Engraved art and acoustic resonance: exploring ritual and sound in north-western South Africa

Riaan F. Rifkin*

At a hill-top site in the Korrannaberg, where there is a water source and a sandy arena embraced by a rocky ridge, the author persuasively evokes a lively prehistoric ritual centre, with rock gongs, reverberating echoes, dancing and trance.

Keywords: South Africa, Korannaberg Mountains, prehistory, San people, shamanism, rock art, music, rhythm, trance, dance

Introduction

There exists a vast corpus of literature dealing with the significance of the landscape in foraging societies and with studies concerning landscapes and rock art (e.g. Deacon 1988; Hartley & Wolley Vawser 2002; Ouzman 2002; Arsenault 2004; Chippindale & Nash 2004; David 2004; Flood 2004; Hyder 2004; Lenssen-Erz 2004; Smith & Blundell 2004). In general terms, the landscape is perceived as a socially- and culturally-constructed phenomenon, a 'mindscape', which is as symbolic and conceptual in character as it is geomorphological (Geana 1980; see also Ouzman 2001; Arsenault 2004). Topophilia, the feeling of a strong emotional attachment to familiar places (Tuan 1974: 92), is a widespread cultural phenomenon.

Recent anthropological and geographical explorations of the interplay of the senses (e.g. Stoller 1989; Howes 1991; Pocock 1993; Tuan 1993; Solomon 2000) critique the exclusively vision-based epistemology, calling for the exploration of the roles of the other senses, of which there may be no fewer than 21 (Durie 2005: 36), in the cultural patterning of perception. Writing explicitly about the realm of sound, Schafer (1985), building on the concept of 'acoustic space' as developed by Carpenter and McLuhan (1960), explores the soundscapes of living environments. That enquiry aimed to illustrate that the concepts of landscape and topophilia do not stand in isolation, but are augmented by what may be termed a cosmologically-prominent 'soundscape' (e.g. Waller 1989; Feld 1994; Leeds 2001). It has been established that music maintains social structure and reinforces group identity, be it among the Suya of Brazil, the Kaluli of Papua New Guinea, the Temiar of Malaysia, the Chayantaka of Bolivia, Aboriginal groups in Australia, or the linguistically distinct San

* *Rock Art Research Institute, University of the Witwatersrand, Private Bag 3, Wits, 2050, South Africa (Email: rianrifkin@yahoo.com)*

Received: 22 August 2008; Revised: 17 November 2008; Accepted: 26 January 2009

ANTIQUITY 83 (2009): 585–601

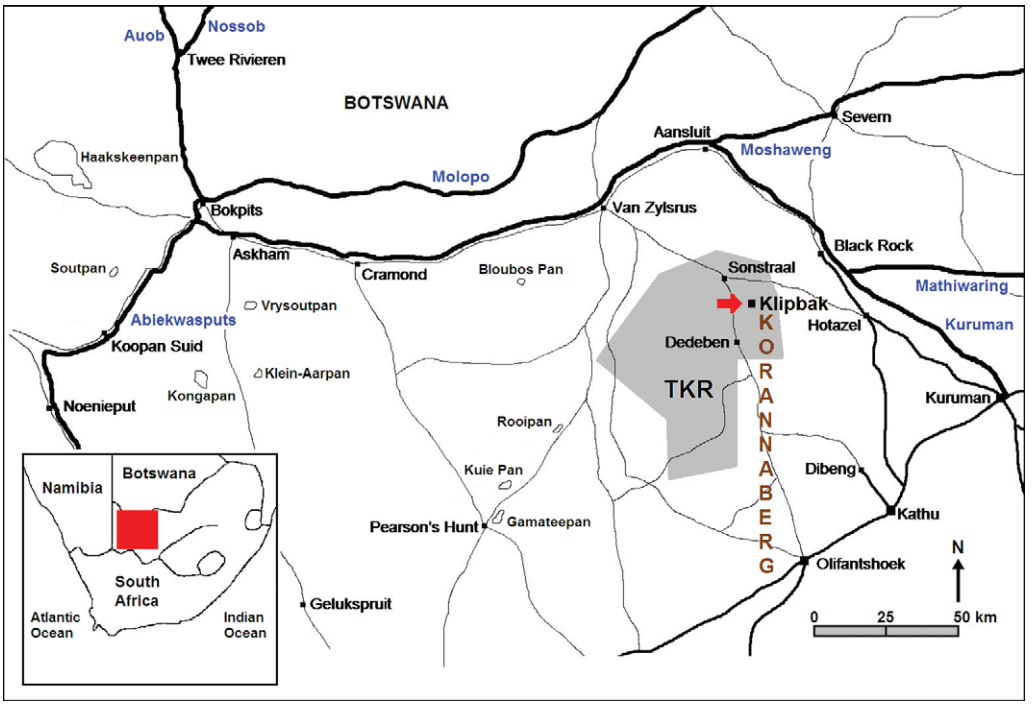

Figure 1. Map of South Africa showing the location of the Korannaberg, Tswalu Kalahari Reserve (as TKR and in grey), and the Klipbak I engraved site (arrow and inset in red).

foragers of southern Africa (e.g. Marshall 1969; Seeger 1987; Devereux 2001; Connel & Gibson 2003; Barac 2004).

Accordingly, while ethnographic evidence alludes to the existence of intimate associations between San foragers (who formerly inhabited the semi-arid western regions of southern Africa) and particular geographic features (e.g. Bleek & Lloyd 1911; Bleek 1933, 1935, 1936a; Barnard 1979; Deacon 1988), the present paper explores the unique character and socio-religious significance of music, performance and echoing sound amongst San forager groups. To accomplish this aim, I focus on an engraved location known as Klipbak I. The site, located within the Tswalu Kalahari Reserve, is positioned on top of an isolated hill in the Korannaberg Mountains in the Northern Cape Province of South Africa (Figure 1). The entire site is situated within an elliptical basin which is bordered on the northern, eastern and western edges by low-lying rocky ridges. It is from these encasing ridges that, on account of human intervention, particularly fascinating echoes emanate.

The Klipbak I site exhibits well-preserved examples of engraved human figures, animal figures and circular motifs, all of which are of the pecked (outline and infill) engraved type. A total of 948 culturally-produced marks occur at the site, the preponderance being located on a smooth horizontal surface adjacent to a sandy area and a natural cistern or *klip-bak* (Afrikaans for rock-bowl). Of these, 856 comprise spherical ground hollows or 'cupules', with 85 banded circular motifs, 32 abraded shallow elliptical hollows, 9 animal figures and 2 human figures (Figure 2).

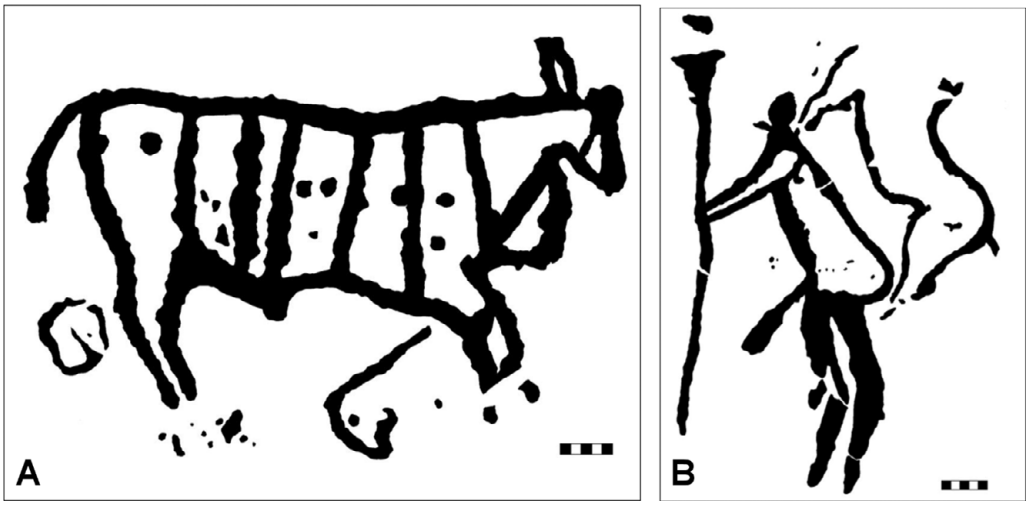

Figure 2. Re-drawings of the pecked engraved eland antelope (A) and human figure (B) from Klipbak I. Scale bars represent 50mm.

Ascertaining the temporal depth of material cultural remains, whilst stated to be notoriously difficult to attain, is nevertheless of primary importance – it is archaeology's 'defining purpose' (Chippindale & Taçon 2002: 107). Examples of engraved art have been dated to 8400 years (Whitley & Annegarn 2001: 194), 4000 to 10 000 years (Thackeray *et al*. 1981: 66), and perhaps even up to 60 000 to 80 000 years in age (Mitchell 2002: 98). Although no attempt has yet been made to date the art at Klipbak I, the archaeology of the site suggests an extensive degree of human occupation of the hill-top. Test excavations have yielded lithic remains symptomatic of human presence during the Early Stone Age, the Middle Stone Age and the Later Stone Age. In addition, surface finds such as foreign lithic raw materials, crude ceramic remains, concentrations of charcoal, fragmented ostrich egg-shell, lithic waste and a single blue glass bead suggest firstly that Klipbak I may have functioned as a place of seasonally-based social aggregation, and secondly that the people who utilised Klipbak I interacted with other socio-economic groups in the region.

Engravings and ethnography

Ethnographic sources are essential to the interpretation of rock art in southern Africa, and in this case much insight is gained from the San ethnographies recorded during the 1800s (e.g. Arbousset & Daumas [1846] 1968; Bleek & Lloyd 1911; Bleek 1933, 1935, 1936a) and also during the twentieth century from the !Kung San (Ju/'hoan) of the Kalahari Desert (e.g. Lee 1968; Marshall 1969; Heinz 1972; Biesele 1978; Katz 1982). It has furthermore been established that San hunter-gatherer rock art is characterised by particular subject matter and postural characteristics (Vinnicombe 1976; Lewis-Williams 1984, 2006), and these thematic and stylistic features advocate that the representational depictions at Klipbak I is San-authored. Remarkably, painted depictions displaying the distinctive therianthropic element date back some 26 000 years (see Wendt 1976: 6), suggesting some degree of continuity

in the cosmology and ideology of southern African San foragers (Lewis-Williams & Pearce 2004: 45). I now attend to the abraded hollows and the representational engraved imagery present at Klipbak I.

Abraded surfaces

The occurrence of 32 abraded hollows on an even horizontal surface, together with their characteristic grindstone-like morphology, suggest that they most probably resulted from the mechanical processing of aromatic and medicinally-used plants (e.g. Bleek & Lloyd 1911: 192; Bleek 1933: 298; Schmidt 1979; Hoff 1998). At present, the San of the region still use grindstones to process tsama melon (*Citrullus lanatus*) and gemsbok cucumber (*Acanthosicyos naudiniana*) seeds. Stone surfaces were also used for sharpening arrowheads and spear blades and for sanding down the edges of ostrich egg-shell beads (Steyn 1984: 119). The proliferation of aromatic plants atop the Klipbak hill may have contributed to the situational and ritual significance of the site, and the abundance of these species is also believed to relate to the occurrence of the abraded surfaces. Fragrant smells have an unconscious but tremendous impact on our moods, abilities, body chemistry and also body odour (Solomon 2000; Durie 2005), and much ethnographic evidence exists for the significant role of the olfactory sense in both !Kung and /Xam San society (e.g. Bleek & Lloyd 1911; Bleek 1933; Marshall 1969; Hewitt 1986; Deacon 1988; Hoff 1998).

The use of an aromatic plant known as *buchu* in a range of ritual and medicinal contexts is well documented in the San ethnographies (e.g. Bleek & Lloyd 1911: 192; Bleek 1933: 298; Schmidt 1979; Hoff 1998). *Buchu* was prepared by grinding the selected plant parts into a fine powder. It was also customary for people approaching a water source to powder their bodies with *buchu*, and upon arrival at the source, to sprinkle *buchu* over the water to appease the Water Bull (Bleek 1933: 300). The !Kung San also use a number of highly aromatic plants for healing and curing during trance ceremonies (Marshall 1969: 360; Katz 1982: 39). These are prepared by being roasted, after which the charred remains are ground to a fine powder. The powdered ingredients are placed in a tortoise shell or pouch, mixed with marrow and fat, and a glowing coal is added to produce smoke medicine, *‿!go n/um*. The smoke, which has powerful medicinal properties, is wafted over the person being healed. The inhalation of the smoke may also assist people to enter a trance state (England 1968: 421; Marshall 1969: 360). Many aromatic plant species thrive in these hills, of which *Tarchonanthus camphorates* (wild camphor) and *Croton gratissimus* (lavender croton) are the most common. There is sufficient historical and pharmaceutical evidence to verify the narcotic effects that the dried leaves of *T. camphorates* and *C. gratissimus* would have had in the event of it being either chewed (Beentje 1999) or smoked (Watt 1967).

Engraved imagery

Given that ritual may be viewed as a vehicle for communicating information (Geertz 1993: 89), it is rational to assume that ritual practice also involves motifs, such as engraved depictions, that either correspond to or communicate such information (Ross & Davidson 2006: 336). I argue that, in addition to the abraded hollows, the engraved human and animal depictions at Klipbak I also signify the events that occurred at the site. The engraved

animal figures – eland and giraffe – relate to supernatural potency and their role in the trance experience, healing or curing performances, and also in rain-making rituals. According to the !Kung, the giraffe (*Giraffa camelopardalis*), possesses some of the strongest supernatural potency, and it is believed that the *Giraffe Song Great* is capable of curing any sickness (Marshall 1969). In addition, both the nineteenth- and twentieth-century /Xam and !Kung San ethnographies confirm that the eland antelope, *Taurotragus oryx* (Figure 2A) was a central and pervasive symbol in San spiritual thought (Lewis-Williams & Biesele 1978: 117; Thackeray 2005: 5-18). The eland was also closely associated with and even identified as the rain, and the supernatural potency of eland was and still is greatly desired by San ritual specialists (Lewis-Williams & Biesele 1978: 121). The manufacture of rain was entirely dependent on the capture and slaughter of a rain animal. The capture of the rain creature or *!kwa-ka xoro* was carried out by rain-shamans or *!kwa:-ka !gi:ten*, usually at night-time, and followed by the ritualistic slaughter of the rain animal atop a nearby hill (Bleek 1933: 378; Deacon 1988: 136). //Kabbo, a nineteenth-century San informant of Wilhelm Bleek and Lucy Lloyd (Bleek 1933: 309), notes a plea to *!kwa:-ka !gi:ten* for rain; *'. . . you must please go and cut the rain at the great waterpits which are on the mountain . . . I will really ride up the mountain on top of which I always cut the rain. It is high, so the rain's blood flows down . . . '*. Water sources were also pivotally placed between the camp and the hunting ground and between the subterranean realm and the sky, fulfilling essential transformative and restorative functions (Lewis-Williams & Pearce 2004: 52).

Several features of the engraved human depiction point towards shamanic trance and rain-making (Figure 2B). In addressing the fundamental physicality of gesture and posture as a conduit, not to ritual, but to religious experience, Morris and Peatfield (2002: 115; see also Keeney 2003: 150) argue that particular body postures are just as effective in inducing trance states as is sensory deprivation, repetitive rhythmic movement, sound and hallucinogens (Eliade 1964; Furst 1972; Harner 1973). Goodman (1986) observed that the trance experience was often initiated by deliberately restricted postures, and went on to identify several categories of trance experience associated with specific postures. The body itself may therefore be viewed as an effective vehicle for the achievement of altered states of consciousness, and such mystical experiences are in turn embodied in the arts of many shamanistic societies, including that of the San.

Historical accounts provide further insight into the spiritual relevance of the engraved human figure. In 1812, William Burchell (1953: 46) observed a dance performed by a group of San in the Prieska district of the Northern Cape. He noted the presence of dancing rattles around the ankles of the performers, and stated that *'. . . he went through his evolutions in the limited space within the ring, leaning upon two sticks, singing while he danced, and keeping time. . . '*. Some days after this, Burchell observed a similar dance, this time performed during night-time. The staff- or stick-like objects observed by Burchell and photographed by Dorothea Bleek (1936b) in the same region a century later are a notable feature of San rock art.

Nicholas England (1968: 445), Lorna Marshall (1969: 358) and Richard Katz (1982: 39) also describe how men frequently carry sticks while they dance (e.g. Figure 3). Sticks are used mostly for balance but may also be held out in front of the person dancing or swung around and over the heads of the singing women (Marshall 1969: 363). When curing dance

Figure 3. Photograph of a medicine dance at Gautscha, Central Kalahari, taken during June 1953. The dancing-sticks employed by the men to the left and centre of the photograph are clearly visible (Marshall 1969, photograph no. 2).

participants, shamans also use their sticks to suspend their *dzem*, the medicine-filled and smoking tortoise-shell containers (England 1968: 422).

When Diä!kwain, another informant of Bleek and Lloyd, was asked to comment on a copy of a rock painting depicting a man, five women and a lone steenbok, he replied: *'This man who stands in front seems to be showing the people how to dance; that is why he holds a stick, for he feels that he is a great man . . . he is the one who always dances first, because he is a great sorcerer'* (Bleek 1935: 11). Apart from the large staff-like object held by the engraved figure, the animal-like articulation of the legs is also significant. Shamans in trance obtain potency from and believe that they transform into animals, and this belief may relate to this therianthropic depiction and the non-human articulation of the legs (Lewis-Williams & Pearce 2004). The figure's enlarged phallus is also significant as San shamans were perceived as extremely sexually potent (Katz 1982: 113). In combination, these features suggest that this image depicts a powerful shaman in a dancing posture and in a state of trance and transformation. It is therefore conceivable that the depiction is indicative of the communal ritualised acts performed at this site.

The spatial dimensions of ritual performance

Although the original objective of ethno-musicology was to study and record the music of traditional and, primarily, forager societies in remote regions of the globe, recent ethno-musicological work has expanded to recognise the tremendous diversity of musical production and consumption in traditional and modern contexts alike (Devereux 2001; Connell & Gibson 2003; Barac 2004). Ethno-musicological studies provide much insight into the social and religious significance of song and music in pre-industrial societies. These

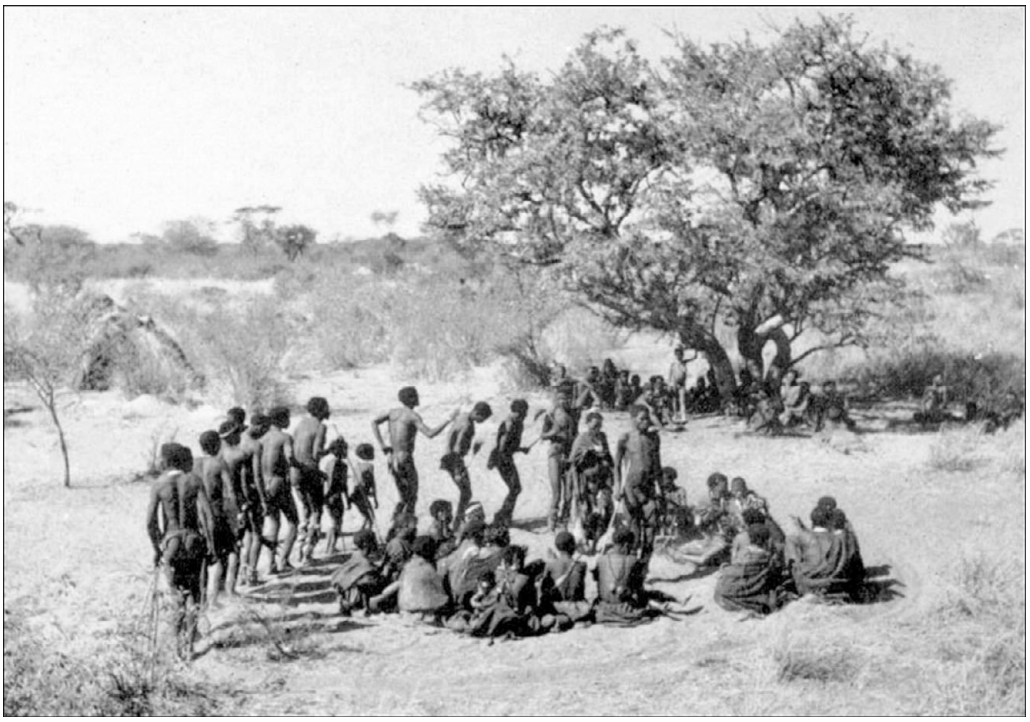

Figure 4. Photograph of a medicine dance at Gautscha, Central Kalahari, taken during June 1953. Note the n≠ebe or dance-groove and the positions of the singing and clapping women (Marshall 1969, photograph no. 1).

modern ethnographies have, for example, shown how the participation of all members of Temiar (Malaysia) in curative medical practice constitutes a formal mode of communal physical and spiritual healing (Connell & Gibson 2003). It seems rational to view the San communal trance or healing rituals in a similar light. They constitute a collective activity which is centred on rhythmic percussion and vocal sound and which aims to heal, in both a spiritual and physical sense, all participating members of the community (e.g. Marshall 1969; Lee 1979; Katz 1982; Biesele 1993).

According to Lorna Marshall (1969: 349), *'The medicine dance is the one activity in !Kung life that draws people together in groups that are of considerable size and are not shaped by family, band, or close friendship. Nothing but a medicine dance assembles all the people into a concerted activity. And, conversely, an assemblage of people induces a medicine dance*'. Richard Katz (1982: 36) also characterises the trance dance as providing a focal point for San culture: *'The dance is the Kung's primary expression of religion, medicine, and cosmology. It is in fact their primary ritual.'*

Nicholas England (1968) and others (e.g. Lee 1968; Marshall 1969; Yellen 1976; Barnard 1979; Katz 1982), have described in detail the structural characteristics of the trance dance as performed by the Kalahari Ju/'hoan. Typically, an open area which is not too far from and often in the centre of the encampment was selected to perform the dance. During the dance a deep dance-groove or $n \neq ebe$ of some 150mm deep and 5-10m in diameter is formed (Figure 4). According to the Ju/'hoansi, the singing, clapping and sound of swishing rattles,

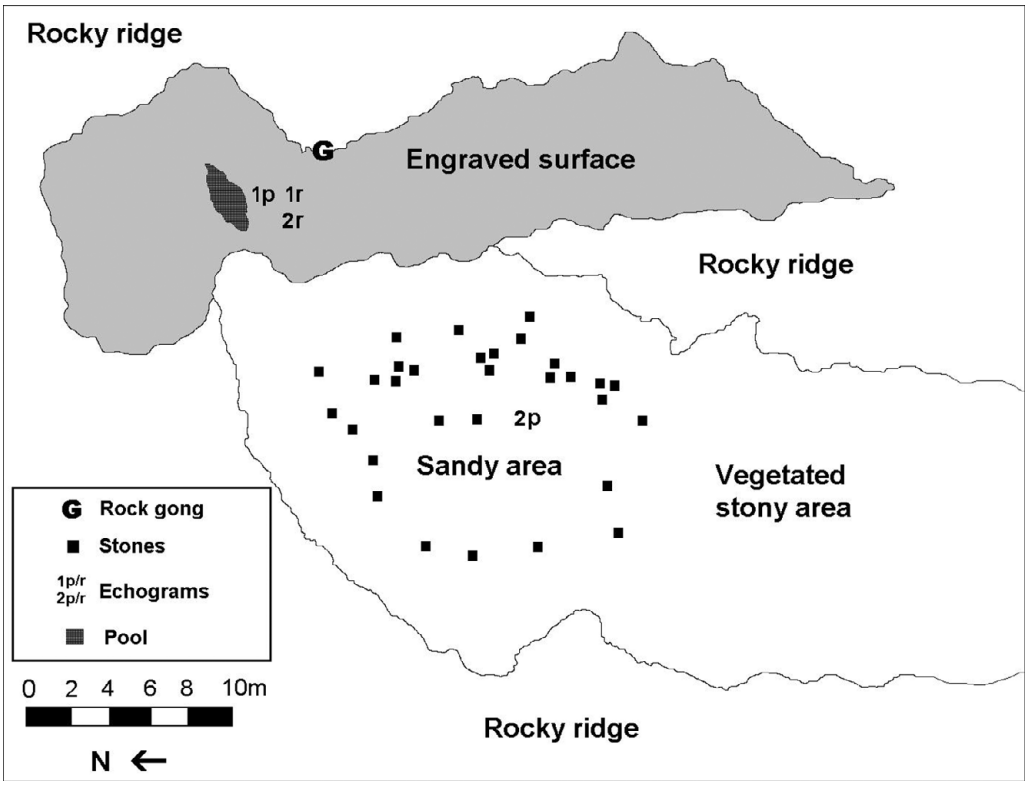

Figure 5. Site diagram of Klipbak I illustrating the relationship between the engraved surfaces, the water pool, the sandy area and the circular arrangement of stones.

the fire and the dancing awaken their hearts and their *n/om* (Marshall 1969: 354; Katz 1982: 34). In this regard, /Han ≠ kass'o, a further nineteenth-century /Xam San informant, stated that *'. . . the men dance well on account of it, while they feel that the drum which the women beat . . . and the dancing rattles which the men tie around their feet . . . sounds well . . . therefore, they sound nicely, because they are good'* (Bleek & Lloyd 1911: 351).

It is of significance to note that, at Klipbak I, a circular structural arrangement of 29 large stones exist in the sandy area below the engraved rock surface (Figure 5). It is highly improbable that standard environmental dynamics could have been responsible for the occurrence of such a circular structure. In fact, the structural arrangement appears to be of a sufficient shape (semi-circular) and diameter (approximately 10m) to indicate that this clearing functioned as the open circular and communal area around which the inward-facing huts of nuclear family units were constructed (e.g. Marshall 1969: 357; Yellen 1976: 63-4; Barnard 1979: 75; Katz 1982: 60; Lee 2003: 34).

Given the centrality of the trance-dance in San society, and seeing that there is a close association between ritual acts and accompanying music, I now consider the significant role of percussive and reflective sound in the performance of communal ritual acts.

Acoustics and echoes

Apart from a few publications dealing with the relationship between sound and rock art (Reznikoff & Dauvois 1988; Steinbring 1992; Ouzman 2001; Arsenault 2004), most researchers have relied primarily on the *visual* in their interpretations. This dependence on the visual is considered by some to have restricted our perception of the cultural significance of rock art sites (e.g. Waller 1989, 1993, 2001; Ouzman 2001; Goldhahn 2002; Rifkin 2005). The significance of sound in ritual has received some attention in the spheres of anthropology and rock art studies (e.g. Needham 1967; England 1968; Scarre 1989; Waller 1993; Devereux 2001; Ouzman 2001; Arsenault 2004; Barac 2004; Rifkin 2005).

Worldwide, ritual acts are accompanied by the production of sound, be it in the form of singing, clapping, the stamping of feet, or through creating percussive sound by means of beating both organic and inorganic substances (Crawley 1912). Percussion has therefore played a central role in effecting shamanic transformations on many continents and in contacting supernatural and spiritual realms (Eliade 1964: 179; Needham 1967: 607). For example, Diä!kwain stated that *'. . . mother used to tell us that she would beat the ground with a stone, to see what could be the matter . . . when we beat the ground we beg of the people who own game; that is why we beat the ground, for it is a prayer'* (Bleek 1935: 41). The fact that people could communicate with shamans or spirit-beings residing in the supernatural realm simply by beating a stone on the ground, suggests that even supposedly mundane objects and percussive activities may have been of supernatural consequence. Sound may also facilitate movement between mental states and assist shamans to enter the spirit world (Crawley 1912; Eliade 1964; Katz 1982; Eibl-Eibesfeldt 1989; Devereux 2001; Fachner & Rittner 2004). The clapping and the sound of rattles in the San medicine dance thus enable shamans to cross the painful threshold between states of consciousness that they themselves describe (England 1968: 485; Marshall 1969: 373). In addition, music and song, and the related rhythmic character thereof, also function as mnemotechnic devices that play a significant role in the enhancement of memory and, as a result, in the transmission of social, cultural and spiritual information (Vansina 1985; Blacking 1987; Biesele 1993). I now argue that percussive sound was an integral part of the performance of trance rituals at Klipbak I and that it also relates pertinently to the engraved depictions.

Resonant rocks

Rock gongs are naturally occurring boulders of varied geological origin that rest on larger rocks and which emit a harsh metallic and often ringing sound when struck. The sound produced by such gongs is generally limited in tone, but some, and perhaps also the gong at Klipbak I, appear to have a wider three-octave range (e.g. Kirby 1972: 247). The percussion marks on such rock gongs are in most cases clearly discernible and appear to coincide consistently with the most suitable places from which to coax the characteristically hollow metallic sound (Goodwin 1957; Malan 1959; Fock 1972; Ouzman 2001). Many gong rocks are engraved and display imagery consistent with what is generally believed to be San authored art (Robinson 1958; Cooke 1964).

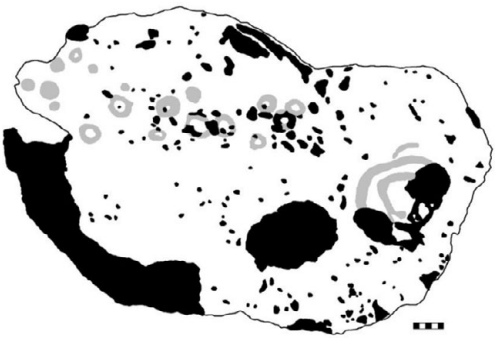

Figure 6. Re-drawing of the engraved rock gong at Klipbak I. Engraved motifs are illustrated in grey. Solid black represents severely hammered areas. Scale bar represents 50mm.

At Klipbak I the upper and front face of the gong exhibits a series of 11 banded and connected circular motifs, 7 ground cupules, and numerous surfaces bearing concentrations of percussion marks (Figure 6).

Given the position (Figure 5) and acoustic resonance of this gong rock, it is highly probable that it was implicated in the production of rhythmic percussive sound. The full aural significance of the gong is elucidated when one considers the echoing character of the sickle-shaped arena in which it is situated.

Echoes

Globally, a number of rock art sites have been documented as possessing exceptional sound reflection in the form of echoes and aural resonance (see Waller 2001 for a review). It is becoming increasingly evident that sound reflection may have been an essential motivating influence in the production and placement of rock art. In many cases the positions of rock art coincide with the exact points from which echoes emanate (e.g. Reznikoff & Dauvois 1988; Scarre 1989). The implication of the echoic qualities at San rock art sites is further clarified when we consider the importance of the rock surface itself. The rock-face was viewed as a permeable veil through which shamans could enter the spirit world (Lewis-Williams & Dowson 1990: 15). A relationship between echoing and the notion of a spirit world behind the veil is further supported by /Han ≠ kass'o, as recorded by Bleek and Lloyd in 1878: *'O beast of prey! Thou art the one who hearest the place behind, it is resonant with sound'* (1911: 247). This phrase is interpreted as referring to a powerful shaman (*beast of prey*) who is familiar with and visits the spirit world (*place behind*), a place which is resonant with sound (Ouzman 2001: 243). It is therefore conceivable that locations with marked acoustic characteristics were perceived as the dwelling places of spirits, and that such places were regarded as possessing vast amounts of supernatural potency. Aurally perceiving these echoes, or actually hearing them, is an important prerequisite for appreciating their significance and for attaching some sort of supernatural significance to them. Because these echoes are of a primarily low frequency intensity (less than 20Hz), the bulk of the acoustic events is physiologically sensed or physically felt, rather than heard.

To confirm the unique echoic character of Klipbak I an experiment involving the production and recording of percussive sound was conducted. Echoes were recorded at eight locations in the natural arena in which the site is situated. Significantly, no distinctly audible echoes were evident from the elevated areas away from the arena and the engravings. The acoustics of rock art sites can be studied in a similar manner to that of architectural acoustics. The impulse response is characterised by plotting the increase in audible sound in decibels

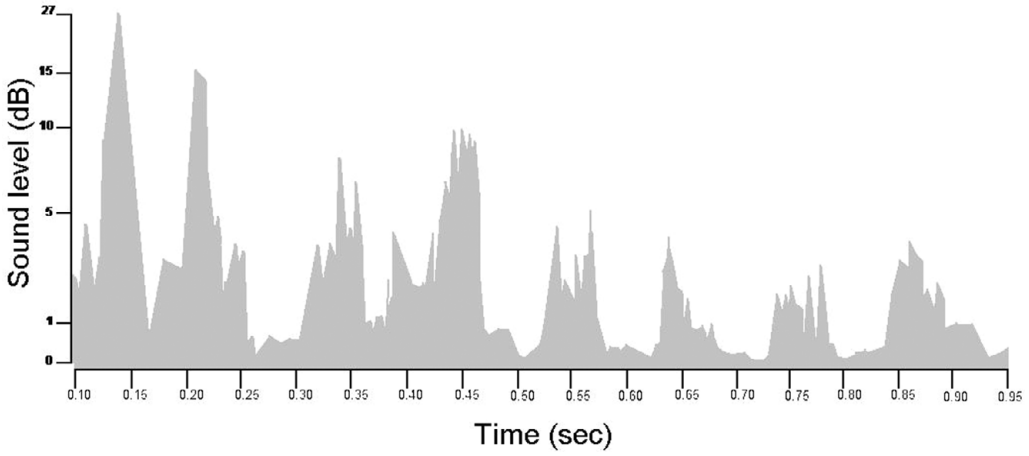

Figure 7. Echogram of 0.10 to 0.95 second duration recorded at Location 1, Klipbak I.

(dB) on the Y-axis, and the frequency or progression of time in seconds (sec) on the X-axis (Waller 2002). At Klipbak I a sharp percussive noise was produced by striking together a wooden clave and wooden block, and both the produced and reflected sounds were recorded with a Sony IC Digital Recorder. The sound was processed and analysed by the Adobe Audition 1.5 Sound Editing Programme. Such quantitative sound level measurements aim to document objectively the presence of significant sound reflection at rock art sites.

Both the percussive stimulus and the resultant echo were recorded at the main concentration of engravings adjacent to the water source (Figure 5, 1p and 1r). The sound created by the eight individual yet closely spaced echoes occurs as a low-tone reverberation which, when digitally delayed and enhanced, sounds like a bullroarer. Because of their occurrence in such short bursts of time (approximately 800 milliseconds), they are aurally perceived as a single acoustic event. The recorded result for this location (Figure 5, 1r) is illustrated in Figure 7 and clearly confirms the existence of a sequence of echoes.

The reflected sound peaks at 27dB above the ambient (0), and is separated from the artificially produced percussive stimulus by 0.10 seconds. This delay is directly and immediately detected by the human ear. In several instances the audibility of the echoes actually increases over time. This occurs, for example, on the engraved surface adjacent to the water source (Figure 5, 2r) when percussive sound is produced in the sandy area below (2p). The reverberations occur over a shorter duration (400 milliseconds), and the eighth returning sound impulse (350 milliseconds after the initial percussive stimulus) is in fact much more perceptible aurally than the initial returning echoes.

Sound and healing at Klipbak I

The echoes at Klipbak I are of interest for two reasons. First, this is an open-air site and the presence of echoes is, in contrast to what one would expect from caves and rockshelters,

Figure 8. Photograph of Klipbak I illustrating the position of the engraved surface and water-source (at bottom right and continuing towards the left), the sandy area in which the arrangement of stones are found (at centre), and the rocky ridges opposite the engraved surface from which the resonating echoes derive.

unusual. Even though at least four additional engraved locations in the nearby vicinity do exhibit marked acoustic-echoic characteristics, these are located within ravines, the rocky edges of which are to be expected to produce echoes. These are not, however, as pronounced as those emanating from the encasing ridges at Klipbak I. Secondly, the echoes at Klipbak I materialise not as a single acoustic event, but as sets of reverberating pulses which comprise a series of closely concurrent echoes. The notable degree of acoustic back-scattering within the arena creates the impression that the echoes emerge from variable locations and that they in fact surround the listener (Figure 8).

Such peculiar sound effects at rock art sites are consistent with and may, at least partly, have been the foundation of the belief that behind the rock surface there is a spirit world resonant with sound. It has been established that the rock-face was viewed as a permeable veil through which San shamans could enter the spirit world. Remarkably, some of the engraved images at Klipbak I (e.g. Figure 2) demonstrate the practice of making use, through assimilation, of natural cracks and fissures in the manufacture of engraved images. These create the illusion that the images either disappear into or emerge from the rock face. Since it is apparent that a belief in the existence of such a veil which formed a permeable divide between this and the spirit world was widespread, it is arguable that sound reflection locations were perceived as the dwelling places of spirits and that such places were consequently regarded as possessing vast amounts of supernatural potency. The illusion of depth, created by sound reflection,

together with the phenomenon that echoes can be experienced as voices calling out from within the rock, could certainly have been a likely inspiration for the widespread belief in a spirit world within the rock. Moreover, the presence of a water source, which functioned as a portal to the spirit world and the place in which the *!khwa-ka xoro* resided, greatly augmented the spiritual implication to this place.

Conclusion

Klipbak I offers a valuable glimpse into the structural nature of (pre-)historic ritual activity. Equivalent sites, at which the structural remnants of prehistoric ritual performances are so clearly visible, are yet to be identified. This site, as an engraved soundscape within a cultural landscape, offers salient insight into the locational nature and performance of curing rituals and also on the actual and perceived neurological, psychological and physiological effects of communal musicologically-governed healing performances. The musicological and percussive activities associated with San trance and healing performances, such as the singing of medicine songs, the women's rhythmic clapping and the stamping of the men's feet, and the sound of swishing dancing rattles and resonating rocks are not at all incidental (Marshall 1969: 365). Whilst the making of painted imagery is dependent on the recollection of visions subsequent to trance experiences, engravings, through their process of manufacture, may in fact have formed an integral part of the achievement of altered states. Analogous to the way in which the clapping of hands, the stamping of feet, and the sound of rattles assist shamans to cross the threshold between mental states during trance performances, the incessant percussive noise resulting from the striking of rock gongs and from the manufacture of cupules and pecked engraved images may have had a similarly trance-inducing effect (e.g. Needham 1967; Waller 1993; Ouzman 2001). Apart from the aural pleasure and mythical references of the echoes, it is apparent that it is their reverberative character, and its profound neurological and physiological influence, that is of primary stimulatory and spiritual and restorative consequence (e.g. Needham 1967; Marshall 1969; Schafer 1985; Pocock 1993; Waller 1993; Valentine 1995; Kahn 1999; Leeds 2001; Brewer 2003; Fachner & Rittner 2004).

Among the insights generated by this and other studies concerned with music and place (e.g. Ivade 1994; Valentine 1995; Kahn 1999; Solomon 2000; Ouzman 2002) is the notion that musical performance serves as a practice, not only for place-making, but also for identity-construction. This follows from the understanding that music does not simply reflect pre-existing cultural structures, but, instead, that musical performance is a social activity through which culture is created, negotiated and performed (Seeger 1987). As Stokes (1994: 3) suggests, *'The musical event . . . evokes and organises collective memories and present experiences of place with an intensity, power and simplicity unmatched by any other social activity'*.

Following the recognition that remarkable acoustic qualities characterise many rock art sites it is imperative that their physical environments should be preserved so as to retain the unique acoustic features of the locations. The documentation of acoustic phenomena at rock art sites calls for a more inclusive approach to the task of recording rock art, an

undertaking which would be incomplete if audio recordings and detailed descriptions of acoustic phenomena are not integrated into interpretative analyses.

Acknowledgements

I thank Jonathan and Jennifer Oppenheimer for their generous financial support during the course of this investigation. Elizabeth Marshall-Thomas is thanked for granting permission to use the photographs shown in Figures 3 and 4 as sourced from Marshall (1969). I express thanks to Peter Beaumont for cultivating my interest in engraved art. I thank Steven Waller for introducing me to rock art acoustics. I thank Gus van Dyk, Thea van Rensburg, Gert Makatong and the hospitality and management staff of Tswalu Kalahari Reserve for their assistance during visits. I express my sincere gratitude to Nadine Rifkin, Justin Du Pisanie and Kerry Fatherley for their sound assistance and cheerful company in the field. I am grateful for the insights provided by David Lewis-Williams, Thembi Russell and David Pearce with regards the writing of this paper. I also thank Christopher Chippindale and an anonymous referee for insightful comments on an earlier draft of this enquiry.

References

ARBOUSSET, T. & F. DAUMAS. [1846] 1968. *Narrative of an exploratory tour to the north-east of the colony of the Cape of Good Hope*. Cape Town: Robertson.

ARSENAULT, D. 2004. From natural settings to spiritual places in the Algonkian sacred landscape: an archaeological, ethnohistorical and ethnographic analysis of Canadian Shield rock-art sites, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 69-84. Cambridge: Cambridge University Press.

BARAC, V. 2004. From primitive to pop: foraging and post-foraging hunter-gatherer music, in R.B. Lee & R. Daly (ed.) *The Cambridge encyclopaedia of hunters and gatherers*: 434-40. Cambridge: Cambridge University Press.

BARNARD, A. 1979. Nharo Bushman medicine and medicine men. *Africa: Journal of the International African Institute* 49(1): 68-80.

BEENTJE, H.I. 1999. The genus Tarchonanthus (Compositae-Mutisieae). *Kew Bulletin* 54(1): 81-95.

BIESELE, M. 1978. Sapience and scarce resources: communication systems of the !Kung and other foragers. *Social Science Information* 17: 921-47.

– 1993. *Women like meat: the folklore and foraging ideology of the Kalahari Ju/'hoan.* Johannesburg: Witwatersrand University Press.

BLACKING, J. 1987. Games and sport in pre-colonial African societies, in W.J. Baher & J.A. Mangan (ed.) *Sport in Africa: essays in social history*. New York: Africana Publishing Co.

BLEEK, D.F. 1933. Beliefs and customs of the /Xam Bushmen. Part V: The rain; Part VI: Rain-making. *Bantu Studies* 7: 297-312, 375-92.

– 1935. Beliefs and customs of the /Xam Bushmen. Part VII: Sorcerers. *Bantu Studies* 9: 1-47.

– 1936a. Beliefs and customs of the /Xam Bushmen. Part VIII: More about sorcerers and charms. *Bantu Studies* 10: 131-62.

– 1936b. Notes on the Bushmen photographs. *Bantu Studies* 10: 200-204.

BLEEK, W.H.I. & L.C. LLOYD. 1911. *Specimens of Bushmen folklore*. London: George Allen.

BREWER, C. 2003. Vibroacoustic therapy: sound vibration in medicine. *Journal of Alternative and Complementary Therapies* 9: 5.

BURCHELL, W.J. 1953. *Travels in the interior of southern Africa*. London: Batchworth.

CARPENTER, E. & M. MCLUHAN. 1960. Acoustic space, in E. Carpenter & M. McLuhan (ed.) *Explorations in communication*: 65-70. Boston (MA): Beacon.

CHIPPINDALE, C. & P.S.C. TAÇON. 2002. The many ways of dating Arnhem Land rock-art, north Australia, in C. Chippindale & P.S.C. Taçon (ed.) *The archaeology of rock-art*: 90-105. Cambridge: Cambridge University Press.

CHIPPINDALE, C. & G. NASH. 2004. Pictures in place: approaches to the figured landscapes of rock-art, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 1-36. Cambridge: Cambridge University Press.

CONNELL, J. & C. GIBSON. 2003. *Sound tracks: popular music, identity and place*. London: Routledge.

COOKE, C.K. 1964. Rock gongs and grindstones: Plumtree area, southern Rhodesia. *South African Archaeological Bulletin* 19: 70.

CRAWLEY, A.E. 1912. Drums and cymbals. *Encyclopaedia of religion and ethics* 5: 89-94.

DAVID, B. 2004. Rock art and the experienced landscape: the emergence of late Holocene symbolism in north-east Australia, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 153-81. Cambridge: Cambridge University Press.

DEACON, J. 1988. The power of place in understanding southern San rock engravings. *World Archaeology* 20: 129-40.

DEVEREUX, P. 2001. *Stone Age soundtracks: the acoustic archaeology of ancient sites.* London: Vega.

DURIE, B. 2005. Doors of perception. *New Scientist* 2484: 34-6.

EIBL-EIBESFELDT, I. 1989. *Human ethology.* New York: Aldine de Gruyter.

ELIADE, M. 1964. *Shamanism: archaic techniques of ecstasy.* New York: Pantheon.

ENGLAND, N.M. 1968. Zuiwasi music of south-west Africa and Botswana. Unpublished PhD dissertation, Harvard University.

FACHNER, J. & S. RITTNER. 2004. Sound and trance in a ritualistic setting visualised with EEG brain-mapping. *Music Therapy Today* 5: 2.

FELD, S. 1994. From ethnomusicology to echo-muse-ecology: reading R. Murray Schafer in the Papua New Guinea rainforest. *The Soundscape Newsletter* 8: 4-6.

FLOOD, J.M. 2004. Linkage between rock-art and landscape in Aboriginal Australia, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 182-200. Cambridge: Cambridge University Press.

FOCK, G.J. 1972. Rock gongs at Keurfontein. *South African Journal of Science* 49: 2.

FURST, P.T. (ed.) 1972. *Flesh of the gods: the ritual use of hallucinogens.* New York: Praeger.

GEANA, G. 1980. On mindscapes. *Current Anthropology* 21(6): 803.

GEERTZ, C. 1993. Religion as a cultural system, in C. Geertz (ed.) *The interpretation of cultures: selected essays*: 87-125. Oxford: Fontana.

GOLDHAHN, J. 2002. Roaring rocks: an audio-visual perspective on hunter-gatherer engravings in northern Sweden and Scandinavia. *Norwegian Archaeological Review* 35(1): 30-46.

GOODMAN, F.D. 1986. Body posture and the religious altered states of consciousness: an experimental investigation. *Journal of Humanistic Psychology* 26(3): 81-118.

GOODWIN, A.J.H. 1957. Rock gongs, chutes, paintings and fertility. *South African Archaeological Bulletin* 45: 37-40.

HARNER, M.J. (ed.) 1973. *Hallucinogens and shamanism.* New York: Oxford University Press.

HARTLEY, R. & A.M. WOLLEY VAWSER. 2002. Spatial behaviour and learning in the prehistoric environment of the Colorado River drainage (south-eastern Utah), western North America, in C. Chippindale & P.S.C. Taçon (ed.) *The archaeology of rock-art:* 185-211. Cambridge: Cambridge University Press.

HEINZ, H.J. 1972. Territoriality among the Bushmen in general and the !Ko in particular. *Anthropos* 67: 405-16.

HEWITT, R.L. 1986. *Structure, meaning and ritual in the narratives of the southern San*. (Quellen zur Khoisan-Forschung 2). Hamburg: Helmut Buske Verlag.

HOFF, A. 1998. The water bull of the /Xam. *South African Archaeological Bulletin* 53: 109-24.

HOWES, D. 1991. *The varieties of sensory experience: a sourcebook in the anthropology of the senses.* Toronto: University of Toronto Press.

HYDER, W.D. 2004. Locational analysis in rock-art studies, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 85-101. Cambridge: Cambridge University Press.

IVADE, P. 1994. The place of music: a conference. *Popular Music* 13(1): 105-7.

KAHN, D. 1999. *Noise, water, meat. A history of sound in the arts.* Cambridge (MA): MIT Press.

KATZ, R. 1982. *Boiling energy: community healing among the Kalahari Kung.* Cambridge (MA): Harvard University Press.

KEENEY, B. 2003. *Ropes to god: experiencing the Bushman spiritual universe.* Philadelphia (PA): Ringing Rocks Press.

KIRBY, P.R. 1972. Musical character of some South African rock gongs. *South African Journal of Science* 49: 2.

LEE, R.B. 1968. The sociology of !Kung Bushman trance performance, in R. Prince (ed.) *Trance and possession states*: 35-54. Montreal: R.M. Bukce Memorial Society.

– 1979. *The !Kung San: men, women, and work in a foraging society*. Cambridge: Cambridge University Press.

– 2003. *The Dobe Ju/'hoansi.* London: Wadsworth.

LEEDS, J. 2001. *The power of sound: how to manage your personal soundscape for a vital, productive and healthy life.* New York: Healing Arts.

LENSSEN-ERZ, T. 2004. The landscape setting of rock-painting sites in the Brandberg (Namibia): infrastructure, gestaltung, use and meaning, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 131-50. Cambridge: Cambridge University Press.

LEWIS-WILLIAMS, J.D. 1984. Ideological continuities in prehistoric Southern Africa: the evidence of rock art, in C. Schrire (ed.) *Interfaces: the relationship of past and present in hunter-gatherer studies*: 225-52. New York: Academic Press.

– 2006. Debating rock art: myth and ritual, theories and facts. *South African Archaeological Bulletin* 61: 105-14.

LEWIS-WILLIAMS, J.D. & M. BIESELE. 1978. Eland hunting rituals among northern and southern San groups: striking similarities. *Africa* 48(2): 117-34.

LEWIS-WILLIAMS, J.D. & T.A. DOWSON. 1990. Through the veil: San rock paintings and the rock face. *South African Archaeological Bulletin* 45: 5-16.

LEWIS-WILLIAMS, J.D. & D.G. PEARCE. 2004. *San spirituality: roots, expression, and social consequences*. Cape Town: Double Storey.

MALAN, B.D. 1959. A rock gong and rock slide in the Parys district, Orange Free State. *South African Journal of Science* 55: 29.

MARSHALL, L. 1969. The medicine dance of the !Kung Bushmen. *Africa* 39: 347-81.

MITCHELL, P.J. 2002. *The archaeology of Southern Africa*. Cambridge: Cambridge University Press.

MORRIS, C. & A. PEATFIELD. 2002. Feeling through the body: gesture in Cretan age religion, in Y. Hamilakis, M. Pluciennik & S. Tarlow (ed.) *Thinking through the body: archaeologies of corporality*: 105-20. London: Plenum.

NEEDHAM, R. 1967. Percussion and transition. *Man* 2(4): 606-14.

OUZMAN, S. 2001. Seeing is deceiving: rock art and the non-visual. *World Archaeology* 33(2): 237-356.

– 2002. Towards a mindscape of landscape: rock-art as expression of world-understanding, in C. Chippendale & P.S.C. Taçon (ed.) *The archaeology of rock-art*: 30-41. Cambridge: Cambridge University Press.

POCOCK, D. 1993. The senses in focus. *Area* 25(1): 11-16.

REZNIKOFF, I. & M. DAUVOIS. 1988. La dimension sonore des grottes ornées. *Bulletin de la Société Préhistorique Française* 85: 238-46.

RIFKIN, R.F. 2005. Rock engravings of the Korannaberg: an analysis of engraved imagery from the south-eastern Kalahari. Unpublished Honours dissertation, University of Witwatersrand.

ROBINSON, K.R. 1958.Venerated rock gongs and the presence of rock slides in southern Rhodesia. *South African Archaeological Bulletin* 13(50): 75-7.

ROSS, J. & I. DAVIDSON. 2006. Rock art and ritual: an archaeological analysis of rock art in arid central Australia. *Journal of Archaeological Method and Theory* 13(4): 305-41.

SCARRE, C. 1989. Painting by resonance. *Nature* 338: 382.

SCHMIDT, S. 1979. The rain bull of the South African Bushmen. *African Studies* 38(2): 201-21.

SCHAFER, R.M. 1985. Acoustic space, in D. Seamon & R. Mugerauer (ed.) *Dwelling, place and environment: towards a phenomenology of person and world*: 87-98. Boston (MA): Martinus Nijhoff.

SEEGER, A. 1987. *Why Suya sing: a musical anthropology of an Amazonian people*. Cambridge: Cambridge University Press.

SMITH, B.W. & G. BLUNDELL. 2004. Dangerous ground: a critique of landscape in rock-art studies, in C. Chippindale & G. Nash (ed.) *The figured landscapes of rock-art: looking at pictures in place*: 239-62. Cambridge: Cambridge University Press.

SOLOMON, T. 2000. Duelling landscapes: singing places and identities in highland Bolivia. *Ethnomusicology* 44(2): 257-80.

STEINBRING, J. 1992. Phenomenal attributes: site selection factors in rock art. *American Indian Rock Art* 17: 102-13.

STEYN, H.P. 1984. Southern Kalahari subsistence ecology: a reconstruction. *South African Archaeological Bulletin* 39: 117-24.

STOKES, M. 1994. *Ethnicity, identity and music: the musical construction of place.* Oxford: Berg.

STOLLER, P. 1989. *The taste of ethnographic things: the senses in anthropology*. Philadelphia (PA): University of Pennsylvania Press.

THACKERAY, A.I., J.F. THACKERAY, P.B. BEAUMONT & J.C. VOGEL. 1981. Dated rock engravings from Wonderwerk Cave, South Africa. *Science* 214: 64-7.

THACKERAY, J.F. 2005. The wounded roan: a contribution to the relation of hunting and trance in southern African rock art. *Antiquity* 79: 5-18.

TUAN, Y. 1974. *Topophilia: a study of environmental perception, attitudes and values*. Englewood Cliffs (NJ): Prentice Hall.

– 1993. *Passing strange and wonderful: aesthetics, nature, and culture*. Washington (DC): Island Press.

VALENTINE, G. 1995. Creating transgressive space: the music of K.D. Lang. *Transactions of the Institute of British Geographers* 20(4): 474-85.

VANSINA, J. 1985. *Oral tradition as history.* Madison (WI): University of Wisconsin Press.

VINNICOMBE, P. 1976. *People of the eland: rock paintings of the Drakensberg Bushmen as a reflection of their life and thought*. Pietermaritzburg: University of Natal Press.

WALLER, S.J. 1989. Sound and rock art. *Nature* 338: 384.

– 1993. Sound reflection as an explanation for the content and context of rock art. *Rock Art Research* 10: 91-101.

– 2001. Sounds of the spirit world: auditory perceptions of depth at rock art sites. *American Indian Rock Art* 28: 53-6.

WALLER, S.J. 2002. Rock art acoustics in the past, present, and future. *International Rock Art Congress Proceedings* 2: 11-20.

WATT, J.M. 1967. African plants potentially useful in mental health. *Lloydia* 30: 1-22.

WENDT, W.E. 1976. Art mobilier from the Apollo 11 cave, South West Africa: Africa's oldest dated works of art. *South African Archaeological Bulletin* 31: 5-11.

WHITLEY, D.S. & H.J. ANNEGARN. 2001. Cation-ratio dating of rock engravings from Klipfontein, Northern Cape, in T.A. Dowson & J.D. Lewis-Williams (ed.) *Contested images: diversity in southern African rock art research*: 189-97. Johannesburg: Witwatersrand University Press.

YELLEN, J.E. 1976. Settlement patterns of the !Kung: an archaeological perspective, in R.B. Lee & I. De Vore (ed.) *Kalahari hunter-gatherers: studies of the !Kung San and their neighbours*: 47-72. Cambridge (MA) & London: Harvard University Press.