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Boredom: A Review

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Psychological and psychiatric studies of boredom from 1926 to the present are reviewed. Articles concerning boredom averaged less than one paper per year during the review period. The most consistent finding has been that extroverts apparently constitute a group especially susceptible to this state, although this has not often been tested directly. Stimulus factors such as repetitiousness, lack of novelty, and monotony have been found to generate boredom. Coping strategies have been found to include daydreaming, motor restlessness, exploration, response variability, and withdrawal from the boring situation. Experimental approaches to the problem have generally been traditional. Attempts have consistently been made to relate boredom to altered or characteristic physiological states, but they have not resulted in a consensus concerning these biological variables.

Although there has been at least sporadic interest in the topic of boredom and monotony for many years, both psychologists and psychiatrists have usually addressed boredom in terms of other, more traditional problems. For psychiatrists, these traditional areas of inquiry have involved defense mechanisms and neuroticism; for psychologists, industrial fatigue, personality theory, and vigilance. A convenient starting point for reviewing modern approaches to the topic is a paper by A. H. Davies which appeared in the *British Medical Journal* in 1926. This paper, entitled "The Physical and Mental Effects of Monotony in Modern Industry," discussed monotony and "its synonym" boredom in relation to fatigue, repetition, depression, reverie, and compulsion. Davies suggests that repetition, fatigue, depression, and compulsion can produce boredom, while daydream-

ing can relieve it. A general discussion focusing upon boredom in the workplace and especially in repetitive manufacturing operations follows. The following year, McDowall and Wells (1927) published a theoretical account of the genesis of boredom. They attempted to link the development of boredom to inadequate reflex circulatory adjustments to the boring task and proposed that normal vascular responses to a task are dependent upon adequate interest in that task. Many of these circulatory adjustments to work were regarded as occurring by means of central (brain and spinal cord) vasomotor pathways. This paper represents the beginning of modern attempts to link boredom to underlying physiological processes.

Throughout the two decades from 1920 to 1940, a series of reports was published in England by the Industrial Fatigue Research Board (later, the Industrial Health Research Board) indicating a continuing concern with problems of monotony and boredom and at-

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tempting to explore whether relationships existed between work output and subjective feelings of boredom. Claims were made (cf. Wyatt, Fraser, and Stock, 1929; Wyatt, Langdon, and Stock, 1937) that boredom was accompanied by changes in work output and that, especially toward the end of the day, workers tended to talk, become restless, work more slowly, and become more variable in their output. Another concern at this time was whether boredom could be predicted from changes in the shape of the work output curve and conversely. There was a great deal of interest in and discussion of monotony and boredom by psychologists in Britain during the twenties and thirties, and nearly all of it was centered about industrial psychology.

In the United States, the work of Barmack (1937; 1938; and 1939a, b) marks the inception of studies of boredom among university students in a laboratory setting. Barmack rejected the physiological theory of McDowall and Wells and replaced the hypothesis of circulatory inadequacies with one of a more psychological character. Barmack proposed that boredom was a *feeling* accompanying the tendency to revert to sleep or to a sleep-like state. The cause of this reversion was the restriction of attention to inadequately motivated tasks. He also proposed (1938) that boredom was

a state of conflict between the tendency to continue and the tendency to get away from a situation which has become unpleasant principally because of inadequate motivation . . . inadequate vital adjustments to the task are unpleasantly appreciated as the feeling of monotony or fatigue . . . [escape] objectives are achieved usually unconsciously by shifting attention away from the task, daydreaming, creating extrinsic goals, modifying the procedure, etc. (pp. 125-126)

He proposed that since stimulants prevent sleepiness they should also ameliorate boredom and found that 10 or 15 mg of d1-amphetamine, 60 mg of ephedrine, and 2 g of caffeine did indeed produce subjective reports of less fatigue, sleepiness, inattention,

irritation, and boredom. In addition, these drugs prevented decreases in the speed of addition of pairs of six-place numbers and retarded the development of pursuit meter inaccuracy when these tasks were performed for prolonged periods (1 to 2 h). By furnishing increased alertness, the stimulants apparently increased the inclination of the subjects to do continuous repetitive work and therefore prevented a physiological reversion to a sleep-like state and attendant boredom. Barmack also reported that a monetary incentive (twenty-five cents in the 1930s) ameliorated the adverse subjective effects of a repetitive pursuit meter task lasting 2 h. Barmack's interpretations of boredom combine the notions of motivational conflicts (approach-avoidance) with what one would currently label a simple arousal hypothesis. Because of this, they sound both plausible and modern. At the time it was presented, Barmack's theorizing did represent a significant improvement over the simple vascular theory of McDowell and Wells (1927). Barmack also introduced an experimental approach to the study of boredom which has been adopted by several others (e.g., Thackray, Bailey, and Touchstone, 1977); it consists essentially in the combined measurement of physiological changes, work performance, and subjective attitudes of subjects required to do repetitive work for prolonged periods.

In addition to the applied industrial viewpoint in England and to the university-based experimental psychologists' approach in the United States, early studies of boredom were enriched by a contribution of a psychoanalytic nature. The essay by Otto Fenichel (1951) "On the Psychology of Boredom," provided a more complete, a more molar, and a more dynamic interpretation of the problem than previously. This is because Fenichel recognized that there probably exist several species of boredom and that some types of boredom are pathological. Basically,

pathological boredom results from a chronic damming up of libido or tension because the drive aims of the individual are repressed. If that is so, one aspect of boredom is aimlessness or at least apparent aimlessness because the goals of the individual are lost to repression. The underlying dynamism of pathological boredom is therefore the basic defense mechanism of repression. If successful, pathological boredom prevents anxiety.

States of drive tension accompanying repressed drive aims can lead to subsequent symptoms of jumpiness, restlessness, inner tension, or jitteriness, and sometimes boredom can barely be distinguished from such states, although Fenichel asserts that it is certainly possible to experience quiet boredom. Fenichel presents the motor restlessness-calm dimension as a basic dimension of boredom. He also distinguishes monotony from boredom and states that the lack of novel stimulation characteristic of monotony leads to disinterest and finally to sleep unless the monotonous stimuli are rhythmic (in which case they may lead to excitement). Normal, as distinct from pathological, boredom arises "when we must not do what we want to do or must do what we do not want to do" (Fenichel, 1951, p. 339). Both normal and pathological boredom are seen as similar because in both something the individual expected to happen does not occur.

The early work of Barmack, Fenichel, and the Industrial Fatigue Research Board in England established the problem area of boredom and monotony as a viable (although admittedly unpopular) candidate for psychological research. The British workers focused upon applied industrial work from the first, and, although they described some of the possible dimensions of boredom such as constraint, repetitiveness, and fatigue, their work was more descriptive than experimental. They appeared more concerned with stimulus factors influencing boredom

than with personality or with the experiential aspects of boredom. The problem was always conceived as a practical one directly influencing the productivity of industrial workers. Barmack, on the other hand, defined boredom carefully as an approach-avoidance conflict based upon inadequate (weak or insufficient) motivation to continue a task. Fenichel also defined normal boredom as the result of an approach-avoidance conflict. Both point out that this unpleasant feeling is related to sleep or a sleep-like state and that boredom has a physiological basis. However, Fenichel's main analysis is of pathological varieties of boredom occurring during the analytic process, and the emphasis is always upon interpersonal relationships, while Barmack's explorations of boredom concern the properties of boring or at least repetitive *tasks* in what has become the traditional setting and methodology of American experimental psychologists.

The decade from 1950 to 1960 was relatively barren; it produced few studies concerning boredom. Two studies by Smith (1953; 1955) concerned with industrial monotony were specifically designed to ascertain whether changes in work output at a manufacturing plant could be predicted from subjective reports of boredom (they could not) and whether certain personality characteristics were predictive of individual differences in susceptibility to boredom and industrial monotony. Although workers susceptible to boredom tended to be younger, restless, and dissatisfied, the factors of extroversion, intelligence level, degree of ambition, and the propensity to daydream did not predict susceptibility. These studies were designed to evaluate earlier claims in publications of the Industrial Fatigue Research Board in England that worker output curves were indicators of subjective feelings. Smith's research did not bear out these claims. For example, she found that jobs which give every external

appearance of being repetitious to the casual observer were not always perceived as such by the workers. The work of Evans and Laseau (1950) based upon an analysis of 174 854 letters on the topic "My Job and Why I Like It" produced evidence that many industrial workers claim to enjoy repetitive work rather than suffering from boredom.

Several well-known works (Hebb, 1955; Heron, 1957; Bartley, 1957; and Berlyne, 1960) appeared during the decade from 1950 to 1960. These were concerned with curiosity, exploration, sensory deprivation, or fatigue and, thus, were marginally related to the topic of boredom. For example, in his 1955 paper, Hebb stressed that it was necessary to include curiosity as one of the fundamental human motives and pointed out that the nervous system was built to be active rather than merely the passive recipient of stimulation. Berlyne (1960) indicated that exploration was motivated by boredom and defined boredom as a drive state provoking a search for diversion. Poulton (1960) presented data congruent with the notion that somewhere between the limits of boredom and mental fatigue there exists an optimum perceptual load leading to peak performance in repetitive work. Poulton used a paced auditory inspection task in his experiments. Finally, Wendt (1955) required 38 high school students to perform an arithmetic task and to rate subjective feelings of boredom, fatigue, and interest. He found that the arithmetic task initially produced feelings of boredom and later feelings of a decrease in interest. When need achievement was high, subjective ratings of boredom were low. Subjective fatigue and boredom ratings were positively correlated. Interestingly, Wendt found that both the quality and quantity of performance on the arithmetic task deteriorated when feelings of boredom were reported increased. Smith (1953; 1955) could find no predictable relation between perfor-

mance and subjective ratings of boredom in a manufacturing plant.

The papers concerning boredom published during the decade (1950-1960), although few, did inaugurate experimental studies concerned with personality factors such as introversion and individual differences in susceptibility to boredom.

McBain (1961) found that the addition of noise improved performance on a monotonous experimenter-paced printing task. He carefully distinguished between boredom and monotony, reserving the term monotony for the total work situation when it provides little variability and little opportunity for arousal. Boredom is defined as a subjective state characterized by unpleasantness and provoked by jobs in which one is uninterested. He defined monotonous tasks as simple (in the sense of little cognitive demand) and repetitious but also compelling one's attention almost continually. Watch-keeping and vigilance tasks are, of course, excellent examples of such tasks. Geiwitz (1964; 1966) has provided the only comprehensive account of boredom since the earlier work of Barmack and of Fenichel. He analyzed boredom in terms of four main factors or dimensions, namely, arousal, subjective repetitiveness, unpleasantness, and constraint. Four experiments were conducted which were designed to assess the role that each of these four factors played in producing boredom. Unfortunately, the small number of subjects employed (only four) and the fact that they were selected for high scores on the Stanford Hypnotic Susceptibility Scale makes generalization difficult. In addition, several methodological difficulties (e.g., use of post-hypnotic suggestion to create boredom and some biased scaling procedures) are present.

A detailed critique of Geiwitz's study will not be attempted; instead, his recommendations and conclusions (tentative as they must

be) will be briefly presented. He suggests that normally four factors, i.e., constraint, unpleasantness, low arousal, and repetitiveness, play a role in boredom. He found that the boredom established by a simple repetitive checking task was characterized by feelings of increased constraint, increased repetitiveness, increased unpleasantness, and decreased arousal. In attempts to create or synthesize boredom by means of posthypnotic suggestions, he found low arousal and increased constraint to play a greater role in generating boredom than repetitiveness or unpleasantness. In general, the results indicated that constraint played a greater role and subjective repetitiveness a smaller role than he had anticipated. He suggests that the theoretical disagreement as to whether boredom is associated with a high level (Berlyne, 1960) or a low level (Hebb, 1955) of arousal may be resolved by postulating more than one sort or locus of arousal, i.e., cortical or cognitive and subcortical or affective. Certainly, present-day concepts of arousal are compatible with this notion (Routtenberg, 1968; Hamilton, Hockey, and Rejman, 1977).

The four factors analyzed by Geiwitz were also discussed 40 years previously (Davies, 1926), but Geiwitz developed an experimental approach to the problem.

Another attempt to relate performance to monotony was furnished by Smith (1966) who described a motivational theory of vigilance. This theory represents the only attempt to date to account for vigilance or watchkeeping performance in terms of individual differences in motivation rather than in learning or perception or attention. In vigilance tasks, monotony is related to task duration and to the number of "imposed acts" (via the noncritical signal rate or event rate or carrier signal rate). An example according to Smith is to be found in a task with 12 signals per hour as compared to a task with 40 sig-

nals. The task with 40 signals is regarded as less boring and as providing more intrinsic motivation to subjects than the task with 12 signals. Further, it is postulated that vigilance tasks are always monotonous rather than interesting because they demand few if any "higher mental acts" and because they are both prolonged and repetitive. He assumes that all persons with normal intelligence and perceptual abilities are capable of essentially errorless performance on vigilance tasks lasting 1 or 2 hours and that those whose performance is not perfect are not performing close enough to the limit of their ability. In other words, there is a distribution of individuals composed both of persons who perform closest to the limit of their capability and of those who perform furthest from the limit. Although there is evidence against Smith's basic assumption that normal subjects could provide errorless performance, motivational variables can and probably do play a role in determining watchkeeping efficiency. Smith's analysis raised the question of whether individual differences in the capacity to endure boredom affect watchkeeping performance. The work of Davies and Hockey (1966) indicates that extroverts and introverts differ in visual vigilance efficiency. They used the *Maudsley Personality Inventory* to select introverts and extroverts who then had to perform a 32-min cancellation task with either 24 or 48 critical events in noise or in quiet. For the extroverts, performance deteriorated with time on task unless noise (90 db) was present. Apparently the introverts were performing close enough to the limit of their abilities that adding noise did not improve their performance.

Another study of individual differences in signal detection was reported by Antrobus, Coleman, and Singer in 1967. Rather than introversion-extroversion, the independent variable was propensity to daydream. Sub-

jects were selected who represented extremes on the *General Daydreaming Questionnaire* (Singer and Antrobus, 1963) and the thoughtfulness subscale of the *Guilford-Zimmerman Temperament Survey* (Guilford and Zimmerman, 1949). The task consisted of a set of 15-s rapid rate auditory signal detection sessions. Those high in daydreaming showed a significant performance decrement over time (but this was not reflected in total detection errors) and also showed more task-irrelevant imagery during the task. Results were interpreted in terms of a model relating the propensity to daydream to preferences for internal rather than external stimulation. Mackworth (1969) attempted to explain the differences between extroverts and introverts in the performance of vigilance and other repetitive tasks in terms of habituation. She stated that introverts habituate more slowly than extroverts and that because extroverts habituate so rapidly, they need more stimulation to maintain an optimum level of arousal; under certain conditions, the introduction of task-irrelevant stimulation into a repetitive task may be beneficial by aiding the recovery of habituated responses in extroverts. These irrelevant stimuli must be arousing rather than distracting in order to improve performance. Berlyne worked for some years in the areas of novelty, complexity, and exploration—the antithesis of boredom and monotony—and, in a paper (Berlyne, 1970) concerned with stimulus complexity, attempted to assess directly the role that boredom may have played in modifying ratings of the hedonic value of visual stimuli. He found that monotonous and homogeneous sequences of stimuli lead (after familiarization) to decreases in judged hedonic value and concluded that the changes in hedonic value he found might best be explained as due to the antagonistic interaction of two factors. First, a tedium factor which is most influential when a simple stimulus is repeatedly en-

countered, and, second, a positive habituation factor dominant when a complex stimulus is repeatedly encountered. It may be that whether a process of habituation or something akin to sensitization occurs with repeated stimulus presentation depends upon the complexity of the stimulus.

A study of accidents in long distance truck driving (McBain, 1970) dealt directly with the role of boredom in producing unsafe drivers. McBain hypothesized that the restricted and often repetitive environments found in monotonous work situations may lead to lowered arousal and a lack of alertness. This lack of alertness in turn predisposes one to accidents. However, McBain did find a group of highly rated safe drivers who apparently have learned to cope with boredom by engaging in activities which lead to greater perceptual variety. Such activities as mental game playing, counting objects as they pass, and other such “irrelevancies” make time appear to pass more quickly and produce an enrichment of subjective experience which keeps arousal high enough to avoid accidents. The reinforcement involved in such time filling activities is not accident avoidance, but rather the more immediate gratification of a reduction in subjective boredom. The best and most experienced truck drivers reported little reaction to boredom on the job; these same drivers were found to show the most variability of response times in a laboratory testing situation. Drivers rated most highly were also those for whom the time spent on the laboratory task seemed to pass most quickly. The best (safest) and most experienced drivers kept themselves constantly occupied. This paper is interesting because it is concerned not so much with monotony or boredom as such, but with the mechanisms employed to cope with boredom. Boredom becomes the independent rather than the dependent variable.

Another fresh approach to the problem is

represented by the development of a sensation seeking scale (Zuckerman, 1971, 1979) designed to measure stimulus hunger, strength of attention, and satiation tendencies. A factor analysis of the items comprising this scale revealed a general factor and (a) thrill and adventure seeking, (b) experience seeking, (c) disinhibition, and (d) boredom susceptibility. However, boredom susceptibility was not well defined in female subjects, whereas it was in males. Of course, the development of this sensation seeking scale leads one to contemplate the construction of a boredom susceptibility scale which could then be used to ascertain what aspects of personality are most closely related to high or low susceptibility. For example, one might hypothesize that type-A coronary prone behavior is related to a high susceptibility to boredom on the basis that the impatience of the coronary prone person renders him vulnerable to boredom or that highly distractible individuals are easily bored since distractibility has been related to extraversion and impulsiveness (cf. Kagan and Rosman, 1964; White, Soueif, and Eysenck, 1969).

London, Shubert, and Washburn (1972) obtained data that supported Berlyne's (1960) position that boredom leads to an increase in arousal. They required subjects to work for 40 min either monitoring a flashing light or writing stories suggested by ambiguous pictures. The subjects rated the monitoring task more boring than writing stories. Additionally, they related monitoring as requiring less attention and being less absorbing than story writing. Scales of anger, nervousness, and frustration did not discriminate between the two tasks. The galvanic skin resistance decreased significantly with time on task for both tasks. In another experiment, boredom was produced by requiring the subjects (military personnel) to write the letters "cd" over and over for 30 min while the control condition again was story writing. There was a rel-

atively low ($r = 0.33$), but statistically significant, correlation between Army General Classification Test (AGCT) scores and subjectively rated boredom on the "cd" task. Bailey, Thackray, Pearl, and Parish (1976) extended this work by employing two tasks, a vigilance task and an advertising task, which were given to 32 subjects (16 performed one task and 16 the other). In addition, physiological measures were taken and subjective ratings obtained at the beginning and the end of each task period. Both tasks were perceived as boring. Both groups reported increasing irritation and decreasing attention as time progressed. The physiological measures indicated significant increases in bodily movement and heart rate variability from the first to the second hour of work, but significant decreases in skin conductance, systolic blood pressure, and heart rate. These mixed results indicating both increasing and decreasing arousal were explained as indicating that "boredom is a complex response pattern consisting of a variety of changes" (much as fear or sexual arousal are physiological response patterns). Rozhdestvenskaya and Levochinka (1972) and Rozhdestvenskaya (1973) attempted to relate performance on monotonous tasks to concepts of weak and strong nervous systems (analogous to introversion and extroversion). They found that subjects with stronger nervous systems were more prone to monotony during mental work. These subjects also displayed a relative lack of photic driving in the EEG. Drowsiness episodes were an early sign of impending performance decrement. The 1973 study employed two sorts of prolonged and monotonous tasks in 63 subjects. The strength of the nervous system was measured by the amount of alpha activity. Both the initial level of activation and the strength of the nervous system influenced task performance. The subjects with weak nervous systems performed best (unless their initial level of activation was too high) and also showed a

U-shaped function relating activation level and performance.

The influence of distractibility upon tasks necessitating sustained attention was explored by Thackray, Jones, and Touchstone (1973). Subjects who rated themselves as highly distractible exhibited increasingly long pauses, indicating lapses of attention, while performing a monotonous, self-paced, serial reaction task for 30 min. In addition, highly distractible subjects were slower to respond, and their rates of responding were more variable than low distractibility subjects. The authors attempted to account for these findings by postulating that highly distractible subjects showed a response style typical of extroverts who are known to do poorly on monotonous jobs. They followed this with a study (Thackray, Jones, and Touchstone, 1974) showing that extroverted subjects exhibited increasing lapses of attention over a 40-min period while performing a serial reaction task. Introverts failed to show any evidence of a decrement in attention. Impulsivity rather than sociability was apparently the component of extroversion responsible for the attentional lapses.

In a study concerned with subjective preference, Harrison and Tutone (1973) presented a series of ideographs at different rates and against constant or shifting backgrounds to 80 subjects. They found that shifting the background tended to prevent tedium as shown by an increase in the favorability of the ratings.

Aminov (1974) and Siddle and Smith (1974) reported attempts to relate physiological changes to monotonous stimulation. The former divided subjects performing the boring task of measuring the areas of a large number of circles into two groups on the basis of alpha-wave energy and frequency, i.e., weak and strong nervous systems. Changes in the level of skin resistance were then measured as a function of time on task. Many dif-

ferent patterns of skin resistance were described including increasing, decreasing, U-shaped, and fluctuating patterns. Subjects whose task performance was worst showed increasing or U-shaped skin resistance patterns. Best performance was seen at moderate rather than high or low levels of arousal. Siddle and Smith reported that subjects characterized by rapid habituation of galvanic skin reflexes showed rapid decreases in alertness and in EEG alpha abundance under two different sorts of monotonous stimulation. On the basis of a suggestion of Eysenck (1963), Hill (1975) reasoned that extroverts should show poorer performance than introverts while working on monotonous tasks such as vigilance. Hill also hypothesized that extroverts should be less tolerant of monotony and therefore should attempt to seek more variety in monotonous tasks than introverts. This hypothesis was confirmed in terms of measures of response variety on a monotonous task. Extroverts displayed significantly more alterations among possible responses and significantly greater average entropy of the set of responses made. Hill interpreted these results in terms of differing optimal levels of cortical arousal for introverts and extroverts. Levin and Brown (1975) explored differences in the susceptibility to boredom of jailers and patrolmen. They used the Zuckerman Sensation Seeking Scale to test the notion that law officers engaged in preventive patrol are less susceptible to boredom than are jailers in the same area. Only when subjects were matched for age was the hypothesis supported (but this reduced the sample size from 73 to 34). It was concluded that since the patrolmen work alone they should be less susceptible to boredom than the jailers who can obtain diversion from social interactions with coworkers and with prisoners.

Robinson (1975) studied boredom in secondary school pupils in Britain by means of a specially developed questionnaire. In this

study, pupils aged 13 to 16 yr were asked if they were studying each of 17 subjects and, of those studied, whether they were interesting, neutral, or boring. Pupils were then placed into groups on the basis of the number of subjects termed boring. Those pupils rating several or many subjects as boring comprised the bored group; all others, the control group. When responding to the question of whether there were many interesting things going on in school, 75% of the controls agreed, but only 45% of the bored pupils did. While 39% of the controls claimed school was the same each day, 67% of the bored pupils made this claim. Apparently, in addition to rating more specific school subjects as boring, the bored group also reported school to be generally monotonous and uninteresting. The bored pupils group expressed greater hostility toward school than the control group, contained fewer hard or very hard workers, and showed a general disenchantment with school. Moreover, even away from school, the bored pupils reported being bored during their spare time more often than controls.

The parents of the bored pupils were most usually unskilled or semiskilled workers, and the fathers were likely to have left school as soon as this was legally possible. The main factor in producing boredom was a negative or indifferent set of attitudes toward education and early withdrawal from school, especially by the father. Having a high score on an intelligence test did provide some protection against boredom, but very low scores were not associated with a higher incidence of boredom. Robinson developed a positive feedback model of the school boredom phenomenon in which teachers, parents, the school, and the home all influenced the perceived interestingness or boredom of school subjects. If teachers show a low interest in the subject and in the pupils, if parents show a low interest in a pupil's progress, if the school provides little in the way of amenities or

motivation, and if the home is a low-income, low-social-class home, then school subjects are likely to be perceived first as trivial or useless and then as boring. Once boredom with school subjects is firmly established, it is likely to lead to low effort, withdrawal, and failure or to increased aggression, truancy, and early discontinuation. Finally, if many school subjects are perceived as boring, Robinson infers that this perceptual attitude can generalize to other situations. Robinson's work extends the problem to the classroom—a different and important domain—and to a different subject population of younger adolescents. The imprecise nature of the term "boredom" itself is recognized. Clearly, Robinson's subjects are using the term boredom to mean irritation, hostility, anxiety, failure, hopelessness, and depression, as well as to mean more conventional things such as monotony.

The possible importance of personality factors in predicting susceptibility to boredom was discussed by Stagner (1975) who stated that older workers with authoritarian traits may tolerate paced repetitive tasks better than others. Stagner found that blue collar workers show steadily increasing job satisfaction with age, although the number of older workers on assembly lines decreased with increasing seniority. The possibility that subjective boredom is reliably accompanied by increasing EEG theta activity was also discussed.

In a recently published symposium on vigilance, Thackray, Bailey, and Touchstone (1977) reported a study which was in part a replication of the early work of Barmack (1938; 1939a,b). Subjects were required to monitor a simulated radar display for infrequent changes in an alphanumeric display for a 1-h work period while their blood pressure, heart rate, oral and skin temperature, skin conductance, and body movements were simultaneously recorded. Subjects also rated

their levels of boredom, irritation, monotony, attentiveness, fatigue, and strain immediately before and after the 1-h work period. On the basis of the reported boredom and monotony scores, two extreme groups of eight subjects were formed. High boredom scores were associated with longer response times to signals; significantly greater heart rate variability; significantly increased fatigue, irritation, and strain scores; and decreased attentiveness ratings. The general pattern for most subjects showed increases in subjective ratings of irritation, fatigue, and strain and overt body movements and decreases in attentiveness, heart rate, blood pressure, oral temperature, and skin conductance. These investigators proposed, on the basis of these results, that boredom was accompanied by a decline in arousal heralded by decreases in sustained attention. However, in the same volume, Jerison (1977) noted that almost all of his subjects experiencing low event rates during vigilance tasks complained of severe boredom but exhibited no significant performance decrements when compared with unbored subjects working at high event rates. The relations between subjective reports of boredom and performance efficiency need further exploration. It is not clear, for example, how the event and the critical signal rate affect subjective estimates of boredom and whether there is an interaction of these two stimulus factors.

DISCUSSION

The amount of research devoted to the topic of boredom by psychologists and psychiatrists is astonishingly small when compared to literary treatments and to the acknowledged importance of the topic by individuals concerned with the quality of life, especially in the workplace. This lack of empirical investigation is especially surprising in the realm of psychiatry and clinical psychology where complaints of boredom as a symp-

tom are common. What little comment there is relies heavily on Fenichel (e.g., Weinberger and Muller, 1975). Studies of boredom by experimental psychologists have been more common but still few. They have been concerned with boredom as a factor contributing to the performance efficiency of persons engaged in monotonous work especially and, most recently, watchkeeping tasks. They have also been concerned with the role of personality factors such as introversion which may influence one's susceptibility to boredom. A few papers in applied areas exist, but a recent volume devoted to work and fatigue (Simonson and Weiser, 1976) fails even to mention the topic. At this time it is difficult to find more than 40 papers published since 1926 directly concerned with boredom. This is less than one paper a year for 53 years.

Perhaps the most robust finding in the boredom literature has been the repeatedly confirmed observation that extroverts' performance on monotonous, repetitive, and boring tasks is apt to deteriorate more quickly than the performance of introverts.

It appears that extroverts constitute a group especially susceptible to boredom. There is also some evidence that those who rate themselves as highly distractible or as daydreamers do poorly on repetitive jobs, and this implies that those who are prone to boredom are aware of it and that the best predictor of continued efficiency on repetitive tasks may be the subjects' estimates of their own performance. In any case it would be valuable to know more about the best predictors of performance efficiency in such tasks as industrial inspection, watchkeeping, or vigilance.

The relation between subjective reports of boredom and physiological changes is certainly not settled. There are reports of both increases and decreases in "arousal" as subjective boredom increases. In addition, little is known about the relation between job performance and subjective boredom. Research-

ers have reported positive correlations (some nonsignificant and some significant) between worker performance efficiency and subjective ratings of boredom. It must be said, however, that it would be difficult to avoid a positive correlation between work efficiency and increases in subjective boredom if one employed a laboratory vigilance task with relatively few (circa 20) critical signals and with 1 or more hours' duration. Conversely, it would be surprising to find a significant correlation in a workplace where social stimulation could occur and influence both efficiency and boredom.

Boredom has been defined as a conflict (Barmack, 1938, 1939a; Fenichel, 1951), a feeling (Barmack, 1938; Bailey et al., 1976), or a drive state (Berlyne, 1960), but it could also be defined as the extinction either of the orienting reflex or of observing responses. It could be defined as the cessation of exploration, as the repeated confirmation of an expectancy, or as synonymous with habituation, stimulus satiation (Glanzer, 1958), or conditioned and reactive inhibition. Boredom has even been used to mean anxiety or depression. However, most researchers have defined the term as a feeling, a drive, or a conflict, i.e., a (usually) conscious motivator of behavior. The clarification and explication of boredom as a motive, governing several activities of interest to psychologists (such as vigilance), also remains a goal for future work. Smith's (1966) contentions that the usually encountered decreases in watchkeeping efficiency with increasing time on the task are due entirely to motivational (as opposed to perceptual or learning) processes has been criticized as overdrawn. Nevertheless, all investigators who have done sufficient work in the vigilance area know that many subjects disobey the instructions and many subjects sleep. Complaints of boredom are common. No research will deny that motivational variables influence watchkeeping tasks, but, aside from some of the early work of

Mackworth (1950), few investigators have dealt directly with these variables. The manner in which boredom affects repetitive task performance is a subject for future study. Another important problem concerning the motivational aspects of boredom is the role boredom may play in engendering exploratory activities. Although this relationship has been mentioned by several psychologists, empirical data are lacking.

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