



a students' journal of psychology

SAINT MARY'S UNIVERSITY
HALIFAX, CANADA

AUG 04 1972

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published by

the department of psychology at

saint mary's university

halifax, nova scotia

VOL. 2 - NO. 2

AUGUST 1972

HALIFAX, N. S.

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EDITORIAL

This is the fourth issue of j.n.d. - a students' journal of psychology. Since its inception, j.n.d. has strived to provide a forum for student psychologists. To this end, j.n.d. is being broadened in scope to facilitate communication among those with a common interest in psychology. j.n.d. has been favorably received by many psychologists, both amateur and professional, across Canada; with continued support we believe that j.n.d. will just noticeably become a viable force within psychology.

OPINION
by Carol White

Vision and sound. The Rolling Stones. War. McLuhan. The unceasing pulse of diverse stimuli which characterizes today's changing audio-visual world permeates every aspect of existence. Education, for example, is in the midst of this flux-state. What will its future be?

In the late 1960's, first grade children in Palo Alto, California were given daily reading exercises from a computer. This group learned to read more efficiently than a teacher-instructed group of children. A question arises: should we be more concerned with adopting a humanistic approach towards education or with developing a relatively nonhumanistic but more efficacious mode of instruction? Primarily, scientific research in computer-assisted teaching is needed to balance the finding of the many speculative reports. The problem is one of priority. Individuality must be weighed against conformity, and considering our audio-visual world, environmental relatedness against alienation. Whether our progeny become human beings or automatons will require a political decision.

SEX DIFFERENCES IN SELF-RATINGS ON THE SEMANTIC DIFFERENTIAL

Maria Hébert
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This study investigated the self-ratings of university students on the semantic differential. The aim was to study the sex differences in the students' description of self on the evaluative (E), potency (P) and activity (A) dimensions. Results indicated that males and females differed significantly on the potency scale, males rating themselves higher on this factor.

A factor analysis made of the fifteen adjective pairs for males and females resulted in six factors for each sex. These factors were interpreted as subdimensions of Osgood's E P A dimensions.

This study investigated the self-ratings of university students on three scales derived from the work of Osgood, Suci and Tannenbaum (1957) with the semantic differential. The chief purpose was to study the sex differences in the students' description of self on the evaluative (E), potency (P) and activity (A) dimensions.

A study of the evaluative and potency dimensions of the semantic differential by Long et al. (1968) undertaken on children showed that boys rated themselves higher on the potency scale, lower on the evaluative scale. Girls rated themselves higher on

the evaluative scale, lower on the potency scale. These findings reflect the cultural stereotypes about sex roles, implying that conformity (being good) is more important for a girl, while being powerful is more important for a boy.

A study by Merenda et al. (1960) attempted to measure passive-dependency tendencies of male and female university students. Females showed a significantly greater tendency toward passive-dependent behavior than males. This again reflected the traditional stereotype of the female.

These studies suggest that real differences in self-concept may exist between the sexes and can be attributed to maleness or femaleness. The present study was undertaken to determine if the cultural stereotypes of sex roles were still reflected in university students in an era of women's liberation and sex equalization movements.

A second aim of this study was to determine if a factor analysis of the semantic differential data would show the three major dimensions of rating response, E P A, as found by Osgood et al. (1957). Although Osgood consistently found only three major

dimensions, Borgotta (1964) found that when adjective ratings are used to assess persons, more than three important factors frequently appear.

It was hypothesized that there would be no significant differences between male and female students on the E P A scales. A second hypothesis was that a factor analysis of the data would reveal only three dimensions, E P A, since the adjectives used had been selected from those relating to the E P A factors of Osgood et al.

METHOD

Subjects

Subjects consisted of 20 male students and 20 female students all enrolled in the College of Liberal Arts of the University of Moncton. The mean age for females was 20.1, for males, 21.9.

Rating scales

Three scales were developed. The first, the evaluative scale, contained five bipolar pairs of adjectives selected from those related to the evaluative factor of Osgood et al. This scale consisted of the following adjective pairs: good-bad, altruistic-

egotistic, wise-foolish, kind-cruel, successful-unsuccessful. The potency scale contained five pairs of bipolar adjectives related to Osgood's power factor: strong-weak, severe-lenient, tenacious-yielding, dominant-submissive, hard-soft. The activity scale contained five adjective pairs related to Osgood's activity factor: active-passive, excitable-calm, fast-slow, complex-simple, rash-cautious.

The adjective pairs were arranged in random order which was the same for all subjects. Left and right positions of the positive end of each scale were also varied randomly.

The rating scales were seven-point scales. Responses were scored from 1 to 7, the higher score indicating a higher rating for the self on the dimension measured. Scores were summed for the evaluative, potency and activity scales.

Procedure

All subjects rated themselves on all adjective pairs. In addition, subjects were asked to rate their satisfaction with their sex. Subjects were instructed to rate themselves as they were, not as they would like to be. An example of the questionnaire is included in Appendix 1.

RESULTS

T tests were calculated to determine if there were significant differences between the evaluative, potency and activity dimensions of the male and female subjects. Only the potency dimension revealed significant differences ($p < .02$), the males rating themselves higher than the females on this factor.

The female subjects rated themselves significantly higher on the evaluative factor than on the potency factor ($p < .001$), higher on the evaluative than on the activity factor ($p < .01$). There was no significant difference between the potency and activity dimensions.

The male subjects rated themselves significantly higher on the evaluative than on the activity factor ($p < .01$). There were no significant differences between the potency and activity factors or the evaluative and potency factors.

Of the 20 female subjects, three indicated some degree of dissatisfaction with their sex, while no male subjects indicated that they were dissatisfied with their sex.

Factor analysis

The scores obtained from the bipolar adjectives were inter-correlated. Two separate factor analyses were computed, one for the intercorrelations obtained from the males and the other from the females. The varimax rotation gave six factors for the males and six for the females. These accounted for 83% of the total variance for the males and 85% for the females. Since the factor structure of the two sexes was not the same, they warrant different interpretations.

Interpretation of the factors for male subjects (See Table 1).

Table 1. Tabulation of factors for male subjects.

Factors	Adjectives	Factor loading
A: status-dominance	severe-lenient	.72
	tenacious-yielding	.90
	wise-foolish	.69
	successful-unsuccessful	.86
	dominant-submissive	.94
B: altruism	altruistic-egotistic	.76
	kind-cruel	.67
	rash-cautious	-.93
	hard-soft	-.57
C: indulgent - authoritarianism	strong-weak	.82
	severe-lenient	.63
	complex-simple	-.96
	hard-soft	-.76
D: impulsivity	excitable-calm	.97
	wise-foolish	-.41
E: goodness	good-bad	.89
	altruistic-egotistic	.47
	strong-weak	.44
	wise-foolish	-.34
	kind-cruel	.36
F: activity	active-passive	.49
	fast-slow	.41

Factor A seems to represent a general picture of status-dominance. All the variables have to do with strength and success. It is interesting to note that dominance has the highest loading on this factor. This would suggest that success for males is very closely related to dominance and general strength of will.

Factor B seems a measure of altruism. The adjectives having high loading on this factor are concerned with being altruistic, kind,

soft; in summary, being cautious of not hurting others.

Factor C. At first it appears contradictory that strong, severe and soft would be related to the same factor. This would

suggest that males may see themselves as dominant, but also strive to be simple and indulgent in their authoritarianism.

Factor D would seem to be a measure of impulsivity. It seems reasonable that excitability and foolishness are both related to the same factor since being too impulsive or excitable often results in acts later judged to be foolish.

Factor E. The meaning of this factor is certainly not obvious from the content of the five adjectives with loadings of over .40. The dominant idea seems to be that of being good, altruistic and kind. It is significant that males relate being strong to being good. The fact that foolish is listed under this factor would make one think that perhaps males believe they are good to the point of being foolish in some cases. This would seem to signify that one may be strong enough to be good in situations where it might be more profitable to be bad.

Why is this factor separate from factor B (altruism)? Perhaps it can be hypothesized that this factor is more a measure of intrinsic goodness, rather than of outward goodness as is the case in factor B. This hypothesis seems plausible since good has a loading of .89 on this factor while altruistic and kind, measures of

altruism, have much lower loadings.

Factor F definitely seems a measure of activity since both active and fast are measures of action.

Interpretation of the factors for female subjects. (See Table 2).

Table 2. Tabulation of factors for female subjects.

Factors	Adjectives	Factor loading
A:strictness	severe - lenient	.95
	hard - soft	.95
	altruistic - egotistic	-.64
	kind - cruel	-.53
	tenacious - yielding	.41
B:complexity	excitable - calm	.97
	complex - simple	.94
	altruistic - egotistic	.54
C:success	wise - foolish	.87
	fast - slow	.79
	successful - unsuccessful	.88
D:goodness	good - bad	.93
	kind - cruel	.76
	dominant - submissive	-.41
E:passive - dependency	strong - weak	-.96
	active - passive	-.80
	tenacious - yielding	-.79
	dominant - submissive	-.89
F:impulsivity	rash - cautious	.74

Factor A seems a measure of strictness and rigidity. All the adjectives of this factor have a common core and paint a picture of a rigid, puritanical person.

Factor B is difficult to summarize in one term. It seems that the main idea is that of complexity. For females, it appears that excitability and altruism are items that contribute

to the idea of complexity.

Factor C is definitely a measure of success. It seems reasonable that being wise and fast are related to success.

Factor D is above all a measure of goodness. It is noteworthy that being submissive is related to being good.

Factor E seems to be a measure of passive-dependency. All these variables have to do with passivity and helplessness; in summary, the traditional female stereotype.

Factor F has only one adjective having a significantly high loading.

DISCUSSION

The study showed that without doubt cultural stereotypes of sex roles still exist in our modern age in spite of attempts to destroy them. The fact that the stereotypes are still prevalent among educated young people shows that the cultural expectancies in this area are very strong and will be extremely difficult to change.

The factor analysis revealed some very interesting facts. Contrary to females, males related success to dominance. For fe-

males, being good was related to being submissive, while for males, being good was related to being strong. This would tend to show that males and females attach different meanings to the same words. Evidently in this case, success and goodness do not mean the same thing to males and females.

The order of factors as well as their content is significantly different in males and females. Three factors are common to both sexes: success or status, goodness and impulsivity, but these are seen differently by each sex.

Status or success is of primary importance to males since it is the first factor for males and only the third for females. It is interesting to note that males had two factors related to being good (factors B & E) while females had only one (factor D). Females did not seem to distinguish between intrinsic goodness and outward goodness or altruism. Impulsivity is common to both sexes, but is much stronger in males. Males are authoritative, but also see themselves as indulgent. Females are passive and dependent, but seem to put much emphasis on being strict. Males see themselves as simple, while females consider themselves as complex. This complexity is important enough to females to warrant a separate factor.

The second hypothesis that the factor analysis would extract only three factors, E P A, had to be rejected.

Osgood et al. (1957) consistently found that semantic differential data could be reduced to three dimensions: evaluative, potency and activity. The present study does not necessarily contradict the finding of Osgood as to the generality of E P A.

Heise (1969) points out that when bipolar adjective scales are factor analyzed across individuals, as was done in this study, rather than over group means, more than three semantic dimensions are found.

Borgotta (1964) found that when adjective ratings are used to assess persons, five or more important factors frequently appear. It would seem that when ratings of a single concept are factored, the dimensions often split into subdimensions. Thus Wiggins and Fishbein (1969) report that factor analyses carried out over individual ratings give a five factor structure: E_1 , E_2 , P, A_1 , A_2 .

It is possible that the present study simply shows individual differences in the application of E P A dimensions. The

six factors for each sex can be categorized under E P A dimensions. For males, altruism, goodness and status are all part of Osgood's evaluative dimension. Indulgent authoritarianism is part of the potency dimension, while impulsivity and activity are part of Osgood's activity dimension. For females, goodness and success can be categorized under the evaluative dimension, strictness and passive dependency under the potency dimension, and impulsivity and complexity under the activity dimension. In this way, the present analysis did not reveal any new factors, but simple subdimensions of Osgood's E P A dimensions.

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11. simple _____ complex
12. successful _____ unsuccessful
13. dominant _____ submissive
14. cautious _____ rash
15. soft _____ hard

Are you satisfied with your sex?

satisfied _____ dissatisfied

DEVELOPMENT OF ATTITUDES TO DEATH IN ADULTS AND CHILDREN

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The attitudes and reactions of adults and children to death has been a much neglected area in psychological research. However, within the last twenty to thirty years a little more research has been conducted in this area and an overall picture of attitudes and reactions to death at all ages is beginning to evolve. However, there are still many gaps in our knowledge and the finding of some studies conflict with others.

Adults Attitudes to Death

A number of studies (Bromberg and Schilder 1936; Middleton 1936; etc.) have been carried out to determine attitudes towards death, using as their chief technique a questionnaire, and exploring only conscious attitudes. Middleton's findings are typical of 825 students filling out a questionnaire, 87% reported that they were unafraid of, or indifferent to their own death. Ninety-two per cent reported that they thought of their own death very rarely, or only occasionally.

A study carried out by Alexander, Colby and Adlerstein (1957) however, revealed that this apparent indifference may mask stronger feelings. Starting with the basic premise that one does not always say what one means or feels, they explored non-verbal reactions to words connecting death. They believed that by the measurement of the galvanic skin response (G S R) and reaction time to a word association test containing words related to death they would obtain more valid information on attitudes toward death. They used as subjects thirty-one male university students. Each student completed a questionnaire on attitudes to death and a word association test was administered. During the test the G S R and reaction time to each word were obtained. They found that the subjects responded in the same way to words relating to death as they did to other words which were chosen because of their emotional overtones. There was a longer response time and an increased G S R. In other words, the subjects responded with greater emotional intensity to death words than to equivalent words drawn from the general language sample.

In many cases there was a great discrepancy between the

subjects' expressions of unconcern when questioned about their attitude to death and their marked reactions to death words in the word association test. This led Alexander, Colby and Adlerstein to postulate two levels of functioning with regard to the death concept: An overt consciously communicated attitude as implied by answers to the questionnaire and less conscious processes inferred from reaction time and G S R to the word association test. In some individuals there was agreement between these levels, in others wide discrepancy.

It would appear that when people are directly questioned about their attitudes toward death they express lack of concern. But this expressed unconcern and lack of fear does not necessarily mean that they are truly unconcerned. Their underlying fear may be covered by denial and repression, or some other defence mechanism.

In another study, Alexander and Adlerstein (1959) worked with fifty male Protestant university students to determine what, if any, were the differences between religious individuals and non-religious individuals in their feelings about death. In their study Alexander and Adlerstein did not have a control group to actually

see what if any would be the attitude of individuals who were not church goers but who believed in God. The criteria for selection of the religious group was that a person had to have a strong religious belief and have participated in religious practices since childhood. The criteria for selection of the nonreligious group was people whose way of life had not included membership in religious groups or sustained personal contact with formal religious systems, beliefs, and practices. The criteria used in the selection of the above groups cannot be considered a valid criteria as a person may have a strong religious belief, but just does not attend any specific church. So, it is quite difficult to distinguish a religious person from a nonreligious person using the criteria given above.

The method of investigation of attitudes in this experiment was achieved by interview and questionnaire, while indirect methods were G S R's and reaction times to a word association test. From the results of the indirect procedures used, death seemed to be a negatively toned affective concept for both groups. When death was dealt with on a conscious level, however, both groups tended to act as if they were quite unconcerned. If one considers only

the question of whether a religious solution is more effective in controlling anxiety about death, one would be forced to conclude from the results of the above study that this is not the case. Both groups showed an equal amount of anxiety. Looking more closely, however, there was a difference in their interpretation of death. The nonreligious group saw death as a natural end of life. They emphasised life, and the rewards of living. There seemed to be a refusal to think about death, and a constant preoccupation with the problems of living and getting ahead in the world rather than emphasis on the hereafter. Denial seemed to be their mode of defence against fear of death. In this experiment the non-religious group would be considered as Atheist. However, they could not be considered as true Atheist for the true Atheist is not interested in the rewards of living and they do think about death as being the final end and that there is no after-life. Death for the religious group was the climax of life, and the means of entry into the after life. This belief cannot be accepted on the fact that the Buddhist believe in a life-after-death and that life does not end with death. The Buddhist believe that after one dies they return as a true spirit.

Fiefel (1959) carried out a comparative study, by means of a questionnaire, of the attitudes toward death of eighty-five mentally ill and one hundred sixty normal individuals. In his selection of subjects Fiefel used as the criteria those persons who had been diagnosed mentally ill by a doctor. For normal individuals he just selected persons whom he felt were normal individuals. This type of selection of subjects causes the results of the experiment to be invalid as one cannot stick a label on a person and diagnose a person normal or mentally ill. Who is to say whether a person is normal or not, for normality cannot be defined.

However, in his research Fiefel found on the whole, that there were very few differences between the two groups. "Neither neurosis nor psychosis produces attitudes toward death which cannot also be found in normal subjects." Though most groups thought that death would be most feared in old age, the mentally ill individuals said that in childhood death was feared almost as much. Fiefel interpreted this, based on Freudian Framework as a reflection of early depreciation, lack of security and castration fears. Another difference in responses between normal and mentally ill persons was that the mentally ill seemed to connect death with violence in much

the same way as Anthony (1940) reports in young children and Freud (1918) reports in primitive peoples.

Development of Attitudes toward Death in Children

From the above review of research done on attitudes toward death, one might assume that as the individual comes to understand the meaning of death, the consequent fear in turn leads to defensive means the coping with this anxiety producing concept. Since the defensive measures have been shown to be so effective in adulthood, it would be safe to assume that they take some time to develop.

Alexander and Adlerstein (1958) studied the attitudes of children toward death. Their subjects for this study were one hundred eight male children between the ages of five and sixteen. They were from low income families and were attending a fresh air camp. Eighty-eight per cent of the children were white, and the remaining twelve per cent black. Again the experimental procedure was to measure the G S R's and reaction times in a word association test containing death words. It was found that death was associated with an increased G S R and latencies in the total sample studied. Futhermore, in all age groups, children responded with larger latencies to death words than to the neutral words. In the age

groups ranging from five to eight, and thirteen to sixteen, the GSR responses to death words were significantly greater than to basal or neutral words. No reliable difference in G S R was found in the nine to twelve group. Alexander and Adlerstein interpret this to mean that children as young as five may already react emotionally to words related to death. The results of this study might have been different had the sample been drawn from a middle class neighbourhood. Instead the children were from low income families, and were attending a fresh air camp. It is quite possible that these children had come into contact with death at an early age, or had not been protected from the reality of death to the degree that middle class children might be. Fear which develops at an earlier age might be expected to be longer lasting. Unfortunately, research on attitudes to death in different socio-economic classes was not able to be found.

Schilder and Wechsler (1934) studied seventy-six children between the ages of five and fifteen. They observed the children at play, recorded spontaneous stories given to pictures, and questioned the children directly. Their findings were given in general statements based on the observations of the children. They stated that the

youngest children believed that others would die, but they did not consider their own deaths probable. These children seemed to connect death with deprivation and aggression.

Nagy (1948) carried out a study of children between the ages of three and ten in which written compositions, drawings and recorded discussions were analysed. She found that there were three stages of understanding of death. In children under six death is considered to be reversible and not final. Death, to the youngest children, meant sleep, while the five year old considered death to be gradual and temporary. From the fifth to the ninth year, death is frequently personified and regarded as an aggressive event, contingent on the action of others. In the final stage, there is the recognition that death is a process dependent on natural laws, and the cessation of vital bodily functions.

For the fear of death to develop, the child must first comprehend something of the nature of death. In "The Child's Discovery of Death" (1940), Anthony describes five stages through which children go in the development of their understanding of death. The first is a stage of complete lack of knowledge about death, the child expressing ignorance of the word. In the second stage some

meaning is attached, but this meaning is limited. Anthony quotes several examples in which children refer to death in terms of sleep and lack of food. By the time the children in her study had reached the mental age of seven, they had passed into the third stage of development of the concept of death. The child now showed by his responses that he understood the concept and applied it to humans. During the final stages in the development of the concept, the child increased his knowledge and understanding of the biological aspect of death.

Piaget (1926) says that before the age of seven or eight, no genuinely physical explanation can be given for any natural phenomenon. The phenomenon of death is probably no exception to this general statement. So, therefore, before the age of seven or eight, the child does not realise that death is the inevitable end of life. In fact, many young children, in common with primitive people and some psychotics connect death only with aggression or accident.

It seems, then, that at least in some children, an emotional reaction to death may not occur until the eighth or ninth year.

However, it seems that this fear may apparently disappear in the eleven to twelve year old child. A possible cause for this disappearance is that it takes several years for a child to develop defences against his fear of death, but that these defences develop by about the age of eleven, and consequently the fear disappears.

At this point I would like to discuss some of the procedures used in the above research. As has been gathered from a review of the literature, direct questioning will elicit a response, but that response in many cases is far from the true feelings the subject may entertain about death. Therefore, this method of research is not valid. Another method used in some of the studies reviewed above, was observation of children at play, and analysis of records of stories given to pictures. The results of these methods are not easily quantifiable and do not lend themselves too well to statistical treatment. Therefore, this method cannot be considered valid for this type of research. It seems from the studies reviewed that the best method for research of this kind would be the word association test. The theory behind this particular test is that the subject will take a longer time to respond to words that have, for him, affective overtones, then he will take to respond to words that are affectively

neutral to him. He cannot help but do this, and therefore cannot "cover up" his true feelings as he might when directly questioned or interviewed. This technique also has the advantage of producing easily quantifiable data, and the test may be administered with accuracy in a rather short time.

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THE ONSET OF HYPNOSIS

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Hypnotism, as defined by The Oxford English Dictionary (1933), is "the process of hypnotizing, or artificially producing a state in which the subject appears to be in a deep sleep, without any power of changing his mental or physical condition, except under the influence of some external suggestion or direction, to which he is involuntarily and unconsciously obedient" (p. 505). The writer will not attempt a more accurate definition, but some of the states of trance do not resemble sleep, some subjects do not respond to external suggestion, and it is not necessarily an "artificial" production. There are many names given to the phenomena which will be called hypnosis, including suggestion, meditation, animal magnetism, mesmerism, psychosomatic sleep and many more (Marcuse, 1968). This article will demonstrate that common mechanisms produce these different phenomena, only the method of induction being different. These mechanisms are probably similar to those causing some hysteric reactions, psychosomatic illnesses and religious or political conversions.

Voodism, shamism and other forms of witch-doctoring were probably known to caveman. Forms of these practices have existed or exist in every primitive culture. The earliest written reports date to the 13th century B.C. in Greece and suggestion was a major part of therapy by the 4th century B.C. (Marcuse, 1968). Religious

healings have been carried out in the name of every god known to man in a similar manner. In these cases, the person usually comes from some distance with the expressed hope of being cured, aware that other people have been cured at the same place. At the place of healing, canes, crutches, medicines and other aids that the cured no longer need are prominently displayed, increasing the suggestion of imminent cure. The ceremonies held before and during the "cure" heighten the suggestion of imminent cure; when the ceremony is over, the sick are well. The writer has witnessed several "cures" by this method at St. Joseph's in Montreal, and Ste. Anne de beaux Pré in Quebec.

Hypnotic methods widely used by stage and therapeutic hypnotists include post-hypnotic suggestions, positive and negative hallucinations, catalepsy and anesthesia. The person in a "deep" state of trance will perform almost any action which the hypnotist suggests, providing the suggestion is consonant with the subject's attitudes and physical ability. Suggestions dissonant with the subject's attitudes will be resisted, and the trance may end.

The hypnotist may first induce the subject to hear music and then to play an instrument along with it. Subjects have been induced to walk around on an empty stage, carefully avoiding hypnotically suggested objects. They cannot see, hear, feel or smell

stimuli which the hypnotist tells them are not there. Wolberg (1948) has reported of a patient who was told under hypnosis that he would not see or hear a visiting doctor. When taken out of the trance state the patient did not see or hear the doctor, and was apparently unaware of his presence. Wolberg handed the doctor an inkwell, and when asked if he saw it, the patient replied "My God, you will think I am crazy, but the inkwell is floating around in space" (p. 57).

Hypnosis can also be used for removing analgesia in dentistry, childbirth and surgery. "Hypnosis may relieve both the milder pains which do not show specific physiological correlates and relieve the effects of stimulation that would, without hypnosis, lead to intolerable pain and suffering" (Hilgard, 1969, p. 149). How this relief occurs is obscure. Some of the physiological correlates of pain, such as increased blood pressure, are not found during hypnotic analgesia, and there are subjective reports of reduced pain. The relief of pain may be of long duration through post-hypnotic suggestion and re-hypnosis, as in cases of childbirth and surgery.

Suspended animation, with only head and feet supported, can be produced in human subjects of only average strength. More spectacular than control over voluntary muscles is the control that can be exerted over the involuntary muscles of the autonomic nervous

system. Trained hypnotised subjects can precisely control their breathing and heart rates, blood pressure, blood flow to limbs, and other bodily functions that are very difficult in the normal waking state. Hypnotised subjects have also acquired allergies and hives by suggestion. Allergies result from the combination of an "allergen" with an antibody. Under hypnosis, allergen production can be reduced or increased upon suggestion (Black, 1969).

Hypnotic suggestion of an emotion can produce physiological reaction, as well as appropriate behavior in a hypnotised subject. Wallace and Benson (1972) have reported that, under hypnosis, a subject's brain wave activity, heart rate, blood pressure, skin resistance and respiration rate take the form characteristic of the induced emotion.

Animals are also susceptible to a state of hypnosis. By modifying a few basic hypnotic techniques, Volgyesi (1966) has demonstrated that virtually all animals are hypnotisable.

Attempts to explain hypnosis are voluminous, but only the briefest outline of sleep theories, and physiological findings on related aspects of arousal, attention, and habituation will be outlined. Due to the complexity of physiological processes during

hypnosis, concentration will be focused on the onset of hypnosis.

Hypnosis as a special form of sleep has had a long history, beginning in the 17th Century. It forms the basis of hypnotic theories postulated by Pavlov (1960), Volgyesi (1966), Kubie and Margolin (1944) and Gastaut (1969).

Pavlov (1960) studied hypnosis from a phylogenetic point of view; not being exclusive to man, the physiological interpretation of hypnosis in man and animals is the same. Due to the greater complexity of human behavior, not all hypnotic states of man may be observed in animals. To induce hypnosis, repetitive monotonous stimuli of medium or low intensity are used, and in man, words associated with sleep are also used. Pavlov believed that sleep-paired words formed inhibitory chain reflexes. The sleep-conditioned words and monotonous stimuli cause discrete cortical inhibition and produce a state in which the more complicated forms of normal activity are excluded and replaced by responsiveness to immediate environmental stimuli. This partial inhibition allows or favors the establishment and reinforcement of the physiological connection between certain stimuli and certain activities. Concentration on these stimuli possibly produces the "narcotic" phase of transition,

when strong and old reflexes persist, but more recent ones disappear.

"the concentrated excitation of some definite point induces, on account of the diminished excitability of the cortex, such a strong inhibition of the rest of the cortex that even the conditioned stimulus of the old, firmly established reflexes are now below the threshold for excitation". (Pavlov, 1960, p. 407).

For man, speech provides conditioned stimuli which are as real as other stimuli, and are connected with other stimuli reaching the cortex. Words can, therefore, elicit reactions which are normally determined by the stimuli themselves. Suggestion is thus a simple conditioned reflex. The verbal suggestions of the hypnotist concentrate the excitation in some definite, narrow region of the cortex, and by negative induction, intensify the inhibition of the cortex. This abolishes all competing effects of contemporary stimuli and traces of previous ones, allowing suggestions to be followed. There is a smaller extent and intensity of cortical inhibition in hypnosis than during sleep. This allows "rapport" with the hypnotist during hypnosis, which does not occur during sleep. The wide range of suggestions that are followed, even those with little, no, or the opposite physical reality, can be compared to the "paradoxical" phase of transition from waking to sleeping states. At this time, weak stimuli have a greater effect than strong ones. Comparisons with people in the normal waking

state show that words influence beliefs about reality more than the facts about reality. Thus, hypnotic suggestions such as lemons tasting sweet are not really as astounding as they first appear.

The "passive defense reflex" is the term given by Pavlov (1960) to the immobilization of an animal following very powerful or extraordinary external stimuli. It results in the same hypnotic state as is produced by low intensity monotonous stimuli. The immobility may have survival value, thus the "defense" aspect of its name.

Volgyesi (1966) also believed hypnosis to be part of the transition from waking to sleeping states, thus accounting for the behaviors elicited under hypnosis being similar to both states. Certain areas of the brain are reduced in efficiency through inhibition caused by vasoconstriction. It is assumed that mainly the higher cortical areas are being put to "sleep". This leaves the older, vegetative centers responding without cortical inhibition. Suggestions can then be followed without the cortex inhibiting these lower areas.

Wolberg (1948) has cited that Kubie and Margolin (1944) have acknowledged the sleep hypothesis of hypnotism.

"...the creation of a focus of central excitation with surrounding areas of inhibition. This condition is ensured by immobility and by a monotonous stimulus of low intensity. Fixation of the eyes on a single spot immobilizes the individual. The sensory adaptation that results has a hypnogogic effect. The onset of hypnosis thus appears

to correspond to a partial sleep" (Wolberg, 1948, p. 71).

Gastaut's (1969) research on hypnosis showed the similarity between Zen meditation and pre-sleep drowsiness states. In Zen, a position of muscular relaxation is adopted, the eyes are open and fixed on an object. Within several minutes, Alpha wave activity starts, and gradually predominates, and may last for long periods of time. Alpha wave activity does not usually occur when visual stimuli are present. Possibly the fixed visual pattern may lead to habituation, thus permitting Alpha waves rather than the usual desynchronized alpha block when subject's eyes are open. In pre-sleep drowsiness Alpha activity is also present, but is usually of short duration only, being replaced by Theta and Delta activity, indicating sleep. Thus, Zen meditation is similar to prolonged pre-sleep patterns.

Schilder and Kauders (1927) place the basis of hypnosis in subcortical sleep-regulating mechanisms, particularly the reticular formation (RF). To them, hypnosis corresponds to the passive theory of sleep: as sensory input awakens a sleeping organism, lack of sensory input should lead it to sleep. The RF receives input from all sensory modalities, therefore making it attractive to the passive sleep theory.

"Cerveau isolé" and "encéphale isolé" experiments by Bremer (1935) gave support to the passive sleep theory, as sleeping EEG's were found in animals with the former preparation but were not always present in the latter preparation, which still had input from cranial nerves V and VIII. It was found by Moruzzi and Magoun (1949) that stimulation of the RF during sleep would produce arousal. These findings led to the hypothesis that the RF is necessary for arousal, and without it there would be no arousal. Lesion studies by Lindsley, Schreiner, Knowles and Magoun (1950) did not fully substantiate the hypothesis. Cats with lesions in the medial RF showed somnolent behavior for only a few days before returning to their normal sleep-wakefulness cycle. Strong auditory or tactile stimuli would produce transient arousal, but the EEG pattern returned to a normal sleep pattern after the stimulus ended. (Milner, 1970, p. 267). Permanent increase in somnolence occurred only when lesions were made in the posterior diencephalon where the tegmentum is located. Somnolent behavior persisted even when there was stimulation of the RF when areas of the posterior hypothalamus (PH) were lesioned (Feldman and Waller, 1962). It is now believed that the PH area is more important for behavioral arousal, and the RF is more important for electrographic arousal. It also appears that the mid - pontine RF

exerts a synchronizing effect on the cortex, as was demonstrated by Bantini, Moruzzi, Palestini, Rossi and Zanchetti (1958).

During all states of waking, sleeping and hypnosis "selective attention" occurs. Selective attention is the attending to the stimuli from one object, while other stimulation of even greater intensity is ignored. Recordings from the "vertex potential" over the non-specific sensory system are affected by attention, as shown by Satterfield (1965). Spong, Haider and Lindsley (1965) found that the late components of the evoked potential (EP) in the specific sensory cortex were influenced by attending to a weak stimulus, whereas the early component of the EP showed no change. It appears that the non-specific sensory system is more influenced by attending to a stimulus than specific sensory nuclei or sensory pathways.

The sensory nuclei and the specific sensory cortex habituate slowly, if at all. However, behavioral habituation usually takes place after less than a dozen presentations. A novel stimulus will produce brief desynchronization of the cortical EEG, and an increase in firing rate of cells in the tegmentum. After several presentations of the same stimulus, the EEG patterns and tegmentum cells both show a decrease in activity, and eventually these show no changes when

the stimulus is presented (Milner, 1970). Sharpless and Jasper (1956) noted that there was always a close correspondence between EEG arousal and behavioral arousal.

Methods of inducing hypnosis have changed over the years. The hypnotic methods most widely used today with human subjects are eye fixation, object fixation, and hand levitation. In hypnosis of animals, the two most frequently used methods of induction are eye fixation and forcing the animal into a supine position. Regardless of method of induction, the two most necessary features appear to be reduction of incoming stimuli, and selective attention to the remaining stimulus. This is accomplished by reducing stimulation from light and noise, and presenting only one stimulus. Selective attention is directed toward this one stimulus by the suggestions of the hypnotist. Suggestions of relaxation and sleep may also operate as Pavlov's (1960) "Chain inhibitory reflex" postulates.

The methods of inducing hypnosis in animals may produce the necessary reduction of stimuli and selective attention to the remaining stimulus by the animal's attempts to escape from the situation. Forced into a supine position, the animal attends to the stimulus coming from the hand holding it, waiting for any change

in pressure that may signal a chance of escape; the reduction in mobility resulting from the position keeps the stimulus constant. The hand exerts a steady stimulus down, keeping movement to a minimum and the minimum movement results in a steady stimulus.

Buser and Viola (1969) show that drowsiness or sleep is not necessary for hypnosis, but immobilization is beneficial to decreasing alertness. Similar findings have been obtained from sensory deprivation experiments, and sleep - onset studies.

EEG recordings taken from subjects in sensory deprivation show a progressive slowing of frequency from desynchronized activity to Alpha waves. This is partly dependant on the severity of deprivation. Restriction of motor activity appears to be the most important single factor causing the reduction of brain wave activity during sensory deprivation. The onset of Alpha activity occurred more quickly when there was reduction of tactile stimulation through immobility than when visual, auditory and olfactory stimulation were deprived. (Zubek, 1969). This reduction of brain wave activity was attributed to the reticular formation by Zubek, due to the decrease in sensory input arriving there. Vernon (1963) found that there was cognitive impairment during sensory deprivation, and that the amount

of impairment increased with the amount of restriction placed on motor activity. Regular activity during sensory deprivation reduced the amount of impairment. It was also found that there was increased suggestability during sensory deprivation.

Sleep onset is a state of relaxation, lying down with the eyes closed. Alpha wave activity is recorded just prior to "sleep". During this period, sleep-onset dreaming very frequently occurs. This dreaming state is different from the period during which dreaming is heaviest, Stage 1 REM, in that Alpha waves are present rather than the fast, desynchronized activity of REM. There is also a difference in dream content, usually being influenced by the events of the previous day or two, whereas REM dreams are influenced by the more continuous aspects of personality. In sleep-onset dreaming, immediate environmental influences can alter the course of dreaming, which rarely happens during REM states. There is less arousal or response to stimulation during REM, which also requires larger amounts of stimulation for arousal than sleep-onset dreaming (Foulkes, 1966). Studies by Orne (1969) show that during sleep-onset, subjects can carry out purposive behaviors in response to suggestions given while asleep, without any evidence of physiological arousal. The

reduction of incoming stimuli in sleep onset is accomplished by immobility (lying down) and closing the eyes, and reduction of arousal is demonstrated by the onset of Alpha activity.

During the induction of hypnosis, the reduction of incoming stimuli is accomplished by having the subject remain immobile, and fixate on one object. The reduction of incoming stimuli through immobility produces reduced arousal of the reticular formation. As there is a close correspondence between reticular formation arousal, behavioral arousal and EEG arousal, the reduced activity in the reticular formation indicates reduced arousal generally. The repeated or monotonous stimuli which remain habituate quickly in the tegmentum. There is also a close correspondence between tegmentum habituation and EEG habituation. Therefore, as the stimuli are reduced and the remaining stimulus habituates, there is a reduction of cortical and behavioral arousal. This is shown to occur during the onset of hypnosis when desynchronized activity becomes less frequent, and Alpha activity predominates.

There is both Alpha wave activity and increased suggestability found in sensory deprivation, sleep onset and drugs such as LSD and marijuana, as well as onset of hypnosis. It thus appears

that states in which Alpha wave activity predominates are also states of increased suggestability. The purpose of the induction is to produce Alpha waves, so that the suggestability of this state can be used.

As the onset of hypnosis appears to depend on Alpha waves, and the increased suggestability that accompanies them, why doesn't the trance end when desynchronized activity occurs? Perhaps further research into REM states will help in finding this answer for hypnosis.

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Published by the Department of Psychology, Saint Mary's University.

Printed at Saint Mary's University Printing Department.