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1. Methodological issues in studying nonverbal behavior

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1.1. A selective historical sketch of methodological development in nonverbal behavior research

Interest in the actions of the voice, the face, and the body can be traced back to the writings of the earliest philosophers. The expression of emotion and intention and the role of nonverbal behavior in rhetoric have occupied some of the major thinkers over the centuries (see Key, 1977; Laver, 1980). Much of the relevant writing, however, is characterized by speculation and introspection. In some cases, a primitive type of systematic observation constituted the basis for inference (Bell, 1806; Duchenne, 1862; Piderit, 1867). Yet, despite some systematic experimental work on expression by anatomists and physiologists during the eighteenth and early nineteenth centuries, the history of the empirical study of nonverbal behavior begins with Charles Darwin and his monumental study, "The expression of the emotions in man and animals" (1872/1965). In this seminal book, Darwin not only introduced some of the major substantive and theoretical issues that still guide much of the research in this area, but also pioneered some of the methods of research.

Two theoretical issues posed by Darwin are at the root of much of the recent controversy in the field. The first issue, central to Darwin's interest in evolution, concerns the issue of the innateness versus the social learning of nonverbal behavior. Although Darwin did not deny that culture and social structure strongly affect nonverbal behavior, he was convinced that facial expressions are biologically determined and, furthermore, that there is phylogenetic continuity in their evolution. This central notion of biological determinism has strongly affected the choice of methods used in collecting evidence for its support. An important aspect of Darwin's methods is the comparative approach, that is, comparing expressive behavior in many animal species, including man. The basis for such comparison is systematic observation in the

form of repeated, close scrutiny of the behavior of an organism in different states and the detailed and careful description of even minute observable changes in action and appearance.

Darwin meticulously observed expressive behavior patterns and in many cases used drawings and photographs to obtain a permanent iconic image of the behavior under study. As objects of study he used naturally occurring expressions as well as experimentally induced ones and expressions posed by actors. He also drew extensively on anecdotal reports in the literature, on the visual arts, and on reports by acquaintances and fellow scientists, particularly about facial expression in different cultures. Although Darwin was impressed on the voyage of the *Beagle* with his ability to understand the facial expressions of individuals from many countries, he obtained more systematic data later. From England he sent a list of questions to 36 people living or working in other countries; he asked, for example, "Is astonishment expressed by the eyes and mouth being raised?" (Darwin, 1872/1965, p. 15).

The second theoretical issue, which is closely related to the first, is the communicative use of expressive signs. In many ways, Darwin pioneered the functional analysis of behavior that characterizes modern ethology. Most of his theoretical efforts consisted of attempts to derive the underlying functional significance of the observable expressive behavior. Darwin clearly acknowledged the fact that some nonverbal behaviors, specifically symbolic gestures, serve primarily communicative functions, and that these are used "voluntarily and consciously" in a culturally shared code, although he was convinced that all of these movements had "some natural and independent origin" (Darwin, 1872/1965, p. 355). Although conventional gestures that varied across cultures might have as their main function communication, Darwin maintained that the innate facial expressions did not originate in a need to communicate, although they provided important information to others.

Darwin was the first to study observers' judgments of facial expression, noting that observers who did not know the context in which an expression occurred still agreed about the emotion shown. The judgment method has become one of the most commonly used in studies of nonverbal behavior (see Rosenthal, Chapter 6). Darwin also experimented, often with his own children, to observe reactions to a variety of sounds, gestures, and facial expressions. Clearly, modern methodologists would have many objections to details of Darwin's procedures; these would reflect the nascent state of most methods during the last half of the nineteenth century. Yet, at the same time, Darwin's approach

compares very favorably with that taken in modern single-shot studies, so far as comprehensiveness, appropriateness of the methods, and detail of observation are concerned.

Darwin's contemporaries in other disciplines, particularly the early German anthropological psychologists (see Allport, 1968, pp. 48–50), also showed much interest in nonverbal behavior. In the process of examining differences and similarities between different races and cultures, they paid much attention to communication systems such as language, gestures, and facial expression (Kleinpaul, 1888/1972; Wundt, 1900–1920). However, their writings, which were mostly compilations of reports from ethnographic studies and of anecdotes, did not spawn much of a research tradition. Such a tradition was established at the beginning of the twentieth century, when the psychology of expression (*Ausdruckspsychologie*) attained a dominant position in German psychology and quickly spread to other countries (without, however, achieving a similar importance). The basic tenet of this tradition was the assumption that individual differences between persons manifest themselves in a particular style of expressive movement, which homomorphically affects all aspects of motor activity, such as facial and bodily movement, handwriting, vocalization, and so on. Whereas many of the representatives of this approach were given to nonempirical pursuits like introspection and phenomenology, others did use more empirical, quantitative methods. In many cases they produced fairly precise observations and descriptions of nonverbal phenomena, often using induction methods (e.g., producing an emotion by imagination or by exposing subjects to arousing stimuli). Furthermore, they introduced systematic behavior sampling methods, obtaining as a result different behavior samples, from several persons, sometimes at several points in time (e.g., Allport & Vernon, 1933; Bühler, 1933; Pear, 1931; Wolff, 1943). In this tradition we also find the first consistent attempts to use quantitative measurement and statistical analysis.

Under the influence of Nazism, segments of German psychology degenerated into an ideology of racial determinism. Some German psychologists attempted to show that the superiority of the Aryan races was manifest even in expressive behavior patterns. In an attempt to procure evidence that would prove these claims wrong, a young social scientist at Columbia University, David Efron, conducted a classic study, published in book form in 1941, which is still counted among the best studies in the field of nonverbal behavior, both in theoretical rigor and in development of appropriate methodology (Efron, 1941/1972).

Efron used both naturalistic observation and some experimental

induction in his study of the gestures of Jewish and Italian immigrants in New York. He was one of the first to use film extensively to document sequences of nonverbal behavior (see also Bateson & Mead, 1942), and he made much use of the frame-by-frame analysis methods that have become one of the hallmarks of nonverbal behavior analysis. In addition, Efron used drawings to code iconically the most important aspects of the movement patterns, thus developing a rudimentary transcription system. He also recognized that the functional classification of movement patterns is an important part of an analysis of bodily movement as an element of expression and communication systems. His distinction of types of hand movements was adopted and further developed in later studies (Ekman & Friesen, 1969, 1975; see Rosenfeld, Section 5.7). Finally, Efron used observers to determine how particular gestures would be decoded, in order to assess their role in a nonverbal signaling system. Interestingly, Efron ignored the face almost entirely, focusing his efforts primarily on body movement. Many of the classes of behavior he noted for the body, such as speech emphasis, can also be seen in facial actions (see Ekman, 1979). It is difficult to overestimate the important role of David Efron as a pioneer for both conceptual and methodological development in the field (see also Rosenfeld, Chapter 5). Unfortunately, many researchers have remained ignorant of his work or have not acknowledged its influence; often methods used by Efron were "rediscovered" many years later.

Another pioneer who has had much influence on the field both conceptually and methodologically, although his work has generated curiously little empirical research, is Ray Birdwhistell. An anthropologist by training, Birdwhistell was heavily influenced by structural linguistics (particularly the work of Harris, Bloomfield, Trager, and Smith) and introduced this way of thinking and its methodology to the analysis of movement behavior. Proceeding from the assumption that human movement is organized in a code with a design similar to that of language (see Hockett, 1960), Birdwhistell (1952) attempted to create a science of "kinesics" in analogy to phonetics. Accordingly, he attempted to define movement units within a hierarchically organized code, which he believes to be almost entirely determined by cultural convention and learning. Birdwhistell, along with other researchers, advocated the heavy use of cinematic techniques and the microanalysis of the filmed behavior, with slow motion and frame-by-frame analysis (as Efron had recommended 10 years earlier); Birdwhistell also developed a transcription system that was one of the first instances of an attempt at exhaustive symbolic transcription of nonverbal behavior (apart from

attempts at dance notation; see Hutchinson, 1970). Though this system has not ever been used extensively, only for illustrative purposes on very short behavior samples, it has had a strong impact on discussion about the transcription and analysis of nonverbal behavior. Kendon provides a detailed description of Birdwhistell's approach and an appreciation of his role in Section 8.2. Critical evaluations of the system can be found in Ekman (1957, p. 146; Section 2.2) and Rosenfeld (Section 5.7).

One of the most notable developments of the fifties and sixties was the strengthened concern of psychiatrists and clinical psychologists with nonverbal behavior, a concern resulting in the establishment of many new approaches and methods. Even though most of these researchers were concerned with mental patients, the rationales for studying nonverbal behavior and the approaches used differed widely, depending on the goals of the inquiry – evaluating the diagnostic value of nonverbal behavior, tracing the etiology of the illness in patterns of social communication, or studying the process of clinical interviews – as well as on the theoretical persuasion of the clinician – psychoanalysis, transactional analysis, behavior therapy, and so on. It would be most interesting to trace the development of interests and the mutual influences of the major researchers in this period in detail. Here only some of the major strands of research can be taken into account.

One distinctive approach, sometimes referred to as the *natural history* approach (reviewed in detail by Kendon in Section 8.2), represents the confluence of ideas from anthropology, structural linguistics, information theory, and psychiatry and is associated with the names of Bateson, Birdwhistell, Brosin, Fromm-Reichmann, Hockett, and McQuown. This group was particularly concerned with a structural analysis of the communication patterns between patients and therapists, using phonetic, paralinguistic, and "kinesic" transcription techniques. One of the problems that has plagued this approach is that it is never quite clear what rules control the identification of structural units and hierarchical organization. More recently, Scheflen (1966, 1973) and Kendon (1970, 1973, Chapter 8) have attempted to indicate with greater specificity how to proceed in order to identify the structural organization of behavior.

Another approach to the analysis of nonverbal behavior stemming from clinical concerns is the psychoanalytic approach. Freud and some of his contemporaries commented on the fact that nonverbal behavior might reveal unconscious processes that are repressed and consequently not verbalized (Ferenczi, 1926; Freud, 1904; Reich, 1949). Psychiatrists in this tradition have looked at both body motion and vocalization, and

mostly have used clinical observation, filmed records, microanalysis, and functional behavior classification to assess the diagnostic value of nonverbal behavior for nonverbalized affect. A number of conceptual–methodological distinctions were contributed, some of which continue to be used today. Krout (1931) distinguished autistic movements from gestures, Mahl (1968) showed the usefulness of distinguishing movements that are directed at the self and communicative movements, and Ekman and Friesen (1969) and Freedman (1972) both elaborated these distinctions in dealing with hand movements. Ekman (1965) also contrasted the information available from the face and body, as Dittmann (1962) had done and as many others have done since then. Mahl and Schulze (1964) worked with vocalization patterns, such as *ah* and non-*ah* speech disturbance types, which have paved the way for more detailed analysis of vocal behavior.

In the area of voice analysis, clinicians have been pragmatically interested in the diagnostic use of vocal characteristics for signs of particular syndromes and for changes over time. Among the methodological contributions that have been made in this area are the identification of categories for the auditory evaluation of voice quality characteristics (e.g., Moses, 1954) and the use of acoustic analysis techniques for the assessment of nonlinguistic aspects of vocalizations (Ostwald, 1963).

Yet another approach linked to the practice of psychiatry and clinical psychology and centered mainly around the analysis of interview processes is the *interaction chronography* approach pioneered by Chapple (1948/49) and subsequently utilized by Matarazzo and Wiens and their co-workers (Matarazzo & Wiens, 1972) and Jaffe and Feldstein and their collaborators (Feldstein & Welkowitz, 1978; Jaffe & Feldstein, 1970). The methodological innovation introduced by this tradition is the objective and sometimes automatic measurement of time-based parameters of conversation sequences (see Scherer, Section 4.6).

Although also coming to the field with clinical interests, Paul Ekman, trained as a psychologist, turned toward the investigation of some of the more basic issues concerning nonverbal behavior, such as the nature of emotional expression and the semiotic aspects of nonverbal behavior (resurrecting the questions studied by Darwin and Efron, and influenced also by Tomkins and contemporary ethologists). Ekman developed a theoretical classification of five types of nonverbal behavior, based on differences in origins, usage, and coding. In addition, he attempted to make full use of the methodological canon of psychology in the analysis of nonverbal behavior, including the measurement of frequency and rate of behavioral phenomena, systematic sampling

procedures, the construction of category and coding systems with known reliability, and the use of statistical analysis. Together with Wallace Friesen, he invested much research effort in the development of measurement systems for body motion (particularly speech illustrator movements and symbolic gestures) and the more recent development of an anatomical system for measuring the face (Ekman, 1957; Ekman & Friesen, 1969, 1976, 1978). Ekman and Friesen's methods and conceptual framework have been used by many other investigators.

A research tradition with increasing impact on the study of human nonverbal behavior is ethology and, more recently, the special branch of human ethology. Because all animal behavior is nonverbal, animal ethologists have had to develop methods of observation and analysis suitable to uncovering the organization underlying the observable behavior patterns (Eibl-Eibesfeldt, 1970; Hinde, 1972). Among the important contributions made within this tradition is the development of sophisticated techniques for the analysis of sequences and clusters of behavior (see van Hooff, Chapter 7). This approach has had a very strong influence on the recent surge of interest in the study of human development and mother–infant interaction, where these techniques are used and further refined (Blurton Jones, 1971).

Finally, methodological impulses come from the research tradition of conversational analysis as developed in microsociology and ethnomethodology (Garfinkel, 1967; Goffman, 1963, 1971; Schegloff, 1968; Schegloff & Sacks, 1973). The particular contributions of this tradition are strategies to uncover the rule systems that govern much of our interaction with others and the role that verbal and nonverbal behaviors play in these systems (see West and Zimmerman, Chapter 9).

After this short review of some of the major historical developments that have influenced the methodology presently available to study nonverbal behavior, we now turn toward a more systematic discussion of the aspects or features that characterize particular approaches or methods and the choices facing a researcher intent on investigating nonverbal behavior empirically.

1.2. Basic issues in studying nonverbal behavior

The study of nonverbal behavior is characterized by two major focuses of interest: the study of the individual and the study of the interaction. In a very fundamental sense, these different focuses also represent major philosophical traditions, as reflected in the different disciplinary affiliations of the researchers and the rather different strategies and

methods of research employed. Biological and psychological researchers tend to be most interested in the determinants and processes of nonverbal behavior on the individual level. These researchers often endorse the belief that it is necessary to understand the factors governing the behavior of the individual better before studying the complex patterns of social interaction between individuals. Many sociologists and anthropologists, on the other hand, believe that it is more important to focus attention on the nature of social interaction and the social and cultural factors that determine the complex interrelationships and interaction processes occurring between social actors. In this tradition, it is often held that individual behavior is strongly governed by social forces and the dynamics of the interaction situation; according to this view, then, studies of the behavior of isolated individuals are rather useless.

Apart from the different focuses of interest and the underlying epistemological traditions, specific research approaches have dominated in each of these research traditions. Researchers interested in the individual have tended to use experimental methods that allow quantitative analysis of individual behavior and aggregation over individuals and situations. Researchers focusing on the interaction, on the other hand, have preferred the observation of naturally occurring behavior in social interaction, and have often used qualitative techniques to describe moment-to-moment changes in behavior, and structural rather than quantitative description for very short segments of an interaction. However, although such a methodological specialization may have developed to some extent in past research, it is by no means obligatory, nor is it found universally. There are, for example, quite a few researchers interested in the individual who use qualitative moment-to-moment description of naturally occurring behavior, and there are researchers who study interaction processes by way of experimental and quantitative methodology. Just as there is no logical necessity for choosing a particular method given a particular focus of research interest, there is no logical necessity for keeping these two focuses of research interest apart or, worse, for considering them as antithetical. Clearly, both are legitimate and important, and it is hardly possible to make a reasonable judgment about the greater urgency or validity of either one of them.

In this section, we attempt to characterize these different research interests in somewhat more detail, trying to show that they complement rather than contradict each other. In order to understand human social interaction, the biological and psychological determinants of behavior, as well as the cultural and situational norms and rules affecting

interaction processes, have to be taken into account. Unfortunately, the focuses of research on the individual or on the interaction have in the past sometimes been associated with the issue of innate or biologically determined versus learned or culturally determined behavior. There is no necessary link here: human behavior is jointly determined by biological and cultural factors, and it is an empirical issue to determine the nature and strength of the respective influences. The effect of social factors can be studied with the individual as the focus of study, as in the investigation of culturally mediated stereotypical inferences from nonverbal cues. Similarly, biological issues can be studied with the interaction as a major focus, as in the study of mother–infant bonding.

Let us now turn to a more detailed discussion of the main questions that have been asked within the focus on the individual and within the focus on interaction, trying to relate these to the historical research traditions that they grow out of or draw from.

Researchers focusing on the behavior of the individual have generally been interested in three major issues: (1) externalization or expression of traits and states, (2) inferences from nonverbal cues, and (3) intraindividual organization of behavior.

As pointed out previously, the investigation of the externalization or expression of personality, action tendencies, or emotion was one of the earliest research issues in studying nonverbal behavior. This issue has been of both theoretical and practical interest. On the theoretical level, investigations have concerned, in psychology, expressive styles of personality and the expression of emotion and, in ethology, intention signals. On the practical or applied level, the diagnostic value of nonverbal behavior for personality and affect disturbances has been explored. The research strategy employed in these studies has generally consisted of searching for correlations between states and traits, as induced or assessed by some kind of external criterion, and measuring particular types of nonverbal behavior.

The study of inferences from nonverbal behavior cues (attributing traits, states, and intentions to the actor) belongs squarely in the area of person perception and impression formation in social psychology. Unfortunately, much of the person perception research has moved away from the person. Researchers in this field have been preoccupied for decades with studying verbal labels rather than behavioral cues, generating quite a bit of evidence on semantic processing but almost none on impression formation and cue utilization (K. R. Scherer & Scherer, 1981). Most of the relevant research has been conducted recently under the heading of nonverbal communication research. Here the research

strategy consists of exposing observers to stimulus persons displaying various kinds of nonverbal behaviors (often posed) and assessing the inferences observers make from these, sometimes checking the accuracy of the inferences against some kind of external criterion. Unfortunately, this research approach has often not taken advantage of the methodological sophistication – in such areas as deciding what kinds of scales to use, the problem of artifacts, judgment conditions, and so on – that has been attained within the field of person perception (see Rosenthal, Chapter 6).

A third approach with the individual as a focus of research, one that has appeared only recently, is the study of the intraindividual organization of action, including nonverbal behavior. Here an attempt is made to investigate the hierarchical structure in the organization of behavior, including the execution of plans and strategies on different levels and the synchronization of different types of simultaneously occurring motor activities (see von Cranach & Harré, in press).

Studies in which the interaction process is the focus of interest can also be subdivided into three fairly distinct approaches: (1) the nature of the cultural communication code, (2) the coordination of behavior in social interaction, and (3) the study of interpersonal relationships.

The first approach, studying the nature of the cultural communication code, is most closely associated with the work of Birdwhistell. As described in the preceding section, Birdwhistell assumed that nonverbal signals are organized in a culturally shared code similar to the language code. This assumption points toward a research strategy making use of techniques developed for linguistic inquiry. The major aspect of such a research strategy is reliance on a few illustrative cases for investigation of the nature of the code, the assumption being that the elements of the code and their relationships are discrete and invariant and that the analysis of a few instances of usage of the code will be sufficient to unravel its structure (just as ancient languages have been deciphered from the inscriptions on a single tombstone).

The second approach, strongly based on the work of Birdwhistell, is concerned with the microexamination of the moment-to-moment structure of the process of interaction. Here researchers study the way in which interaction partners manage to coordinate their behavior in a complex dancelike pattern. Examples of studies using this approach are Duncan's (1972) work on turn-taking, Condon and Ogston's (1967) study of interactional synchrony, and Kendon's study of greetings (see his detailed discussion in Chapter 8).

The third approach is quite different in that it represents the more

typically psychological approach to the study of interaction. Studies of this kind, which often proceed by manipulating the behavior of one person in the interaction, look for signs that indicate the nature of the relationship of the interaction partners or their respective status. This approach is concerned with the nonverbal marking of relationships, rather than with the nature of the code or the complex coordination of behavior. Examples of this approach are found in many studies on eye contact (Argyle & Dean, 1965; Ellsworth & Ludwig, 1972; Exline & Fehr, Chapter 3) and in work on posture and positions (Mehrabian, 1969, 1972).

To summarize, the distinction between approaches with the individual as focus and those with the interaction as focus is based on differences in scientific interest and perceived research priorities. Some researchers, partly because of their disciplinary origins, are more interested in studying the individual and the factors that determine his or her behavior and consider it important to start studying social behavior by considering the contributions made by the individuals. Others are more interested in social and cultural phenomena and consider the interaction of individuals a more logical place to start studying human behavior. Only very extreme adherents of either approach, however, would question the validity of the other perspective, although there are of course some differences of opinion concerning the usefulness of certain concepts and research approaches.

Thus, clearly, these two focuses of research are complementary rather than contradictory. It is only the complexity of the appropriate research design and the amount of time and expertise needed that deter researchers from studying the individual and the interaction at the same time. It would seem possible, for example, to study how introverts and extroverts coordinate their behavior in different types of social interactions.

Indeed, there have been some attempts to combine the study of the individual and of the interaction in a single research project. Paul Ekman and his collaborators have studied the effect of stress on the communicative behavior of Japanese and American students, both individually and in social interactions, to assess the effect of social rules and situational determinants on communicative behavior (Ekman, 1972). Duncan and Fiske (1977) have looked at variables defining the individual in a context of studying turn-taking behavior and the rules that govern this type of interaction regulation. K. R. Scherer and his collaborators have looked at individual variables and social situational variables that determine the behavior of public officials in dealing with clients, trying to assess both

the effect on individual behavior and the effect on the nature of the interaction as a whole (U. Scherer & Scherer, 1980). Exline and his collaborators have studied Machiavellianism in its effect on nonverbal behavior in deception (see Exline & Fehr, Chapter 3). It is to be expected that future research using either the individual or the interaction as a focus will make increasing use of the findings of the other approach, and it is to be hoped that integrative studies trying to combine the two focuses of interest will increase in number.

It is particularly important to stress that the choice of a particular research focus does not necessarily determine the methodological approach to be used. Though there has been a tendency for the two approaches to prefer different research techniques, as already noted, this is more a historical accident than a logical necessity. On the whole, it may be very detrimental to equate research interest, conceptual preferences, and choice of particular research methodologies with possibly exclusive types of approaches. Unfortunately, this seems to have been the effect of the widely cited distinction between *structural* and *external variable* studies introduced by Duncan in 1969 in an attempt to review the literature on nonverbal communication at that time.

This distinction reified two types of research, which, as we have been trying to show, cannot really be consistently differentiated on any set of dimensions. The distinction between *structural* and *external variable* implies differences in scientific interest, conceptual schemes, disciplinary orientation, fundamental unit of inquiry, preferred methodology, and research priorities. Fundamentally, a researcher's decisions on any of these dimensions are independent of one another. If, as has been the case, there is a clustering of some of these decisions in particular historical research approaches, this may be of interest for a historian of science, but it should not limit the choice of options for research.

It is the purpose of this chapter to consider these methodological options in somewhat more detail. Clearly, the points that will be made cover only a small part of the large number of issues relevant for empirical research in nonverbal behavior (see Weick, 1968). However, many methodological issues are relevant to any kind of empirical study in the social and behavioral sciences and are adequately treated in many existing sources on research methodology in this domain. Here we are selecting for discussion either those issues concerning which there are chronic deficiencies or no established standards in the nonverbal literature or those which are unique to a particular approach or have more than general importance.

For the selection of the appropriate method to be used and as a safeguard against possible artifacts, the nature of the phenomenon to be studied has to be carefully considered. In many studies on nonverbal behavior the phenomenon to be studied consists in the relationship of some nonverbal behavior as a sign to an underlying referent or external variable, that is, in the *coding* of nonverbal signs. The first detailed discussion of the issue of coding of nonverbal behavior was provided by Ekman and Friesen (1969).

Because there are important implications for methodological decisions, we will briefly review the nature of nonverbal coding. The nature of coding, that is, the kind of relationship between sign and referent, can be described by three major dimensions: (1) discrete versus continuous/graded, (2) probabilistic versus invariant, and (3) iconic versus arbitrary (Ekman & Friesen, 1969; Giles, Scherer, & Taylor, 1979; K. R. Scherer, 1977). Verbal signs are generally coded discretely, invariantly, and arbitrarily; that is, a particular word does or does not mean a particular thing, the word always and for everybody means this thing, and the nature of the word does not bear any relationship to the nature of the thing.

Although some nonverbal signs are coded in the same way, others are coded continuously, probabilistically, and iconically. In other words, a nonverbal sign may change with changes in the extent or strength of a referent (e.g., loudness of voice with degree of emphasis); it may mean a particular thing only for certain persons or certain situations (e.g., high voice pitch may indicate stress for some speakers but not for others, and thus there is only a certain probability that it signals stress in any one case); and it is often part of the thing or a homomorphic representation of the thing it signals (as blushing is part of the arousal state it signifies).

Thus the coding of nonverbal behaviors varies from, on the one extreme, languagelike coding to, on the other, very loose probabilistic associations between behaviors and external referents that semiotic purists would refuse to call coding. For example, gestural emblems, movements with precise meanings (see Ekman, 1976; Johnson, Ekman, & Friesen, 1975), are close to language coding in many respects because, although they often are iconically coded, their signification of external referents is invariant and generally discrete. That loudness of the voice is a sign of extroversion only for some speakers in some cultures (see K. R. Scherer, 1979a) indicates, on the other hand, a probabilistic relationship, and voice level may vary continuously with the strength of the extroversion disposition. It is thus debatable whether we can talk of a

code at all in this domain (although it can be argued that this vocal behavior might be used like other elements of communication codes in self-presentation and interaction regulation; see K. R. Scherer, 1979a, pp. 197–201), or only of a statistical correlation.

We do not, at this point, want to discuss the nature of code systems and the requirements under which behaviors qualify as code elements. The preceding discussion was intended to show that nonverbal behaviors differ in their relationships to external referents of which they might be signs. Depending on the nature of this relationship, different research procedures are required for study of the characteristics of the signs and their usage. Obviously, the extent to which nonverbal behaviors are coded like language determines the extent to which classical linguistic techniques, such as the contrastive analysis of consensually defined discrete units in fairly small samples, can be used in their investigation. For example, the intersubjective agreement on the denotative meaning of most words is so high (invariant coding or very high probability of consensual use) that significance testing is superfluous. Of course, this does not mean that statistical methods cannot be used in studying messages that are discretely and invariantly coded. Although the coding may be evident, the *use* of the respective signal (i.e., when shown and by whom) needs to be studied empirically, using statistical techniques. However, the more the coding resembles a statistical association, the more indication there is for standard psychological techniques, relying on operationalized measurement procedures with known reliability and statistical analysis of fairly sizable samples.

Unfortunately, we do not yet well understand the coding characteristics for many nonverbal behaviors, and we are thus faced with the dilemma of having to make choices about research procedures without knowing very much about their appropriateness for the research object. All too often, this dilemma is solved by having recourse to one's theoretical predilections. Thus researchers trained in anthropology or linguistics tend to presuppose that most of the nonverbal behaviors they are dealing with are coded in a languagelike manner and that structural linguistic techniques are appropriate. If the assumption is incorrect, the research results may not be valid. For example, if a researcher isolates what seem to be consensually valid units of nonverbal behavior with a particular signification, without checking on the reliability with which such a distinction can be made, the conclusions of the study will be in error if the behavior is in fact probabilistically coded and the signification

varies with sign encoders and decoders or the situation or setting in which it occurs.

Psychologically trained researchers, on the other hand, tend to lean toward the assumption that there are probabilistic relationships between behaviors and external referents and attempt to determine the nature of the relationship by statistical analysis of a number of cases, often trying to isolate variables by controlling or manipulating factors in experiments. The danger of an unreflective use of this approach consists in the strong possibility of missing important structural relationships between nonverbal behaviors in relation to external referents, because often only one-to-one correlations are studied and other variables or behaviors are controlled by manipulation or exclusion. However, appropriate research designs using multivariate procedures and configurational analyses may alleviate this danger to some extent.

We do not want to imply by these two examples that there is a linguistic and a psychological methodology and that one has to choose between them in studying nonverbal behavior. This is not the case. The options available and the choices to be made are of course much more complex. Apart from different assumptions about the nature of the code and their subsequent effects on choice of research methodology, there are different views in various disciplines of the social and behavioral sciences on the nature of scientific activity and on what constitutes proof for the description and explanation of a phenomenon.

One can distinguish among at least three kinds of research activities: (1) discovery, (2) proof, and (3) illustration. The role of these three is seen very differently in different areas of the social and behavioral sciences. There are those who believe that the work ends with discovery or with illustration. There are others who believe that these are just the first steps and that very different and more demanding activities are required to establish proof. Most researchers subscribing to an empirical, experimental approach believe that discovery is the first step, which has to be followed by proof and eventually by illustration for the dissemination of the findings. Another way to view the difference between traditions is that what is considered proof for some is for others considered only the discovery of a hypothesis still needing proof, or the illustration of a claim not proven. And proof, which is seen as the sine qua non by some, is considered pedestrian reiteration of the already obvious by others.

The methodology and techniques that are most appropriate for discovery, illustration, and proof are rather diverse, and it would seem

reasonable to make the appropriate choice of methodology on the basis of the purpose of the research approach.

1.3. Sampling nonverbal behavior

Scientific research, including the study of nonverbal behavior, always requires sampling of the object to be studied. Only a limited number of people can be studied in a limited number of settings, and we can observe only a small part of their behavior. Thus the researcher has to make a large number of decisions about the sampling of the behavior that he intends to study, such as *where* to study the behavior (for example, in the field or the laboratory), *which behavior* to study (i.e., natural or arranged behavior), *who* ought to be observed (that is, which persons and how many of them), *how* the observation is to be conducted (for example, direct observation or recording of the behavior), for *how long* these persons will be observed, and finally *which aspects* of the behavior are to be noted. In this section we shall consider some of the issues involved in making these decisions.

Field versus laboratory

The term *field* is used by social scientists to refer to the typical settings of human behavior, such as living rooms, schools, public places, and a myriad of other social settings in which our daily behavior is situated. The field is any setting that is not a laboratory. Although it is possible to simulate some of the major aspects of social settings in the laboratory, these re-creations never completely approximate real-life settings. Thus, if there is no need to observe in the laboratory, one should study nonverbal behavior in the field. In many cases, however, it is necessary to use the laboratory. Whenever the coding characteristics of the nonverbal behavior studies are probabilistic and continuous, and statistical analysis techniques are required, a certain degree of control of the relevant variables and of comparability of the conditions under which the behavior unfolds is desirable. Furthermore, if film or video records are required for microscopic measurement or if very high quality audio records have to be made for acoustic analysis, the technical facilities available only in laboratories need to be employed (particularly when several cameras are to be used, recorders synchronized, separate audio records made, etc.; see Wallbott, Technical Appendix). Similarly, the laboratory approach has to be used for studies in which instruments for the direct measurement of particular aspects of nonverbal behavior

(such as transducers, floor switches, etc.; see Rosenfeld, Chapter 5) are to be used (although it is sometimes possible to use sophisticated recording instrumentation in the field, too).

Whether behavior is to be sampled in the field or the laboratory depends on the issue and the type of nonverbal behavior to be studied as well as the nature of the data desired. Both offer advantages and disadvantages (see Exline & Fehr, Section 3.2). If little is known about the nonverbal behavior of interest, it is advisable to start a research project with field observations to obtain a feeling for the characteristics of the behavior and the factors that might influence it. After such information has been obtained, it is more easily possible to devise a representative research design for behavior sampling in the laboratory.

Clearly, not all settings, situations, or interaction patterns can be simulated in the laboratory. Political rallies, religious ceremonies, and weddings, among many other cases, have to be observed in the field. Again, the choice between laboratory and field depends on the interest of the researcher and the nature of the question to be asked. Given the constraints of both settings, concessions and compromises have to be made for usefulness and appropriateness.

Naturally occurring versus arranged behavior

Unfortunately, the choice between field and laboratory is often confused with the distinction between natural and artificial behavior. This is misleading. Nobody wishes to study the artificial, and it goes without saying that researchers studying behavior in the laboratory do not agree that their object of study is artificial behavior. Artificiality is always a problem in behavioral research and is just as likely to be found in the field as in the laboratory.

In a laboratory, people do not behave as they would in their living rooms, but then, they do not behave in their living rooms as they would in a bus, a church, or an office. Many behavior patterns and interactions between strangers are as natural in a laboratory as in any other unfamiliar formal setting. The only exception would be a situation in which subjects tend to be suspicious of everything and everyone around them out of fear of deception and nonacceptance of the roles in which others present themselves. This is often the case with psychology students, who have a long history of participation in complicated experiments in which things never were what they seemed. Fortunately, this is not true for all people whose behavior can be studied in a laboratory.

One precondition for the occurrence of "natural" behavior is that the task characteristics and the situational demands be such that natural behavior, in the sense of being appropriate to these demands, is functional in that context. If a person is required to do things that seem foolish or irrelevant to that person's life, unnatural behavior will result. If the task characteristics and the demands made are highly realistic and involving, as in simulated jury discussions, for example, or if subjects are required to perform an activity that they are engaged in day after day, as in simulating client contacts with civil service officials (U. Scherer & Scherer, 1980), the resulting behavior will be natural both in comparability with real-life behavior patterns and in affective involvement. Thus the distinction is not between natural and artificial behavior but between naturally occurring and arranged behavior, by which we mean behavior in the occurrence and possibly in the unfolding of which the researcher has had a hand.

One source of artificiality in many studies in which the interaction is arranged is that the situation is totally ahistorical. Typically there is no shared past experience between the participants in an arranged interaction, and there is little likelihood of any future interaction once the experiment is over. It is possible, however, to arrange an interaction in a laboratory that eliminates these problems. For example, friends or couples may be studied, or even people previously unacquainted if they can be expected to interact with each other. Another source of artificiality in many arranged situations is that they have little relevance to the subject, quite apart from the participants' unfamiliarity with one another. Again, a laboratory experiment may be arranged so that it is relevant to the career, values, or goals of the participant.

One of the problems with the sampling of naturally occurring behavior is the difficulty of obtaining repeated instances of the same type of behavior in a comparable context. Another problem is the lack of control over the factors determining the occurrence and the particular characteristics of particular behavior, such as aspects of the physical environment, the identity and behavior of significant others, and so on. Unfortunately, both of these aspects of behavior sampling are essential for the systematic study of particular issues, as, for example, the correspondence between a wide range of parameter values in the behavioral signs and differences in degree or strength of underlying external referents (e.g., emotional states) or the nature of the inference processes based on different types of nonverbal cues. In many such research situations, sampling of arranged behavior has to be used to obtain the appropriate evidence.

The study of behavior that has in some way been arranged by the observer has many advantages. Not only does it allow study of samples of behavior that may only rarely occur naturally, but the researcher can also arrange the behavior repeatedly to obtain replications of the findings. In addition, the observation or recording conditions of the behavior can be better controlled, and the researcher can attempt to guard against observer bias. Furthermore, it is often feasible to manipulate specific aspects of the setting and thus obtain a better idea of how different factors interact with each other in determining the behavior of the persons studied. One must always be careful to avoid artificiality and to question whether the results can be generalized. However, the same cautions often apply equally to those studies of naturally occurring behavior in which the person or persons observed realize that they are being scrutinized. Similarly, it is not usually possible to generalize from one piece of behavior observed under "natural" conditions to other behaviors of the same person or other persons even in the same situation, unless one has sampled very many such behaviors.

The literature on nonverbal behavior abounds with examples of different techniques for arranging behavior: role playing, the showing of films, the administration of electroshocks, the manipulation of the behavior of interaction partners (confederates), the use of professional or amateur actors, and many others.

Behavior patterns can be induced by the researcher through a wide variety of means. He or she can, for example, ask the subject to perform a certain task, such as wrapping a perambulator, solving arithmetic problems, describing a dirty movie, or occupying a table in the library. The behavioral reactions to each of these tasks enjoin a number of nonverbal behaviors, which may include those of interest to the researcher. Furthermore, the researcher can produce in the subjects a certain state, such as a particular emotion (e.g., via stimuli, insults, etc.) or a particular motivation (e.g., by food deprivation, exposure to a flirtatious member of the other sex, etc.), and observe the resulting behavioral reactions. In many cases these induced behaviors are "natural"; they are just not "naturally occurring." These methods are among the most powerful techniques available for behavior sampling. They allow the researcher control over the persons to be observed, many of the factors that determine the behavior, and often, the context in which the action takes place. As long as the tasks set for the subjects or the methods used to induce states of various sorts are realistic and part of the subjects' repertoire, there is little reason to expect that the behavior will be artificial.

Any kind of observation of behavior will lead to changes in that behavior; in many cases even the possibility of observation will produce such changes. Even field observation of naturally occurring behavior, with the naked eye or a camera (see Wallbott, Section A.6), can have an intrusive effect on the persons observed and often will change their behavior. There are a number of studies showing that behavior differs if the subject knows that he or she is being observed (see the studies reviewed in Ekman & Oster, 1979). Increased concern with the ethics of observing or recording behavior without the consent of the observed brings with it the risk that only self-conscious behavior will be studied. This is always a problem in arranged behavior sampling, because subjects know that they are in a contrived situation; but asking for consent to record may make it worse. In naturally occurring behavior in familiar surroundings, observation or even recording generally would be very unusual, and asking for consent could be even more intrusive than in a laboratory. In many cases institutions concerned with human subjects' rights will accept a procedure in which observation or recording occurs without knowledge of the observed and consent is obtained afterwards (with records destroyed if agreement is denied). At the very least, the recording instruments should be concealed to reduce their salience, even if their presence is revealed to those observed.

There are two major dimensions involved in arranging behavior: the requests made of the person whose behavior is to be studied and the manipulation of the situation by the researcher. The researcher can, in making requests, explicitly specify a role for the person studied, that is, either emphasize one of the person's roles out of his or her role repertoire, for example, that of a husband or wife, or ask the subject to play a role that is not a normal one, for example, that of a police officer. Alternatively, the researcher can leave the role implicit, assuming that the person studied will adopt a role appropriate to the situation. Secondly, the researcher can explicitly specify a specific task, such as solving a puzzle, playing a game, or posing a specific affect; or the task can be left implicit, defined by the situation, such as waiting for an experiment to begin or a partner to arrive.

As far as the manipulation of the situation goes, a researcher can administer a specific external stimulus, such as showing a film, administering electroshocks, or manipulating the temperature in a room. Secondly, the context or setting in which the behavior is to take place can be changed. This often involves the suggestion of a particular definition of the situation; for example, it may be implied that a person is

competing with another person or group, that his or her behavior is being monitored by experts, or something similar. Thirdly, in situations involving an interaction, the researcher can manipulate the nature of the subject's behavior by using a stooge or a confederate who has been briefed about the behavior to adopt in the interaction. Situations in which this manipulation is used vary from the use of interviewers with prearranged interview schedules to the use of confederates whose task it is to anger the subject under observation.

We cannot consider all the techniques that have been used to arrange behavior in research on nonverbal behavior. We will concentrate here on some particularly important ones, discussing issues relevant to reducing artificiality.

One of the most frequent techniques of arranging behavior is the use in an interaction of a confederate or collaborator of the researcher. This technique has been a frequent one in experimental investigations of nonverbal behavior in which researchers have attempted to induce a certain behavior or to observe the reaction of the subject in response to the preprogrammed behavior of the confederate. In this case it is not possible to study interactive effects as they might actually occur. Even if one is exclusively interested in the behavior of the subject, one cannot exclude the possibility of artifacts. For example, the subject's behavior may be unusual in part because he is responding to someone who follows a fixed schedule. In looking at standardized interviews with psychiatric patients one is impressed by how often the patients' reactions are determined by the need to switch topics abruptly, because that is what the schedule calls for. Thus standardized interviews may distort the picture of psychopathological syndromes and not even represent the usual clinical interview.

Although the interaction in this case is not "natural," in the sense that the behavioral choices of one participant are preplanned and at least partly independent of the actions of his partner, there is no reason to assume that the behavior of the person studied is always "unnatural," unless one has reason to suspect that that person is aware of the manipulation. In some cases, the subject can even be told that he is dealing with a confederate in a simulation, as long as the task requirements are such that the subject is forced to react in an appropriate, serious manner. For example, U. Scherer and Scherer (1980) used lay actors as "standard clients" (allowing the manipulation of social class and aggressive vs. submissive behavior) in interactions with public officials. The behavioral reactions (and the subjective evaluation) of the

subjects showed that the demands of the task and the situation generally were such that they had to use their standard behavioral repertoire for that situation in order to appear competent.

Such experimental simulations should not be confused with role playing. In role playing nothing is at stake and subjects are generally asked just to portray a particular person or role. In experimental simulations, the person plays himself, and if the situation is properly arranged, his competence and his self-esteem are at stake; he cannot afford not to treat this as a real situation and make use of all his skills to establish his competence as an actor in the interaction. Again, we do not want to claim that such experimental simulations are exactly like naturally occurring behavior in all aspects. There may indeed be differences in the nature or strength of the behavioral reactions, but as noted before, such effects can never be excluded when the person observed is aware of the observation. On the other hand, using confederates in experimental simulations provides the researcher with a very powerful technique for repeatedly producing particular types of behavior in response to situational factors controlled within an experimental design. Many studies on nonverbal communication are almost impossible to conduct without using this technique (see Exline & Fehr, Section 3.3).

Another type of arranged behavior that has been frequently used is posing and playacting. This technique is generally used in studies of inference processes from nonverbal cues, where the researcher needs some control over and some range of parameters or cues – a control and range that are impossible to obtain from the recording of naturally occurring behavior. This has been a particular problem in the area of emotional expression. The open expression of emotion is regulated by culturally determined display rules (Ekman, 1972), and most societies do not allow the expression of very strong emotions in public (quite apart from the ethical problem involved in recording such expressions). Therefore, posing by professional or lay actors has often been used in the study of the recognition of emotion from nonverbal cues. For a more detailed discussion of the advantages and disadvantages of this approach see Ekman, Friesen, and Ellsworth (1972, pp. 35–38) and K. R. Scherer (1981). These discussions show that there are research issues that cannot be studied appropriately without the use of posing. However, as with the use of confederates, there are more or less sophisticated ways of using this technique. In posing, greater artificiality is to be expected if actors are simply asked to "show fear" than if they are asked to act out a small scenario in which they can identify with particular

persons and particular affects. In some cases, depending on the research issue, posers can be given very precise instructions, based on findings from naturally occurring behavior, about the behavioral cues they are supposed to produce. For example, the Facial Action Coding System (see Ekman, Chapter 2) can be used to specify the facial actions to be produced for a study of emotion inference from systematically varied facial cues.

Unfortunately, researchers often choose a particular technique without carefully considering its pros and cons. The issues raised here may help to render the basic decisions involved in the choice of a particular technique more salient. In very many procedures the requests made of the person whose behavior is arranged are left implicit. Though this procedure has the advantage that behavior is less constrained by the investigator's demands, it has the disadvantage that different persons may construct or perceive their roles and tasks very differently. Obviously, this will render a comparison of the behavior observed very difficult. If roles and tasks are left unspecified, it is necessary to ask the person observed, after the observation, how he or she defined the situation and which reference or standard was used in deciding on a specific role or task perception. Furthermore, it is essential to establish the extent to which explicit roles or tasks specified are comparable and compatible with roles or tasks normally encountered by the person observed. Clearly, it would be very important for the evaluation of the behavior observed if the role that has been requested is one which the confederate has never played before and with which he or she may have had very little experience.

Sampling persons

In the best of all possible worlds in which to investigate research questions, one would like to be able to look at as many people as possible in as many settings as possible, to examine as many different aspects of the nonverbal behavior as possible, and to look at as many of these behaviors as occur within the setting. However, practical constraints usually require that we compromise on many aspects of the sampling issue. The nature of the compromise, that is, the decision about which requirements have to be sacrificed to the limited time and resources available, should depend upon at least two considerations: (1) the question being asked and (2) the generalization being sought. For example, is one trying to answer a question for all persons or just for a particular type of person? Is one trying to answer a question that is

independent of settings or one that varies with types of settings? Is one trying to answer a question that cuts across several modalities of behavior, concerning, for example, the organization of different nonverbal behaviors, or is the question specific to a particular type of nonverbal behavior?

A further consideration in sampling concerns the purpose of a particular research project. Sampling considerations will be very different if one is concerned with discovery from what they will be if one attempts to provide proof for a phenomenon discovered in just a small sample. If one is interested in discovery, one is often willing to economize on the number of subjects and often even on the number of settings in order to look at as many modalities of behavior as possible and to observe as much behavior as possible within a particular setting or interaction. Thus the various aspects of sampling are clearly interrelated and dependent upon the purpose of the research project. This interdependence should be kept in mind during our discussion of the particular dimensions. We will first deal with the choice of the type of person to be studied.

In some cases, for example, if one is interested in discovering the basic rules of nonverbal communication, one has little basis for specifying which persons ought to be observed. At the opposite extreme, one can have questions so precise that it is quite easy to specify very narrowly which persons ought to be observed. For example, if the nonverbal behavior of babies of a particular age is to be studied, the group of persons constituting the population for sampling is quite well defined. Thus the choice of the persons to be studied is often inherent in the research issue – a study of mother–infant interaction or kindergarten play, for example, or the diagnosis of depression. In such cases, the major problem usually is to obtain access to the group of persons one is interested in observing. In some cases, however, problems may occur because the group to be studied is not well defined or is less homogeneous than one thought. For example, much of the research on the nonverbal behavior of schizophrenics suffers from the fact that this diagnosis covers an enormous number of different psychopathological syndromes (as well as etiological factors), a situation that vitiates any attempt to treat "schizophrenics" as a homogeneous group and dashes hopes to find consistent nonverbal behavior patterns (K. R. Scherer, 1979b). Thus, if the research issue demands a particular type of actors, one has to be very careful to assure that the group studied does indeed exhibit the characteristics that are theoretically important.

There are two kinds of generalization issues involved here. First, one needs to have reasonable certainty that one is in fact looking at the

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population that is to be studied. In this case, the question is whether one can generalize from the persons sampled to that particular subgroup of persons. In many cases this is not automatically the case. Though the example of psychopathological patients is a particularly difficult one, given the many problems in defining diagnostic groups, the issue is equally problematic with other groups of persons that cannot be easily defined on the basis of objective characteristics such as age or sex. It is quite difficult, for example, to generalize from a small sample of persons observed to social class, occupational group, or some other socially defined type.

The second generalization issue concerns generalizing from the sample observed to the population as a whole. Although many researchers acknowledge that they are studying a specific group of persons, they often seem to assume implicitly that generalization to the population as a whole is possible. For example, in the history of nonverbal communication research the clinical interview has played a major role. Often interactions between therapists and psychologically disturbed patients have been studied with the implication that the findings can be generalized to the general population. It is possible, however, that the clinical interview is a very specific kind of interaction with rules of its own and that it is not possible to generalize from the nonverbal behavior of disturbed persons to the nonverbal behavior of "normals." If one is interested in applying one's results to the general population to illustrate basic patterns of nonverbal behavior, it seems to be necessary to sample at least two different subgroups.

If the type of nonverbal behavior under study can be profitably investigated with any kind of person, the issue of easy availability and easy access becomes central. Often, the natural choice for researchers in university settings is college students, particularly if they have to serve as subjects to obtain course credit. Although college students constitute a somewhat limited population, this would not in itself present a problem, were it not for the fact that many students, particularly in psychology, are often experiment-wise and more prone than others to be affected by demand characteristics (Orne, 1962) or experimenter expectancy (Rosenthal, 1966) in unpredictable ways. Thus researchers have to be unusually careful to avoid such artifacts when dealing with students, although the wide distribution of popular body language books may present a severe problem for demand characteristics with any type of subject population, if the purpose of the investigation is known.

An investigator who takes advantage of the easy availability of college students should try to study at least one population of nonstudents,

even if it is only a very small subset, to check on the possibility of artifacts and/or sample specificity. The choice of this second sample is determined by many different considerations. Obviously, if one does not want to generalize to the population as a whole, but only to young people, one would be content with a second group of young persons who happen not to be enrolled in a university. However, if one wants to generalize to the population at large, it might be advisable to choose a second sample that is extremely different, for example, middle-aged convicts.

Obviously, the more one believes that the phenomenon under study is a very basic one that should not be affected by many social and individual factors, the more extreme should be the comparison samples. In some cases, it is necessary to choose a very highly specialized group to make this point. For example, in attempting to show that many of the basic processes in the facial expression of emotion are innate, Ekman and his collaborators had to study isolated New Guineans to make the point (Ekman, Sorensen, & Friesen, 1969). Thus the type of phenomenon to be demonstrated and the kind of generalization that the researcher attempts to make have a very strong impact on the decisions concerning sampling. Of course, given the many different types of groups in any society, it is never safe to generalize to the entire population, even if several groups have been observed. However, a sample of two groups is a vast improvement over a sample of one.

Apart from the type of person to be studied, it is important to decide on the number of persons whose behavior is to be observed. Given that the analysis of human behavior is a very time-consuming task, many researchers in the area of nonverbal communication have been content with rather few cases, in some studies with a single case. This is very problematical, however, because, particularly in a single case, there is no way to determine to what extent the behavior patterns found are a function of the characteristics of that particular person. The assumption that behavior patterns that follow well-defined social or cultural rules can be observed even in a single case is valid only if the existence of such strong cultural patterns has been established before. For most phenomena this is not the case. Consequently, a minimum of two persons should be studied, even if the researcher is convinced that he or she is dealing with very universal phenomena, to check the extent to which the behavior is determined by the individual characteristics of a particular person.

Similarly, if one attempts to determine differences between types of persons observed, such as differences between males and females, one

needs at least two cases of each type to see whether there are smaller variations within types than between types. It would be desirable to have many more subjects for statistical analysis, in which the sources of variation could be determined more precisely. This may be impossible in cases where a particular type of interaction or a particular type of individual is difficult to observe in great numbers or in which the analysis is so time-consuming that it cannot be conducted for a large number of persons. But though it is only rarely acceptable to use single case studies for any kind of generalization, they may be very valuable in initial approaches to particular phenomena and in an attempt to develop hypotheses to be tested later. Furthermore, it is extremely useful to observe a single individual frequently and over a long period of time, to get a more complete sampling of the behavior in context than is normally possible in studies employing a large number of subjects. Yet a single case study is not sufficient to establish the existence of a particular phenomenon or relationship. Unfortunately, many of the phenomena studied in nonverbal behavior research have shown rather large individual differences; not very many have been robust enough to survive the sampling variation produced by individual differences.

Obviously, the more probabilistic the coding of the nonverbal behavior, the more important it is to observe a fairly large number of encoders. Here it is advisable to use a group of encoders with fairly homogeneous characteristics, as otherwise it is impossible to determine, in the case of negative results, whether there is no relationship or whether it is dependent on the type of person. Even if the results are positive, they may be dependent on the particular encoder. Just how homogeneous such groups of encoders should be is difficult to say. Often the researcher has to use prior knowledge or intuition about individual differences to make the decision. For example, if there is good evidence for strong sex differences in a particular nonverbal behavior, it is advisable to limit the study to members of one sex or, if feasible, to include several members of each sex. If the researcher is unable to keep a group of subjects nicely balanced in essential characteristics, he or she should at least attempt, through questionnaires, to assess some of the major characteristics, such as age, education, geographical origin, social class, and, possibly, personality, to be able to check in at least a rudimentary way whether these factors may have made a difference. At times, the outcome of such checks allows a better understanding of the pattern of findings (or lack thereof) and suggests hypotheses for further study (see K. R. Scherer, 1972).

Although more difficult, it is not impossible to find fairly homoge-

neous groups of persons that can be studied outside colleges. Possibilities include the use of church and community groups, participants in adult education centers, and members of organizations and institutions.

The nature of behavior sampling

On the pages to follow we will deal with a number of decisions concerning particular aspects of sampling behavior and the procedures used in securing such behavior samples out of a stream of behavior over time in social contexts.

Sampling the individual versus the interaction. Obviously, if the individual is studied in a situation where he or she is alone, only the behavior of that individual person can be sampled. Similarly, when the purpose of the research is to study patterns of interaction, two or more individuals will have to be sampled. However, if the focus of interest is the individual and the factors that determine his or her behavior in an interaction, it becomes crucial to decide whether the behavior of that individual alone ought to be sampled or whether it is necessary also to sample the behavior of an interaction partner.

Clearly, this problem can be decided only on the basis of the specific question asked. If the effects of factors totally independent of the interaction partner or the interaction situation as a whole are to be assessed (e.g., the effects of drugs on behavior), it would seem to be sufficient to focus just on the behavior of the individual. However, in most cases, it is difficult to exclude the effect of the behavior of the interaction partner or partners when assessing the determinants of an individual's behavior. Consequently, in most cases where interactive behavior is observed, it is necessary to sample the behavior of all the persons interacting, even if the focus of interest is on one individual. If confederates are used, it is advisable to employ more than one, to be certain that the results are not specific to the effect of one particular person. In some cases, the reason for this is simply to check on the success of a particular manipulation in the experiment. For example, often a confederate or interviewer has been programmed by the investigator to behave in a certain way. In these cases, it is necessary to sample the behavior of the confederate to establish whether the instructions are being followed, as well as to check how the behavior of the subject affects the behavior of the confederate.

Technical problems become almost insurmountable if more than two persons are to be observed or recorded simultaneously, if many modal-

ities are to be investigated, or if close-up recordings are required. Most studies in which the behavior of more than one person was sampled have been conducted with dyads. Clearly, in studies in which the interaction is the focus of research, it is essential that all participants of the interaction be included in the behavior sampling. If exact temporal correspondence between the behavior patterns of two or more actors is to be investigated, fairly elaborate precautions have to be taken to make sure that the behavioral records and possibly the audiovisual recordings are well synchronized. This question becomes particularly important if audiovisual recording is used to sample behavior (see Wallbott, Technical Appendix).

Direct observation versus audiovisual recording. This choice is of major importance for research design and procedure, because a decision to record often has many implications for the approach to be taken. As mentioned earlier, the technical requirements for adequate recording (see Wallbott, Technical Appendix) are fairly obtrusive, and unless at least some aspects of the recording procedure can be hidden from the subject's view, the researcher has to count on some change in the behavior observed, owing to the subject's reaction to being recorded. Furthermore, both the physical setting and the temporal structure of an interaction have to be accommodated to the technical constraints of the recording. Last, though not least, recording is expensive, both in the equipment required and in the tape and/or film material used.

Despite these disadvantages, audiovisual recording of behavior is becoming more and more frequent in the analysis of nonverbal behavior. There are many important advantages: the possibility of replaying and observing a sequence of behavior over and over, of viewing the behavior in slow motion, of doing microscopic frame-by-frame analysis, of using the material for judgment studies, and many others. Another advantage of obtaining a permanent record is that it is possible to measure, through repeated passes, many more aspects of behavior than can possibly be measured in the one real-time pass possible when no record is obtained.

Because of these advantages of recording behavior, direct observation is preferable only if recording is too costly, if it would be too obtrusive in a natural setting, or if the features or categories of behavior to be observed are very simple and are unlikely to be changed in the course of the research. There are such situations, and in them researchers should forgo recordings. They should realize, however, that in direct observation much more stringent demands need to be made on careful

reliability checks of the coders or observers, because the scores cannot be checked again later.

In this chapter, the issue of direct observation versus audiovisual recording can be discussed only very briefly. Given the importance of the issue, the reader is referred to the literature on observational methods (Sackett, 1978; Weick, 1968), as well as to the discussion of specific problems in observation and recording in the individual chapters of this volume (Ekman, Chapter 2; Exline & Fehr, Chapter 3; Kendon, Chapter 8; Rosenfeld, Chapter 5; Scherer, Chapter 4; Wallbott, Technical Appendix).

Single versus repeated sampling. In almost all of the existing studies of nonverbal behavior, encoders have been observed on only one occasion and in only one situational context, the assumption being that the use of nonverbal signals will not differ depending on situational characteristics or the identity of the interaction partners. This assumption may be quite wrong, of course. We do know that even speech patterns change rather noticeably depending on situational context (Brown & Fraser, 1979), and it would be quite surprising if this were not the case for the much less stringently coded nonverbal signals. It seems reasonable to assume that the more probabilistic the relationship between a nonverbal behavior and an external referent is, the more situation dependent it might be. In the civil servant study mentioned earlier (U. Scherer & Scherer, 1980), the officials had to deal with two different cases (differing in the amount of power the official could wield) involving two different clients. Results showed different relationships between personality and attitudes and nonverbal behavior for each of the cases, indicating that personality dispositions and attitudes may differentially determine the nonverbal behavior patterns shown under different situational constraints.

Clearly, it would be most desirable to sample behavior repeatedly from the same person, both in similar situations and in different situations, with the same interaction partners at different times and with different partners. Such behavior sampling procedures are both more complex and more demanding of time and money than the single case studies that dominate the field. Yet it is difficult to see how one can confidently assume that the coding and usage patterns found in a single behavioral sample are indeed independent of the situation and the interaction partner.

Single-culture studies versus cross-cultural comparison. Most of the studies in the field have been conducted not only on single cases, but also in a single culture. Although most of these studies have been conducted only in the United States, the authors of textbooks and review chapters

usually do not bother to note that the results reported may be culture-specific and that the relationships between nonverbal behavior and external referents might be very different in other cultures. If all or even most nonverbal behavior were to be strongly biologically determined, as the basis for the expression of emotion seems to be (Ekman, 1972), this might not be of great consequence. But even in emotional expression, strong cultural differences in display rules have been found (Ekman, 1972), which render generalizations of findings across cultures rather dubious. In some of the studies that have included cross-cultural comparison, very different patterns of results have emerged for the cultures investigated (see Key, 1977, pp. 138–139). A more extensive discussion of this issue cannot be offered at this point. However, we feel strongly that it is necessary to devote more effort to cross-cultural comparison in order to understand better the effect of cultural factors on nonverbal behavior and the significance of such behavior in communication.

Whereas the importance of cross-cultural assessment of nonverbal behavior is only rarely alluded to in studies on nonverbal behavior, there is more frequent concern with the importance of ethnic group or race and gender (see Harper, Wiens, & Matarazzo, 1978; Key, 1977). Clearly, there are other intracultural factors that urgently require more systematic study, such as differences between social classes, ages, or occupations. It is to be expected that our knowledge of nonverbal behavior would be greatly advanced if researchers would turn toward a more complete sampling of the social and cultural contexts in which to observe nonverbal behavior. Similarly, anthropological and ethnographical studies should be considered more frequently in planning research on nonverbal behavior. Finally, apart from the comparison of different social and cultural settings for human behavior, a comparative approach studying similarities and differences in the nonverbal behavior patterns in animals and humans may also highlight the functions of nonverbal behavior revealingly (K. R. Scherer, 1981).

Exhaustive versus selective sampling. One can either observe or record an entire interaction or select certain excerpts. Very often this decision depends on the length as well as on the nature of the behavior being sampled. If out of a lengthy behavior sequence only one particular time frame is important for the analysis – for example, the verdict in a jury trial – it is obviously sufficient to record just this segment of the interaction. The situations in which the behavior sequences of interest are so clearly identifiable are very rare, however. Often a researcher may be able to decide only after many repeated viewings of the behavior

sequence which parts of that sequence are relevant for his or her question.

If it is impossible to record the total interaction or behavior sequence because of practical considerations, selective samples are drawn. The two most frequently used techniques are (1) the sampling of representative segments of the interaction (e.g., taking 5-minute sequences from the beginning, middle, and end), and (2) fixed-interval sampling (e.g., observing or recording a minute of behavior at 5-minute intervals). Both the choice of appropriate sampling procedures and the decisions on sampling intervals and observation periods depend on a large number of theoretical and practical issues, such as the frequency of occurrence of the behaviors studied, their duration, and so on (see detailed discussion in Fagen & Young, 1978; Sackett, 1978). Such selective samples are often drawn for the analysis, even if the entire interaction has been recorded, because an analysis of very lengthy behavior samples is too costly and time-consuming if elaborate microscopic analysis procedures are used.

One of the basic issues is the decision whether to pick naturally defined units like openings and closings, greetings, departures, interruptions, and the like or to use arbitrary time samples, such as every fifth minute of the interaction. If arbitrary time samples are used, there is little or no ambiguity about the selection procedure or the definition of the units, because they are defined by the objective parameter time. With this procedure, however, natural social units of behavior are in danger of being fragmented; the researcher is prevented from following a complete pattern of behavioral events and hence from understanding the relationships between different behavior patterns over time. The use of naturally occurring units has the advantage of avoiding such fragmentation but the disadvantage of having to reach agreement on the operation for determining beginning and ending of these natural events, which may be difficult to attain. Furthermore, the length of the samples may differ sizably across interactions.

Both of these procedures have the problem of comparability, that is, of establishing whether one is looking at the same or at different types of time periods or units across persons and interactions. Great care has to be taken in defining such units to make sure that there is reason to believe that the behavior patterns under study will reliably occur within sampling units chosen across individuals and across different settings.

Complete versus partial behavior sampling. Sometimes researchers are interested only in one aspect of the total nonverbal behavior pattern, such as gaze, facial expressions, or vocal behavior. They then have the

option of observing or recording only this particular aspect of the nonverbal behavior. In many cases the decision to restrict sampling to a particular behavior pattern or modality has been simply a matter of convenience resulting from restrictions of apparatus, technique, or time. The problem of isolating particular aspects of behavior or modalities of behavior out of an integrative whole has only rarely been considered. This is unfortunate, because such isolation precludes an analysis of the relationships between different aspects of nonverbal behavior. On the other hand, if audiovisual recording is used, it is often very difficult to record adequately all the different aspects of nonverbal behavior with as much detail as the analysis requires (e.g., obtaining close-ups of the face, adjusting the camera angle to allow determination of gaze, etc.). Yet it may be desirable to record behavior as completely as possible (within reason), even if it is unclear at the time of the recording whether all aspects sampled can be analyzed later.

If one decides to divide up behavior, either because only some behaviors will be measured, or because observers will be used to compare judgments based on different sources, how should one proceed? Usually the choice has fallen on the end organs involved in producing the behavior, for example, hands, legs, body, face, or speech. Alternatives would be to focus on the central mechanisms that produce the end-organ behavior, or the mechanisms involved in the perceiver. Take two examples: one, judgment; the other, measurement. If one is interested in measuring emphasis movements, why study just the hands? The head, the voice, the facial muscles can all similarly produce emphasis. In all likelihood the same central neural mechanism sends out emphasis signals to various end organs. If one is interested in studying how observers process verbal and nonverbal behavior, one might divide channels according to whether the right or the left hemisphere of the brain handles the information, rather than concentrate on the verbal–face–body interaction, because within both the verbal domain and the face there are probably highly symbolic left-hemisphere-processed items and analogic right-hemisphere-processed items.

1.4. Measuring nonverbal behavior

After the researcher has decided how to sample the behavior, he or she has to decide which aspects of the nonverbal behavior are to be measured and which measurement procedures are to be used. In the case of direct observation, observers have to be given checklists that they can use to record the occurrence of specific behavior patterns, or

instruments (such as event recorders) to codify the occurrence and duration of various behavior patterns. If nonverbal behavior has been recorded on film or magnetic tape, a larger set of options for measurement procedures is available, because measurements of various types can be performed during repeated passes through the material and because there is the possibility of slow motion and frame-by-frame analysis of visual records and acoustic analysis of auditory records. This section describes some of the basic options for measurement procedures; details and examples are discussed in subsequent chapters.

The choice of particular measurement procedures mainly depends on the phenomena to be investigated. In some cases, these may be difficult to observe because they are internal to the organism; examples are anatomic, chemical, or electrical phenomena (e.g., movement of a muscle). In such cases, measurement procedures must either directly assess these internal phenomena, as through physiological recordings, or utilize outward indicators of them. In most cases, however, researchers are interested in the consequences of such underlying phenomena for the visible or audible behavior of the person. The nature of the measurement systems to be used to isolate and measure the respective variables describing the nonverbal behavior under study are hotly debated in nonverbal behavior research. Some of the options available for study and analysis of nonverbal behavior are discussed here.

The major distinction is between descriptive approaches and inferential approaches (allowing for a mixed category that contains some elements of both). What we mean by descriptive approaches are attempts to capture particular aspects of behavior patterns by using transcription or category systems that describe the spatiotemporal characteristics of particular movements. Inferential approaches, on the other hand, go beyond the description of behavior patterns in time and space by using functional or motivational criteria to provide a categorization or typification of particular behavior patterns. Thus descriptive approaches attempt to use very objective techniques that do not require an observer's inference about the function and purpose of a particular behavior pattern, in terms either of the actor's intention or of the social function of a behavior (see also Ekman, Section 2.5).

Furthermore, the techniques available for the measurement of nonverbal behavior are differentiated by whether they are (1) highly microscopic, precise, and highly differentiated – that is, capable of making very fine distinctions between various aspects of the behavior observed and looking at very fine grained changes in the behavior – or (2) more macroscopic or global, identifying only fairly large-scale

phenomena. Clearly, the use of a microscopic differentiated system has the advantage of providing a very fine resolution and allowing an empirical basis for the later procedure of collapsing categories into more integrative ones. It has the disadvantage, however, of being very cumbersome, and it presents the danger of losing particular phenomena because of too atomistic an approach. A more macroscopic system has the advantage of being more economical and providing a better relationship between the signal and the function of a behavior pattern, but it presents the problem that important clues might be missed, and it is virtually impossible (except for a reanalysis at very high cost) to decompose macroscopic categories into more fine grained items.

Finally, measurement systems can be differentiated according to their comprehensiveness or selectivity. It is claimed that some measurement systems will accommodate any kind of behavior that occurs within the general stream of behavior. In other systems, coverage is restricted to just some items or patterns of behavior, selected out of the stream of behavior for recording. In many cases, it is problematic to postulate that a system is comprehensive unless all anatomic possibilities for motor behavior are taken into account (see Rosenfeld, Chapter 5). Selective systems, on the other hand, have the disadvantage that often the selection may be not a reasoned one but one based on opportunism or convenience. As we go on now to consider the advantages and disadvantages of some particular measurement techniques illustrating these dimensions, it should be kept in mind that machines and observers always operate jointly, because almost all machines still need human operators and observers, at least for interpretation of the data.

Judges and coders versus instruments and apparatus

At present, perceptual units can only be identified and categorized by human judges, because even the most advanced computers still lack the pattern-recognition ability required for this task. Physical characteristics, however, can be measured both by machine and by human judges. Obviously, in those cases where machines can be used without recourse to human judges, more objective and reliable data can be expected. For example, although listeners hear fundamental frequency of voice as pitch, their judgment of the physical value is not nearly as good as is electroacoustic measurement, both because of the nature of the auditory system and because of the listeners' lack of appropriate scaling ability (see Scherer, Section 4.6).

In many cases, however, machine analysis must be supplemented by

human observers, generally in order to perform pattern-analysis tasks that are beyond the capability of even sophisticated instruments. For example, if spatial coordinates for the movement of the hand are to be entered into a computer to allow objective measurement of speed and acceleration of movement, human observers have to be used to mark a fixed part of the hand (e.g., the middle finger knuckle) with a light pen or another computer-access device (see Rosenfeld, Section 5.5). As the examples in many of the chapters in this volume will show, in general, a combination of human judges or operators and machines has to be used for the analysis of physical characteristics. In some cases, movement patterns are so complex that highly trained coders must be used to identify the physical components of an action, as for example in the Facial Action Coding System developed by Ekman and Friesen (see Ekman, Chapter 2).

The use of judges or coders in behavioral research is a highly complex research procedure, the dangers of which are underestimated by many researchers. Many published studies in this area suffer from serious problems concerning judge selection, judgment procedure, and most often, insufficient checks on the reliability of the judgments. A comprehensive discussion of the issues to be considered in conducting judgment or decoding studies is found in Rosenthal (Chapter 6; see also Ekman, Section 2.1).

Persons doing the observation can be naive or trained. Naive observers will usually mix description with inference or evaluation. Trained observers can operate at different levels, varying from the strictly descriptive to the inferential. In descriptive approaches the observer frequently utilizes iconic or digital transcription systems or classifications. Inferences made by observers can be termed judgments and may refer to intent, motive, affect, conversational function, and so on. In most cases, the inferences do not specify the sign vehicles upon which they are based. Intermediate but closer to description are behavioral rating systems, which are usually more gross than transcription or classification systems. Closer to inference, on the other hand, are functionally based ratings or classifications.

The terminology in this area is very confusing. Various terms are used – often interchangeably – to describe the persons engaged in ratings or classifications. The most general term seems to be *observer*, that is, a person who does nonverbal measurement; the specific type of measurement is not specified. *Coder*, *scorer*, or *transcriber* is used if description but not inference is the major type of measurement to be done by the observer. In the case of a *coder*, the major task seems to be

the recording of data from machine analyses. The term *scorer* is used in those cases where observers are to classify behaviors into different typologies or classes or categories. A *transcriber* is usually involved in transforming or notating behavior into a behavioral record of some written form. The term *judge*, on the other hand, is used in those cases in which the observers are mainly asked for inference rather than description, that is, cases where the major interest of the researcher is in assessing the judge's interpretation of the behavior. Finally, the more neutral term *rater* is used for global assessment on adjective or attribute scales in which either inferential or behavioral characteristics are being evaluated.

Some issues in transcription and classification

Transcription by symbolic notation is very much influenced by the phonetic–linguistic tradition, which assumes that every portion of speech consists of a meaningful unit. Adherents of the transcription method for nonverbal behavior assume that the same is true for behavior generally and that it is therefore essential to provide an exhaustive transcription of all aspects of behavior. A large number of transcription systems for nonverbal behavior have been developed or adapted from areas such as dance notation (see Birdwhistell, 1970; Hutchinson, 1970; Kendon, Chapter 8; Rosenfeld, Chapter 5; Scherer, Chapter 4). Some of the advantages and disadvantages of using the transcription method are discussed in later chapters. In general, however, it seems fair to state that the usefulness of a thorough transcription of nonverbal behavior as a way of providing evidence for any of the major research issues in the field has not yet come forth. Most of these transcription systems are exhausting to use, but there is no evidence that they are exhaustive. In fact, one of their key problems is that usually there is no explicit statement about how the investigator decided what to include, and the user is led to believe that a transcription is complete just because it is long and cumbersome. Furthermore, many of these transcription systems have been developed in a way that makes them difficult to use in statistical analyses, though there is no necessary reason for this to be the case.

As mentioned before, coding or category systems are selective, in that only a certain number of predefined units are analyzed. There seem to be three major types of such coding schemes: (1) natural language labels, (2) categories of physical characteristics, and (3) functional categories.

Natural language-label categories make use of the segmentation and categorization potential inherent in culturally shared language labels. Thus categories such as *smile, laughter, frown, pout, giggle,* and the like are presumed to be used in a comparable fashion by judges and thus to be usable as coding schemes (possibly on the basis of a checklist of labels of this sort). The use of such categories is not infrequently reported in the literature, particularly in human ethology, sociolinguistics, and social psychology. Although this procedure is quick, it may also be rather dirty. Unfortunately, researchers using this method often do not bother to establish whether their judges really do all mean the same facial movements by *smile* or all agree on the sound quality of a *giggle.* Because there may be regional and interindividual differences in language-label use, the comparability of results obtained with different judges cannot be established. Furthermore, many natural language labels contain evaluative connotations. For example, the label *gloomy voice* contains not only a voice quality description but also a characterization of the state of the speaker. Thus it is difficult to know to what extent judges using natural language labels use their inferences and attributions about psychological states and interpersonal processes in assigning labels to behaviors.

Category systems using physical characteristics as criteria can be more objectively defined. For example, a scorer could categorize as "right head lean" all head movements where the head is tilted to the right to at least a particular angle (see Rosenfeld, Chapter 5). Or the scorer could determine fundamental frequency (pitch) contours and categorize them as going up or down or up-and-down (see Scherer, Section 4.6; Stern & Wasserman, 1979). As long as coders can be expected to be reasonably precise about the interpretation of physical measurements, a high reliability of such categorizations will result. One possible drawback is the fact that classification on the basis of particular physical features cannot be guaranteed to result in valid or meaningful categories.

The third approach to coding attempts ensures that valid categories do result by basing them on functional considerations, that is, classifying behaviors on the basis of their role in communication or individual coping. The best example of such functional coding schemes is a number of hand movement coding systems differentiating self-manipulatory movements such as scratching or stroking, with presumed individual adaptation functions, from "illustrating" or "object-focused" movements, with an information-transmission or interaction-regulation function (Ekman & Friesen, 1969; K. R. Scherer, Wallbott, & Scherer, 1979; see also Rosenfeld, Section 5.5). Possible

problems with this kind of measurement system include the necessity of making a priori judgments about the functions of certain behaviors, the danger that coders will make inferences concerning the intentions of actors in categorizing movements by function, and the difficulty of differentiating movements that have similar functions but that could be profitably distinguished on other grounds.

1.5. Some comments on data analysis

The possibilities for the analysis of the data obtained through the measurement procedures just discussed do not differ dramatically from the choices researchers usually face in analyzing their data. Depending on the purpose of the study, different types of analysis techniques can be used: exploration vs. testing hypotheses, quantitative vs. qualitative analysis, statistical vs. illustrative approaches, and so on. Many examples of these different possibilities will be found in the individual chapters in this volume, and comprehensive coverage of the various aspects of these data-analytic procedures can be found in most surveys of data analysis in the social and behavioral sciences.

One serious deficiency of much of the research in nonverbal behavior is that in general only central tendencies in the data are reported. Very rarely is each individual or each record examined individually and in detail. If one is trying to characterize general nonverbal behavior for a specific type of person, let alone the species, then one cannot be content with simply describing the mean or reporting a correlation. An attempt must be made to inspect individual records and behavior patterns and to report the number of instances that fit the general trend indicated in the statistical coefficients. One should try to explain the reason why behavior patterns for some individuals do not conform to the central tendencies. In many cases, this is an important possibility for the improvement of a theory or hypothesis.

For example, in a study of stress and deception among nurses (Ekman, Friesen, & Scherer, 1976), a number of phenomena were apparent on the group level, such as increase of fundamental frequency from baseline to stress. However, looking at each of the individual subjects made it readily apparent that there were moderator variables, mostly personality characteristics, that could serve to separate the subjects into two groups characterized by very different types of nonverbal reactions (K. R. Scherer, 1979b).

Very frequently, researchers tend to look not at raw data but only at the output generated by statistical analysis packages. This may be quite

misleading in cases where the distribution of various behavioral categories is very important for the question being asked. It is thus advisable to look more frequently at the distributions and the scatterplots between variables, and not just at the means and the variances. In many cases, the data should be transformed before statistical analyses are performed, because changes in the mean might be associated with change in the variance.

Among data-analytic methods that are very relevant for nonverbal behavior research and that are not well established in the social and behavioral sciences are the qualitative analyses of the structure of interactive behavior (see Kendon, Chapter 8; West & Zimmerman, Chapter 9), as well as the sequence and cluster analysis methods designed to study sequences and changes rather than aggregates (see van Hooff, Chapter 7).

Given that most of the research and the analyses on nonverbal behavior are exploratory, the use of statistical procedures without consideration of individual behavior patterns and raw data is not really justified. It is only after a phenomenon and its characteristics have been fairly well established that we can use high-powered data analysis techniques. Also, given our very restricted knowledge about nonverbal behavior, we should not stick to single cases, as pointed out previously. When we are dealing with measurement techniques that are imprecise, in areas which are not yet well explored and in which we do not have much conceptual guidance, it is all the more problematical to be content with a single case.

1.6. Conclusions

This chapter has been an attempt to survey some of the major methodological issues facing students of nonverbal behavior. Although our review has shown that behavior sampling and measurement procedures are closely linked to research issues and theoretical assumptions, there is no inherent dichotomy between qualitative, structural, and interactional approaches, on the one hand, and experimental, quantitative, and psychological studies, on the other. Although this distinction may have some basis in the historical development of the field, and although it was sharpened by early reviews of the literature, it can and it must be overcome if the nature and function of nonverbal behavior are to be studied comprehensively. Nonverbal behavior expresses both traits and states of individuals and serves as a culturally shared and structured signaling system. What is more, it performs both of these functions at

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the same time and often through the very same movements. Thus studies focused on the individual and studies focused on interaction and communication have to complement each other. Researchers leaning toward a particular focus and raised in a particular theoretical tradition need to take cognizance of the wide variety of methodological approaches available for the empirical study of nonverbal behavior, and need to base their choices on appropriateness rather than prejudice. We hope that this handbook will help them to do so.

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2. Meth
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