

## States of Consciousness: A Study of Soundtracks

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A number of different altered states of consciousness (ASC) are accompanied by vocalization. Such vocalizations exhibit an intonation pattern that has the same structure within an ASC but varies significantly between ASCs. As indicated by level-recorder tracings, the uniqueness of intonation appears both in ASCs induced biologically (infant brain activity, sleep, orgasm) and in those instituted upon cultural cues (hypnosis, religious ASC). It is hypothesized that the ASC-specific impulse elicits a brain response which then acts as a generating deep structure for a fixed modal action pattern in the form of a particular intonation. By studying the intonation, therefore, it is possible to discriminate between various ASCs, and to arrive at some conjectures concerning the generating systems.

Clinically healthy subjects can assume different perceptual conditions beyond ordinary alertness. Such conditions are subsumed under the descriptive term of "altered states of consciousness" (ASC). ASCs may be physiologically triggered, drug-induced, and/or instituted upon cultural cues. The last type has been reported as part of religious behavior around the world (cf. Bourguignon, 1973, 1974).<sup>1</sup> Since ASCs appear in many guises, the psychological literature offers various suggestions as to how to distinguish between them. Fischer, for example, maps the "varieties of conscious states" on a "perception-hallucination continuum of increasing ergotropic or hyperarousal...and a perception-meditation continuum of increasing trophotropic arousal" (1975, p. 234). In his model, there is a fluid transition between states of consciousness, with the degree of arousal taken as the diagnostic trait. A closer examination of various ASCs, such as the meditative state (cf. Das and Gastaud, 1957) or the religious ASC (cf. Goodman, 1972) reveals,

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<sup>1</sup>Bourguignon found, e.g., that in a sample of 488 societies from all parts of the world, 437, that is, 90% were reported to have one or more culturally patterned forms of religious ASC.

however, that within the same ASC, arousal may evolve from hypoarousal to hyperarousal within the same episode. Arousal can therefore not be considered as a useful criterion for distinguishing between various states.

Ludwig (1968), on the other hand, places the burden of recognizing the presence of an ASC on individual perception:

...I shall regard "altered states of consciousness"...as those mental states...which can be recognized subjectively by the individual himself (or by an objective observer of the individual) as representing a sufficient deviation, in terms of subjective experience or psychological functioning, from certain general norms as determined by the subjective experience and psychological functioning of that individual during alert, waking consciousness. (1968, pp. 69-70)

The problem with this stance concerning what constitutes a "sufficient deviation" would clearly depend on the respective culture. In a fieldwork situation, where observer and subject do not share such underlying assumptions, neither could be relied upon to make an objective determination about the presence of an ASC, let alone its nature.<sup>2</sup>

In the same article, Ludwig then proceeds to classify ASCs by the manner in which they are produced: Either by a reduction or an increase of exteroceptive stimulation and/or motor activity; by increased or decreased mental alertness; or by the presence of somatopsychological factors. While such strategies *may* produce distinct ASCs, observation (cf. Goodman, Henney & Pressel, 1974) indicates that many of them will, with proper cultural cues, produce one and the same ASC, such as the religious one. A determination of the induction method would not facilitate the discrimination as to which ASC the subject instituted.

Even the value of electroencephalography is questionable. Some ASC-related processes are accessible only by deep electrode, and there is a contamination by movement artifacts (cf. Heath, 1972). Moreover, the use of the requisite equipment, although it might be miniaturized and remote controlled, would be inadmissible in most religious environments.

For some kinds of ASC, a different approach may be feasible. These states are accompanied by vocalization. Infants, technically in an ASC with only brief interruptions (cf. Lenneberg, 1967), vocalize from birth. People talk in NREM (non-rapid-eye-movement) sleep (cf. Rechtschaffen, Goodenough & Shapiro, 1962), and there are sounds uttered during coition (cf. Kinsey et al., 1953; Masters and Johnson, 1966). ASC subjects speak at length in hypnotic regression. And there is a rich variety of vocal behavior during religious ASC, such as glossolalia ("speaking in tongues" in Christian context), ecstatic speech, and phonetically diffuse "barks" and screams. What a detailed examination and comparison of

<sup>2</sup>It is, for example, often impossible in a field situation to know whether the informant is reporting a dream or a vision (hallucination).

the soundtracks reveal is that they exhibit a specific intonation pattern that is consistent within, and characteristic of a particular ASC, but which diverges as we pass from one ASC to another. In this trait, ASC-based utterances differ decisively from ordinary speech, where intonation is random, varying according to the meaning to be conveyed.<sup>3</sup>

The following examples of ASC-based intonation patterns were taken from soundtapes recorded during fieldwork by myself and by colleagues.<sup>4</sup> Their tracings were produced on a Bruel and Kjaer level recorder, Models 2304 and 2305, providing a graph of the power density fluctuation (intonation) of the utterances, their amplitude and frequency.<sup>5</sup>

*Infant babbling.* This inarticulate vocalization of a seven-month-old female infant shows two distinct intonations. One (a) consists of single spikes with hardly any articulation; the other (b) starts at the base line, rises to a peak in the exact center, and drops to the base line in perfect symmetry. (Figure 1.)

*Sleep talking.* As demonstrated by Figure 2, the unit utterances yield curves of somewhat irregular shape. They usually start off with several lower spikes and end in a staggered peak; the amplitude is low and even, reflecting the characteristic monotony of this vocalization.

*Orgasmic vocalization.* Such utterances are usually inarticulate. The unit utterance of a male subject, about forty years old, given in Figure 3, reflects the phases of excitation, orgasm, and attenuation. It starts at the lowest level of the voice and energy range, with the onset of the peak coming past the middle. The peak itself is wide, rising to a moderate climax at the end of its second third. Then it slowly descends to a level not as low as the start of the unit. This intonation curve seems a more exact picture of the orgasmic episode than the impressionistic curve given by Masters and Johnson for it (1966, p. 5).

*Hypnotic regression speech.* In such speech (Figure 4a), intonational spikes are of nearly equal amplitude, and as illustrated in Figure 4b, using a paper speed of 10 mm/sec instead of 3 mm/sec, the plateaus are

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<sup>3</sup>This observation prompted D. Bolinger, a linguist, to quip in the title to an article, "Accent is predictable (if you are a mind reader)." *Language*, 1972, 48, 633-645.

<sup>4</sup>The following researchers supplied tapes for the present analysis, complementing my own data gathered in the USA, Mexico City, and Yucatán: G. N. Appel, (Brandeis); S. Farfan (Columbus, Ohio); L. D. Franga (Denison); S. D. Glazier (Connecticut); J. H. Henney (Capital); D. Horning (Denison); N. Olson (Multi Media Resource Center, San Francisco, California); W. M. Pfeiffer (Westfälische Wilhelms-Universität); E. J. Pressel (Colorado State); Father A. Renz, SDS (Lindau, West Germany); M. Tanaka (Kobe, Japan); D. F. Webb (Waltham, Massachusetts); R. W. Wescott (Drew).

<sup>5</sup>Recording must be done without AVC (Adjusted Volume Control), which would cut off the intonational peaks.

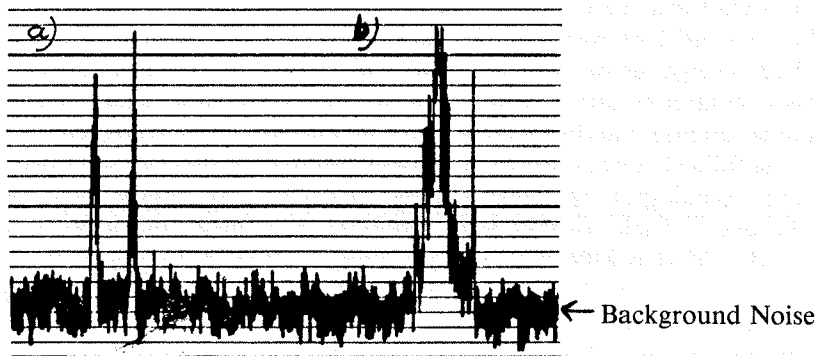


Figure 1. Infant babbling. (a) Single spikes with little articulation; (b) symmetrical curve with peak at the center. (Bruel and Kjaer level recorder, Model 2305, paper speed 3 mm/sec)

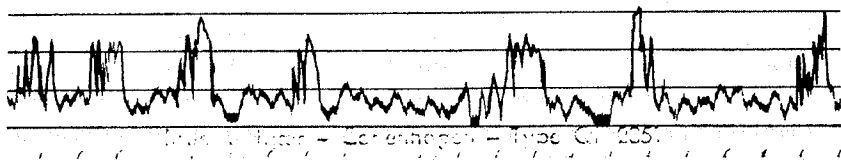


Figure 2. Sleep talking. Irregular curves of low amplitude, the staggered peak usually comes toward the end of the curve. (Bruel and Kjaer level recorder, Model 2304, paper speed 3 mm/sec)

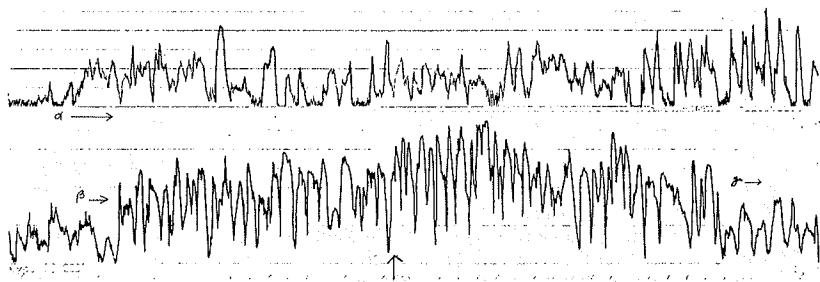


Figure 3. Orgasmic vocalization. A single episode: ( $\alpha$ ) excitation; ( $\beta$ ) orgasm; ( $\gamma$ ) attenuation. Onset of the peak ( $\delta$ ) past the middle of the curve. (Bruel and Kjaer level recorder, Model 2304, paper speed 3 mm/sec)

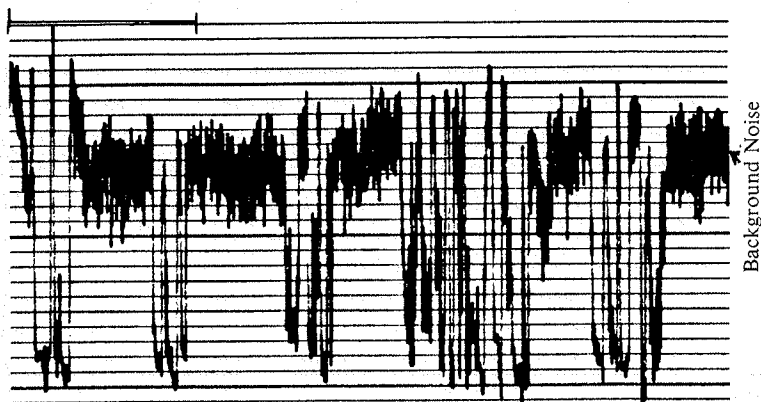


Figure 4a. Hypnotic regression speech. Intonational spikes of nearly equal amplitude, forming plateaus. (Bruel and Kjaer level recorder, Model 2305, paper speed 3 mm/sec)

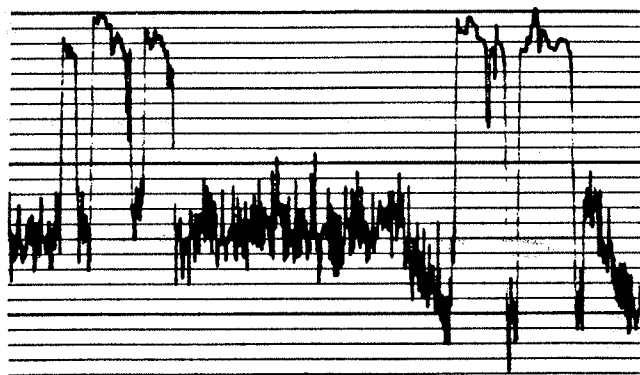



Figure 4b. Section  of Figure 4a at paper speed of 10 mm/sec; the plateaus slope and are highest at the onset.

highest at their beginning. The pattern remains the same whether the subject uses a natural language or a semantically vacuous code, that is, nonsense syllables. The woman providing this sample, about thirty years old, used both.

*Utterances during religious ASC.* Speaking while in an ASC is a feature shared by all religious systems of the world. In Christian context, there are the phenomena called "speaking in tongues," "interpretation," and "prophesying." The latter two can be subsumed under ecstatic speech. These three are considered to be manifestations of the Holy Ghost, which is believed to descend into the body of the speaker and utilize the tongue. ASC utterances also occur during rites of exorcism, when they are thought to be produced by demons or "unclean" spirits possessing the subject and speaking from his mouth. In other religions there are parallel experiences and attendant beliefs of the possessing spirit, ancestor, deity, given voice to by its medium. As a variation, a healer may converse with his spirit helper, etc. Some utterances are semantically vacuous, termed "true" *glossolalia*; others employ a natural language. All have in common their characteristic, unique intonation curve. In a unit utterance there is an onset in the medium voice range and intonation level, a peak at the end of the first third of the unit, and a drop to a level below the onset over the next two thirds down to final extinction.

As shown by soundtracks from many different religious communities, this intonation never varies. It remains unaffected by the speaker's native tongue, e.g., the glossolalia represented in Figure 5 is that of a subject whose native language is the Black English of the Caribbean. The subject of Figure 6 talks the Rungus Dusun of Borneo. The result is the same with speakers of Portuguese, Spanish, Yucatecan Maya, African Ga, or Japanese, all of whose glossolalia is in my collection. The intonation



Figure 5. "Speaking in tongues" of a member of the Streams of Power congregation of St. Vincent Island. B=beginning, P=peak; E=end. (Bruel and Kjaer recorder, Model 2304, paper speed 3 mm/sec)

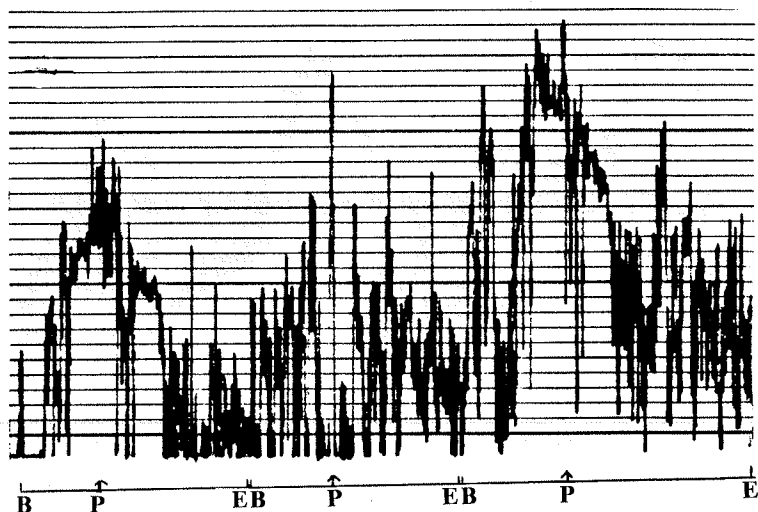


Figure 6. Rungus Dusun healer hailing her helping spirit. B = beginning; P = peak; E = end. (Bruel and Kjaer level recorder, Model 2305, paper speed 3 mm/sec)

does not change with the quality of the entity from the "separate reality." In Figure 5 it is supposedly the Holy Ghost speaking; in Figure 7, a demon being exorcized. The latter tracing derives from a girl, whose case made headlines around the world when she died in 1976 after two priests had tried unsuccessfully to rid her of her evil spirits (cf. Goodman, 1981). Neither does a variation in the use of the religious ASC affect the intonation. The curve remains the same whether there is possession (Figures 5 and 7) or a healer speaking to her spirit helper (Figure 6).

Ecstatic speech, such as the fundamentalist Christian "prophecy," yields a tracing which is a variant of that described for glossolalia. The energy expended is quite low, and the flow of the ASC-generated utterances is occasionally interspersed with hesitation periods of ordinary speech. Consequently the curves, while being as regular as those of glossolalia, appear as a series of extended arcs. Even the peak is protracted. Toward the end of the total utterance, the hesitation intervals tend to become longer and the arcs shorter. All arcs, however, have their onset in the medium range. The peaks, although expanded, start at the beginning of the second third of the curve, and the drop is lower than the onset (see Figure 8). The example given is the prophecy of an 8-year-old girl, a Maya speaker of an Apostolic (Pentecostal) congregation in Yucatán.

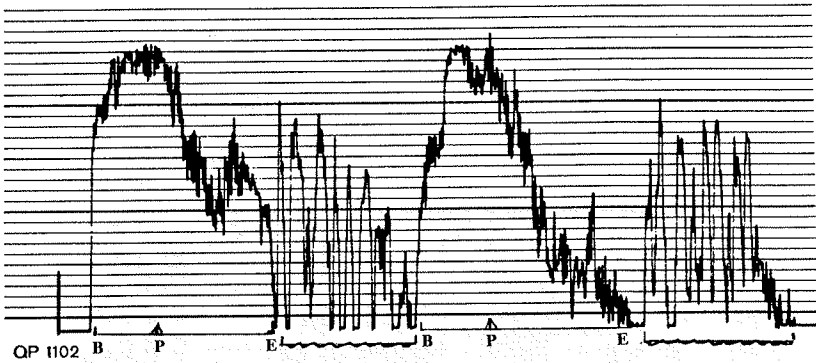



Figure 7. Utterances of a "demon" of possessed Roman Catholic German girl. B=beginning; P=peak; E=end;  priest praying. (Bruel and Kjaer recorder, Model 2305, paper speed 10 mm/sec)

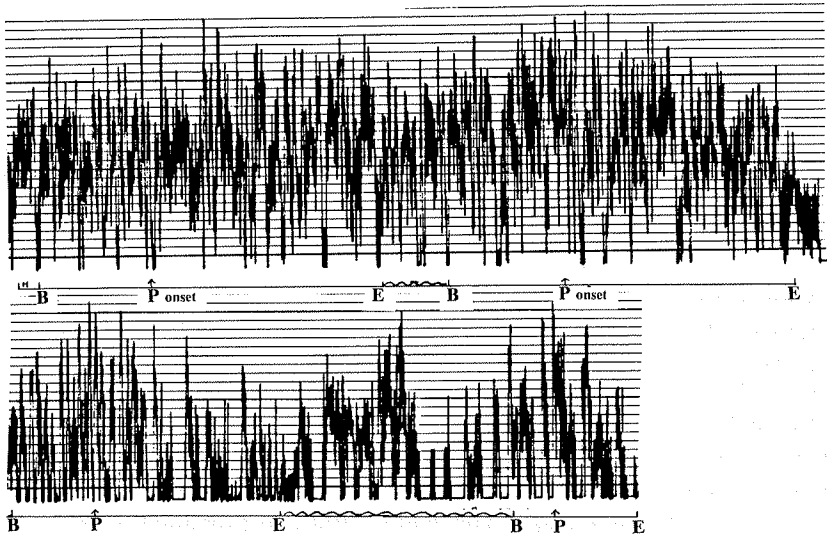



Figure 8. Ecstatic speech. Regular arcs with expanded peaks. B=beginning; P=peak; E=end;  hesitation period. (Bruel and Kjaer recorder, Model 2305, paper speed 3 mm/sec)



### Discussion

The above data admit the conclusion that rather than representing a continuum as Fischer postulates, ASCs are strictly circumscribed, stable brain responses. Neither are they interchangeable. Glossolalia, for instance, an expression of the religious ASC, is not a regression to infant babbling, as sometimes maintained. Nor is it a veiled manifestation of a repressed sexual impulse, as Fischer intimates when he says, "The ecstatic state [is] characterized by...an erotic euphoria or orgasmic intensity" (1975, p. 234).

The cues eliciting the brain response are highly specific: the stimulus of coition does not produce the response leading to sleep talking, e.g., or hypnotic speech does not appear as a reaction to a religious induction strategy. Obviously, the range of biological cues is very narrow. By contrast, cultural cues cover a wide selection of behavior patterns. This is the case especially of those calling forth the religious ASC.

Once triggered, the brain response evolves in the manner of a fixed action pattern (cf. Chapple, 1970; Goodman, 1973). Because of the great variability in the expression of such patterns, Barlow suggested that the term should be replaced by that of a "modal action pattern." The following characteristics cited by him for a modal action pattern are relevant in this context:

- 1) The behavior patterns are stereotypes in appearance.
- 2) The pattern is produced by a functionally organized system in the central nervous system (CNS).
- 3) Once triggered, the behavior is able to run to completion without further environmental control, i.e., without exteroceptive feedback (1977, p. 99).

All three traits obtain in the vocalizations discussed above. They are stereotyped: The shapes of the curves do not vary within a particular ASC, and the positioning of the peak remains constant. Once initiated, the utterance will be completed in its entirety. An external stimulus, such as addressing a person speaking in tongues, will not interrupt the vocalization unit or modify its intonational structure. Barlow's second point, however, requires some elucidation. As vocalization and motor behavior, the patterns discussed will of course be produced in the CNS. But in our context, we need to place the emphasis on the *functionally organized system* in the CNS. Judging from the regularities uncovered by the analysis of the soundtracks, we may postulate that each ASC represents a discrete, precisely circumscribed system, which upon certain cues is instituted in the brain, and which then produces the vocalization behavior. Put differently, this system acts as the deep structure of the intonation, to use a model first suggested by Chomsky (cf., 1957).

Chomsky maintains that the human mind has the innate capacity for language. Operating with rules of grammar, this "deep structure" brings forth, or *generates* a performance, namely the sentences of speech. These represent the "surface structure," the messages that pass between hearer and speaker. The model can be applied to the present case by proposing that an ASC, as a functionally organized system of the CNS, is a particular deep structure and has its own operational characteristics. During vocalization these characteristics are imprinted on, and they *generate* the features of this vocalization, the suprasegmental elements, as they are called in linguistics, that is the length, rhythm, and most importantly, the intonation. Turning the argument around, we may then hypothesize that a comparison of the various curves traced by the level recorder will afford us some information concerning these generating systems. Thus we find an intriguing similarity between sleep talking and hypnotic regression speech. The resemblance indicates that we are most probably dealing with functionally parallel, although not identical organizations. The peaks of the religious ASC are easily distinguished from the blunt and extended orgasmic peak discharge, an indication of the significant functional separation between these two systems. The spikes and rigid symmetry of infant vocalization should give pause to those who think that regression to infant experience is possible in adulthood when the substrate of the immature brain is no longer available. And the variations within the religious ASC despite a clear dominance of the overall structure bear testimony to an important interplay between biology and culture.

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