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DIFFERENTIAL COMMUNICATION OF AFFECT BY HEAD AND BODY CUES[1]

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4 experiments demonstrated that head and body nonverbal cues provide different affective information. Head cues carry information primarily about what particular affect is being experienced, and relatively little about intensity of affect or level of arousal. Body cues reverse this pattern, communicating information primarily about level of arousal or degree of intensity of an affective experience, but relatively little about what particular affect is being experienced. Photographic stimuli were drawn from 5 standardized stress interviews. All photographs were rated on Schlosberg's 3 dimensions of emotion. In each experiment 3 separate groups of judges each viewed 1 cue version: head, body, or whole person (head and body).

In recent studies of expression through body movements and facial expressions, consistent results contrast sharply with the haphazard and contradictory earlier findings. In a review of the research of the preceding few decades Bruner and Tagiuri (1954) incisively stated the methodological problems which had impeded progress. While confused results prevented drawing conclusions about the potential richness of nonverbal behavior as a source of information, what evidence there was seemed to suggest that nonverbal behavior is a meager source of information, with *agreement* in interpretation of the behavior far exceeding *accuracy* of judgment, and accuracy, when found, usually dependent upon knowledge of the situation. An experiment by Giedt (1955) confirmed this impression; he found that judges of patient interviews made far more accurate decisions when they read a typescript than when they saw a silent film, and showed no benefits when exposed to a sound film.

While the methodological problems are far from solved, and indeed many of them are still often ignored, the new spate of more encouraging studies have shared one feature: focusing on *spontaneously occurring interactive* nonverbal behavior. Most of the earlier studies had sampled an individual's behavior in isolation, or ignored the relevant interaction with the experimenter; usually the subject was asked to pose a feeling, or spontaneous behavior was evoked by a novel or bizarre stimulus; and, frequently the subject was limited to communicating through nonverbal behavior alone. In contrast, the more recent experiments have sampled nonverbal behavior as it occurs during an ongoing, verbally communicative, interpersonal relationship.

Direct measures of nonverbal behavior have been related to independent measures of mood (Dittmann, 1962) and to the verbal content of an interaction (Exline, 1963; Sainesbury, 1954, 1955). With the more usual design of measuring an observer's judgments, nonverbal behavior has been shown to communicate accurate information about affect (Ekman, 1965a, 1965b), about momentary changes during an interaction consistent with the concomitant verbal behavior (Ekman, 1964a), about changes in the quality of an interpersonal relationship (Ekman, 1965a; Hoffman, 1965), about psychodynamic and psychodiagnostic features (Mahl, Danet, & Norton, 1959), and about whether a pupil understands a teacher (Maccoby, Jecker, Breitrose, & Rose, 1964).

In view of this evidence that a person's nonverbal behavior can carry diverse messages, it becomes important to begin to specify the link between particular nonverbal cues and the inferences drawn by an observer.

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There are two problems: on what basis to isolate nonverbal cues in the stimulus behavior, and what kind of inferences by observers to measure. The problem of isolating nonverbal cues is complicated by the lack of any obvious natural units, and by the fact that body movement and facial expression encompass an enormous number of simultaneously occurring stimuli, continuously emitted, any of which might carry differential messages to an observer. Even within a still photograph, where time has been artificially halted, there are a variety of stimuli which an observer might decode, depending upon whether he observes the feet, the hands, the shoulders, the eyes, etc.

Most past research on nonverbal behavior has focused on the interpretation of only one set of nonverbal cues, usually those provided by the face. A few studies have shown that information is also communicated by the body: studies of posture, gait, and the hands. Yet, no direct comparison of these different nonverbal cues in terms of the type of information each might communicate has been possible, since the stimulus persons, the observers, and the type of inferences measured have varied widely.

The present study provides an initial basis for specifying the link between cue and inference, by showing two broad categories of nonverbal cues taken from photographs of the same stimulus person to a common group of observers, and comparing observers' ability to draw the same set of inferences from each of the two sources. The results might well vary depending upon both the two classes of nonverbal cues and the type of message or class of information selected for study. In recognition of our philosophic antecedents, the decision was made to divide nonverbal behavior at the neck, into the time-honored categories: head and body. The second choice was to focus upon the class of information which has received the greatest past study, information about affect, and to explore how the head and body might differ in the *subclasses* of affective information each communicates.

Informal inspection of photographs from past experiments suggested that the affective information communicated by the head might well be independent of that communicated by the body. Almost identical facial expressions, seeming to signify similar affect, for example, pleasure or anger, were sometimes accompanied by markedly dissimilar body positions. Similar body positions seeming to communicate related information about level of arousal were occasionally accompanied by markedly dissimilar facial expressions. Differences to be discussed later, between head and body in anatomical properties and functional activities during a conversation, supported these observations and led to the formulation of the following hypothesis about nonverbal behavior occurring during a conversation. *Hypothesis:* head cues carry information primarily about what particular affect is being experienced (anger, sadness, joy, etc.) but provide relatively little information about the intensity of the affect or the level of arousal; body cues reverse this pattern, communicating information primarily about the level of arousal or the degree of intensity of the affective experience, but providing relatively few cues about what particular affect is being experienced.

Schlosberg's (1954) formulation of three dimensions of emotion offered a method of testing this hypothesis by measuring the information communicated about these three dimensions by head and body cues. Although Schlosberg's evidence for his theory was based solely upon judgments of facial expressions, which were usually posed, Schlosberg did believe that the theory was pertinent to emotional expression in general. Schlosberg's theory stated that underlying the variety of different affect states were three dimensions: a pleasantness dimension, a dimension of attending to or rejecting stimulation, and an intensitive dimension from sleep to tension.

In a number of studies of facial expression (Engen, Levy, & Schlosberg, 1957, 1958; Levy & Schlosberg, 1960; Schlosberg, 1952; Triandis & Lambert, 1958), judgments on the attention-rejection and the pleasantness-unpleasantness dimensions differentiated photographs which had been identified as showing any of the six Woodworth affect categories (happiness, surprise, fear, anger, disgust, contempt). That successful predictions could be made of the Woodworth affect labels

from judgments on attention-rejection and pleasantness-unpleasantness was Schlosberg's main argument for suggesting that these two scales should be conceived as the dimensions underlying the recognition of different affect states. In terms of the hypothesis under study here, it would be expected that judgments on the pleasantness-unpleasantness and attention-rejection dimensions are primarily derived from head cues and that these dimensions are much less pertinent to judgments made from body cues. Conversely, judgments on Schlosberg's third dimension, sleep-tension, could be expected to be derived primarily from body cues.

Unfortunately, it was not possible to test the hypothesis in this fashion because intercorrelations have been found between the attention-rejection dimension and each of the other two. Although Schlosberg had proposed that these three dimensions were independent, Abelson and Sermat (1962) found that attention-rejection was correlated with pleasantness-unpleasantness, and in our own research (Ekman, 1964b) this dimension has been found to be intercorrelated with both pleasantness-unpleasantness and with sleep-tension. The intercorrelations of attention-rejection with sleep-tension and with pleasantness-unpleasantness might make attention-rejection applicable to both head and body cues, completely apart from the hypothesized difference in the information conveyed by these two sources. Therefore, attention-rejection results were not utilized to test the hypothesis, but a more limited test was made utilizing only the dimensions empirically demonstrated to be independent, pleasantness-unpleasantness and sleep-tension. Thus, in determining whether the head might convey more information than the body about the different affect states, the test is limited to only one of the possible dimensions underlying differences between affect states, pleasantness-unpleasantness; the test of whether information about level of arousal is conveyed primarily by the body utilizes, of course, the sleep-tension dimension.[2] The hypothesis can be rephrased as follows: more information relevant to the pleasantness-unpleasantness dimension than to the sleep-tension dimension is available from head cues; and more information about sleep-tension than about states of pleasantness is available from body cues.

Four experiments were conducted to test this hypothesis. Different groups of judges participated in each experiment, and in certain instances different photographic stimuli were shown. The general method will be described first. The results of all four experiments will then be reported and discussed.

METHOD

Stimuli

The nonverbal stimuli were selected from the records of five standardized stress interviews. In these interviews the interviewer, a staff psychologist or psychiatrist, had attacked and criticized the motivation and competency of the subject, a student in psychology or psychiatry. After 10 minutes of this stress period, the interviewer attempted to induce a catharsis phase by explaining his own behavior, praising the subject for his resiliency in meeting the attack, joking with the subject, etc.[3] Time-sample, still photographs were taken every 30 seconds in the first interview (A), every 15 seconds in the second interview (B), and every 5 seconds in the last three interviews (C, D, E). The pictures showed only the subject's behavior, with a profile view in Interviews A and B, and a full-face view of the entire head and body in C, D, and E.

In Experiments I, II, and III photographs were randomly selected without prior inspection from the total sample. In Experiment IV, no attempt was made to acquire a representative sample of the interview; instead, only the most highly communicative photographs were chosen. The selection criterion was based on the results of another series of experiments (Ekman, 1965a), in which judges were required to guess whether each randomly selected photograph had been taken during the stress or catharsis phase of the standardized interviews. Photographs were chosen for Experiment IV from those which more than 80% of the judges had correctly identified, with this level of accuracy replicated in at least two separate experiments. In all four of the new experiments the number of pictures from the stress phase equaled the number from the catharsis phase.

Three separate cue versions showed only the stimulus person's head, the body up to the neck, the whole person (head and body). These three

[2] The findings on attention-rejection will be reported in another article as a part of a series of other experiments directly addressing the question of adequate models of emotional expression, in which new dimensions are also proposed.

[3] The stress interview procedure and selection of subjects for these interviews has been described at greater length in Ekman (1964a, 1965a).

TABLE 1

DESIGN OF THE FOUR EXPERIMENTS

Experiment	Number of stimulus persons shown	Total number of photos shown to a judge	Method of selecting pictures	Use of anchor photographs	Cue conditions
I	2 (A,B)	24	Random	Anchor pictures	Head Body Whole
II	5 (A,B,C,D,E)	60	Random	Anchor pictures	Head Body Whole
III	5 (A,B,C,D,E)	60	Random	No anchor pictures	Head Body Whole
IV	5 (A,B,C,D,E)	42	Criterion selection	No anchor pictures	Head Body Whole

different cue versions were made through photocopying procedures on 35-millimeter slides and projected for the judges. With a few pictures some difficulty was experienced in separating head and body because a hand was in the vicinity of the face; with these particular stimuli in the head version part of the hand showed in the photograph, and in the body version part of the hand was not showing. In all of the experiments the photographs of the five stimulus persons were presented in a random order.

Experiment I, conducted in 1961, showed photographs from the two interviews (A and B) recorded at that time. The other three experiments, conducted 2 years later, employed photographs from all five stress interviews. The differences among the stimuli are given in Table 1.

Judgment Task

In all four experiments judges were required to rate the emotion being experienced by the person in each photograph on each of Schlosberg's three dimensions. Judges had no knowledge of the interview situation, or even of the fact that the pictures were drawn from interviews. Schlosberg's generous help made possible the use of instructions and answer sheets identical to his. Each dimension was presented as a 9-point scale, with the name of that scale placed under the numbers "1 . . . 9." A short paragraph defined each scale:

Pleasantness-unpleasantness. You are to rate each picture on a 9-point scale where 1 indicates that the person in the photograph is feeling about as UNPLEASANT or unhappy as imaginable, and 9 indicates the maximum PLEASANTNESS.

Attention-rejection. You are to rate each picture on a 9-point scale where 9 indicates that the person in the photograph is feeling the maximum ATTENTION, as if the person is making every effort to see something. A rating of 1 indicates that the person is feeling the maximum REJECTION, as if the person is trying to shut out or keep out any stimulation. Inattention is not the true opposite of attention, but occupies a position of about 5, midway between ATTENTION and REJECTION.

Sleep-tension. You are to rate each picture on a 9-point scale where 1 indicates that the person in the photograph is feeling the complete relaxation of SLEEP, whereas 9 would be given to the most "emotional" expression you can imagine, in which the person is very excited and shows maximum TENSION.

Procedure

In each experiment each of the three cue conditions—head, body, and whole person—was viewed by a separate group of judges. A group of judges saw the entire set of pictures within a cue condition three times, with each photograph projected for 20 seconds during each presentation. In Experiments I and II judges rated the photographs on pleasantness-unpleasantness during the first presentation, on attention-rejection during the second, and on sleep-tension during the third.

In the first two experiments, before using each rating scale, judges were shown Schlosberg's anchoring photographs to help define its meaning. These photographs show posed facial expressions. They were not employed in Experiments III and IV, because of the possibility that a picture of a posed face was not appropriate for defining the meaning of a rating scale to be applied to a picture of an unposed body. This difference in procedure is shown in Table 1. In Experiments III and IV the dimensions were rated in a balanced order.

Judges

Separate groups of college freshmen served as judges. Individuals whose parents were foreign-born, or who were themselves foreign-born, were discarded from the data analysis.[4] Judges who did not

[4] Other research conducted on attempting psychiatric diagnosis from photographs of patients has found that foreign-born judges and judges whose parents are foreign-born perform significantly below native-born judges on this task.

TABLE 2

NUMBER OF JUDGES FOR EACH CUE CONDITION IN EACH EXPERIMENT

Experiment	Head	Body	Whole
I	34	41	35
II	17	22	—
III	18	19	26
IV	18	18	17

respond to every photograph were also discarded. The number of judges remaining in each experiment is shown for each cue condition in Table 2.[5]

RESULTS

The first and most direct test of the hypothesis was to determine by calculating a coefficient of concordance (Siegel, 1956, p. 229) the extent of judge agreement in rating the different cue versions on the two dimensions. The prediction was that there would be a higher concordance on pleasantness-unpleasantness than on sleep-tension when the head is judged, and a higher concordance on sleep-tension than on pleasantness when the body is judged.

Table 3 shows that the concordances obtained in all four experiments support the hypothesis, although there is some variation in the absolute size of the coefficients. One of these variations was anticipated; since there were no anchor photographs in Experiment III, somewhat less agreement than in Experiment II was expected; this was confirmed.

Another method of testing the hypothesis was to correlate, on each dimension, judgments of the head with judgments of the body versions of the same pictures. According to the hypothesis, if the head and body carry primarily different information, there should be no necessary correlation between judgments of the head and of the body. These intercorrelations are not independent of the coefficients of concordance. If little agreement is found in judgments of a particular cue condition on a given dimension, a low correlation results when the ratings on that dimension are correlated with judgments from any other cue source. Table 4 shows Spearman rank-order correlations calculated on the median ratings for each photograph on each dimension for comparison of head/body, head/whole, and body/whole cue conditions. On neither the pleasantness-unpleasantness dimension, nor the sleep-tension dimension was there a significant correlation between judgments of head and body.

The results on the head/whole correlations and the body/whole correlations suggest some qualifications to the hypothesis. Clearly, ratings of the head and of the whole person on the pleasantness-unpleasantness scale are highly intercorrelated, while there is no relationship between judgments of body and whole person cue versions on this dimension. But, on sleep-tension ratings, not only were there moderate correlations between judgments of body and whole person, as would be expected, but there were similarly moderate correlations between judgments of head and whole. Thus, while the evidence so far clearly suggests that little information about pleasantness-unpleasantness is communicated by the body, and that the head provides more information about pleasantness-unpleasantness than about sleep-tension, the qualification must be added that some information about

[5] The number of judges discarded from the data analysis because they failed to yield complete records was less than 10% of the sample in any experimental group; the number of judges excluded because they or their parents were foreign-born ranged from 5 to 35% of an experimental group.

TABLE 3

CONCORDANCES FOR EACH DIMENSION AND EACH CUE CONDITION IN EACH EXPERIMENT

Scale	Head				Body				Whole		
	I	II	III	IV	I	II	III	IV	I	III	IV
Pleasant-unpleasant	.386*	.675*	.589*	.771*	.191	.143	.090	.141*	.571*	.601*	.620*
Sleep-tension	.164	.319*	.193*	.250*	.447*	.401*	.308*	.271*	.321*	.222*	.171*

* $p < .001$.

TABLE 4

RANK-ORDER CORRELATIONS BETWEEN CUE CONDITIONS FOR EACH DIMENSION WITHIN EACH EXPERIMENT

Scale	Head and body				Head and whole			Body and whole		
	I	II	III	IV	I	III	IV	I	III	IV
Pleasant-unpleasant	−.042	−.096	.038	−.037	.821*	.804*	.946*	−.142	−.125	−.003
Sleep-tension	.072	.067	.163	.239	.413*	.527*	.729*	.512*	.455*	.572*

* $p < .001$.

sleep-tension is communicated by the head. This qualification is in agreement with the finding shown in Table 3 that there were low but significant concordances on the sleep-tension dimension for the head-cue condition.

Another way to explore the question under study involves determining whether known changes in interpersonal interaction could be inferred from head cues or body cues. The photographic stimuli had been drawn from the stress and catharsis phases of a standardized interview, and other experiments had demonstrated that these photographs communicate information relevant to the planned manipulation of the interaction. Thus, another method of testing the hypothesis was to compare ratings of the head for the stress and catharsis photographs, and similarly compare ratings of the body for the photographs from these two interview phases. From knowledge of the stress interview, it could be expected that the stress photographs would be rated as more unpleasant than the catharsis pictures. According to the hypothesis, however, information about pleasantness is carried by the head and not by the body, and therefore such a difference between stress and catharsis photographs was expected only in judgments of the head. Similarly, it could be reasoned that stress would be rated closer to the tension end of the scale than would catharsis; and, this was anticipated only for judgments of body cues.

Table 5 presents these data for the four experiments. The judgments were analyzed by first obtaining a median rating for each judge across all of the stress photographs from the five interviews, the same for the catharsis photographs, and the difference between the two medians. A Wilcoxon matched-pairs signed-ranks test (Siegel, 1956, p. 75) was then performed on the difference scores for all judges. The prediction for the pleasantness-unpleasantness dimension was supported. The lack of difference on head or whole cues in Experiment I can be attributed to the fact that the experiment was heavily weighted (about 70%) with photographs of a particular stimulus person shown in other studies to have been difficult to judge. In the other three experiments, pleasantness-unpleasantness ratings differed for the head and not for the body. The lack of difference in pleasantness ratings on the body, in contrast

TABLE 5

MEDIAN ON ALL STRESS AND MEDIAN ON ALL CATHARSIS PHOTOGRAPHS FOR EACH DIMENSION AND EACH CUE CONDITION

	Head				Body				Whole		
	I	II	III	IV	I	II	III	IV	I	III	IV
Pleasant-unpleasant											
Stress	4.61	4.09	4.88	3.50	5.33	5.00	4.71	4.85	4.85	4.33	3.89
Catharsis	4.92	5.09*	5.72*	7.90*	4.75	4.96	4.56	4.72	5.21	5.68*	6.89*
Sleep-tension											
Stress	5.34	4.75	5.50	4.83	4.31	5.14	5.00	5.38	5.21	5.60	4.75
Catharsis	5.12	5.44	5.21	5.50	4.32	5.23	5.22	4.90	4.98	5.61	4.88

* The difference between judgments of stress and catharsis photographs is significantly different, $p < .001$.

to the difference obtained on the head, would have more import if a more substantial difference in pleasantness ratings on the head had been obtained for the stress/catharsis photographs than was found in Experiments II and III. In anticipation of such a doubt, the photographs in Experiment IV had been selected so as to maximize the likelihood of obtaining different affect ratings of stress interview pictures. In this experiment, where there is a very large difference between the pleasantness-unpleasantness ratings for stress and those for catharsis photographs when judgments are based on head or whole person cues, there is still no difference between pleasantness-unpleasantness ratings of these two types of photographs when judgments are based on body cues.

The prediction on the sleep-tension dimension was not borne out. In none of the experiments was a difference found between stress and catharsis photographs on this dimension, regardless of whether judgments were based on head, body, or whole person cues. An explanation, admittedly after the fact, is that the two interview experiences may have been characterized by the same level of arousal. It should be remembered that the word *tension* does not refer to a necessarily unpleasant state of affairs. Schlosberg claimed that, as the intensitive dimension, sleep-tension was independent of the nature of the affect; this has been borne out by a zero-order correlation between ratings on pleasantness-unpleasantness and sleep-tension dimensions. The catharsis phase was not a relaxed experience as compared to the stress phase; while the affects differed, their intensity did not. One bit of supporting evidence was a relationship detected between sleep-tension ratings and the stimulus person's hands. There appears to be a definite, though not perfect, relationship as follows: when the hands are not showing, or are against legs or trunk, the picture was rated toward the sleep end of the scale; when the hands are in front of the person, but not out in space, the picture was rated toward the middle of the scale; and when the hands are out in space, the picture was rated toward tension. These variations in hand activity occurred with similar frequency in both the stress and catharsis phases, although within these activity levels the specific positions of the hands and fingers differed.

DISCUSSION

A number of factors limit the generality of the results.

First and importantly, judgments were obtained on only five stimulus persons, who may have a number of similarities because they were all trainees in psychology or psychiatry. Certainly the pool of stimulus persons must be increased and varied before the results can make any claim to generality.

A second limitation is that nonverbal behavior was sampled from a single situation, a stress interview. The results of other experiments (Ekman, 1965a) indicate that this was not an atypical situation, considering that judges, though untrained, must have recognized the behavior in order to accurately decipher it; nevertheless other forms of interaction should be sampled.

A third problem is the artificiality inherent in presenting behavior in the static form of still photographs. From other data it appears unlikely that the use of motion picture film records would yield significantly different results on the pleasantness-unpleasantness dimension. In a pilot experiment (Ekman, 1965b) judgments of a new sample of stimulus persons, for which the photographic stimuli were bursts of five frames taken at 1-second intervals, rather than single frames, produced concordances of a similar magnitude. The results of another study (Hoffman, 1965) allow more direct comparison of motion picture film and single frame stimuli. Hoffman utilized the same stress interview, employed the stress/catharsis judgment task, and the accuracy levels he obtained with 5 seconds of motion picture film are identical to those we obtained with the single frame. The relationship demonstrated, between the stress/catharsis task and the pleasantness-unpleasantness ratings reported here, suggests that the use of films rather than still photographs might not appreciably modify the results on this dimension. It seems likely, however, that ratings on the sleep-tension dimension would

change appreciably if the stimulus unit were a sample of motion picture film. The concordances reported here are probably lower than those which might be derived from stimuli which captured sequence of movements and acceleration of activity over even a short period of time.

A final problem is one common to all studies utilizing what has been termed a *communicative*, as distinguished from an *indicative*, experimental design (Ekman, 1965a). Analysis of judges' reactions reveals only what judges are able to do, but not what further information may be available in the stimuli either to the more tutored eye or through more precise measurement and analysis techniques.

In view of these sampling and methodological problems, the reader is urged to approach the discussion to follow with caution, and regard the interpretations as tentative.

There are two questions to discuss: Why do head cues furnish less information about sleep-tension than about pleasantness-unpleasantness? And, why do body cues communicate almost no information about pleasantness-unpleasantness and yet still carry information about sleep-tension? The first question focuses attention on a discrepancy between our results and Schlosberg's.

Schlosberg's theory held that the intensitive dimension of emotion, as represented by the sleep-tension dimension, is relevant to facial expression and not in a subsidiary role. While Schlosberg did not employ a measure of judge agreement, he regarded the sleep-tension dimension as tentative, and in describing the reasons for his caution, partially forecast the present difficulties as follows:

> Much more work has to be done before we can be satisfied with the intensitive dimension of facial expressions. For one thing, we were working with a collection of pictures posed to represent emotions; this concentration on one end of the continuum introduces "series effects" in the ratings [1954, p. 87].

It is precisely the differences between nonverbal behavior which occurs when a subject is prevented from talking and is asked to use the nonverbal channel alone to communicate emotions, and the nonverbal behavior which occurs more spontaneously when an individual is conversing in an emotionally toned relationship, which probably best account for the differences between our results and Schlosberg's. Posing can elicit nonverbal behavior which rarely occurs within the constraints usually operative during a spontaneous interpersonal interaction. If we had asked our stimulus persons to look sleepy or lethargic, their facial cues might have elicited much greater judge agreement on the sleep-tension dimension—but they would not have been representative of *interactive* nonverbal behavior. When an individual is talking or directly reacting to another's communications, the face is alive. The quality of the affect shown in the face does vary, but while the person is engaged in the interaction he cannot go to sleep; his eyes do not droop; his jaw does not sag.

Thus, if the dimensions of emotion are to apply to interactive nonverbal behavior, then information from *head* cues about sleep-tension should be relegated to a subsidiary role; if the dimensions are to apply to the *potential* range of information communicated by head cues, in particular if the behavior is purposely posed free of restraints to represent the range of possible information or if the interaction is a highly special one, then sleep-tension should occupy a more important place.

Essentially the same line of reasoning is relevant to the question of why the body provides information about sleep-tension. While the face is occupied with maintaining visual contact and with speaking, and thus communicates less about a dimension such as sleep-tension, the body is less constrained, required merely to keep the person in his chair. The body posture, and the positions of specific body parts can appear relaxed or tense. Positions of the hips and of the trunk can place the person closer to or farther away from the other person. Positions of the hands, arms, or feet can accent or underline part of the verbal message, or can in a miniature portrayal act out part of the verbal message, or a theme which has not been verbalized. The body can be engaged in instrumental activity (lighting a pipe, scratching the head, cleaning the fingernails, stretching, etc.), or can be revealing the readiness to take some action relevant to the interaction. Observers

may infer from these various bodily activities information about degree of intensity and/or level of arousal. An observer can infer intensity of an affect or extent of arousal from body photographs in which the behavior appears either mobile or highly immobile. Our research in progress suggests, at least tentatively, that high levels of arousal can be associated with either much or little body movement, depending upon whether the person is directly expressing the affect, or inhibiting and holding in the expression of the affect.

Certain types of bodily activity probably carry information about pleasantness-unpleasantness, but occur infrequently during spontaneous conversations; that is, some gestures have a pleasant or unpleasant quality; certain action patterns which in miniature act out part of a verbal message can also carry this kind of information; and, certain types of bodily activity which a sophisticated observer might interpret on a psychodynamic level (e.g., the interpretation of scratching finger movements as hostility directed inwards by Mahl et al., 1959) could also lead to inferences about a dimension such as pleasantness-unpleasantness. While various parts of the body might convey such information, probably the position of the fingers most typically carries information akin to that provided by the face.[6] Another area of overlap is the position of the head; the tilts and swings of the head may carry information akin to that provided by the body.

The terms *level of arousal* and *intensity of affect* have been used jointly to characterize the information measurable on the sleep-tension dimension. Schlosberg, in his description of this dimension, and other authors who discuss arousal and intensity of affect, have used the terms as synonymous. There may be a slight difference between the two, however, as a function of the kind of nonverbal cues available to the judge. If the observer sees only body cues, he probably interprets the information available in terms of how aroused or energized the organism is when he rates the behavior on the sleep-tension scale. If the observer sees the face as well as the body, then he could use the information about arousal communicated by the body as an intensity quantifier of the particular affect communicated by the head. The distinction is a minor one, and our recent research has taken a different approach exploring just what type of information is being measured by the sleep-tension dimension.

In a partially completed series of experiments, new rating scales have been devised, and judgments of the same sets of photographs have been obtained, so that judgments of each of these new dimensions can be compared with the data already available. The first new scale was designed to investigate whether sleep-tension ratings might reflect judgment of physical appearance more than inferential judgment, such as is made in the pleasantness-unpleasantness ratings, about an internal feeling state of the stimulus person. This scale was labeled *physically mobile-physically immobile*. The second new scale was labeled *aroused-unaroused*, since one of the main theoretical interpretations of the sleep-tension ratings is that they measure level of arousal. A third scale was labeled *active-passive*, since other writers (Triandis & Lambert, 1958) have pointed out the similarity between this factor from Osgood's research on the semantic differential and the sleep-tension dimension.

While no conclusions are possible yet, it is clear that while ratings on all three new scales are correlated with ratings on sleep-tension, the correlations among the new scales are greater than the correlation of any one of them with sleep-tension. Further, unlike sleep-tension, these three new scales seem less independent of pleasantness-unpleasantness ratings. At this point, the interpretation of the sleep-tension dimension appears to be a more complex problem than was anticipated.

The problem for this study was to specify the link between nonverbal cues and inferences drawn by observers. Only one class of information has been considered here, and there is little reason to suppose that the same results would be obtained from inferences

[6] In a recently completed experiment, we have demonstrated that photographs showing particular hand positions do communicate information about attitude, interpersonal manner, and affect (Ekman, 1965b).

about another class of information. In fact, in another work (Ekman, 1964a) there was some evidence of similarity between head and body cues as modifiers of a verbal message. The study has, however, established that there is a difference between these two broad classes of nonverbal cue sources, the head and the body, in the communication of information about affect. This is regarded as only a first step. Further subdividing into more specific cues within each of these stimulus classes is still to be done.

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