprietary database of professionals in the hospitality industry and who often use intuitive thinking in the course of their daily work (cf. Lange & Houran, 2010).

Measures.

Participants completed the computerized test of psi described in-depth by Houran and Lange (2013; Houran, Lange, & Lange, 2013), as well as four (4) questionnaires. The computer task and questionnaires were counterbalanced:

Anomalous Experiences Inventory (AEI: Kumar, Pekala, & Gallagher, 1994; Gallagher, Kumar & Pekala, 1994; cf. Kumar & Pekala, 2001), Constructed from the Mental Experiences Inventory (MEI: Gallagher, Kumar, & Pekala, 1992), the AEI has five subscales:

- *Anomalous/paranormal experiences* (29 items, e.g., "At times my consciousness feels expanded beyond my body," "At times I have felt possessed by an outside force," "I have had a psychic experience").
- *Anomalous/paranormal beliefs* (12 items, e.g., "I believe that mind can control matter," "I believe that many paranormal occurrences are real").
- *Anomalous/paranormal abilities* (16 items, e.g., "I am able to move or influence objects with the force of my mind alone," "I am able to communicate with supernatural forces").
- *Fear of the anomalous/ paranormal* (6 items, e.g., "Hearing about the paranormal or psychic experiences is scary," "I am afraid of having an altered-state experience").
- *Drug use* (7 items, e.g., "I have tried mind-altering substances," "I have smoked marijuana"). Tattoos ut

Response categories are dichotomized ("True" or "False"). Only the first three subscales were deemed relevant to the present purposes, so the others were not administered.

Tobacyk's (1988) *Revised Paranormal Belief Scale* (RPBS) consists of 26 statements that are to be rated on seven-point Likert-type scales. Lange, Irwin et al. (2000) found that the RPBS comprised only two, moderately correlated Rasch-scaled belief subscales, representing different control issues. New Age Philosophy appear beneficial to individuals by instilling a greater sense of control over interpersonal and external events (e.g., belief in psi), whereas Traditional Paranormal Beliefs seem to be more culturally-transmitted and beneficial in maintaining societal control via a belief in magic, determinism, and a mechanistic view of the world. Scores on New Age Philosophy are more consistently and strongly related to the experience and report of anomalous experiences than Traditional Paranormal Belief scores. Several studies support the internal reliabilities and construct validities of these subscales (Houran, Thalbourne, & Ashe, 2000; Houran & Lange, 2001; Houran, Irwin, & Lange, 2001).

The *Revised Transliminality Scale* (RTS: Lange, Thalbourne et al., 2000) is a Rasch version of Thalbourne's (1998) original 29-item, true/false scale (Form B). Twelve items from the original scale are excluded from the scoring due to age and gender biases. However, the remaining seventeen test items constitute a unidimensional Rasch (1960/1980) scale. These 17-test items, which share a common underlying dimension, span seven domains: Hyperesthesia, (fleeting) Hypomanic or Manic Experience, Fantasy-Proneness, Absorption, Positive (and perhaps obsessional) Attitude Towards Dream Interpretation, Mystical Experience and Magical Thinking. The Rasch reliability of the RTS is .82 (Lange, Thalbourne et al., 2000) and the test-retest reliability is .82 ($p < .001$) over seven weeks (Houran et al., 2003).

Finally, we administered a 17-item, Rasch scaled questionnaire on self-reported experiences of intuitions in workplace settings called the *Business Intuitions Inventory* (BII: Lange & Houran, 2010). Questions were designed by a panel consisting of social and industrial-organizational psychologists and professionals who claimed to have had frequent and accurate intuitions in their careers. Items cover content related to the phenomenology of intuitions identified by Sinclair and Ashkanasy (2005). The response format was a four-point Likert Scale anchored by "Disagree Completely" and "Agree Completely." Lange and Houran (2010) reported a Rasch reliability of 0.83, as well as initial validity data for the scale.

Results

Consistent with expectations, two main findings emerged. First, we used Winsteps software (Linacre, 2003) to model responses to the four (4) perceptual-personality measures according to the Rasch (1960/1980) framework. The BII measure of intuitive thinking showed poor model fit with the other measures so was excluded from further analyses.

Table 1 shows that the remaining variables of Transliminality, Paranormal Belief (New Age Philosophy) and the AEI (Experiences, Beliefs, and Abilities) were subsumed within a common Rasch scale. In particular, Transliminality and New Age Philosophy Beliefs tend to occur early in the Rasch hierarchy (are endorsed comparatively easier), whereas the AEI items reflecting putative psi experiences under conscious control tend to occur later in the hierarchy (are comparatively more difficult to endorse). In terms of a preliminary model of trait ability and task difficulty, Table 1 implies that paranormal beliefs and the syncretic-like perceptual experiences that define Transliminality require low to intermediate levels of "perceptual-perosnality" ability, while direct experiences of putative psi require substantially higher levels of this same ability. Interestingly, success rate on Houran and Lange's (2013) computerized test of intuiton (psi), which was also administered to participants, was positioned midway in the Rasch hierarchy of difficulty (see Table 1). This suggests that success rate on this task requires at least an intermediate degree of psi ability, as measured by the holistic Rasch scale of perceptual-personality variables.

Table 1 here

Second, this interpretation is corroborated by *post-hoc* analysis. We categorized participants according to success rates on their one run of twenty-five (25) trials. "Targets" (n = 29) were defined as those who scored above mean-chance expectations (6 hits or more) and "controls" (n = 95) were those who scored at or below mean-chance expectations (5 hits or less). Analysis revealed that the targets (M = 23.4, SD = 15.6) scored higher on the holistic Rasch model of the perceptual-personality variables than the controls (M = 20.2, SD = 17.8), although this difference was merely suggestive and did not reach statistical significance [t (122) = 2.93, p = .086].

Conclusion

Perceptual-personality variables that previous research has identified as relevant to psi experiences and/or ability conformed to a holistic Rasch (1960/1980) implying that there is an over-arching trait factor at play (cf. Lange, Thalbourne, et al., 2000). This trait factor can be overlaid onto another Rasch scheme whereby different putative psi experiences and/or abilities form a "difficulty model" that follows from apparent trait ability. Therefore, Transliminality and Paranormal Belief are not just correlated with reported psi experiences – the Rasch model provides strong evidence for the idea that we are dealing with two inherently connected schemes which we interpret as reflecting trait ability and task difficulty. That is, we have direct statistical evidence that specific putative psi experiences and abilities are aligned to specific trait levels of perceptual-personality variables. Testing the predictive validity of these conclusions is the focus of Study 2.

Study 2

Method

Participants

Data derived from a convenience online sample (n = 153) gathered via a snowball sampling approach (M_{age} = 51.2 yrs, SD = 12.7, range = 28-80 yrs.). Sample consisted of 18.7% men and 81.3% women drawn from the same proprietary database of professionals in the hospitality industry used in Study 1, although the present sample was independent from Study 1.

Materials & Procedure

We planned to use the free-response imagery task outlined in Lange and Houran (submitted) to screen innocuously for putative psi ability and reduce potential test fatigue, except our previous efforts proved that the method was currently too imprecise for the present purposes. Therefore, we replicated the questionnaire protocol from Study 1, minus the BII measure of intuitive thinking, in order most effectively categorize participants as either "targets" or "controls." A "target" was defined as someone who was predicted to have the psi ability level that matched the task difficulty of the computerized intuition (psi) task, as described by Lange and Houran (2013; cf. Lange, Houran & Lange, 2013). "Controls" were those who scored in a way that suggested they did not appear to have the psi ability level to meet the task difficulty of the psi test (similar to Schmeidler's sheep-goat dichotomy). Respondents were presented with 25 trials of the computerized intuition task. Again, we predicted that "targets" would score significantly higher than "controls" (Hypothesis 1) and that this higher scoring would exceed mean-chance expectations (Hypothesis 2).

Results

As in Study 1, targets scored higher (M = -4.12 vs. -3.80), however this difference failed to reach statistical significance (t (151) = 1.41, p > 0.15).

Table 2 here

The main findings are summarized in Table 2, which shows the four categories defined by target vs. control (columns) and scoring "at or below chance level" vs. "above chance level" (rows). It can be seen that the control respondents score below chance level (i.e., 46/141 =0.32), whereas the targets' performance exceeds chance (7/12 = 0.58). However, the overall effect fails to reach acceptable levels of statistical significance ($\chi 2$ = 3.22, p > 0.07).

Given the lack of statistically significant effects, no further analyses were performed.

Conclusion

The findings primarily support those of Study I, that is, target respondents showed better performance on the computerized intuition task. Unfortunately, the effect failed to reach statistical significance. We attribute this finding to the fact that very few "target" respondents were available, emphasizing the need for more effective respondents selection procedures.

General Discussion

Tart's (1966, 1977) work on immediate feedback in the training of psi ability demonstrated that traditional learning principles were applicable to theory-building in parapsychology. We have attempted to build on his insights and early foundation by identifying *task difficulty* – another well-known construct in educational psychology – as a highly suggestive mediator of success rate in experimental psi tasks. In fact, our initial evidence for this construct offers convergent validity to Tart's core premise that psi is a trainable ability that functions similar to other learned human skills and competencies. It is important to note that our study represents a preliminary and admittedly rudimentary attempt to understand how trait ability for psi corresponds to various manifestations or experiences of the paranormal. This is a new application of Rasch (1960/1980) scaling that offers a substantial methodological advance in the selection of participants for experimental research. More detailed work is needed to refine this model, but the present research suggests that it is inherently promising.

Validating our hypothesized model of success on psi tasks as a function of "trait ability matched to task difficulty" would likely explain and possibly overcome the replication issue in experimental psi research. In particular, a repeatable experiment should be achieved if we understand what trait levels of psi ability are required for success at specific psi tasks and subsequently identify suitable individuals to participate in those respective tasks. This is the crux of proof-oriented research. Once above mean-chance scoring (i.e., a psi effect) can be elicited reliably, more detailed examinations of environmental and physiological variables can be done in order to move proof-oriented research towards more process-oriented research. Interested readers are referred to the work of Michael Persinger for instructive case studies along these lines (e.g., Makarec & Persinger, 1987; Persinger & Krippner, 1989; Persinger et al., 2002, 2003). Rather than replace perceptual-personality variables like Transliminality, Paranormal Belief or motivational variables like social milieu and the sheep-goat effect, the concept of task difficulty complements these variables and subsumes them within a broader framework of assessment, skill development, and learning theory.

Based on the preliminary efforts documented here, we expect progress in reaching these goals will be a slow and meticulous endeavor as two parallel paths must be undertaken. *Firstly*, the psychometric assessments used to gauge trait ability for psi must become more streamlined and precise. Leading-edge psychometric analyses have been successfully applied to Paranormal Belief (Lange, Irwin & Houran, 2000; Lange & Thalbourne, 2002) and Transliminality (Lange et al., 2000) measures, yielding the most rigorous and precise instruments of their kind to date. That said, we fear that there is probably a substantial restricted range of measurement for existing tools that limits their current potential for the purposes described here. On the other hand, we have recently shown that some perceptual-personality variables relevant to participant screening can be reliably and significantly inferred from free-responses to simple, innocuous imagery-based tasks (Lange & Houran, submitted). This method offers one framework that can be expanded and improved, but others might prove more feasible. Addressing the psychometrics of screening for psi ability is predominantly unchartered territory.

Secondly, experimental psi tests – spanning Zener card-guessing, dice throwing and modern random number generators (RNGs), *I Ching* readings and Ganzfeld protocols – are expected to have markedly different difficulty levels. The same likely applies to various spontaneous experiences as well (cf. Houran, 2002; Houran et al., 2002; Lange & Houran, 2001; Lange et al., 2004). This means that each psi task, or paranormal experience in general, must next be evaluated separately and meticulously in order to define its difficulty level so as to approximate the ideal trait level of putative psi ability needed for success.

Pursuing the approaches proposed here could be a strategic breakthrough for funding agencies and researchers alike. Thinking about experiments in terms of a cost-to-benefit ratio allows agencies to allocate money to those studies with the greatest chance of success by using tests and subject pools that should be yield the best outcomes. In turn, researchers should work to ensure the psi tasks being used are applicable to the research populations available to them. Drawing participants from convenience samples or the general population, as is often the norm out of necessity, will likely need to be abandoned in favor of rigid pre-screening of subjects to ensure adequate alignment between ability and task. This unfortunately adds to the time and cost factors associated with psi research, but the outcomes are likely to be maximized and thus more productive. Finally, bringing parapsychology within the domains of mainstream social science can only help to de-stigmatize the field. Research emphasizing traditional principles in learning theory and broader educational psychology should appeal to broader social science journals. Publications in these forums can capture the attention of investigators currently outside the field and hopefully promote new and productive collaborations, perspectives, and results.

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Table 1. *Summary of Rasch analyses for Perceptual-Personality Measures and Success Rate on Computerized Intuition (psi) Test*

Item Location (logit)	Standard Error	Infit	Outfit	Variables
5.22	1.01	1.03	0.40	I can heal a sick or injured person with the healing energy from my mind and body
5.22	1.01	1.03	0.40	I am psychic
4.50	0.72	1.07	0.30	I am able to communicate with the dead
4.50	0.72	1.02	0.30	My bizarre predictions have often come true
4.07	0.60	1.10	0.40	I am able to communicate with supernatural forces
4.07	0.60	0.88	-0.10	I have spoken in tongues
3.76	0.52	1.13	0.40	I have experienced my physical body or objects floating in the air (levitation)
3.76	0.52	0.95	0.00	I use a ouija board on a regular basis
3.76	0.52	1.02	0.20	I can leave my body and return to it at will
3.31	0.43	0.77	-0.60	I have experienced other planes of existence beyond the physical
3.13	0.41	0.93	-0.10	I am able to move or influence objects with the force of my mind alone
3.13	0.41	1.08	0.40	I have had memories of a past life
2.98	0.38	0.96	0.00	I have tried channeling or have been a medium
2.84	0.36	0.92	-0.20	I have become aware of events that took place far away (clairvoyance)
2.84	0.36	1.15	0.60	I have communicated with the dead
2.84	0.36	0.97	0.00	At times, I have felt possessed by an outside force
2.49	0.32	0.90	-0.40	I can control my own dreams
1.96	0.27	1.08	0.50	I have had a near death experience
1.96	0.27	0.97	-0.10	I am able to see auras surrounding peoples' bodies
1.88	0.27	1.03	0.20	I have had the experience of time standing still
1.81	0.26	1.01	0.10	I have experienced objects appearing or disappearing around me (materialization or dematerialization)
1.74	0.26	0.92	-0.50	I have had an out of body experience
1.74	0.26	1.09	0.60	I can experience others' feelings as they experience them
1.55	0.25	1.00	0.10	I can influence or change an event by concentrating on that event
1.46	1.01	1.04	0.40	I have felt that I had received special wisdom, to be communicated to the rest of humanity.
1.16	0.23	0.96	-0.30	I have seen a ghost or apparition
1.06	0.22	0.96	-0.30	At times my consciousness feels expanded beyond my body
0.97	0.22	0.94	-0.50	I have had a mystical experience
0.97	0.22	1.03	0.30	I have had waking visions of an event
0.28	0.20	0.96	-0.50	I often know what others are feeling or thinking without them telling me
-0.01	0.20	0.94	-0.70	I often seem to become aware of events before they happen
-0.80	0.44	0.88	-0.50	I often have dejá vu experiences
-1.10	0.19	0.73	-1.30	There have been events that I dreamed about before the event occurred
-1.73	0.28	0.88	-0.60	I sometimes have a feeling of gaining or losing energy when certain people look at me or touch me

-1.88	0.27	1.03	0.20	I have experienced an altered state of consciousness in which I felt that I became cosmically enlightened
-1.95	0.26	0.87	-0.70	I have experienced an altered state of awareness which I believe utterly transformed (in a positive manner) the way I looked at myself
-1.95	0.26	0.99	0.00	For several days at a time I have had such a heightened awareness of sights and sounds that I cannot shut them out.
-2.20	0.09	1.12	0.90	The horoscope accurately tells a person's future
-2.41	0.08	0.87	-1.00	Astrology is a way to accurately predict the future
-2.50	**0.23**	**1.18**	**1.40**	**Success Rate on Computerized Intuition (psi) Test**
-2.59	0.08	0.96	-0.30	Reincarnation does occur
-2.62	0.08	0.79	-1.80	A person's thoughts can influence the movement of a physical object
-2.73	0.08	0.95	-0.40	Psychokinesis, the movement of objects through psychic powers, does exist
-2.85	0.22	1.00	0.00	At times I perform certain little rituals to ward off negative influences.
-2.99	0.21	0.95	-0.50	I think I really know what some people mean when they talk about mystical experiences.
-3.03	0.21	0.95	-0.50	I have sometimes sensed an evil presence around me, although I could not see it.
-3.04	0.08	0.75	-2.20	During altered states, such as sleep or trances, the spirit can leave the body
-3.11	0.16	1.45	1.60	Your mind or soul can leave your body and travel (astral projection)
-3.36	0.17	1.10	0.40	Those who know my work best would say that my gut feelings about work decisions are extremely accurate
-3.54	0.20	1.04	0.50	Often I have a day when indoor lights seem so bright that they bother my eyes.
-3.74	0.20	1.00	0.00	At the present time, I am very good at make-believe and imagining.
-3.97	0.20	0.94	-0.90	It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered.
-4.09	0.20	1.06	0.90	My thoughts have sometimes come so quickly that I couldn't write them all down fast enough.
-4.09	0.20	0.85	-2.40	A person should try to understand their dreams and be guided by or take warnings from them.
-4.17	0.20	0.91	-1.30	I have gone through times when smells seemed stronger and more overwhelming than usual.
-4.53	0.14	3.91	6.30	Mind reading is NOT possible
-4.99	0.22	1.10	1.00	I can clearly feel again in my imagination such things as: the feeling of a gentle breeze, warm sand under bare feet, the softness of fur, cool grass, the warmth of the sun and the smell of freshly cut grass.
-5.04	0.22	0.97	-0.30	While listening to my favorite music, in addition to feeling calm, relaxed, happy, etc., I often have a feeling of oneness with the music, or of being in another place or time, or vividly remembering the past.

Table 2. *Distribution of Cases Across Respondent Group (Target vs. Control) and Performance Level*

	Respondent type		
Performance	Control	Target	Total
At or below chance	95	5	100
Above chance level	46	7	53
Total	141	12	153