A THEORETICAL MODEL OF COMMUNICATION VIA FACIAL EXPRESSIONS

D. CÜCELOĞLU

Department of Social Sciences, Hacettepe University

This paper presents a theoretical framework concerning communication via facial expressions. The article consists of three parts: In the first part «the semantics of facial communication» is discussed and it is suggested that the facial channel is particularly specialized in the transmission of those semantic features which are affective in nature. In the second part facial expression is taken at two different levels : the system level and the performance level; a notion parallel to the distinction made by linguists between the model of competence and the model of performance. Finally, the issue of static vs. dynamic facial expressions, i.e., posed vs. alive facial expressions are discussed and the idea of a modal facial structure *is proposed to account for the basic differences between the two types of research.*

Recent years have witnessed an increase in research on nonverbal communication in general, and on facial expressions in particular. Going over these studies one gets the impression that most of the problems investigated in these studies stand isolated and specific to that particular study. The studies seem to be dominated mainly by statistical analysis techniques, such as Factorial Analysis (Williams & Sundene, 1965; Gitter & Walkley, 1968; Sjoberg, 1968; Sweeney, et al., 1968; Kozel, 1969) or entropy measure technique provided by Information Theory (Osgood, 1955; Cuceloglu, 1972) or application of some conditioning techniques (Jenkins, 1967; Hug-

hes, 1968). Some of the theoretical studies done in the last decade (Osgood, 1966; Cuceloglu, 1970; 1972; Izard, 1971; Mehrabian, 1972) still leave much to be desired in the degree of completeness expected from such theoretical models.

In this paper an attempt will be made to construct a comprehensive theoretical model which will include most of the relevant variables in the interpretation of facial expressions. In constructing this theoretical model we will first discuss the semantics of facial communications, i.e., the nature of messages transmitted via the face. After this, the two levels of facial communication will be considered, and thus a distinction will be made between the system level and the performance level. Thirdly, we will briefly reconsider the issue of dynamic vs. static facial expressions.

WHAT DOES THE FACE COMMUNICATE ?

The Semantics of Facial Communication

The face is a source of information, but this information varies in quality as well as in quantity. There is empirical evidence that besides transmitting information about the nature of emotional experience of the expressor, a human face may transmit information concerning various psycho-social aspects of the expressor, such as feelings of inferiority or superiority (Argyle, et al, 1970), personality traits (Cross, Cross, & Daly. 1971), sexual attractiveness Parrott & Coleman, 1971), or attitudes about certain issues (Shapiro, Foster & Powell, 1968). The main message transmitted by facial expression is affective, however. Contemporary students of facial communication consider the face as basically a channel transmitting messages concerning the emotional experience or affective intention of the expressor. A branch of general semantic theory similar to the «compenential analysis» approach employed by Wallace & Atkins (1960) in analysis of kinship terms was put forward by Osgood and Foster and further extended by Osgood (1968; 1970). It provides a theoretical framework for the mesages transmitted via facial expressions. According this particular psycholinguistic approach «the meaning of a word-form can be con-

ceived as a simultaneous bundle of distinctive semantic features. This bundle can be represented by a strip-code plusses, zeroes, and minuses, if we make the simplifying assumption of a discrete model» (Osgood, 1968, 506). A word-form such as *hope* is coded (+) on a semantic feature concerning time such as *Future/Past* for it indicates a semantic content related with *Future;* on the other hand, a word-form such as *anger* is coded (—) for it transmits information concerning *Past* activity. If a particular word-form does not have anything to do with time, i.e., the time component is irrelevant as far as the word is concerned, then it is coded zero (0). Osgood conceives the psychological nature of these semantic features as mediational (Osgood, 1968). This particular semantic theory is not, as Osgood admits, necessarily an outcome of the mediational approach, however. There may be other plausible explanations for the nature of these semantic features. Here we are interested mainly in the utilization of semantic features, rather than in their psycho-physiological nature.

A word of affect consists not only of those semantic features which indicate affect but also of those features which are denotative in nature. Let us take *scolding* and *warning* as two examples of words of affect. The basic difference between these two words lie in the denotative feature indicating time rather than in affect, i.e., while *scolding* is (—), *warning* is (+) on the time feature. As examples of affective features, the dimensions found in Factor Analitic studies of Schlosberg (1954) *Pleasantness/Unpleasantness; Sleep/Tension; Attention/Rejection,* or of Williams and Sundene (1965) *Evaluation; Social Control; Activity,* or of Osgood (1966) *Pleasantness; Control; Attention,* or of Cuceloglu (1970) *Pleasantness; Irritation; Receptivity* can be taken. Since the general structure of the model, not the nature of affective features is under discussion, types found in studies usuing typologies, such as *interest-excitement; anger-rage; enjoyment-joy; surprise-startle; distress-anguish; disgust-contempt; shame-humiliation; fear-terror* defined by Tomkins (1962) and Izard (1971) can also be taken as semantic features. As examples of denotative features those which seem to be discriminating among the emotion names can be given (Osgood, 1972) : *Overt-Covert; Cognitive/Gut; Onto Ego/From Ego; Future/*

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Past; Supra/Subordinate; Terminal/Interminal; Striving/Nonstriving; Social/Nonsocial. Figure 1 gives a schematic representation of the affective and denotative semantic features. This figure in-

VERBAL CHANNEL

FACIAL CHANNEL

	A	B	C	D	E	F	G	H	I	J	K	
HAPPINESS	+	–	0	0	0	+	–	0	+	0	+	
ANGER	–	+	+	+	–	–	–	0	+	+	–	
FEAR	–	0	–	+	–	+	0	–	+	0	–	
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Figure 1. Communication Channels and Semantic Features

The capital letters refer to the following features : A : Pleasant/Unpleasant; B : Irritated/Calm; C : Receptive/Unreceptive; D : Overt/Covert; E : Cognition/Gut; F : Onto Ego/From Ego; G : Future/Past; H : Supra/Subordinate; I : Terminable/Interminable; J : Striving/Nonstriving; K : Social/Nonsocial. The first three, i.e., A, B, and C are features of affect, and are communicated essentially through the facial channel; the others are denotative features, and are basically communicated via the verbal channel.

dicates that the verbal channel may transmit information concerning both affective (Features A, B, and C) and denotative features (Features D, E, F, G, H, I, J, K) ; whereas the facial channel, as most contemporary students of facial communication conceive it, is limited essentially to those features which are affective in nature.

This specialization in the transmission of information is important and its significance will be discussed in the following sections.

THE TWO LEVELS OF FACIAL COMMUNICATION

The idea put forward by de Saussure that *la langue* and *la parole,* even though related, should be considered as two different events, is now one of the basic concepts of students of language. Even though labeled differently by them, this notion is used by both linguists and psycholinguists. Chomsky makes a point of explicating the difference between the competence and the performance of a speaker (Chomsky, 1957; 1965), whereas Osgood refers to the same phenomena as the model of L (language) and the model of U (user) (Osgood, 1966 b). The model of language (competence) is not concerned with those variables that the speaker brings into the communication situation : such as motivational, personality, and perceptual factors and memory limitations. The model of language tries to establish the underlying rules that the speaker - hearer share. The model of the user (performance), however, takes into account all the psychological factors that the speaker brings into the communication process (Bever, 1968; Garrett & Fodor, 1968).

It is proposed here that a parallel notion should be employed in analyzing communication via facial expressions; in other words, a discrimination should be made between *the system level* and *the performance level* of facial communication. At the performance level, an analysis of facial communication includes psycho-social variables present in the communicative situation, whereas at the system (competence) level the rules which underly the flow of information via facial structures are investigated.

Facial Expressions at the System Level

It is assumed here that each emotional expression, distinct at the affective level, has a different pattern of expressive facial structure. Figure 2 provides an expression matrix which constitues a framework for the comparison of expressive facial structures. It is assumed here that there is an *initial* neuter *facial structure* which
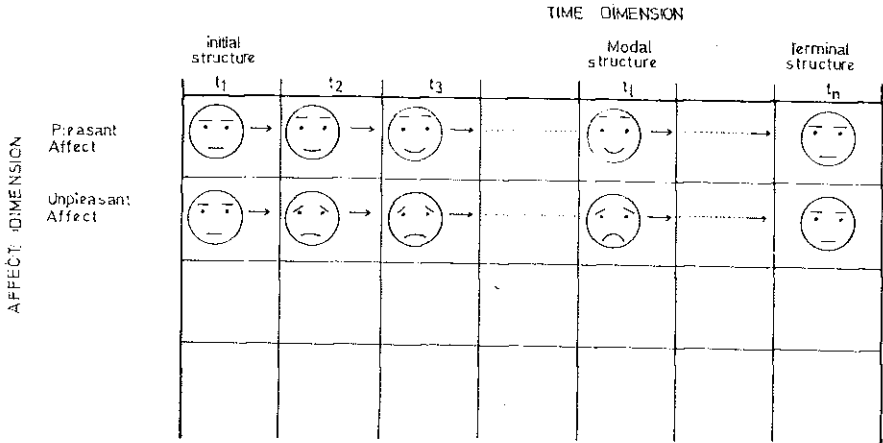
TIME DIMENSION

Figure 2

does not express any affect and which functions as the starting
and ending point for all of the expressive facial structures. Each
distinct emotional experience leads to a distinct expressive facial
structure which evolves along the time dimension and at one point
develops into *a modal structure* which is conceived as expressing
that particular affect best. The time required for the eventuation
of the modal structure and its duration or continuity may be dif-
ferent for each distinct affective experience. After the actualiza-
tion of the modal structure on the time dimension, it is assumed
that the facial expression will fade out toward the neuter, nonexpres-
sive *terminal structure*. There is some empirical evidence that the
time dimension constitutes an important aspect of facial communi-
cation (Argyle & Henry, 1971). The notion of a modal facial struc-
ture presented here is parallel to the notion of the morpheme in
descriptive linguistics. In human speech, production of certain
phonemes on a time dimension leads to the eventuation of a par-
ticular morpheme. Even though the notion of a modal facial struc-
ture has found some support in a study of facial code (Cuceloglu,
1972), it remains basically an empirical question still to be inves-
tigated through movie films rather than posed static pictures. The
question of the origin of these modal structures leads naturally to
the general question of the origin of facial code, and this question is
not a basic concern for us here. If the issue is taken simply in terms

of innate versus learned processes, however, there is considerable evidence for the existence of universal facial code shared by all human beings (Cuceloglu, 1970; Izard, 1971; Nystrom, 1971; Ekman, *et al,* 1972).

Facial Expressions at the Performance Level

When facial expressions are taken at the performance level those variables which are psycho-social in nature may modify the interpretation of facial expressions. As examples of the basic variables of performance, we can mention the multichannel nature of human communication under normal daily conditions, the existence of a particular context within which communication takes place, and finally those variables which are brought by the interpreter into the communication process.

Multichannelness of human communication. Human communication works in a multichannel manner under daily conditions. The verbal channel carries information by means of linguistic units and structures, and by paralinguistic means such as intonation patterns. Depending on the setting within which human communication takes place, the nonverbal channel may carry facial, bodily, tactile, and even olfactory messages. Studies indicate that information in these channels may be harmonious or discordant and in each case the outcome of the communication process changes (Shapiro, 1968; Bugental, Kaswan & Love, 1970). There is empirical evidence (Howell & Jorgenson, 1970) that unposed emotional behavior is judged better if the observers see the actor rather than rely solely on transcript cues. In another study of the attribution of personality traits from voice quality, listeners were able to give reliable judgments on such personality traits as extroversion, assertiveness, and emotional stability (Scherere, 1971). In a study conducted by Jorgenson and Howell (1969) it was found that verbal content (information by transcript) was a more reliable source than facial expression and voice when unpleasant emotions were involved. More evidence for the multichannel nature of human communication and on the nature of information transmitted via these different channels has been provided by Lampell & Friar (1969), and Phillis (1970). The multichannel nature of human communication is important in

the interpretation of facial expressions and its significance will be discussed.

Context. It is assumed here that the psycho-social context within which facial expression takes place is an independent source of affective information. As a source of affective information context is probably more closely tied to social learning processes than are facial expressions. Thus one would expect greater cross-cultural variance in the nature of context transmission of similar affective content than in facial expressions. There is considerable evidence in the direction of cross-cultural similarity of facial structures employed in the transmission of affect, but no cross-cultural studies of context, as yet. To show how seemingly similar social contexts may lead to different facial expressions let us take a wedding situation as an example : for the majority of Americans, a girl should smile on her wedding day, whereas for most of the people who live in the town of Silikfe on Turkey's Mediterreanean coast, a girl should shed some tears or look rather sad on her wedding day. A happy ending in one culture, means leaving home and one's beloved family in another. One may reasonably assume that the facial expression of the girl from Silifke has a higher chance of being interpreted correctly by an American without the context; here context, instead of helping, will have a confusing effect on the observer.

A cross-cultural investigation of context as a source of affective information would seem to be an interesting field for the psychologist and the social scientist in general.

Interpreter variables. Those variables which are brought into the communication situation by the observer and the expressor should be taken into consideration at the performance level. There is considerable evidence, for example, that *motivational* and *attitudinal* factors do influence the interpretation of facial expressions (Kissen, 1968; Landy & Mettee, 1969; Hoffman *et al*, 1970; Katz, Johnson & Parker, 1970). Gitter & Black (1968) found that the *race* and the *sex* of the expressor have a significant effect on the interpretation of facial expressions. Studies done by Kozel & Gitter (1968) and Malpass & Kravitz (1969) have led to similar results.

The *personality traits* of the interpreter were also found to have significant influence on the interpretation of facial expressions (Ellgring, 1970; Cross, Cross & Daly, 1971). Buck, *et al* (1969) found that several personality variables were positively correlated with the ability to communicate.

It can be concluded that all these variables have an influence on the communication process via facial expressions. But the same variables mentioned above influence the communication process via language. However, the existence of these variables at the performance level does not mean to a linguist that there is no grammar of a language. We know that linguists work at constructing grammars of languages, i.e., verbal codes, and we also know that similar factors exist at the performance level for verbal communication Thus, a demonstration of the influence of certain other factors at the performance level does not necessarily mean that there is no underlying code in communication via facial expressions.

STATIC VERSUS DYNAMIC FACIAL EXPRESSIONS

In face-to-face situations in daily life, the total developmental pattern of facial expressions can be observed by the addressee; this extended observation along the time dimension includes the *modal structure* and the sequence of structural changes of facial musculature. A study which employs static (posed) facial expressions should make sure that the expressions is a modal structure for that given affect, for there is the possibility that any of the facial structures along the time dimension could be captured and presented as the posed expression. It is assumed here that the distance between a facial structure and the modal structure is correlated with the degree to which that particular affect is expressed by that particular facial structure; a facial structure closer on the time dimension to the modal structure better expresses the given affect. Those studies which employ static facial expressions should provide some sort of evidence that the picture being employed in the study is in fact the modal expression. Unless this is done, the results of

that particular study can be questioned in terms of the development of the expressive structure of the posed face.

DISCUSSION

Let us begin our discussion with the advantages of the proposed model over other models of facial communication. This model of facial communication puts the idea of a well-defined facial code into focus without denying the relevance of such factors as the influence of context, and characteristics of the expressor and/or interpreter which affect the interpretation of facial expressions. The human facial code is conceived as a highly abstract system which can only be deduced by systematic observation of the facial communication act, that is, from behavior at the performance level. As it was pointed out earlier, however, the variables observed at the performance levels should be analyzed and their communicative effect should be included to complete the facial communication model at the performance level. Such a model represents an attempt to integrate relevant variables into a meaningful whole.

Secondly, such a model closes the gap between verbal and non-verbal communication through the use of a particular kind of semantic theory, and thus, the superficial difference between verbal and nonverbal communication is, we believe, eliminated by central perceptual/cognitive processes which are called *semantic features*. Let us take an example : By seeing only the face of a person you interpret that particular facial expression as *jubilance*. When you are able to see the whole picture you realize that the man is sitting in an armchair, rather comfortably; and you now want to call this facial expression *merriness*. You do this for you know that in your linguistic/cultural system a man can sit in an armchair merrily but *not* jubilantly. The semantic features concerning the level of activation are coded differently in the affective states expressed by «merriness» and «jubilance». Such a model has an explanation for these kinds of occurrences found in verbal and nonverbal communication.

Thirdly, such a model may help the student of facial communi-

cation reconsider the distribution of research emphasis on variables relevant to facial communication in a more concientious way; for a model of the kind presented above provides a framework of relevant variables. There has not yet been, as far as we are aware, much research on the nature of context as in independent source of information. In much of the research on facial communication, only one of the variables at the performance level is taken as independent, with no mention of any control of the other variables relevant at the peformance level. The idea of two levels of facial communication and the variables of these levels might provide a framework within which more meaningful questions can be put to experimental investigation.

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