



# The experience of altered states of consciousness in shamanic ritual: The role of pre-existing beliefs and affective factors

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## ABSTRACT

Much attention has been paid recently to the role of anomalous experiences in the aetiology of certain types of psychopathology, e.g. in the formation of delusions. We examine, instead, the top-down influence of pre-existing beliefs and affective factors in shaping an individual's characterisation of anomalous sensory experiences. Specifically we investigated the effects of paranormal beliefs and alexithymia in determining the intensity and quality of an altered state of consciousness (ASC). Fifty five participants took part in a sweat lodge ceremony, a traditional shamanic ritual which was unfamiliar to them. Participants reported significant alterations in their state of consciousness, quantified using the 'APZ' questionnaire, a standardized measure of ASC experience. Participants endorsing paranormal beliefs compatible with shamanic mythology, and those showing difficulty identifying feelings scored higher on positive dimensions of ASC experience. Our findings demonstrate that variation in an individual's characterisation of anomalous experiences is nuanced by pre-existing beliefs and affective factors.

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## 1. Introduction

The influence of Brendan Maher (1974, 1988, 2005) has been very influential with regard to theorising about the relationships between anomalous experiences, affective biases and unusual beliefs. He, and other researchers (Bell, Halligan, & Ellis, 2006; Davies, Coltheart, Langdon, & Breen, 2001; Langdon & Coltheart, 2000), have proposed that anomalous experiences trigger the generation of unusual beliefs (e.g., delusional beliefs) via the interplay of cognitive mechanisms (e.g., processes of data gathering and hypothesis generation) and affective influences (e.g., motivational self-protective biases in attributing cause). Thus the focus has been on the bottom-up influence of anomalous experiences on belief formation via cognitive and affective mechanisms. Recent theorists (Corlett, Frith, & Fletcher, 2009; Young, 2008) have also noted the concurrent top-down influence of beliefs on the way unusual perceptual experiences are reinterpreted and reinforced. In this paper we consider the direct influence of pre-existing cognitive and affective factors in shaping the content of anomalous experience and explore more generally the relationships between belief, affect and experience. We focus on the cognitive factor of paranormal beliefs; and the affective influence of alexithymia.

Berenbaum, Kerns, and Raghavan (2000) describe a variety of phenomena that might be considered as anomalous experiences, ranging from relatively straightforward cases of unusual perception such as those experienced in synaesthesia (Marks, 2000) through to peculiar reports of near death experiences (Greyson, 2000) and possession states (Carrazana et al., 1999). Anomalous experiences are often described as involving an altered state of consciousness (ASC), the focus of

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the current study. The concept of an ASC is notoriously difficult to define. Examples of ASCs include (but are not limited to) sleep, daydreams, meditation, hypnosis, trance, sensory deprivation, dissociative states, hallucinations and states induced by psychoactive substances. The traditional approach has been to describe an ASC as a change in an individuals' pattern of mental functioning which they recognise as being qualitatively different to normal waking consciousness (Tart, 1972). Recent analyses (Móro, 2010; Revonsuo, Kallio, & Sikka, 2009; Rock & Krippner, 2007) have pointed out inadequacies with this definition, most significantly that such a conceptualisation can lead to confusion between the specific phenomenal content of consciousness and the global conscious state. Although there is disagreement over the best theoretical model of ASCs, most researchers (e.g. Hobson, 2007; Pekala, 1991; Tart, 1972; Vaitl et al., 2005; Vollenweider & Geyer, 2001) adopt a strategy of cataloguing changes in mental functions that are associated with ASCs (e.g. memory, sense of identity, emotions, attention, perception, inner speech, arousal and volition). For the purposes of this study ASCs are conceptualised as subjective changes to these patterns of mental functioning as operationalised by an empirically validated measure of altered state experience.

Despite their relatively low profile in the psychological literature, altered states of consciousness have been considered an integral part of human life since the earliest recorded times (Winkelman, 1997). Anthropological records report that over 90% of human societies sanction some form of altered state experience as a part of their everyday culture (Bourguignon, 1973). Western culture differs considerably from the rest of the world in this regard; socially sanctioned altered state experiences are rare, discouraged and met with an attitude of distrust and discredit in the Western world (Torrey, 1986; Walsh, 1998).

Yet, at the same time, Western societies are showing growing interest in indigenous cultures. A focal point of indigenous spiritual practices is the techniques and the ceremonies used to induce mystical states of non-ordinary consciousness (Eliade, 1972). While psychologists and anthropologists in the West have paid considerable attention to the specialist practitioners of indigenous spirituality, commonly referred to as shamans (Krippner, 2000, 2002; Noll, 1983), less attention has been paid to the experiences of non-indigenous members of Western society who participate in shamanic ceremonies. This study will focus on extraordinary altered states of consciousness induced in general community members living in Sydney, Australia, when they take part in an unfamiliar indigenous ceremony, in this case a Native American sweat lodge ceremony. The sweat lodge ceremony was selected since it is unfamiliar to Australians, whether of western or indigenous background and since, at the time of the study, such ceremonies were being run at several locations around Sydney, Australia. Thus this study provided a unique opportunity to investigate the experience of naïve participants in a ceremony specifically designed to induce an unfamiliar altered state of consciousness in a naturalistic setting.

A sweat lodge is a small dome shaped structure, consisting of bent wooden poles or sticks covered with thick hides and blankets. Inside, participants sit silently in near total darkness, surrounding a small pit into which heated rocks are placed. The ceremony is led by a shaman who pours water over the rocks, which then evaporates creating heat like a sauna. The shaman sings songs, tells stories, chants and plays rhythmic, repetitive drum beats. For a detailed overview of the history, role and function of the sweat lodge ceremony see Bucko (1999) and Mcgaa (1992). For discussion of the therapeutic benefits of the ceremony see Smith (2005). The sweat lodge ceremony has previously been shown by several researchers to induce an altered state of consciousness (Bucko, 1999; Eliade, 1972; McWhorter, 1994; Price-Williams & Hughes, 1994; Smith, 2005), however most previous research has taken the form of ethnographic reports or case studies. The present investigation is unique as an empirical study of participants' altered state experience, in a non-manipulated, genuine shamanic ritual.

As discussed above, one of the biggest challenges for researchers investigating altered states of consciousness has been the need for a framework to accurately describe the phenomenological characteristics of ASCs. One of the most succinct accounts of this type was provided by Dittrich (1998). Dittrich developed the APZ questionnaire (or 'Aussergewöhnliche Psychische Zustände' which translates as 'Altered State of Consciousness Scale'). The APZ measures the self-reported subjective experience of altered states. Dittrich proposed that there are three dimensions present, to varying degrees, in all altered states:

The first dimension, 'oceanic boundlessness' (OSE) refers to positive aspects of ego-dissolution. These experiences may involve heightened mood, general feelings of well being, loss of boundaries and a radically altered sense of time and absorption. In the extreme, this dimension captures the sense of ineffable profundity, sublime happiness and intense feelings of connectedness sometimes reported in altered states.

The second dimension, 'anxious ego-dissolution' (AIA), refers to negative experiences related to derealisation. This dimension thus measures fearful sensations associated with ego-disintegration such as thought disorder, loss of self-control, paranoid thoughts and anxiety. These experiences are similar to the depersonalisation and cognitive distortions associated with schizotypy.

The third dimension 'visionary restructuralization' (VUS), accounts for sensory illusions, an altered sense of meaning, synaesthetics and ideas of reference. The experiences captured by this dimension are related to perceptual distortions, body image changes, hallucinations and an altered sense of significance of objects and the environment.

Despite these common dimensions, there are considerable individual differences in responses to ASCs. In shamanic rituals such as the sweat lodge some participants may describe profound emotional or even visionary experiences while others report experiencing little more than slight relaxation or agitation. Factors which might explain this variation include any of the myriad of psychological concepts that have been used to describe the enduring characteristics of a person; beliefs, affect, personality, attachment, intelligence, health, or physical conditioning, for example. The current study focused on the influence of cognitive factors (indexed by a measure of paranormal beliefs) and affective factors (indexed by a measure of alexithymia) in determining the intensity and the type of altered state experienced.

First we considered paranormal beliefs. These beliefs have consistently been shown to be endorsed by a relatively high proportion of the general population despite the lack of any compelling scientific, rational basis (Schumaker, 1990; Thalbourne & O'Brien, 1999). Tobacyk and Milford (1983) identified seven types of paranormal belief: beliefs concerning psi (or ESP), witchcraft, superstition, spiritualism, extraordinary life forms (e.g., aliens), precognition and traditional religious beliefs. Research linking paranormal beliefs with altered states of consciousness has been limited. Some researchers have suggested a relationship between paranormal belief and hypnotisability (Wagner & Ratzeburg, 1987) although evidence for this relationship has not been replicated in a more recent, well controlled study using a standardized measure of hypnotisability (Groth-Marnet, Roberts, & Ollier, 1998). The most promising line of research linking paranormal beliefs with altered states to date has focused on the relationship between paranormal beliefs and dissociative experiences. Irwin (1994), for example, found that conviction in paranormal belief was positively correlated with degree of dissociation. This capacity to dissociate from the environment or mental processes may facilitate the experience of altered states.

While no previous studies have examined the relationship between paranormal beliefs and altered states of consciousness induced via sweat lodge ceremonies specifically, Jilek (1982) has reported on the occurrence of altered states in two similar (though more extreme) Native American rituals – spirit dances and sun dances. In his study, Jilek emphasised the importance of 'culture propaganda' (i.e., belief in both the power of the ceremony and in the shaman performing it). According to Jilek, this culture propaganda is developed through the specific training of participants prior to the ceremony and then reinforced during the (multi-day) ceremony by aspects of the ritual in which the shaman asserts his power over the participant (e.g., by symbolically clubbing the participant to death). Jilek's comments suggest that belief in the capacity of the rituals to have significant impacts on the participants' lives is specifically encouraged and developed in traditional Native American culture.

One objective of this study was to examine whether non-indigenous individuals, whose beliefs support the existence of paranormal influences, will be more likely to experience altered states of consciousness when participating in a Native American ritual or will experience more intense altered states as a result of the ceremony. There is considerable variation in the types of beliefs assessed by Tobacyk and Milford's (1983) paranormal beliefs scale. Three of the seven factors (traditional religious beliefs, superstition, and belief in extraordinary life forms) are culturally dependant and concern the existence or significance of specific phenomena (e.g., the devil, black cats and bigfoot). The remaining four factors (belief in psi, witchcraft, spiritualism and precognition) represent more universal or prototypical beliefs concerning an individual's capacities or powers. It is these latter universal beliefs which are most compatible with traditional expectations of altered state experiences occurring during a sweat lodge ceremony.

The second area of interest was affective factors, in particular, the construct of alexithymia'. Alexithymia is a personality variable which involves an inability to distinguish between inner feelings and their associated body sensations (Evren et al., 2008). Alexithymic individuals appear to lack mental representations of emotional states, leading to an inability to self-regulate emotion (Lundh & Simonsson-Sarnecki, 2002; Taylor, 2000). Alexithymia has also been associated with dissociative experiences (Clayton, 2004; Evren et al., 2008); for example both are conceived as ways to manage painful emotions (Tutkun et al., 2004). However, the link between the two is not straightforward. While research with clinical populations has found no evidence for an association between alexithymia and dissociation (Tutkun et al., 2004; Wise, Mann, & Sheridan, 2000), research with non-clinical individuals has found that level of alexithymia, particularly 'difficulty identifying feelings', predicts extent of dissociation (Elzinga, Bermond, & van Dyck, 2002). This inconsistency between clinical and non-clinical studies may have occurred because the link between alexithymia and dissociation is obscured when more extreme, clinical emotional problems are present. In accord with the above-mentioned non-clinical findings, it was predicted that the non-clinical participants in the present study with higher levels of alexithymia would experience a more intense altered state experience.

There were three aims to this study. The first aim was to confirm that participation in a Native American sweat lodge ceremony did indeed induce an ASC, indexed by change in self-reported APZ ratings.

The second aim was to explore relationships between paranormal beliefs, alexithymia and self-reported altered state experience. It was hypothesised that prototypical/universal paranormal beliefs (belief in witchcraft, spiritualism, psi and precognition) and alexithymia would be associated with a greater intensity of altered state experience.

The third aim was to assess which specific beliefs and dimensions of alexithymia were the best predictors of altered state experience. It was hypothesised that belief in witchcraft, spiritualism, psi, precognition and reduced levels of overall alexithymia would predict altered state experience.

## 2. Method

### 2.1. Participants

Participants were 55 attendees (29 male, 26 female) at the independently organised sweat lodge events of a Navajo shaman in Sydney, Australia. All participated voluntarily and were recruited independently of the researchers. Participants' ages ranged from 19 to 62 ( $M = 31.85$ ,  $SD = 10.6$ ). 74.5% (41) had completed high-school and 38.2% (21) had completed or were currently undertaking some form of tertiary education. 20.0% (11) of participants were currently students, 5.5% (3) unemployed and 74.5% (41) working. Participants came from a wide variety of religious backgrounds, 18.2% christian, 1.8% jewish, 9.1% buddhist, 10.9% pagan, 7.3% indigenous beliefs, 5.5% eastern beliefs, 3.6% agnostic, 14.5% non-religious and 23.6%

non-specific personal spirituality. No participants were of Native American descent. 80.0% (44) of participants were attending a sweat lodge for the first time.

## 2.2. Measures

*Paranormal beliefs scale* (PBS; Tobacyk & Milford, 1983). The PBS is a 25-item questionnaire using a five-point Likert scale which measures strength of belief in the paranormal. An overall score (range 25–105) is generated as well as subscale scores for seven specific dimensions: traditional religion (e.g. “there is a heaven and hell”; range 4–20); psi (e.g. “mind reading is possible”; range 4–20); witchcraft (e.g. “black magic really exists”; range 4–20); superstition (e.g. “black cats bring you bad luck”; range 3–15); spiritualism (e.g. “during altered states, such as sleep or trances, the spirit can leave the body”; range 4–20); extraordinary life forms (e.g. “big foot exists”; range 3–15); and precognition (e.g. “dreams can provide information about the future”; range 3–15).

*Aussergewöhnliche Psychische Zustände* (APZ; Dittrich, 1998). The APZ was originally developed in German (Dittrich, von Arx, & Staub, 1985) but has since been translated and validated in several languages. The instrument consists of 72 dichotomous YES/NO items which generate an overall rating of the intensity of the altered state of consciousness, as well as subscale scores for three dimensions: ‘oceanic boundlessness’ (OSE); ‘anxious ego-dissolution’ (AIA); and ‘visionary restructuralization’ (VUS). The ‘oceanic boundlessness’ subscale consists of 13 items referring to positive experiences of ego-dissolution and loss of boundaries such as “I felt as though I was floating” and “I experienced past, present and future oneness”. The ‘anxious ego-dissolution’ subscale contains 22 items which refer to negative, fearful experiences such as “I felt tormented without knowing exactly why” or “I felt a total emptiness in my head”. The final ‘visionary restructuralization’ subscale is comprised of 14 items measuring effects such as hallucinations and illusions as well as changes in the significance of objects. Items include “I saw things that I know were not real” and “Everyday things gained a special meaning for me”. The overall intensity of altered state experience is rated by the total score of three primary subscales plus 23 additional items tapping a generalised change in state of consciousness (e.g., “I no longer knew where I actually was” and “I became conscious of another ‘I’ hidden behind my usual ‘I’”).

The APZ questionnaire has been used to assess altered states induced by a wide variety of methods, both pharmacological, via, e.g., ketamine (Geyer & Vollenweider, 2008), psilocybin (Griffiths, Richards, McCann, & Jesse, 2006) or MDMA (Frei et al., 2001), and non-pharmacological, via, e.g., sensory deprivation (Norlander, Kjellgren, & Archer, 2002), hypnagogic states, hypnosis, autogenic training and sensory overload (Dittrich et al., 1985).

*Toronto alexithymia scale* (TAS; Bagby, Parker, & Taylor, 1994). The TAS consists of 20 items which generate an overall measure of alexithymia as well as three subscale scores for: ‘difficulty identifying feelings’; ‘difficulty describing feelings’; and ‘externally oriented thinking’. The latter refers to a preoccupation with the details of external events and limited imagination or fantasy. Each item is rated on a five-point Likert-type scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Items include statements such as “I don’t know what’s going on inside me” (difficulty identifying feelings), “It is difficult for me to find the right words for my feelings” (difficulty describing feelings) and “I prefer to analyze problems rather than just describe them” (externally-oriented thinking).

*Profile of mood states questionnaire* (POMS; McNair, Lorr, & Droppleman, 1971). The POMS was also included to index emotional state. It is a 65-item measure comprising six factors: tension; depression; anger; vigor; fatigue; and confusion. Items consist of very short descriptions (usually just one word) describing mood. Each item relates to one of the six factors, e.g. “uneasy” (tension), “gloomy” (depression), “bitter” (anger), “lively” (vigor), “exhausted” (fatigue) and “muddled” (confused). Participants are typically asked to rate how much they have felt each emotion during the last week on a five-point Likert scale ranging from 0 (not at all) to 4 (extremely). The total score (with some items reversed) yields a ‘total mood disturbance’ measure indicating overall presence of negative mood states. For the post-event administration of this scale the participants were asked to retrospectively rate their feelings during the sweat lodge ceremony.

## 2.3. Procedure

Data was collected at a number of sweat lodge ceremonies located throughout the greater Sydney area. Participants were asked to make a donation to the organisers of the ceremony and the amount requested was \$50. A donations box was located discreetly in a separate area to the sweat lodge and donations were not monitored in any way. In practice, participants’ payments varied from \$0 to \$50.

With regard the experimental measures, participants completed questionnaires before and after participating in the sweat lodge ceremony. At baseline, participants completed: the profile of mood states questionnaire, rating their emotions during the previous week including the current day; the APZ questionnaire, rating their state of consciousness in the preceding few hours; the paranormal beliefs scale; and a demographic questionnaire. Following their participation in the ceremony, participants again completed the profile of mood states and APZ, with instructions to base responses on their experiences during the sweat lodge.

## 3. Results

Table 1 shows the mean, standard deviation and range for the ratings of paranormal belief and alexithymia collected prior to participation in the sweat lodge ceremony.

**Table 1**  
Descriptive statistics of paranormal belief and alexithymia scores.

Measure	Mean	SD	Min	Max
<i>Paranormal beliefs scale</i>				
Total paranormal beliefs	3.10	0.52	2.08	4.14
Traditional religious beliefs	3.29	0.76	2.00	5.00
Psi	3.57	0.74	2.25	5.00
Witchcraft	3.50	0.64	2.00	5.00
Superstition	1.81	0.74	1.00	3.33
Spiritualism	3.94	0.86	2.00	5.00
Extraordinary life forms	2.50	0.84	1.00	4.33
Precognition	4.04	0.73	2.00	5.00
<i>Toronto alexithymia scale</i>				
Total score	53.04	9.18	34.00	81.00
Difficulty identifying feelings	19.37	4.65	7.00	32.00
Difficulty describing feelings	15.07	3.89	5.00	24.00
Externally-oriented thinking	18.59	3.47	8.00	25.00

Table 2 shows means and standard deviations of mood and altered state scores before and after participation in the sweat lodge ceremony. The mean scores for all altered state dimensions were higher following the ceremony. Paired sample *t*-tests were used to compare the participants' pre and post sweat lodge scores. Scores for 'oceanic boundlessness' increased significantly,  $t(54) = 7.78, p < .01$ , as did scores for 'visionary restructuralization',  $t(54) = 7.04, p < .01$ , and total altered state score,  $t(54) = 6.51, p < .01$ . Scores for 'anxious ego-dissolution', despite a slight increase, remained quite low following the sweat lodge and were not significantly different to pre-sweat lodge levels  $t(54) = 1.85, p = .71$ . Mood scale scores were significantly reduced for total mood disturbance,  $t(54) = 9.43, p < .01$ ; tension,  $t(53) = 7.84, p < .01$ ; depression,  $t(51) = 6.37, p < .01$ ; anger,  $t(50) = 8.16, p < .01$ ; fatigue,  $t(53) = 7.72, p < .01$ ; and confusion,  $t(52) = 7.33, p < .01$ .

Next we examined the relationships between paranormal beliefs, alexithymia and the altered state experiences induced by the sweat lodge (see Table 3). The total altered state score did not correlate with any of the paranormal belief scores. The 'oceanic boundlessness' subscale score did, however, correlate positively with the total paranormal belief score ( $r = .32, p < .05$ ), as well as belief in psi ( $r = .30, p < .05$ ), spiritualism ( $r = .31, p < .05$ ) and precognition ( $r = .28, p < .05$ ). There were also significant correlations between a number of alexithymia dimensions and altered state scores. The total alexithymia score correlated with overall altered state score ( $r = .33, p < .05$ ), and subscale scores for 'oceanic boundlessness' ( $r = .28, p < .05$ ) and 'visionary restructuralization' ( $r = .34, p < .05$ ). The alexithymia dimension, 'difficulty identifying feelings', was highly correlated with change in overall altered state ( $r = .39, p < .01$ ), as well as the subscale scores for 'oceanic boundlessness' ( $r = .37, p < .01$ ) and 'visionary restructuralization' ( $r = .42, p < .01$ ). Finally, the alexithymia subscale, 'difficulty describing feelings', was correlated with overall altered state ( $r = .29, p < .05$ ) and the subscale of 'visionary restructuralization' ( $r = .30, p < .05$ ).

The final aim of this study was to determine the best predictors of the different dimensions of altered state experience: 'oceanic boundlessness', 'dread of ego-dissolution' and 'visionary restructuralization'. However, as participants did not experience significant levels of 'dread of ego-dissolution' before or after the sweat lodge, this particular measure was not considered further. Predictive models were constructed using hierarchical multiple regression. Since this was an exploratory study, and in order to maximise potential relationships between variables, only scores showing a correlation with each dependent variable were entered in the regression models. No interaction terms were significant.

**Table 2**  
Mood and altered state scores before and after the sweat lodge ceremony.

Measure	Mean		Standard deviation	
	Before	After	Before	After
<i>Profile of mood states</i>				
Total mood disturbance	83.75	40.95	36.99	21.02
Tension	14.13	5.78	7.8	5.37
Depression	17.52	6.92	14.48	9.35
Anger	14.64	3.88	10.39	3.22
Vigor	14.78	14.88	6.78	6.80
Fatigue	12.35	4.91	7.14	4.45
Confusion	11.89	6.33	6.39	4.27
<i>APZ: altered states questionnaire</i>				
Total altered state score	8.15	20.95	10.31	11.44
Oceanic boundlessness (OSE)	2.04	6.11	2.69	3.25
Anxious ego-dissolution (AIA)	2.16	3.25	3.44	3.05
Visionary restructuralization (VUS)	1.16	4.60	2.21	3.18

**Table 3**

Partial correlations between paranormal belief, alexithymia and altered state scores.

	Total altered state	Oceanic boundlessness (OSE)	Dread of ego-dissolution (AIA)	Visionary restructuralization (VUS)
<i>Paranormal beliefs scale</i>				
Total paranormal belief	0.22	0.32*	0.07	0.17
Traditional religious beliefs	0.14	0.22	0.03	0.12
Psi	0.20	0.30*	0.01	0.18
Witchcraft	0.12	0.16	0.01	0.14
Superstition	0.11	0.09	0.20	0.01
Spiritualism	0.20	0.31*	−0.03	0.23
Extraordinary life forms	0.09	0.20	0.07	0.01
Precognition	0.21	0.28*	0.09	0.21
<i>Alexithymia</i>				
Total TAS score	0.33*	0.28*	0.16	0.34*
Difficulty identifying feelings	0.39**	0.37**	0.09	0.42**
Difficulty describing feelings	0.29*	0.18	0.16	0.30*
Externally-oriented thinking	0.01	0.04	0.11	−0.02

\*  $p < .05$ .\*\*  $p < .01$ .

The full regression model for 'oceanic boundlessness' with four predictors (paranormal beliefs concerning psi, spiritualism, and precognition and the alexithymia dimension of 'difficulty identifying feelings') was significant,  $F(4, 49) = 2.71$ ,  $p < .05$ . Backward elimination was used to derive a reduced model. Only one variable remained significant – 'difficulty identifying feelings',  $t(54) = 2.85$ ,  $p < .01$ , such that greater difficulty identifying feelings corresponded with greater experience of 'oceanic boundlessness'. This reduced model explains 13.5% of the variation in 'oceanic boundlessness',  $F(1, 52) = 8.13$ ,  $p < .01$ .

None of the paranormal belief factors showed a significant correlation with the altered state dimension of 'visionary restructuralization'. So for this regression, only two dimensions of alexithymia – 'difficulty identifying feelings' and 'difficulty describing feelings' – were entered into the model. The full model with these two predictors was significant,  $F(2, 51) = 5.58$ ,  $p < .01$ . Backward elimination again resulted in a reduced model with just one predictor – 'difficulty identifying feelings',  $t(54) = 3.37$ ,  $p < .01$ , such that greater difficulty identifying feelings associated with higher levels of 'visionary restructuralization'. This reduced model explains 17.90% of the variation in 'visionary restructuralization',  $F(1, 52) = 11.34$ ,  $p < .01$ .

#### 4. Discussion

The first aim of the study was to examine the effect of participation in a sweat lodge ceremony; as expected, this participation induced higher ratings on measures of altered state experience compared to baseline. Specifically, there were significantly greater experiences of 'oceanic boundlessness' and 'visionary restructuralization', while experiences of 'anxious ego-dissolution' were relatively uncommon at baseline and remained so after participation in the sweat lodge ceremony. The 'anxious ego-dissolution' experience is subjectively negative and fearful. This type of experience is often portrayed as dangerous and undesirable particularly when induced by psychoactive drugs (Hermle, Spitzer, Borchardt, Kovar, & Gouzoulis, 1993; Hermle et al., 1992; Liechti, Gamma, & Vollenweider, 2001). That these negative aspects were not experienced by the participants in this study is surprising considering the nature of the sweat lodge ceremony. Participants sit in near total darkness, with only the red glow of rocks and silhouettes of strangers visible. They remain in very close proximity to one another, enduring sustained heat and hearing only monotonous drumming and frantic singing in a foreign language for a considerable time. Such conditions would be expected to be unfamiliar to the participants (80% were attending for the first time) and, as such, might be expected to generate some level of fear or discomfort. That they did not may be due, in part, to the emotional support and guidance given to all participants by the shaman during the sweat lodge ceremony and that the sample self-selected for those expecting more positive outcomes. Consistent with this suggestion, there were marked positive changes in POMS scores after the ceremony. Changes in mood state are a key component of altered states (Tart, 1972). The variation in mood evident here suggests that the shifts indicated by the APZ scale represent a genuine shift in participants' state of consciousness rather than reflecting expectations about the ceremony or a desire to answer the altered state scale in desirable manner.

The second aim of the study was to investigate the relationship between altered state dimensions and the measures of paranormal belief and alexithymia. Whilst no measures of paranormal beliefs were related to overall altered state score, three of the prototypical/universal paranormal beliefs (psi, spiritualism and precognition) were associated with higher levels of 'oceanic boundlessness'. The relationship between paranormal beliefs and 'oceanic boundlessness' can be interpreted in two ways. First, higher levels of paranormal beliefs accommodating the mythology of the sweat lodge may have increased

sensory change during the ceremony. Alternatively levels of sensory change may have been similar, regardless of the depth and the type of paranormal belief, while there was a greater tendency for the individuals with prototypical/universal paranormal beliefs to interpret such changes as positive experiences of 'oceanic boundlessness'. We think the latter more likely since the strength of paranormal beliefs, of any type, was not a significant predictor of the general intensity of altered state experience being induced by the sweat lodge ceremony.

The predictions concerning affective factors were supported by the current data as there was a positive relationship between alexithymia and intensity of the altered state of consciousness. The facilitatory impact of alexithymia on altered state experience may relate to an ability to detach from personal experience. The altered state experienced by participants in the sweat lodge involves a calm, meditative state in which many individuals feel detached from their body or personal identity. As discussed previously, feelings of dissociation from bodily and mental processes have frequently been linked to altered states of consciousness (Edge, 2004; Luhrmann, 2004). Instructions to consciously and purposefully detach from cognitive and emotional processes are also an explicit part of many meditative altered state inductions. In mindfulness meditation, for example, participants are instructed to focus all their attention on their breath and allow any thoughts and emotions to pass over them without paying them any attention (Grossman, Niemann, Schmidt, & Walach, 2004). Similar instructions are given in the sweat lodge, with participants encouraged to focus their attention on the glowing rocks in front of them or the beat of the shaman's drum. The aim of such techniques is a purposeful detachment from normal rationalisations and emotional responses to the challenging environment. In a similar vein, Harner (1982) and Krippner (2000) have described the altered states which occur in shamanic contexts as primal physiological responses to unusual stimuli. Individuals who have difficulty identifying their feelings may thus be more able to directly experience these primal physiological responses without being distracted by reflective cognitive and emotional processing.

The final aim of the study was to investigate the best predictors of altered state experience. The alexithymia subscale, 'difficulty identifying feelings', was the only significant predictor of both 'oceanic boundlessness' and 'visionary restructuring'. There are two possible explanations of this finding. Firstly, the relationship between alexithymia and altered states of consciousness may be mediated by a more general tendency to dissociate as discussed above. Alternatively, difficulty in identifying one's own emotions may directly facilitate the experience of altered states. Entering an altered state of consciousness involves shifts in a range of psychological processes, not all of which are related to emotional experience. Whilst non-alexithymic participants may tend to become distracted by emotional aspects of the experience, alexithymic participants, due to their inability to identify such emotions may be more able to focus on subtle, non-emotional components of the ritual, enabling a more pronounced altered state experience.

In summary, findings of the current study demonstrate the influence of pre-existing cognitive (belief in the paranormal) and affective (alexithymia) factors on the characterisation of an altered state of consciousness resulting from participation in a Native American sweat lodge ceremony. More generally these findings suggest a more complex relationship between anomalous experiences and cognitive and affective processes than is typically described in the literature. Rather than being psychological abnormalities which result from anomalous experiences, our findings demonstrate that pre-existing unusual beliefs and affective biases can themselves influence the degree of occurrence and/or the characterisation of such anomalous experiences. Future research into the aetiology of psychopathologies related to anomalous experience, particularly delusional beliefs, may benefit from further consideration of these more complex, bidirectional relationships.

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