mental functioning." Similarly, Ludwig (1966) defines an altered state of consciousness as

any mental state induced by various physiological, psychological, or pharmacological maneuvers or agents, which can be recognized subjectively by the individual himself (or by an objective observer of the individual) as representing a sufficient deviation in the subjective experience or psychological functioning from certain general norms for that individual during alert, waking consciousness.

There is the question of whether or not these quite varied states can be reduced to a common denominator. Freud (1900) attempted to do so in his discussion of attention cathexis in Chapter VII of *The Interpretation of Dreams*, and his ideas were later systematized, refined in some areas and expanded in others, by Rapaport (1951), who attempted to provide a metapsychology sufficiently comprehensive to handle all these complex and diverse phenomena.

**DE-AUTOMATIZATION**

The prolonged focusing of attention, whether in meditation or hypnosis, often leads to an altered state of consciousness. In the case of meditation, this altered state is documented not only by subjective reports but by numerous psychophysiological correlates as well (e.g., Kasamatsu and Hirai, 1969, Anand et al., 1961, Kamiya, 1969, Wallace, 1970). The process whereby sustained attention leads to an altered state has been called de-automatization. The concept of de-automatization is derived from Hartmann's (1958) discussion of the automatization of motor behavior. According to Hartmann, automatization occurs when with increasing prac-
Thus, de-automatization is the undoing of automatization by reinvesting automatized actions, thoughts, or precepts with attention. The techniques of both meditation and hypnotic induction seem to constitute just such a manipulation of attention as is required to produce de-automatization. The occurrence of cognitive or perceptual de-automatization presumably results in a change in the state of consciousness through a shift in the level of perceptual and cognitive organization.

ATTENTION AND MEDITATION

The techniques of meditation offer an ideal laboratory for studying attention and de-automatization. There are a number of techniques for meditating (see Maupin, 1969) but the essence of all of them is that the meditator works to gain control over his attentional processes. Gaining mastery over one's attention is difficult work for there seems to be a natural tendency for attention to constantly shift from one point of focus to another. DeRopp (1968, p. 71) says, "Only by work, by a steady, unremitting effort can he learn to stop the wheel of the imagination, to halt that flood of inner conversations, arguments, mere chatter, with which the roof brain, by its useless overactivity, floods the awareness from dawn to dusk." In the Bhagavad-Gita, Prince Arjuna says to Krishna, "The mind is restless, turbulent, powerful and obstinate ... I deem it as difficult to control as the wind." Another Yogic text (Satprem, 1964, p. 35) compares the mind to a grinding machine:

For the mind does not seek to know truly, though it seeks to grind. Its need of knowledge is primarily a need of something to grind. And if perchance the machine were to come to a stop because the knowledge was found, it would quickly rise in revolt and find something new to grind, to have the pleasure of grinding and grinding. This is its function.

Thus, we seem obsessively compelled to have thoughts during all our waking hours, even when not engaged in the problem solving for which thought presumably evolved. So it is that in meditation one attempts the difficult task of gaining control over this apparently wasteful dissipation of attention by fixing attention either on one thing or on nothing. Deikman (1963) did preliminary research on meditation in which he had a small number of subjects fix their attention on a vase for 15-minute periods over 12 sessions while distracting stimuli were played on tape. Even within this small
number of meditative sessions, his subjects reported a wide range of striking alterations in perception and thought, which Deikman explained in terms of sensory translation, reality transfer, and perceptual expansion, all of which he believed to be a consequence of a de-automatization of the psychological structures that organize, limit, select, and interpret perceptual stimuli.

Maupin (1965) attempted to study ego functions that he felt would be relevant in meditation. In his study, male college volunteers were instructed in an exercise related to Zen Buddhist meditation procedures and their subjective response to the exercise was rated high, moderate, or low based on their verbal reports taken after daily sessions over a three-week period. He hypothesized that successful response to the exercise would correlate with measures related to attention, tolerance for unrealistic experience, and capacity for regression in the service of the ego. While capacity for regression and tolerance of unrealistic experience significantly predicted response to meditation, the attention measures he used did not. This rather surprising failure he attempted to explain post hoc by suggesting that "Once issues related to comfort in the face of strange inner experience are resolved, attention functions necessary to the experience probably become available," However, it is possible that Maupin dismissed the role of attention too easily. A somewhat more likely possibility is that the particular measures of attention he used (digit span, continuous additions, and size estimation) did not correlate because they were confounded with factors other than attention and did not tap into the most relevant aspects of the attention construct vis a vis meditation. Later, two alternative measures of attention will be proposed which, at least on the face of it, appear to be more directly relevant to the meditation task and less confounded. Maupin did find that experimental meditators experienced many of the alterations of consciousness classically reported in mystic literature. These striking subjective changes were a consequence, presumably, of instructions to the subjects to focus their attention on their own breathing.

A NOVEL TECHNIQUE FOR STUDYING ATTENTION DURING MEDITATION

The technique is incredibly simple, but a detailed description of the procedure follows, in the event that others wish to use it.
Forty-seven male undergraduates at the University of Michigan, 18-23 years, participated as paid volunteers in a study on meditation, hypnosis, and attention. In the course of this study each subject was asked to report an intrusion each time his attention wandered during two meditation exercises. One of the meditations selected involved attending to an external stimulus (candle-gazing), the other to an internal stimulus (breathing). The subject was seated in a small anechoic chamber and the experimenter read aloud the following instructions:

The purpose of this session is to study your attention style. Some people are able to focus their attention readily on one thing while others tend to scan over a number of things. Of course, we all do both of these, focusing and scanning, to some degree but generally a preferred mode develops. In this next task, I am going to ask you to focus your attention on one thing and I am going to rely on your report of the extent to which you were or were not able to keep your attention focused.

Let me show you what I mean by having you practice focusing your attention on this doorstop here (the doorstop just happened to be a convenient fixation point that was at eye-level across from the seated S). In a moment, I am going to ask you to sit back comfortably in your chair and fix your attention on this doorstop. By focusing your attention on the doorstop, I do not mean analyzing its different parts, or thinking a series of thoughts about it, or associating ideas to it, but rather trying to see the doorstop as it exists in itself, without any connection to other things. Try to exclude all other thoughts or feelings or sounds or body sensations. Do not let them distract you but keep them out so that you can focus all your attention, all your awareness on the doorstop itself. Try to let the perception of the doorstop fill your entire mind, Is this much clear? OK, I’d like you to try it for a minute or two right now . . .

Fine. How did it go? At some point, you may have noticed yourself thinking about something rather than just focusing on the doorstop. Most people find it fairly difficult to keep their mind empty of thoughts and it is expected that you will experience the intrusion of random thought. I’d like you to signal each time such an intrusion occurs by pressing this button (E shows S the button which Was mounted in a small 2½” X 1½” X 2” chassisbox so that the S could hold it comfortably in one hand on his lap. The button electrically activated a counter outside the experimental chamber.) Some extremely fleeting thought or perception may cross your mind and not be counted as an intrusion so long as you’ll do not get
caught up in a stream of thought about it. An intrusion is counted whenever you find that you have gotten caught up in some thought or other and, by force of will, have to bring yourself back to the task of just focusing on the doorstop. It is as if you have momentarily forgotten the task or had a slight lapse of consciousness and then suddenly remembered what you were supposed to be doing. It is very important that you report the intrusions as honestly as you can without getting caught up in trying to look good to me. I assure you that I am only interested in studying your attention style as it is and I have no basis for making judgments of good or bad. So just do your best to report an intrusion whenever you notice that you are not concentrating on the doorstop as fully as you might and you have to bring your attention back to the task. Let's try another practice session now, this time for 3 minutes. This time I will be closing the door and observing you from the adjoining chamber. I will tell you through the intercom when to begin. Remember, each time you experience an intrusion, press the button (E left chamber, closing doors) . . . Ready? Begin (E allowed 3-min. If no intrusion occurred by then, the period was extended to the first intrusion.) Fine. (E rejoined S in the chamber.) How did that go? (E answered questions and clarified by essentially repeating the above.)

You seem to understand what I want you to report, so let's try an actual 15-minute session now. (E then lit a large candle which was sitting in the middle of the table. The same candle was used throughout the experiment and did not change appreciably in size. It was about 8" high and 3" in diameter.) This time I am going to ask you to focus your attention on the flame of this candle. Remember that by focusing I do not mean analyzing the different parts of the flame, or thinking a series of thoughts about the flame, or associating ideas to the flame, but rather trying to see the flame as it exists in itself, without any connection to other things. Each time an intrusion occurs, press the button. I will let you know when the 15-minute period is over. Before we begin, take a moment to get as comfortable and relaxed as possible. I will let you know through the intercom when to begin. (E left chamber, closing doors.) Ready? Begin . . . (E was able to observe S from behind through the observation window. E recorded the number of times S pushed the button during each minute of the 15-minute period.)

Fine. You can stop now. Perhaps you would like to step outside the chamber a moment to stretch before we begin the next task. (E then had S return to his seat in the chamber alone and closed the doors.)

(Over the intercom.) Now let's try another 15-minute session. In a moment, I am going to ask you to close your eyes
and focus your attention on your breathing. I don't want you to try to change your breathing or try to analyze it. I just want you to watch yourself breathing, as it were, to focus on the in-and-out movement of your belly. In other words, you are to try to keep your mind clear of all thoughts except for the perception of your breathing. Remember to report an intrusion whenever you find you have gotten caught up in a stream of thought. Right now let your breathing become relaxed and natural. Let it set its own pace and depth if you can. Close your eyes and I will tell you when to begin. I will also tell you when the IS-minute session is over. Ready? Begin . . .

Once again, E recorded the number of times S pressed the button during each minute of this second IS-minute period. The E then rejoined S in the experimental chamber and conducted a brief interview to gather information on the S's subjective experience of the meditation exercises.

DISCUSSION

This study employed the novel technique of having the subject report each intrusion during meditation. Fortunately, and despite its introspectionist flavor, this reporting of inner experience turned out to be an effective measure that could be significantly related to behavior (i.e., hypnotizability). Intrusions during meditation correlated with hypnotizability \(-.42\) (Van Nuys, 1971b). Thus, the technique seems naturally suited to the study of meditation, which at least in its initial stages consists of an attempt to control and limit thought intrusions. Deikman (1966) has hypothesized that eventually an intrapsychic barrier is developed that keeps such intrusions out of consciousness. Presumably, as a subject progresses in meditation he would report fewer and fewer intrusions. Also, the number of intrusions reported should correspond to the different stages of meditation as judged by changes in the quality of experiencing (Maupin, 1965). Although it was possible in this study to compare the number of intrusions reported with the subjective reports gathered in the interview after the meditation session, no clear relationship between the two could be discerned. However, one meditation session is certainly not enough for much differentiation to occur. The counting of intrusions during meditation would likely be a far more powerful tool if the measure were based on a number of sessions over a longer period of time. Informal pilot testing, however, had suggested that a single session might be sufficiently reliable for the purpose of this study. The intrusion measure would be further enhanced if EEG studies were to show changes in brain rhythms corresponding to the occurrence of intrusions.
Future research is planned using this technique at Sonoma State College, which provides a rich supply of mediators of varying experience and from many traditions. It should be possible, for example, to compare the rate of intrusion decline between a group of Transcendental meditators and a group of Zen breath-counters. Having subjects report intrusions has somewhat of the quality of negative reinforcement. It might be interesting to play around with having a periodic stimulus (tone, bell, voice) go off that in essence says, "Bring your attention back now." Those who find that they don't have to bring their attention back, having remained focused, would press the button. In this way, button pressing might well take on the quality of positive reinforcement. Instrumentation might be further simplified by supplying meditators with simple mechanical digital counters which can be held in the hand. Positive reinforcement of concentration might well have therapeutic value since it is possible to conceive of obsessions, phobias, schizophrenias, hysterias, and so on as disorders of attention. The possibilities seem limitless. I hope others will want to explore them.

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