

Altered Sensory Environments, Altered States of Consciousness and Altered-State Cognition

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The concept of an altered state of consciousness (ASC) may be clarified when three major issues are discussed: (a) the phenomenon, (b) its method of induction, and (c) criteria for evaluating the phenomenon. An ASC is a mental state, but it is not clear how such a mental state is related to subjective experience and cognitive functioning. The relationship between the method of induction and the resulting ASC is also unclear at present. Finally, criteria for determining and evaluating the ASC are indistinguishable from the phenomenon itself, leaving the latter ill-defined. These are the basic issues which are addressed in the theoretical formulation here presented. I propose that the cognitive mode distinguishing the normal waking state from an ASC is the mode of meaning employed.

While there has been considerable interest in the field of consciousness in general, and in the notion of an altered state of consciousness (ASC) in particular (e.g., Dittrich, von Arx, and Staub, 1981; Fischer, 1971; Glicksohn, 1991; Hilgard, 1977, 1980; Hunt, 1984, 1985, 1989; Kihlstrom, 1984; Ludwig, 1966; Natsoulas, 1978, 1981; Ornstein, 1975; Pekala and Wenger, 1985; Pope and Singer, 1978; Tart, 1972a, 1972b), little progress has been made into the study of altered-state cognition. In part, this is due to the problem of defining exactly what an ASC is, and what distinguishes an ASC from the ordinary waking state of consciousness (cf. Natsoulas, 1981).

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As a working definition of an ASC, one can adopt Ludwig's (1966, p. 225) description of this as being "... any mental state ... recognized ... as representing a sufficient deviation in subjective experience ... from certain general norms ... during alert, waking consciousness." In the next two sections I shall discuss the induction of such an ASC, and some defining characteristics of an induced ASC. Following this I shall propose a cognitive mode that distinguishes an ASC from the ordinary-waking state of consciousness, in reply to Natsoulas' (1981) query.

The Induction of an ASC

An ASC may be induced by any procedure that results in a shift in one's psychophysiological state. A number of such procedures have been explored in the literature, and various causal relations have been postulated. For example, meditative techniques (Naranjo and Ornstein, 1971) may induce an ASC because of a qualitative shift in the allocation of attentional resources, or change in attentional focus (Davidson and Goleman, 1977; Shapiro, 1980). Relaxation techniques (Davidson and Schwartz, 1976), on the other hand, may induce an ASC because of a qualitative shift in arousal level (Benson, Kotch, Crassweller, and Greenwood, 1977).

The psychophysiological state is obviously susceptible to the influence of variations in sensory stimulation. Both Dittrich, von Arx, and Staub (1981) and Ludwig (1966) have suggested that two major ASC-induction procedures are those of perceptual overload (Lipowski, 1975) and perceptual deprivation (Zubek, 1969). It should seem that the primary effect of variations in stimulation is on the level of arousal (Davies and Parasuraman, 1982; Zuckerman, 1969). Exactly what the nature of the relationship is between sensory stimulation and arousal level remains, however, an empirical problem (Zubek, 1969). As changes in arousal level are correlated with changes in state of consciousness along the sleep-wakefulness continuum (Lindsley, 1960), one would assume that radical changes in arousal level would induce ASCs. A number of authors have proposed such a change as being prerequisite for the induction of an ASC (e.g., West, 1962).

Indeed, the subjective experience reported during perceptual deprivation would seem to be indicative of the induction of an ASC (Glicksohn, 1991; Reed, 1979; Suedfeld, 1980; Suedfeld and Borrie, 1978; Ziskind, Graham, Kuninobu, and Ainsworth, 1963). Zubek and MacNeill (1967), for example, reported that subjects confined to a week of perceptual deprivation reported "hallucinatory-like experiences, changes in body image, loss of contact with reality, temporal disorientation, and speech difficulties" (p. 150). By present criteria (see below), such reports would be considered as reflecting induction of an ASC.

Gellhorn (1967, p. 61) has noted that monotony, internal inhibition and sleep are interrelated, and that repeated exposure to the same stimulus leads to drowsiness and to an increase in the susceptibility to hypnotic suggestion. Subjects who are susceptible to hypnotic induction exhibit large amounts of EEG theta that is characteristic both of the drowsy, hypnagogic state and of intensively attentive states (Schacter, 1977). While a reduction in sensory stimulation leads directly to a low-arousal psychophysiological state that is hypnagogiclike (Schuman, 1980), an increase in sensory stimulation may indirectly lead to such a state (Ludwig and Lyle, 1964; Sargant, 1957, 1973). Either way, a low-arousal state that is hypnagogiclike may be achieved (Glicksohn, 1991).

Now, while environmental stimulation influences arousal level, and arousal level, in turn, is correlated with state of consciousness, such a simple chain cannot, however, suffice as a theoretical model for the induction of an ASC. From Ludwig's (1966) definition, the ASC is primarily a cognitive phenomenon, and not a physiological one. One therefore has to investigate the cognitive dynamics underlying the shift to an ASC. In addition, there are three major reasons for rejecting a simple "arousal" framework. First, physiological measures are insufficient to determine the state of consciousness of the subject (Davidson, 1976; Hilgard, 1969; Johnson, 1970). Thus, one has to look to behavioral and cognitive criteria in addition (Stoyva and Kamiya, 1968). Secondly, the correlation between physiological measures of arousal level and subjective reports of relaxation have been found to be low, and sometimes even negative (Tarter-Benlolo, 1978). Thirdly, a common finding in the literature is, that despite any physiological differentiation between the ASCs induced by meditation, relaxation and hypnosis (e.g., Morse, Martin, Furst, and Dubin, 1977), there is a subjective differentiation.

Defining Characteristics of an ASC

How can one determine that an ASC has been induced? Dittrich et al. (1981) required subjects to complete a standard questionnaire in a number of experiments that entailed various ASC-induction procedures. The following factors were found to be characteristic of the ASC: alterations of thinking (e.g., "I was not able to complete a thought; my thoughts repeatedly became disconnected"); a changed time sense (e.g., "I experienced past, present and future as a oneness"); a feeling of loss of control (e.g., "I had the feeling that I no longer had a will of my own"); intensive emotions (e.g., "I was afraid without being able to say exactly why"); body image changes (e.g., "It seemed to me that I did not have a body anymore"); an altered visual perception (including pseudo-hallucinations, illusions, synesthesia; e.g., "I saw scenes rolling by like in a film in total darkness or with my eyes closed"); and

a change of meaning of various percepts (e.g., "Things around me had a new, strange meaning for me").

Following are examples of introspective reports¹ obtained by: (1) Hunt and Chefurka (1976) in a study using introspective sensitization (i.e., the instruction to pay attention to one's subjective experience), given a short period of isolation (noted as HC); (2) Ludwig (1972) in a study using perceptual overload (noted as L); and (3) by Glicksohn, in a pilot study, using a number of ASC-induction procedures (e.g., perceptual deprivation and perceptual overload—noted as G). The above-noted ASC criteria are applied for content analysis of these reports, which are all categorized as being indicative of an ASC. Reports 1 through 4 may be classified along only one criterial dimension; reports 5 through 8 may be classified along a number of such dimensions:

1. "A strange room! So relaxing—a calm state of mind. I felt sort of light-headed. I was sitting here and all I could feel was my finger tips on my legs and I couldn't feel the rest of my body. My body was sort of floating." (HC; body image change)
2. "The lights were flickering off and on and I was looking at the design on the wall, the bricks; they expand and contract with music; they would get bigger than saucers." (L; altered visual perception)
3. "During my experience . . . I imagined like I was in my own little world, and at times this world was slowed down." (L; a changed time sense)
4. "At times I got goose pimples from certain sounds and chills up and down my back. And the time my heart beat was a little faster, I felt a little more worked up by the sounds and the light . . . just the sensations as cold streaks down my legs . . ." (L; intensive emotion)
5. "I think that the lights brightened and different colors came . . . The lines in the wall became purple and green instead of white. And I saw green and purple lines floating across the air . . . Just when you came in, my legs started shaking and my head

¹ It should be noted, however, that self-observation may change the subject's ongoing state of consciousness. For example, it has been known for some time that when a person is angry, self-observation regarding that anger tends to decrease that state of anger (Bakan, 1968, p. 100). From this, and other observations, one may conclude that the act of introspection, or indeed the production of any type of verbal report (cf. Radford, 1974), may disrupt an ongoing *conscious cognitive process* (e.g., Bakan, 1968; Mandler, 1975), contrary to what has been argued regarding thinking-aloud instructions (Ericsson and Simon, 1980). Whether introspection, or any other type of verbal report, is therefore inherently unreliable or not (Ericsson and Simon, 1980; Natsoulas, 1967, 1970; Nisbett and Wilson, 1977; Smith and Miller, 1978; White, 1980) may in the end revolve around the issue of whether by introspecting the subject is, in fact, altering his or her ongoing cognitive functioning, and thus altering his or her state of consciousness. Indeed, some forms of introspection are capable of inducing an ASC—in particular the type of "classical" introspection adopted by the structuralists of the Wundt-Titchener era that, in essence, entailed an *introspective sensitization* to subjective experience (Hunt, 1984, 1985, 1989; Hunt and Chefurka, 1976).

started spinning . . . I was conscious of myself breathing and blinking and then it felt like my legs were shaking and I was swaying back and forth, and I thought I was falling over sideways when you knocked at the door" (HC; altered visual perception; a feeling of loss of control)

6. "Before the brick started to move, I was staring at a little hole in the brick. After a while it looked like an eye—not really an eye but I visualized the hole as staring at me—I thought the room was alive itself. Like it had blood flowing through veins and it was trying to entertain me—showing me all this stuff. It seemed to have a life of its own almost. Like I was encompassed by it." (HC; altered visual perception; a change in meaning of percepts)

7. "I feel a state—in terms of arousal—of sleep. A state of 'back and forth.' When I was completely alone—a state of wanting to sleep, with a return to wakefulness . . . and once again back and forth, here and there . . . it reminded me of a state of hypnosis. At the very end I didn't feel my hands—as if I were floating." (G; report of ASC; a feeling of loss of control)

8. "I felt like this—as if I'm landing somewhere—the whole room was in a different situation. That is to say, I didn't feel—if you know what I mean—as if a loss of . . . very interesting! Another thing that I wanted to tell you, was in the middle—when you left—and I was listening to the voices here, for a second it was as if I had fallen asleep, and I went into . . . I hallucinated a hallucination of me driving in a car at full speed and bang! Hitting a wall!" (G; alterations in thinking; a change of meaning of percepts; altered visual perception).

Altered-State Cognition

Adopting the general orientation of the organismic-developmental framework of Werner (1948, 1957/1978, 1959/1978), who suggested that different *levels* or *stages* of cognition (i.e., microgenetic or ontogenetic) may be tapped by employing particular experimental or clinical conditions, I propose that different *states* of consciousness entail different *modes* of cognition. Indeed, it can be argued that Werner was specifically concerned with what is now termed ASC phenomena (Barten and Franklin, 1978). Of particular interest to the present discussion is the fact that Werner (1959/1978) cited the phenomena that occur in sensory deprivation as supportive of his concept of regression to an earlier form (level, stage) of cognitive functioning. Thus, within this organismic-developmental framework one would expect that the mode of cognition evidenced in the shift to an ASC, as induced via perceptual deprivation, for example, would be developmentally earlier to the mode of cognition characteristic of the alert, waking state.

But such altered-state cognition can only be assessed when a detailed content-based theory of cognition is available. In fact, such a theory exists (Kreitler and Kreitler, 1976, 1982). According to the latter, the meaning of an item can be represented in a multidimensional semantic space by a profile of meaning values (responses) along a set, of meaning dimensions (such as

“function,” “sensory qualities,” “manner of occurrence,” etc.). In addition, and of present interest, four types of relation have been defined connecting a meaning value to the referent of the meaning process: the attributive and comparative relations, which together characterize the *lexical* mode of meaning, and the exemplifying–illustrative and metaphoric–symbolic relations, which together characterize the *personal* mode of meaning (Kreitler and Kreitler, 1976). An example will clarify these relations, as one follows the change in meaning of a single referent “life”: “a biological process” (attributive); “the opposite of death” (comparative); “a pregnant woman” (exemplifying–illustrative); and the example from Kreitler and Kreitler (1976, p. 33), “a colored kerchief that blazes for a second and disappears in the hand of a magician” (metaphoric–symbolic).

As the lexical mode of meaning is mainly used to convey interpersonally-shared, lexical meanings whereas the personal mode is mainly used to convey personal subjective meanings (Kreitler and Kreitler, 1976), it would seem that the lexical mode is the developmentally later one. Thus, the personal mode, entailing both the exemplifying–illustrative and metaphoric–symbolic relations, should be characteristic of ASC cognition, even if not developmentally prior in all aspects (i.e., in the use of the metaphoric–symbolic relation). In fact, Werner (1957/1978) had originally proposed that the use of (what Kreitler and Kreitler have termed) the exemplifying–illustrative relation is developmentally prior to that of the attributive relation.

This hypothesis regarding the dominance of the personal mode of meaning in an ASC has empirical support from a number of sources. First, the use of psychedelic drugs to induce an ASC results in a shift to a metaphoric–symbolic mode of thought (Grof, 1975; Masters and Houston, 1966), and subjects experiencing peak experiences (Maslow, 1968) are prone to metaphoric–symbolic thought; as Maslow (1968, p. 110) has noted, “expression and communication in the peak-experiences tend often to become poetic, mythical and rhapsodic, as if this were the natural kind of language to express such states of being.” Second, the use of perceptual deprivation induces a hypnoid-like (Ziskind et al., 1963) or hypnagogiclike (Schacter, 1976) ASC that is characterized by symbolic visual imagery (Rapaport, 1951/1967, 1957/1967; Schacter, 1976; Silberer, 1909/1951, 1912/1951; Stoyva, 1973). Thirdly, subjects under stress, or other conditions entailing an increase in arousal, are prone to using metaphoric–symbolic language (Anderson, 1964); and subjects experiencing depersonalization, such as via perceptual deprivation (Reed, 1979), also resort to metaphors and similes (“as if” experiences) to describe their subjective experience (Taylor, 1982; Weckowitz, 1970). Fourth, Martindale (1977–78, 1981) has argued that both high and low levels of arousal should be correlated with the appearance of what may be termed as either primary-process thought, or primary-process states, and Dawes (cited in Blum, 1967) found

that primary-process thought appeared in low arousal states induced via hypnotic programming. Finally, the expression of an ASC is usually in terms of culture-specific metaphors and symbols (e.g., "boiling," "fire"—cf. Locke and Kelly, 1985); and subjects experiencing mystical states resort to metaphors and symbols to describe their subjective experience; as Underhill (1955, p. 239) has noted, "symbols . . . play a major part, not only in the description, but also in the machinery of illumination: the intuitions of many mystics presenting themselves directly to the surface-mind in a symbolic form."

It should be noted that the majority of writers on mysticism have viewed the metaphoric-symbolic language that is used to convey the experience as being a means to express what is in actuality ineffable (e.g., Stace, 1960). Davidson (1976) has suggested that this ineffability, and concomitant use of metaphoric-symbolic language, is due to the fact that the mystical state (and, indeed, other ASCs) may be correlated with a (hypothesized) dominance of the right cerebral hemisphere, which is characterized, among other things, as being languageless. Similarly, Reed (1979) has suggested such a shift in hemispheric dominance as being induced by sensory deprivation. While this may be so, and is indeed compatible with the hypothesis of a shift to a dominant personal mode of meaning (as well as with a shift to an ASC, as evidenced by such other right-hemisphere characteristics allowing for shifts in time perception, emotional reaction, etc.—see, e.g., Ornstein, 1975; Reed, 1979), one must not confuse the use of metaphoric-symbolic language as a makeshift mode of communication, with the use of metaphoric-symbolic language as reflecting underlying metaphoric-symbolic thought. The latter is a much stronger proposition, and is that which is here proposed. Thus one would expect that a shift to an ASC will be correlated with a shift to a dominant personal mode of meaning.

The distinction between the lexical and personal modes of meaning is compatible with that regarding primary and secondary processes (Freud, 1900/1965; Hilgard, 1962). The primary process mode of cognition may be viewed as being self-centered (Noy, 1979) and essentially metaphoric in nature (Suler, 1980). It is quite similar to what has been termed autistic thought (Bleuler, 1912/1951) or A-thinking (McKellar, 1968). Indeed, there is much overlap among various proposed dichotomies of modes of cognition (Neisser, 1967). Nevertheless, the definitions of the lexical and personal modes of meaning (Kreitler and Kreitler, 1976) have the distinct advantage of not being intimately tied to ASC experience, as are the other conceptualizations. For example, Freud's primary process is clearly evidenced in dreams, by definition (Freud, 1900/1965). McKellar's A-thinking, on the other hand, is evidenced in sensory deprivation (McKellar, 1968, pp. 81–85). Thus, the proposed shift in mode of meaning, while being intuitively reasonable, is not necessarily self-evident.

In an extensive review of the field of consciousness, Natsoulas (1981, p. 164) noted a basic issue that has as yet to be resolved: "What is the cognitive mode of function . . . that distinguishes the normal waking state from other general states of consciousness and unconsciousness?" Based on the present review, and my own preliminary work in this domain (Glicksohn, 1991), I propose that the distinguishing cognitive mode is that of the mode of meaning.

References

- Anderson, C.C. (1964). The psychology of metaphor. *Journal of Genetic Psychology*, 105, 53–73.
- Bakan, D. (1968). *On method: Toward a reconstruction of psychological investigation*. San Francisco: Jossey-Bass.
- Barten, S.S., and Franklin, M.B. (1978). Introduction. In S.S. Barten and M.B. Franklin (Eds.), *Developmental processes: Heinz Werner's selected writings, Vol. 1* (pp. 1–7). New York: International Universities Press.
- Benson, H., Kotch, J.B., Crassweller, K.D., and Greenwood, M.M. (1977). Historical and clinical considerations of the relaxation response. *American Scientist*, 65, 441–445.
- Bleuler, E. (1951). Autistic thought. In D. Rapaport (Ed.), *Organization and pathology of thought* (pp. 399–437). New York: Columbia University Press. (originally published in 1912)
- Blum, G.S. (1967). Hypnosis in psychodynamic research. In J.E. Gordon (Ed.), *Handbook of clinical and experimental hypnosis* (pp. 83–109). New York: Macmillan.
- Davidson, J.M. (1976). The physiology of meditation and mystical states of consciousness. *Perspectives in Biology and Medicine*, 19, 345–380.
- Davidson, R.J., and Goleman, D.J. (1977). The role of attention in meditation and hypnosis: A psychobiological perspective on transformations of consciousness. *International Journal of Clinical and Experimental Hypnosis*, 25, 291–308.
- Davidson, R.J., and Schwartz, G.E. (1976). The psychobiology of relaxation and related states: A multi-process theory. In D.I. Mostofsky (Ed.), *Behavioral control and modification of physiological activity* (pp. 399–442). Englewood Cliffs, New Jersey: Prentice-Hall.
- Davies, D.R., and Parasuraman, R. (1982). *The psychology of vigilance*. New York: Academic Press.
- Dittrich, A., von Arx, S., and Staub, S. (1981). International study on altered states of consciousness (ISASC), Part 1: Theoretical considerations and research procedures. *Revue Suisse de Psychologie*, 40, 189–200.
- Ericsson, K.A., and Simon, H.A. (1980). Verbal reports as data. *Psychological Review*, 89, 215–251.
- Fischer, R. (1971). A cartography of ecstatic and meditative states. *Science*, 174, 897–904.
- Freud, S. (1965). *The interpretation of dreams*. New York: Avon. (originally published in 1900)
- Gellhorn, E. (1967). *Principles of autonomic-somatic integrations: Physiological basis and psychological and clinical implications*. Minneapolis: University of Minnesota Press.
- Glicksohn, J. (1991). The induction of an altered state of consciousness as a function of sensory environment and experience seeking. *Personality and Individual Differences*, 12, 1057–1066.
- Grof, S. (1975). *Realms of the human unconscious*. New York: Viking.
- Hilgard, E.R. (1962). Impulsive versus realistic thinking: An examination of the distinction between primary and secondary processes in thought. *Psychological Bulletin*, 59, 477–488.
- Hilgard, E.R. (1969). Altered states of awareness. *Journal of Nervous and Mental Disease*, 149, 68–79.
- Hilgard, E.R. (1977). *Divided consciousness: Multiple controls in human thought and action*. New York: Wiley.
- Hilgard, E.R. (1980). Consciousness in psychology. *Annual Review of Psychology*, 31, 1–26.
- Hunt, H.T. (1984). A cognitive psychology of mystical and altered-state experience. *Perceptual and Motor Skills*, 58, 467–513.
- Hunt, H.T. (1985). Cognition and states of consciousness: The necessity for empirical study of ordinary and nonordinary consciousness for contemporary cognitive psychology. *Perceptual and Motor Skills*, 60, 239–282.

- Hunt, H.T. (1989). The relevance of ordinary and nonordinary states of consciousness for the cognitive psychology of meaning. *Journal of Mind and Behavior*, 10, 347-360.
- Hunt, H.T., and Chefurka, C.M. (1976). A test of the psychedelic model of altered states of consciousness: The role of introspective sensitization in eliciting unusual subjective reports. *Archives of General Psychiatry*, 33, 867-876.
- Johnson, L.C. (1970). A psychophysiology for all states. *Psychophysiology*, 6, 501-516.
- Kihlstrom, J.F. (1984). Conscious, subconscious, unconscious: A cognitive perspective. In K.S. Bowers and D. Meichenbaum (Eds.), *The unconscious reconsidered* (pp. 149-211). New York: Wiley.
- Kreitler, H., and Kreitler, S. (1976). *Cognitive orientation and behavior*. New York: Springer.
- Kreitler, H., and Kreitler, S. (1982). The theory of cognitive orientation: Widening the scope of behavior prediction. In B.A. Maher and W.B. Maher (Eds.), *Progress in experimental personality research, Vol. 11: Normal personality processes* (pp. 101-169). New York: Academic Press.
- Lindsley, D.B. (1960). Attention, consciousness, sleep and wakefulness. In J. Field (Ed.), *Handbook of physiology, Vol. 3* (pp. 1553-1589). Washington, D.C.: American Physiological Society.
- Lipowski, Z.J. (1975). Sensory and information inputs overload: Behavioral effects. *Comprehensive Psychiatry*, 16, 199-221.
- Locke, R.G., and Kelly, E.F. (1985). A preliminary model for the cross-cultural analysis of altered states of consciousness. *Ethos*, 13, 3-55.
- Ludwig, A.M. (1966). Altered states of consciousness. *Archives of General Psychiatry*, 15, 225-234.
- Ludwig, A.M. (1972). "Psychedelic" effects produced by sensory overload. *American Journal of Psychiatry*, 128, 114-117.
- Ludwig, A.M., and Lyle, W.H., Jr. (1964). Tension induction and the hyperalert trance. *Journal of Abnormal and Social Psychology*, 69, 70-76.
- Mandler, G. (1975). Consciousness: Respectable, useful, and probably necessary. In R.L. Solso (Ed.), *Information processing and cognition: The Loyola Symposium* (pp. 229-254). Hillsdale, New Jersey: Erlbaum.
- Martindale, C. (1977-78). Creativity, consciousness, and cortical arousal. *Journal of Altered States of Consciousness*, 3, 69-87.
- Martindale, C. (1981). *Cognition and consciousness*. Homewood, Illinois: Dorsey Press.
- Maslow, A.H. (1968). *Toward a psychology of being* (second edition.). Princeton, New Jersey: Van Nostrand.
- Masters, R.E.L., and Houston, J. (1966). *The varieties of psychedelic experience*. New York: Holt, Rinehart and Winston.
- McKellar, P. (1968). *Experience and behaviour*. Harmondsworth, Middlesex: Penguin.
- Morse, D.R., Martin, J.S., Furst, M.L., and Dubin, L.L. (1977). A physiological and subjective evaluation of meditation, hypnosis, and relaxation. *Psychosomatic Medicine*, 39(5), 304-324.
- Naranjo, C., and Ornstein, R.E. (1971). *On the psychology of meditation*. New York: Viking.
- Natsoulas, T. (1967). What are perceptual reports about? *Psychological Bulletin*, 67, 249-272.
- Natsoulas, T. (1970). Concerning introspective "knowledge." *Psychological Bulletin*, 73, 89-111.
- Natsoulas, T. (1978). Consciousness. *American Psychologist*, 33, 906-914.
- Natsoulas, T. (1981). Basic problems of consciousness. *Journal of Personality and Social Psychology*, 41, 132-178.
- Neisser, U. (1967). *Cognitive psychology*. New York: Appleton-Century-Crofts.
- Nisbett, R.E., and Wilson, T.D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84, 231-259.
- Noy, P. (1979). The psychoanalytic theory of cognitive development. *The Psychoanalytic Study of the Child*, 34, 169-216.
- Ornstein, R.E. (1975). *The psychology of consciousness*. New York: Penguin.
- Pekala, R.J., and Wenger, C.F. (1985). Retrospective phenomenological assessment: Mapping consciousness in reference to specific stimulus conditions. *Journal of Mind and Behavior*, 4, 247-274.
- Pope, K.S., and Singer, J.L. (Eds.). (1978). *The stream of consciousness: Scientific investigations into the flow of human experience*. New York: Plenum.

- Radford, J. (1974). Reflections on introspection. *American Psychologist*, 29, 245–250.
- Rapaport, D. (1967). States of consciousness: A psychopathological and psychodynamic view. In M.M. Gill (Ed.), *The collected papers of David Rapaport* (pp. 385–405). New York: Basic Books. (originally published in 1951)
- Rapaport, D. (1967). Cognitive structures. In M.M. Gill (Ed.), *The collected papers of David Rapaport* (pp. 631–664). New York: Basic Books. (originally published in 1957)
- Reed, G.F. (1979). Sensory deprivation. In G. Underwood and R. Stevens (Eds.), *Aspects of consciousness, Vol. 1: Psychological issues* (pp. 155–178). London: Academic Press.
- Sargant, W. (1957). *Battle for the mind: A physiology of conversion and brain-washing*. New York: Doubleday.
- Sargant, W. (1973). *The mind possessed: A physiology of possession, mysticism and faith healing*. London: Heinemann.
- Schacter, D.L. (1976). The hypnagogic state: A critical review of the literature. *Psychological Bulletin*, 83, 452–481.
- Schacter, D.L. (1977). EEG theta waves and psychological phenomena: A review and analysis. *Biological Psychology*, 5, 47–82.
- Schuman, M. (1980). The psychophysiological model of meditation and altered states of consciousness: A critical review. In J.M. Davidson and R.J. Davidson (Eds.), *The psychobiology of consciousness* (pp. 333–378). New York: Plenum.
- Shapiro, D.H. (1980). *Meditation: Self-regulation strategy and altered state of consciousness*. New York: Aldine.
- Silberer, H. (1951). Report on a method of eliciting and observing certain symbolic hallucination phenomena. In D. Rapaport (Ed.), *Organization and pathology of thought* (pp. 195–207). New York: Columbia University Press. (originally published in 1909)
- Silberer, H. (1951). On symbol formation. In D. Rapaport (Ed.), *Organization and pathology of thought* (pp. 208–233). New York: Columbia University Press. (originally published in 1912)
- Smith, E.R., and Miller, F.D. (1978). Limits in perception of cognitive processes: A reply to Nisbett and Wilson. *Psychological Review*, 85, 355–362.
- Stace, W.T. (1960). *Mysticism and philosophy*. Philadelphia: Lippincott.
- Stoyva, J. (1973). Biofeedback techniques and the conditions for hallucinatory activity. In F.J. McGuigan and R.A. Schoonover (Eds.), *The psychophysiology of thinking: Studies of covert processes* (pp. 387–406). New York: Academic Press.
- Stoyva, J., and Kamiya, J. (1968). Electrophysiological studies of dreaming as the prototype of a new strategy in the study of consciousness. *Psychological Review*, 75, 192–205.
- Suedfeld, P. (1980). *Restricted environmental stimulation: Research and clinical applications*. New York: Wiley.
- Suedfeld, P.E., and Borrie, R.A. (1978). Altering states of consciousness through sensory deprivation. In A.A. Sugarman and R.E. Tarter (Eds.), *Expanding dimensions of consciousness* (pp. 226–252). New York: Springer.
- Suler, J.R. (1980). Primary process thinking and creativity. *Psychological Bulletin*, 88, 144–165.
- Tart, C.T. (1972a). States of consciousness and state-specific sciences. *Science*, 176, 1203–1210.
- Tart, C.T. (Ed.). (1972b). *Altered states of consciousness* (second edition). New York: Anchor/Doubleday.
- Tarter-Benlolo, L. (1978). The role of relaxation in biofeedback training: A critical review of the literature. *Psychological Bulletin*, 85, 727–755.
- Taylor, F.K. (1982). Depersonalization in the light of Brentano's phenomenology. *British Journal of Medical Psychology*, 55, 297–306.
- Underhill, E. (1955). *Mysticism: A study in the nature and development of man's spiritual consciousness*. New York: New American Library.
- Weckowitz, T. (1970). Depersonalization. In C.G. Costello (Ed.), *Symptoms of psychopathology: A handbook* (pp. 151–166). New York: Wiley.
- Werner, H. (1948). *Comparative psychology of mental development*. New York: International Universities Press.
- Werner, H. (1978). The concept of development from a comparative and organismic point of view. In S.S. Barten and M.B. Franklin (Eds.), *Developmental processes: Heinz Werner's selected writings, Vol. 1* (pp. 107–130). New York: International Universities Press. (originally published in 1957)

- Werner, H. (1978). Significance of general experimental psychology for the understanding of abnormal behavior and its correction or prevention. In S.S. Barten and M.B. Franklin (Eds.), *Developmental processes: Heinz Werner's selected writings, Vol. 2* (pp. 327–345). New York: International Universities Press. [originally presented at a conference in 1959]
- West, L.J. (1962). A general theory of hallucinations and dreams. In L.J. West (Ed.), *Hallucinations* (pp. 275–291). New York: Grune and Stratton.
- White, P. (1980). Limitations on verbal reports of internal events: A refutation of Nisbett and Wilson and of Bem. *Psychological Review*, 87, 105–112.
- Ziskind, E., Graham, R.W., Kuninobu, L., and Ainsworth, R. (1963). The hypnoid syndrome in sensory deprivation. In J. Wortis (Ed.), *Recent advances in biological psychiatry, Vol. 5* (pp. 331–346). New York: Plenum.
- Zubek, J.P. (Ed.). (1969). *Sensory deprivation: Fifteen years of research*. New York: Appleton–Century–Crofts.
- Zubek, J.P., and MacNeill, M. (1967). Perceptual deprivation phenomena: Role of the recumbent position. *Journal of Abnormal Psychology*, 72, 147–150.
- Zuckerman, M. (1969). Theoretical formulations: 1. In J.P. Zubek (Ed.), *Sensory deprivation: Fifteen years of research* (pp. 407–432). New York: Appleton–Century–Crofts.