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INFERENCE OF ATTITUDES FROM NONVERBAL COMMUNICATION IN TWO CHANNELS [1]

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In the present study 3 degrees of attitude (i.e., positive, neutral, and negative) in facial expression were each combined with 3 degrees of attitude communicated vocally. The vocal communications of attitude were superimposed on a neutral word. In preparing the 2-component communications, the components were selected so that the degree of positive attitude communicated facially was equivalent to that communicated vocally—that is, the independent effects of the 2 components were comparable. It was found that attitudes inferred from combined facial-vocal communications are a linear function of the attitudes communicated in each component, with the facial component receiving approximately 3/2 the weight received by the vocal component. Implications of the findings for more general attitude-communication problems are discussed.

While there are many studies of nonverbal attitude or feeling communication in single channels (e.g., reviews by Davitz, 1964 or Mahl & Schulze, 1964), investigators are only beginning to explore simultaneously transmitted feelings or attitudes in two or more channels. Gates' (1927) investigation of single-channel decoding of facial and vocal stimuli is relevant to the present study. She found that children are more accurate in their judgments of facial compared to vocal expressions of feeling. Unfortunately, her method only allows a tentative conclusion that discrimination of feeling on the basis of facial cues is easier than discrimination of feeling on the basis of vocal cues. There is, however, some corroboration of Gates' findings in a study by Levitt (1964). Communicators were filmed as they attempted to communicate six emotions facially and vocally, using neutral verbal materials. The decoding of facial and vocal stimuli in combination was only as accurate as the decoding of facial stimuli alone, and both conditions were more accurate than the decoding of vocal stimuli alone. This finding can be interpreted to indicate that in a two-channel facial-vocal communication of emotion, the facial channel contributes more to the decoding of the total message than the vocal channel.

There is one other study in which the characteristics of two-channel communications of emotion have been explored. Williams and Sundene (1965) used the semantic differential method (Osgood, Suci, & Tannenbaum, 1957) to obtain judgments of the same emotions communicated facially, vocally, and in facial-vocal combinations. All three modes of communication of emotion were found to be recognized in terms of the three factors of general evaluation, social control, and activity.

It should be noted that none of the foregoing studies investigated two-channel communications in which the emotion communicated in the facial expression was inconsistent with that communicated vocally. Despite the paucity of experimental studies of decoding of multichannel communications of feeling or attitude by any particular population (e.g., children or adults), there is some theoretical consideration of the effects of such communications. Bateson, Jackson, Haley, and Weakland (1956) proposed a "double bind" theory of schizophrenia. They consider the maladaptive responses of schizophrenics to be a consequence of their being the frequent recipients of inconsistent attitude communications. The double-bind communication can be defined as typically consisting of two or more inconsistent attitude messages which are assumed to elicit incompatible responses

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from the addressee. For example, a mother asks her son to come over and kiss her while she nonverbally communicates disinterest in what he is requested to do. The child is assumed to be left with the difficult task of responding to either the verbal or the nonverbal component, with the knowledge that response to the former will elicit a rebuff and response to the latter will elicit indignation. The recipients of frequent double-bind messages are assumed to learn to respond with their own double-bind messages. In the example considered, the child may respond with, "I can't come because my leg hurts," or "I can't come because Trap is holding me," the hurt leg and Trap being figments of his imagination.

While double-bind communications are assumed to lead to the development of maladaptive patterns of interpersonal functioning, Haley (1963) also conceptualized most psychotherapeutic processes as being interpretable within a beneficial double-bind paradigm. Haley's thesis is that applications of the beneficial double bind serve the function of successfully eliminating the secondary gain which is associated with a symptomatic behavior and therefore eliminating the behavior.

The above assumptions about the change-inducing properties of inconsistent communications require clarification through investigation of the ways in which multichannel attitude communications are decoded. Since the quantification of degree of consistency or inconsistency between communications in two channels is only possible if the two communications can be scaled along a common dimension, the general evaluation dimension obtained in the Williams and Sundene (1965) study seems appropriate. Mehrabian and Wiener (1967) pursued these considerations by investigating the decoding of two-channel vocal-verbal communications in which three degrees of attitude (i.e., positive, neutral, and negative) in the vocal component were each combined with three degrees of attitude in the verbal component (i.e., meanings of words). They found that when vocal communication of attitude is inconsistent with verbal communication of attitude, normal addressees respond to the two-channel communication by subordinating the verbal component to the vocal component. If, for example, the word "scram" is said in a tone of voice which is independently judged as communicating positive attitude towards the addressee, the consensual interpretation of the total communication is positive.

The present study was designed to investigate the decoding of inconsistent and consistent communications of attitude in facial and vocal channels. Three degrees of attitude (i.e., positive, neutral, and negative) communicated in facial expressions were each combined with three degrees of attitude communicated vocally. In accordance with Gates' and Levitt's findings, it was expected that the decoding of a consistent facial-vocal communication would yield a judgment equivalent to that obtained from the decoding of the facial component only—that is, the facial component would be dominant. Furthermore, since Mehrabian and Wiener's (1967) study indicated that the dominant component in a two-channel communication determines the meaning of inconsistent communications, it was expected that the decoding of an inconsistent facial-vocal communication would yield a judgment equivalent to that obtained from the decoding of the facial component only. It was therefore hypothesized that judgments of attitude, on the basis of consistent and inconsistent pairings of facial and vocal attitude communications, would yield a main effect due to variations in the facial component and no effect due to variations in the vocal component or its interaction with the facial component.

METHOD

Subjects. A group of 25 subjects (*Ss*) was used in the preliminary selection of a neutral word. A second group of 17 *Ss* was used to assess the independent effects of facial and vocal communications. A third group of 20 *Ss* was used to obtain the combined effects of facial-vocal communications. All 62 *Ss* were female University of California undergraduates who participated in the study in partial fulfillment of introductory psychology course requirements.

Materials. For the selection of a neutral attitude-communicating word, 25 *Ss* were asked to judge the attitude of a speaker towards her addressee when saying each of 15 words. The 15 words were each presented in written form and *Ss* recorded their judgments of attitude on a 9-point scale designated "like very much," +4 and "dislike very much," −4

at its poles. The word "maybe" was selected as an appropriate neutral verbal carrier of vocal communications, since it was rated .28 on the attitude scale with a standard deviation of .72.

For the selection of vocal communications of three degrees of attitude, three female speakers were instructed to vary their tone of voice while saying the word "maybe," so as to communicate like, neutrality, and dislike towards an imagined addressee. Each speaker was instructed to say the word "maybe" twice in the same way while her communications were being recorded on magnetic tape. The 18 items, consisting of two instances each of positive, neutral, and negative vocal attitude communications obtained from the three speakers, were presented to 17 female *Ss* with the following written instructions:

> The purpose of this study is to find out how well people can judge the feelings of others. In this part, you will hear a recording on which the word "maybe" is spoken in different tones of voice. You are to imagine that the speaker is saying this word to another person, the addressee. For each tone, indicate on the scale what you think the speaker's attitude is towards the addressee.

A modified form of the semantic differential instructions (Osgood, Suci, & Tannenbaum, 1957, pp. 80–85) was used to direct *Ss*' use of an attitude scale designated "like," +3 and "dislike," −3 at its poles. The 18 items were presented in a different random order to each *S*. The positioning of positive and negative poles of the scale was counter-balanced and was random in the 18-item sequence.

The facial communications of three degrees of attitude were selected in a similar manner. Photographs of three female models were taken as they attempted to use facial expressions to communicate like, neutrality, and dislike towards another person. The photographs were $3\frac{1}{2} \times 4\frac{1}{2}$ inch black and white prints of head only against a neutral background. Eighteen items, consisting of two photographs for each degree of attitude communicated by each of the three models, were presented to the same 17 *Ss* who judged the vocal communications. The instructions for recording judgments of the facial communications of attitude were analogous to those used with the vocal communications. The *Ss* were randomly assigned so that eight of them judged facial communications prior to judging vocal communications and nine made their judgments in reverse order.

TABLE 1

INDEPENDENT EFFECTS OF VOCAL AND FACIAL COMMUNICATIONS: DEGREE OF POSITIVE ATTITUDE INFERRED FROM THREE KINDS OF VOCAL ATTITUDE COMMUNICATION BY TWO SPEAKERS AND THREE KINDS OF FACIAL ATTITUDE COMMUNICATION BY TWO MODELS

Communicator	Inferred Attitude Scores Corresponding to Communications Considered					
	Positive		Neutral		Negative	
	M	*SD*	*M*	*SD*	*M*	*SD*
Speaker 1	2.41	0.79	0.06	0.82	−2.29	0.77
Speaker 2	2.35	0.70	−1.12	1.11	−2.18	0.73
Model 1	2.12	0.70	0.35	0.61	−2.65	1.00
Model 2	2.35	0.61	−0.24	1.15	−2.53	0.62

On the basis of *Ss*' judgments of the vocal and facial communications, three vocal communications (i.e., positive, neutral, and negative), obtained from each of two speakers, and three facial communications, obtained from each of two models, were selected. As the data in Table 1 indicate, the facial attitude communications of a given value (e.g., positive) were selected to match the vocal attitude communications of the same value. Standard deviations of judgments as well as their means were approximately matched. A 3 Attitude × 4 Communicator × 17 Subject analysis of variance of the data summarized in Table 1 indicated a significant effect due to the Attitude factor ($F = 333.47$, $df = 2/32$; $MS_e = 1.12$, $p < .001$), no significant effect due to the Communicator factor ($F < 1$, $df = 3/48$; $MS_e = .37$, $p > .25$), and no significant Attitude × Communicator effect ($F = 1.05$, $df = 6/96$; $MS_e = .70$, $p > .25$). Thus, the independent effects of all vocal communications of attitude are comparable to the independent effects of all facial communications of attitude within each of the three levels of attitude investigated.

Design. The three vocal attitude communications of each speaker were each paired with the three facial attitude communications of each model. Therefore, there were 36 experimental conditions, consisting of 3 Vocal Attitude × 3 Facial Attitude × 2 Speaker × 2 Model interactions. All 36 conditions were administered to each of 20 *Ss*, thus yielding a 3 × 3 × 2 × 2 factorial design with repeated measures on all factors.

Procedure. The experiment was individually administered to each *S*. The written instructions presented to the *Ss* were:

> The purpose of this study is to find out how well people can judge the feelings of others. You will be shown photographs of different facial expressions and at the same time you will hear a recording of the word "maybe" spoken in different tones of voice. You are to imagine that the person you see and hear (A) is looking at and talking to another person (B). For each presentation, indicate on the scale what you think A's attitude is towards B.

A second form of instructions was identical to those presented above with the exception that references to facial expressions and seeing, and tones of voice and hearing, were made in reverse order. The *Ss* were randomly assigned so that half received

the first form and half received the second form of instructions. A modified form of the semantic differential instructions was again used to direct *Ss*' use of an attitude scale designated "like," +3 and "dislike," −3 at its poles.

The 36 two-channel communications were presented in a different random order to each of 20 *Ss*. In each experimental condition, the vocal and facial components of the communication were presented simultaneously, so that *Ss* heard the vocal component only while seeing the facial component and vice versa.

RESULTS

Each *S* recorded 36 responses, corresponding to all possible combinations of three facial communications of each of two models with three vocal communications of each of two speakers. The responses, which had a possible range of +3 to −3, were analyzed in a $3 \times 3 \times 2 \times 2$ factorial design with repeated measures on all factors. The analysis indicated a significant effect due to Facial Attitude ($F = 233.14$, $df = 2/38$; $MS_e = 2.37$, $p < .001$) and a significant effect due to Vocal Attitude ($F = 77.49$, $df = 2/38$; $MS_e = 3.33$, $p < .001$). None of the other main or interaction effects attained the .05 level of significance. The Facial Attitude × Vocal Attitude interactions with $MS_e = 2.21$ are summarized in Table 2. The Newman-Keuls method (Winer, 1962) yielded significant differences at the .01 level for all comparisons within each level of both factors.

The Facial Attitude factor accounted for 41.4% of the total sum of squares, whereas the Vocal Attitude factor accounted for 19.3% of the total sum of squares. Furthermore, the effects of the facial and vocal components were strongly linear. The linear trend accounted for 97% of the effect due to the facial component and 99% of the effect due to the vocal component. Moreover, the combined effect of the facial and vocal components was a weighted sum of their independent effects, since there was no significant interaction between them. The following regression equation summarizes the relative contributions of facial and vocal components to interpretations of combined facial-vocal attitude communications:

$$A_T = 1.50\,A_F + 1.03\,A_V$$

TABLE 2

EFFECTS OF TWO-CHANNEL FACIAL-VOCAL COMMUNICATIONS: DEGREE OF INFERRED POSITIVE ATTITUDE CORRESPONDING TO THE FACIAL ATTITUDE × VOCAL ATTITUDE INTERACTIONS

Vocal component	Facial component		
	Positive	Neutral	Negative
Positive	2.45	1.31	−0.91
Neutral	1.33	0.50	−1.62
Negative	0.20	−1.07	−2.47

A_T represents attitude inferred on a −3 to +3 scale from the two-channel communications. A_F represents attitude communicated in the facial component alone and is assigned values of +1, 0, and −1 for positive, neutral, and negative attitude, respectively. Similarly, A_V represents attitude communicated in the vocal component alone. The .95 confidence interval for the coefficient of A_F is 1.32 to 1.68, while that of the coefficient of A_V is .79 to 1.28. The absence of overlap between the two intervals indicated that the effect due to the facial component was significantly greater than that due to the vocal component.

DISCUSSION

The hypothesis of the present study was only partially supported. A main effect due to variations in the facial component and no effect due to variations in the vocal component or its interaction with the facial component had been expected. The results of the study indicate that the facial and vocal components do not interact and that the facial component has a stronger effect than the vocal component. However, in contrast to the hypothesis, the effect due to the vocal component is also significant. Thus, the results of the study can be summarized as follows: Attitudes inferred from two-channel facial-vocal attitude communications are a linear function of the attitude communicated in each component, with the facial component receiving approximately 3/2 the weight received by the vocal component.

The above results were obtained from a sample of normal adult female *Ss* who were communicators and addressees. However, it is

likely that the linear model for two-channel communications of attitude obtained for female communicator-addressee combinations has broader applicability. For instance, the model (with, perhaps, slightly different relative weights for the facial and vocal components) may be applicable to same- and different-sex communicator-addressee pairs of various ages.

One interesting implication of the linear model with positive coefficients relates to redundant multichannel communications of attitude. The model indicates that the effect of redundancy (i.e., consistent attitude communication in two or more channels) is to intensify the attitude communicated in any one of the component channels. Thus, pushing a child away while turning away from him is assumed to communicate a more negative attitude toward the child than only pushing him away or only turning away from him. Similarly, holding and kissing a child is assumed to communicate a more positive attitude towards the child than only holding or only kissing the child.

A final comment is required to integrate the implications of the findings of the present study with the findings of the Mehrabian and Wiener study (1967). It is suggested that the combined effect of simultaneous verbal, vocal, and facial attitude communications is a weighted sum of their independent effects—with the coefficients of .07, .38, and .55, respectively. Analytic procedures outlined by Anderson (1962, 1964) can presently be employed to test this proposed weighted-sum model for any single decoder. In view of these extrapolations of experimental findings from the decoding of multichannel inconsistent communications, the assumptions underlying the effects of double-bind communications can be questioned. Further experimentation with schizophrenics or children as addressees is needed to clarify the pathology-inducing or behavior-modifying effects of inconsistent communications of attitude.

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