"FEAR AND AMAZEMENT"

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"Fear and amazement is a very potent combination!" said Maximus in the film "Gladiator"[1], referring to the spectacles of the Roman circus. – Was Maximus right? And if so, does that bear any relevance for understanding the Hypogeum?

If one wants to understand the past, there are only a few ways to enter it. One is through contemporary literature (history), another is through material culture (archaeology), and a third is through the biological sciences (genetics, etc.) Archaeoacoustics (the study of past sounds) is a new way to enter the past.
This paper does two things. First, it describes the role of sound in a selected set of present societies that are most relevant to role of sound in past cultures. Second, it tries to suggest one possible explanation for the use of sound in prehistory.

The Ethnological and Ethnographic Reality

In order to understand the role of sound in past societies one suggests that modern societies that are derived from past societies will maintain some aspects of culture from their ancestors. Figure 1 shows such an evolutionary or phylogenetic tree.

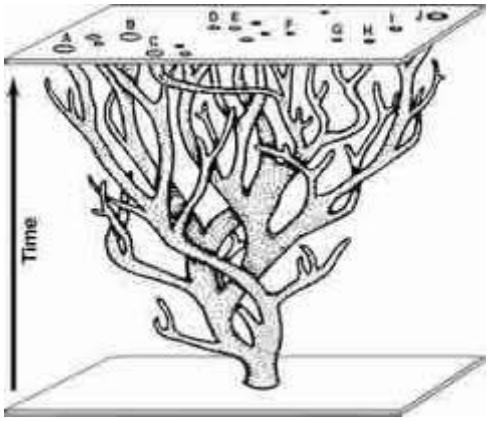

Figure 1.

For example, one can trace elements of modern orchestral music to earlier beginnings. So Phillip Glass (contemporary) has elements of Bach 1685-1750, Mozart 1756-1791, and Shubert 1797-1828 etc. Contemporary popular music has elements of "rock and roll", "bluegrass", "R&B", "jazz", "ragtime", etc.

One may use the principles of ethnographic analogy which relates the known knowledge of present societies to unknown aspects of past societies on the basis of similarities. It is the

[1] Film from 2000. Filmed in Malta.

formal interpretation of traits of past cultures based upon their similarities to analogous traits in present cultures.

For this study the Human Relations Area Files were used to analyze a large amount of comparative cultural data on sound from modern ethnographic societies. Between the two World Wars behavioral scientists at Yale and other universities began to collect cultural materials classified at the paragraph level by subject. During World War II it was used by the Allies military intelligence to provide information about little known areas of the world where the war was taking place. After the war, a nonprofit research consortium was created to develop and distribute files of organized information related to human societies and cultures. Today it is two electronic databases filled with an increasing catalogue of cross-indexed ethnographic data, sorted and filed by geographic location and cultural characteristics. Its purpose is to foster comparative research on humans in all their variety so that explanations of human behavior would be universally valid, not culture bound.

So this study examines four domains of acoustics. They are music, speech, dance, and other types of human generated sound. Each of these domains is analyzed for characteristic sub-categories. There are eight sub-categories that are examined in relationship to the domains. They are pain, fear, emotion, startling, religion, initiation and funeral characteristics. In short, each domain is queried by asking how many ethnographic cultures use the domain for each sub category. For example in other words, the question is asked "how many ethnographic societies use music in relationship to pain"; how many ethnographic societies use music in relationship to fear". After completely analyzing the music domain for each of the eight subcategories we go to the next domain. "how many ethnographic societies use speech in relationship to pain" ; how many ethnographic societies use speech in relationship to fear". After completely analyzing the speech domain for each of the eight subcategories we go to the next domain. In short, we cross tabulate the four domains by the seven sub-categories. Figure 2 shows the distribution of 280 societies using the acoustic domain of music by sub-category. 150 societies use music in conjunction with pain. 85 societies use music in conjunction with funeral activity and so on.

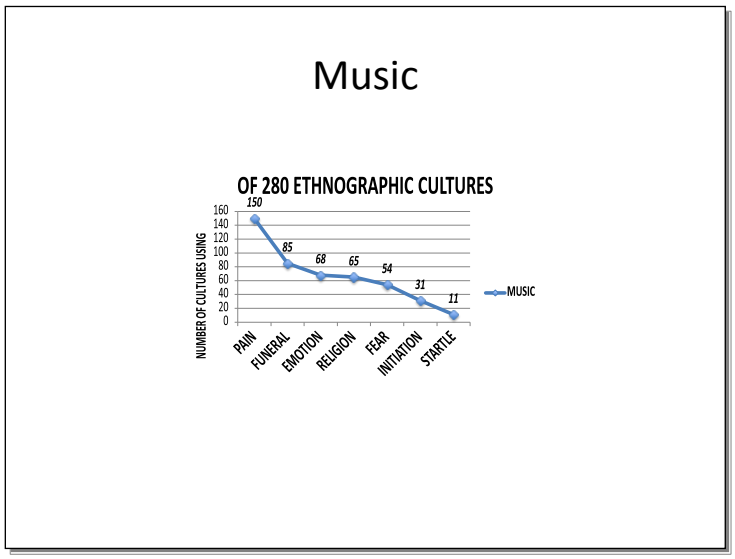

Figure 2

One could ask the question does the type of subsistence make a difference. One knows for example that there are differences between hunting-gathering societies, fishing societies,

pastoral societies, subsistence farming societies, and peasant agricultural societies to name a few. Actually, analyzing different types of subsistence patterns does not make a difference. Figure 3 is exemplary. It shows the distribution for all "non-hunter-gatherer music" versus all societies for all seven sub-categories. The results are almost exactly the same. Of course non-hunter and gatherer societies will be less than all ethnographic societies but the basic distribution is the same and the order of the size of the subcategories—music, funeral, emotion, religion, etc. etc. is exactly the same.

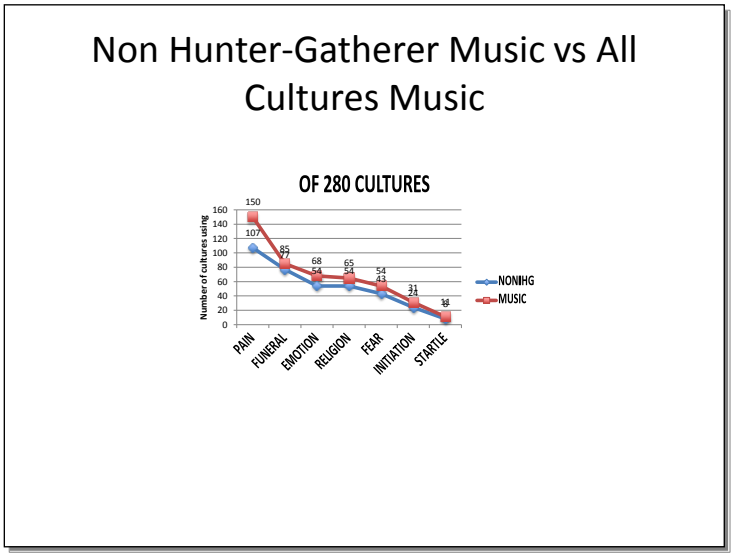

Figure 3

Turning to the second domain of sounds (figure 4), one finds a similar pattern with one significant difference. The order of the sub-categories in terms of the diminishing number of ethnographic societies is the same. In fact the number of societies for which it is standard part of pain is even higher than in the first domain -224 to 150. However, there is a very large drop between pain and the next sub-category funeral use. In the case of music funeral use is about one half of the use with pain while in the case of sound it is slightly over a quarter.

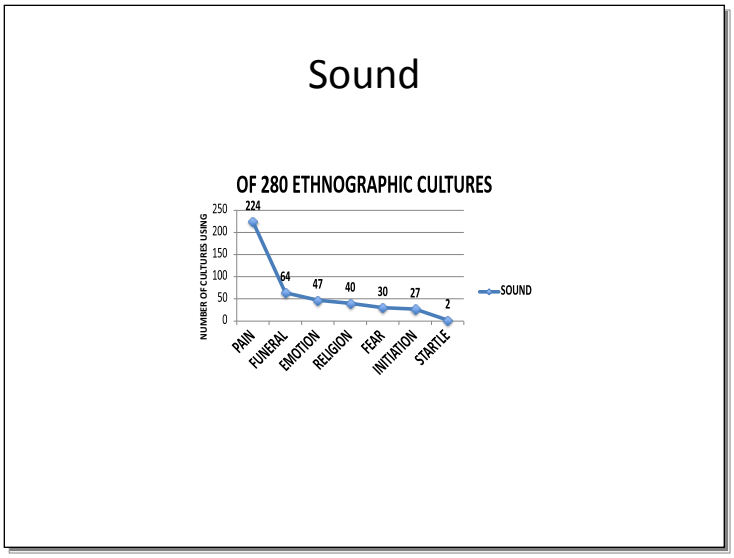

Figure 4

Turning to the domain of dance (Figure 5) one finds the same pattern but for the first and only time does one find a difference in the diminishing order of the sub-categories. Use of dance in funeral activities fits between fear (135 societies) and initiation (89) societies.

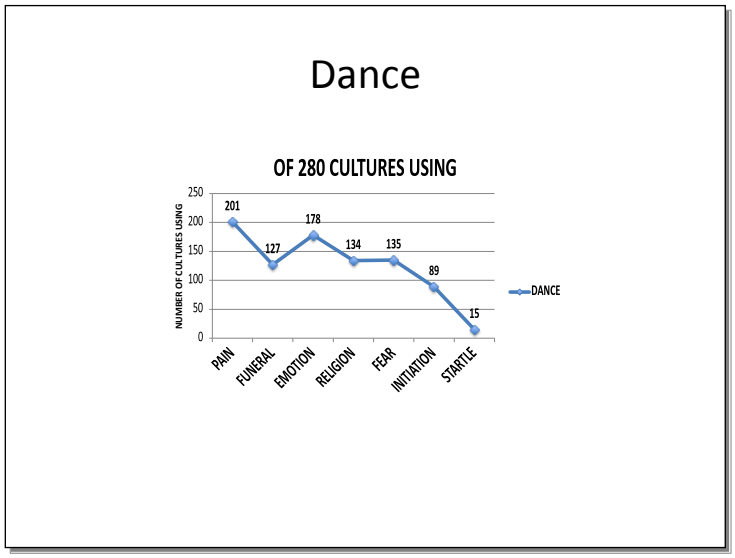

Figure 5

Turning to speech one sees the same order again. The relatively small numbers is caused by the rather formal definition of speech.

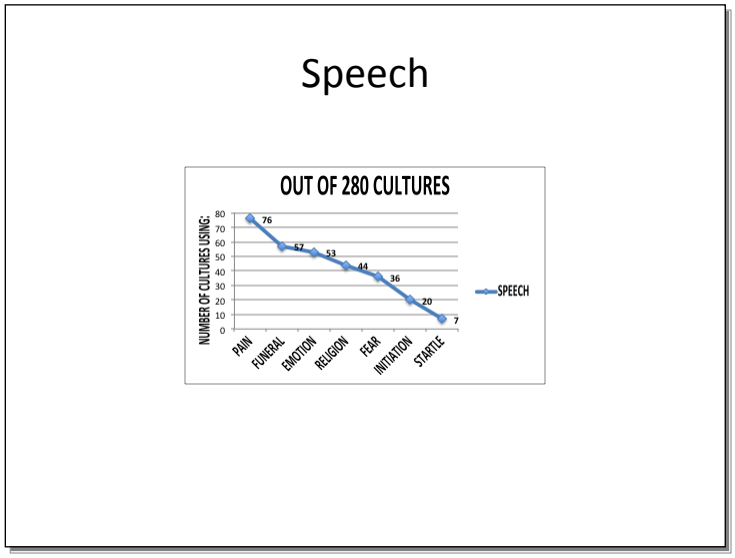

Figure 6

Figure 7 combines the four domains. It simply reinforces what has been previously noted that the patterns across the domains are the same.

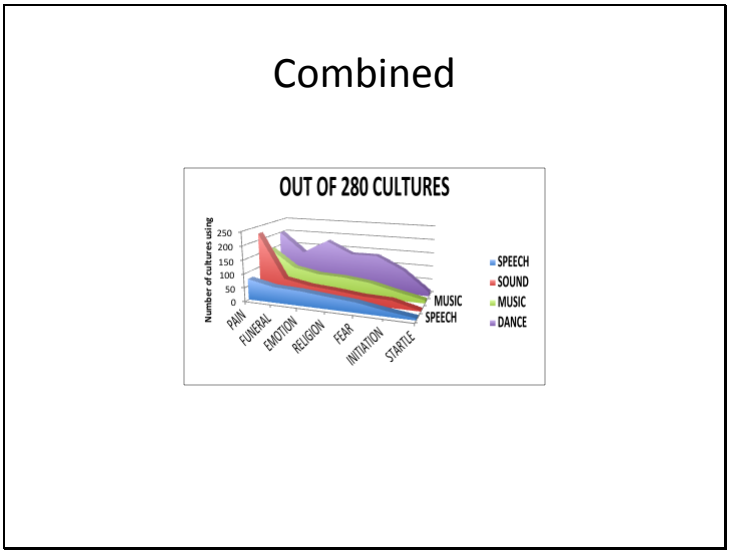

Figure 7

In addition to the similarity of patterns, one may note some other results. They are that pain consistently is the most frequent category across the domains averaging approximately 58% of all cultures. Using sound for startling people is consistently the least frequent averaging 12.5%. The use in funerals are twice more frequent than in initiation rites and ceremonies (30% to 15%). Perhaps, the most unusual domain is dance with its relatively high emotional context.

One need not make too much of the above results. There are a variety of potential problems. Some of these are more significant than others. There were analytical rules used for the cross tabulating of the number of cultures in each sub category in each domain. Here is an illustration. If in a particular society there are several domains used in single instance of a sub category that sub category is counted for each domain. For example if in a particular initiation ceremony of a particular culture there is dance, music, sound, and speech, it was counted as an instance for each domain. So in the Na'ii'ees, the Western Apache Woman's Puberty Ceremony in Phase 1 the pubescent girl dances, in Phase 2 singing begins, in Phase 3 massaging takes place, in Phase 4 running occurs, in Phase 5 running in all directions, in Phase 6 gifts poured over her head, in Phase 7 blessing speeches, in Phase 8, she leaves a woman. So the Na'ii'ees would be counted as one for each domain. One might want to argue this is a type of multiple counting. It is only one ceremony but it is being counted in each domain.

Similarly, in a particular society's funeral ceremony there is a large amount of speech and only a few minutes of music. The rule that is used in this study is that both count equally and they are each counted as an instance of each domain. However, one could try to have a weighted system. However, there also are problems with that. What should be the criteria for the weighting? Should it be comparative time? Something that is short may be more important than something that is long. For example, a few minutes of musical prayer may be far more critical than a eulogy. There are other weaknesses as well. One could argue that the definitions are not equivalent. For example, pain in one society may not be equivalent to pain in another.

However, even so the patterns of similarity across such a large number of ethnographic societies should give us pause and does lead credence to the common ancestry of sound usage

in prehistoric society. The authenticity of common ancestry and the diminishing order of the sub-categories are probably as far as one wishes to go and not push the conclusions much further. Yet it is quite evident that "sounds" in various forms and formats have been, and are, essential to human culture. Created, "man-made" sounds in symbol-laden ritual contexts are found everywhere, and therefore probably through all times.

Still, one needs to raise the question: *Why* did people produce and use sounds? This paper suggests one possible use of sounds, for a particular purpose.

Inside-Stone Sanctuaries

Sanctuaries in caves are as old as humanity itself. Venues in caves for rituals and cultic practices are found worldwide (Reznikoff 2004/2005). In Mediterranean contexts caves were places for rites through all prehistoric periods from the Paleolithic (Campbell 1976, Mavridis *et al.,* 2013).

Caves could be changed and decorated for such purposes. Among those, the Hypogeum of Hal-Saflieni in Malta, is perhaps the most unique and outstanding. From around 4000/3300 BC, over a period of at least 1500 years, it was extended with numerous rooms and galleries going wider and deeper into the ground, and developed into a large and complex subterranean sanctuary. Skeletons of approximately 7000 individuals were found in the Hypogeum, so evidently it was used as a communal burial place or "knuckle-house" for a long time. However, that does not preclude that it was also used for other cultic and ritual purposes, before, during, or after its function as a necropolis.[2] What rituals that might have been, we can only carefully and tentatively suggest on the basis of comparative anthropological and archaeological information.

The Hyper-Acoustics of the Hypogeum

The Hypogeum has many perplexing properties, one of which is the acoustics. They have caused much speculation regarding the ritual uses of the Hypogeum, of ritual uses of the acoustics in themselves, and even to speculations about whether the Hypogeum was built out (or rather: carved out) in order to create or develop its particular acoustics. The acoustics have already been explored to some extent, and some findings will be outlined here. In the early works of Devereux *et al.* (1995) and Jahn *et al.* (1995), and in the more recent works of Devereux (2009) and Cook *at al.* (2008) it is concluded that many of the ancient solid stone structures, (called "temples"), in Malta, and in particular the Hypogeum, have resonances registered at the frequency of approximately, at 110 - 111 Hz. Similar deep pitch frequencies have been registered also in prehistoric megalithic monuments elsewhere (Watson and Keating 1999). Likewise, many caves containing rock art are documented to have strong resonant acoustics (Reznikoff 2004/2005). These acoustic properties appear to be found particularly in places where rock art is located, and seem to be surprisingly unrelated to the surface-properties of the stone.

Yet, according to the findings of the explorative investigation performed by the Achaeoacoustic Conference in Malta on February 21th, 2014, there are also several other

[2] Also Christian churches are used for very different ceremonies.

resonances than the 110-111Hz to be found in the Hypogeum, with frequencies as different as 68-70Hz (male voice) and 114Hz (male voice, drum), (Archaeoacoustics 2014).

Still, the 110-111Hz frequency has, perhaps erroneously, been regarded as the frequency of the Hypogeum, and therefore investigations regarding this particular frequency have been done. Experiments done by Cook *et al.* (2008) recorded that when people were exposed to sounds at the pitch of 110 Hz, it produced certain alterations in the brain's electrical activity. The activity patterns over the prefrontal cortex, measured by EEG, were affected and changed. The language centre was to some extent de-activated, and there was a temporary shifting from left-hemispheric to right-hemispheric dominance. Several other frequencies were tested, but this finding was reported to be particular for 110 Hz. And, it was explicitly commented in the report that the right side of the prefrontal cortex is related to emotional processing, meaning that such acoustics made people particularly aware of emotions.

In the information on the web (www.disclose.tv/forum/the-underground-chambers-of-the-hypogeum-t...) about the Hypogeum it is claimed that: "A word spoken in this room (the so-called "Oracular Room") is magnified a hundredfold and is audible throughout the entire structure." And: "The effect upon the credulous can be imagined when the oracle spoke and the words came thundering forth through the dark and mysterious place with terrifying impressiveness." This refers to the indisputable fascinating acoustic properties of the Hypogeum, but whether oracular activities took place there, is simply an assumption. But, apparently, according to these quotes above, *not necessarily a particular pitch* was essential, but also a *high volume* of sounds was needed for producing the auditory effects and experiences of the Hypogeum, - whatever these effects and experiences might have been. We will suggest a few.

Effects, Experiences, Emotions

Words spoken would be audible "through the entire structure". Yet, Cook *et al.* (2008) concluded that their findings of changes in brain-activity were compatible with a relative de-activation of the language centres which are located in the left hemisphere of the brain; and contrastingly, there was a shift towards right-hemispheric dominance. Further, that a prefrontal activity related to emotional processing took place. These findings do of course not rule out the possible importance of spoken words: speech, prayers, chanting, or singing, as important sounds made in the Hypogeum. But they *could* mean that the *emotional* effects of vocalizations, less than the meaning of words, might have been more at the core of the experiences. And indeed, not only voices, but also other sounds caused by movements, footsteps, whistling, animals, and music-instruments may have sounded and resounded in the Hypogeum.

During the experiments performed in the Hypogeum (Archaeoacoustics 2014), it was our impression that all sounds, but in particular dark sounds were magnified. People respond with orientation reflexes, even startle reflexes, to sounds (and other stimuli) that are: sudden and strong (Sokolov 1960, Davis *et al.* 1982, Lang *et al.* 1990). One could call the response: "*amazement*". We would suggest that *dark* sounds are particularly likely to trigger such responses. Sudden and strong sounds elicit fear even in new-borne babies. This is a reflexive response. Human hearing, through our phylogenetic development, is adapted to be particularly aware of sounds signalling danger (Schaal 2012). Many danger-signalling sounds are dark, sudden and strong, (such as the sounds of predators, avalanches, earthquakes,

thunderstorms, and aggressive human vocalizations). Danger evokes *fear*. – Given this, we then have the combination of "fear and amazement" as effected by sounds.

Is fear located in in a particular part of the brain? Yes and no. The amygdala is essential for fear, and various areas of the brain show different activation-patterns in relation to different emotions. But, psycho-neurological research, using methods such as EEG (electroencephalography), fMRI (functional magnetic resonance imaging), and PET (positron emission tomography), all being various forms of brain-scanning, tell us that despite that there are particular areas in the brain which are more active in connection with certain emotions the whole brain is largely involved in all emotions, and there are individual differences (Phan *et al.* 2002, Kassam *et al.* 2013). Still, with regard to lateral dominance patterns, it is claimed that people who tend to have a left-hemispheric dominance are more set to experience positive emotions such as: joy, happiness, amusement, and positive social emotions; whereas people with a right-hemispheric dominance have a bend towards negative emotions such as: depression, worry, and anxiety (Schwartz *et al.* 1979, Ahern and Schwartz 1985, Alfano and Cimino 2005).

The right hemisphere has a predominant role in mediating attention, perception of emotional stimuli, and of interpreting visual and *auditory* stimuli that are relevant for emotional processing. The right hemisphere is also important in the regulation of the autonomic and endocrinological activation that takes place with emotional arousal, (Lane *et al.* 1999). The association between negative emotions such as anxiety, fear, worry, and a preponderance of right hemispheric activity, means that the observed shift from left to right-sided prefrontal cortical dominance in subjects exposed to sounds at 110 Hz (one of the resonances of the Hypogeum), does support our suggestion that "fear and amazement" were likely emotional experiences to be had in the Hypogeum.

Given these premises, it is possible to imagine this scenario taking place in the Hypogeum in ancient times: First: if there was a sudden shift from silence to sound, it would elicit an immediate surprise-reaction, a startle-response ("amazement"), with a subsequent sudden orienting reflex. Startle-responses and orienting reflexes are in themselves intensely attention focusing, and have a particular short latency-time when the stimulus is auditory (Lang *et al.* 1990). Then, after this startle and amazement, given that the sounds made and emitted were around 110-114Hz, (or simply any dark pitches), and of a strong volume, such sounds were likely to produce a right hemispheric dominance in the audience. That would produce a set towards emotional attention and facilitate a situation where, in particular <u>fear,</u> but also other negative emotions could be elicited and experienced. In other words: It is not unlikely that ancient people in the Hypogeum could have experienced the combination of "Fear and amazement".

Yet, if that really was so, the question still remain: Is "fear and amazement" "a potent combination"? – Psychologically speaking? – Does it have any other effect on the human mind apart from being a strange and otherworldly experience, a "kick", or "a thrill?"

Seesaw of Emotions

We believe so. In a series of experiments (both field- and laboratory-experiments) Dolinski, Nawrat and collaborators (1998, 2002, 2007, 2013/14, 2013, 2013) demonstrated that persons who were exposed to a situation with stimuli that elicited an emotional response, and then,

quickly thereafter, were exposed to stimuli that triggered a different emotional response, which rendered the first response irrelevant, became "mindless" and bewildered. And, shockingly, those persons became subsequently surprisingly susceptible to influences, and would tend to comply with any suggestions, requests, and whatever was demanded of them. They became easy to influence, convince, and command. One could perhaps call the effect a light brain-washing. In the first, and most well-known, experiments the sequence of emotions was that of "fear-then-relief". People were scared, and then shortly thereafter were informed that there was no danger, resulting in an emotion of relief and even joy. Later, experiments have shown that also combinations of other emotions can give the same results. The pivot point is the rapid shifts and quick requests of compliance shortly after. Dolinski called this phenomenon "The Seesaw of emotions", (referring to a children's playground-instrument that makes children go up and down in rapid successions). The explanation given for the seesaw-effect is that several emotional programs of opposite contents are activated in such rapid succession, that a person's brain (and the person) becomes bewildered and mindless. Persons such "softened" will therefore tend to respond positively to anything that serves at a clue about what to do in the situation. Social requests are strong cues, so when such "bewildered" people were asked to give money, help somebody, buy something, etc., they tended to be surprisingly willing to agree and comply.

The effect of seesaw-of-emotions has been documented with various combinations and shifts of emotional content. - But, since *fear* is such an unpleasant, intense and spellbinding emotion, with profound physiological concomitants, we believe that the effect can be particularly dramatic when a person is relieved of fear. The fear-then-relief-combination is a particularly powerful ("potent") one. The consequence of seesaw: making people susceptible to accept and obey messages and commands, and to conform, can be very useful indeed for those who want to influence people or exert power. We therefore suggest this effect as a possible and plausible motive for *using* seesaw-of-emotions.

Rites of Initiation

Rites of initiation (rites-de-passage) (Pausanias (in Jost 1985), Van Gennep 1960[1909], Campbell 1976, 2008[1949], Eliade 1976, Ustinova 2013) are found in almost all human cultures, cross-culturally, trans-historically and pre-historically. Campbell (1976) claimed that they took place in caves in prehistoric times. Despite variations and different types, they generally imply these elements: initiatory ordeals, separation, seclusion, darkness, blind-folding, pain, fear, symbolic-death-experiences; then revelation and/or instruction of truths or of mystic wisdom, insight, enlightenment, epiphany of the Deity, darkness and fear dispersed, return to the ordinary society and/or introduction into a secret society.

Psychological laboratory experiments have shown that initiation-rites can produce cognitive dissonance which produce feelings of strong group attraction among initiates after the experience (Festinger 1962). Initiations can also produce conformity, cohesion and compliance among members of the society (Harmon-Jones 2002). It strikes us that rites-of-initiation have many perplexing similarities with the sequence of events in the seesaw-of-emotions phenomenon.

Could *sounds* be used for fear-induction in both processes? – We think so.
Could the Hypogeum be used for initiation-rites? – We think that could be possible.

Resounding the Arguments

However, words of caution are warranted. We are, of course, fully aware of the fact that the use of psychological manipulations in order to increase peoples' susceptibility was not scientifically studied in the prehistoric past. Nevertheless, we believe that the effects of manipulative strategies may have been discovered intuitively and used strategically. With regard to the possibility of sounds having been used in the Hypogeum in order to elicit fear, we admit that this possibility is highly speculative. There is absolutely no evidence that the Hypogeum was a place where sounds, vocal, instrumental, or others, were deliberately emitted for any particular purposes. The Hypogeum certainly has fascinating acoustic properties. But we find no reason to believe that the Hypogeum was created and built out in order to enhance, develop, and use the acoustics for cultic, ritual purposes. However, that being said, we regard it as almost inevitable that people in the Neolithic past in Malta discovered the acoustic effects of the Hypogeum, and experienced these as extraordinary strange, perhaps even as weird and "otherworldly". As a consequence, since the acoustics were already there, people may have found the acoustics useful in cultic ceremonies and rites. If so, the uses of the acoustic could be regarded as a "secondary product" of the Hypogeum's properties.

The fear-evoking potential of strong sounds, sounds that could certainly be "magnified a hundredfold" within the Hypogeum, render themselves as very useful implements to create the components of fear and symbolic death that are characteristic of initiation rites.

Conclusion

Admittedly, our suggestion is a chain of "ifs". Still, we find the parallels between the ingredients and effects of seesaw-of-emotions and of rites-de-passage as very striking: Seesaw-combination of: fear, then relief, and ensuing social compliance; and initiation-rites with: potential fear-inducing symbolic death, (sometimes even pain), and then, reassuring inclusion, instruction and celebration, with ensuing acceptance of the social order and acceptance into the social order.

The Hypogeum does offer great locations for initiation-rites. The dead bodies that were stored there certainly made a perfect "set" for experiencing a symbolic death and a descent into the netherworld. The darkness and acoustic effects of the place could heighten the experience of fear, and finally, the ensuing return to daylight and the relief of having "made it", would indeed be perfect contexts for creating seesaw-of-emotions in the initiates. Increased social compliance in the initiates would be the likely result.

But, why? – Is there reason to believe that social compliance and submissiveness was treasured in the Maltese Neolithic context? – We believe so. The Neolithic itself was characterized by cultures focused on a new invention: collaborative agriculture. And, the many astounding temples in Malta, and the Hypogeum itself, bespeak of enormous collective collaborations over extended periods of time. For these large-scale projects of agriculture and building social cohesion and compliance was absolutely needed and necessary. – To this end, "fear and amazement" could be "a very potent combination". – "Maximus" was right.

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