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Methodological Approaches in Human Communication: From Complexity of Perceived Situation to Data Analysis[1]

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For Prof. Luigi Anolli,
with sincere and heartfelt affection

1. The field of interpersonal communication and non-verbal behavior

Human communication is a highly complex phenomenon that can be approached from numerous theoretical perspectives of varying nature. In this regard, psychology offers a rich and extensive range of approaches which reflect the many different aspects addressed within this field: interpersonal communication, non-verbal behavior and communication, language and social interaction, group communication, organizational communication, intercultural communication, mass media, new communication technologies, cultural studies, the study of performance, communication and health, and communication applied to problem solving.

Indeed, the field of interpersonal communication — a well-established research area within the social sciences [1] — is a good example of how traditional metatheoretical, epistemological and methodological controversies can be channeled

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through a body of knowledge whose aim is the rational and systematic search for different approaches, interconnections and complementary features.

During the 20th century the themes addressed within the field of interpersonal communication developed as a result of contributions from various scientific disciplines: anthropology, linguistics, psychology and sociology. Thus, the field today is characterized by plurality in terms of the choice of fundamental units, the identification of basic processes, and the theoretical and methodological attention which must be paid to the communicative contexts of everyday life [2].

The consideration of non-verbal signals as fundamental units of human communication [3][4] and the greater number of studies conducted with improved technical resources for observing, coding and measuring non-verbal behavior [5] have resulted in this topic becoming a research area in its own right, one that is mainly geared toward the study of interpersonal behavior [6] [7] [4].

From the methodological point of view, the research activity arising out of interpersonal communication (verbal and non-verbal) is based on two key features: 1. A pragmatic approach with respect to understanding the objectives of scientific knowledge: *Thus, none of the "paradigms" of inquiry occupies a privileged position in the court of truth; all share the burden of justification* [8]; 2. Awareness of the need to link the choice of methodology with the theoretical approach taken by researchers: *Significant progress depends both on substance and on method, and neither can be slighted without harming the whole* [9].

It appears, therefore, that the confrontation between positivist strategies and naturalistic research methods in the area of interpersonal communication has lessened:

> [Interpersonal Communication] *As a traditional bastion of quantitative and positivist and post-positivist research, this subfield has been relatively slow and cautious in accommodating interpretative epistemology (Leeds-Hurwitz, 1992). Groundbreaking qualitative studies have treated personal relationships (e.g., family and friendships) and episodes of interaction (e.g., conflict) as situated accomplishments of speech and nonverbal (Ray, 1987) communication (e.g., Jorgenson, 1989; Rawlins, 1983, 1989). In their premises and practices, most of these studies reflect the influence of social-constructionism, "conventional" explanation and "grounded theory"* (Lindlof & Taylor, 2002, p. 20).

As Poole & McPhee [9] point out, conventional explanation is regarded as a goal associated with qualitative studies. By means of conventional explanation the perspective adopted by subjects with respect to their own world is taken as the starting point of the relationship between behavior and social norms. However, this goal can also be detected in the hypothetico-deductive approach to research and in the generation of models. Moreover, the goal of causal explanation, traditionally associated with hypothetico-deductive research and considered, more recently, in theoretical models [10], has also been adapted to qualitative research (ethnography, symbolic interactionism and grounded theory) in the field of interpersonal communication (e. g., [11]).

In what follows we offer a contemporary and stepwise discussion of how the methodological options available within scientific observation, both qualitative and quantitative, can be used to approach a number of — succinctly described — problems in the field of human communication research.

2. From opposing paradigms to methodological decision-making

The communicative process is an event or activity characterized by the different levels which can be considered: interpersonal distance, gaze exchange, gestural behavior, vocal emissions, verbal behavior, etc.[3] It is deeply imbued with cultural norms, is capable of being contextualized and re-contextualized at any given moment, and can be considered as comprising various episodes, each one of which is formed by a sequence of communicative acts produced by the transmitter.

This conceptual and experiential complexity raises many questions, uncertainties and doubts on the methodological level. However, the discipline that can be imposed through use of a given procedure should not prevent us from maintaining spontaneity, or at least the sense of everydayness with which we consider the production of communicative acts, that is, in terms of molecules — each one formed by atoms — that interact with one another in various ways and form groups of greater or lesser magnitude. Undoubtedly, the conceptual perspective adopted — which is always both feasible and open to debate — will constitute the reference point that in each case provides the backbone of the approach taken.

The extraordinarily wide range of aspects to be considered and the experiential richness that goes hand in hand with every communicative episode make it necessary to choose methodological approaches that are, above all, capable of being both flexible and objective. The former, flexibility, must take into account the constant search for fit between transmitter(s) and receiver(s) with respect to diverse elements such as existing prior knowledge, the thematic nature of the situation, the physical location, social norms and uses, and the expressive capacity of the communicating parties, to name but a few of the key aspects. The second attribute, objectivity, is non-negotiable due to it being an inherent feature of all scientific research, and, therefore, it should characterize the methodological procedure followed, in this case, *observational methodology*. Undoubtedly, combining the various elements of this process poses a great challenge.

2.1. Adequacy and possibilities of a qualitative approach in the first stage of an observation of communicative behavior

Once the specific object has been defined (initiative in communication, single or multi-channel forms of communication, communicative symmetry/asymmetry, communicative networks, etc.) the scientific observation of human communicative behavior begins with the recording. Recording simply implies the representation of reality in a given format, and will involve the use of a coding system. In procedural terms this capturing of reality can only be carried out qualitatively.

Until recently such a methodological approach was widely considered to be marginal and attracted the attention of few researchers. Nowadays a shift appears to be underway, although the dominant paradigm (in Kuhnian terms, but without the exclusive meaning he attributed to the term) continues to be the positivist-empiricist one. Benoliel (1984, p. 3) described qualitative research as “forms of systematic inquiry aimed at understanding human beings and the nature of their interactions with one another and with their environment”. Indeed, qualitative research is often described as holistic, as being concerned with the complexity of human beings and their surroundings, and fits neatly into the recording stage of an observational study of behavior, performance and situations

[3] Although the present chapter is concerned with human communicative activity, this does not exclude the existence of animal communication or that between humans and animals.

involving individuals, groups or a given organization; in this regard, it is possible to classify the different types of recording. All this is illustrated by the way in which it can readily be adapted to what is implied by the study of communication in everyday life [12] [13] [14] [15].

Qualitative methodology is based on a number of assumptions and there are certain key characteristics which define it. Method or methodology means "way to", and in the context of communication this will be defined by the content and, therefore, the substantive questions to which it *can* and *should be* applied. At times a choice is available as regards the initial reductionism implied by data collection (for example, in the case of someone going on a trip organized by a group of friends, this would be the transcription of a series of episodes, which may include a detailed description of the specific actions that constitute the aim of the trip or merely a list of distances covered, times, angles, etc.); in other cases, however, the approach is restricted by the nature of the situation and the basis of the theoretical framework (for example, communication with an acquaintance who is going through a personal crisis). Although both form part of everyday life it is only in the first example that we can *strictly* refer to the occurrence of perceivable behavior.

The root problem here is one of operationalization, or what amounts to the same, of the "correctness" of the reductionism which will enable *the information considered to be relevant to be selected from the communicative process, and thus collect the data in one form or another*. This is both the heart of the problem and the crucial question around which attitudes in favor or against will emerge, thus giving rise to the development of a qualitative or quantitative methodology. *In the first stage of the process involving observational methodology, qualitative methodology is preferred for the study of communication given the wide range of options it provides in terms of data collection* [16].

2.2. Characterization and application of a quantitative approach in the second stage of an observation of communicative behavior

In the first stage of an observational study in communicative research, particular care must be taken in justifying the adequacy of qualitative methodology, and the greatest difficulty lies in obtaining data. Once the latter have been obtained, and quality control procedures have been applied to detect and rectify possible errors, the process enters *a second* stage involving *adequate analyses based on the adequate observational design* [17], which will be discussed below.

Traditionally, it has been stated that followers of quantitative methodology tend to translate their observations into figures, and these numerical values are produced through the counting, measurement or verification of the order or sequence, or from interval or ratio data, thus enabling researchers to discover, verify or identify the relationships between concepts derived from a theoretical framework developed in accordance with the criteria governing each one of the communicative situations to be studied. In terms of the *assumptions of quantitative methodology*, hypothesis testing requires that the criteria of representativeness and randomization are fulfilled, which implies the use of adequate sampling techniques, as well as the possible use of sophisticated univariate and multivariate analytic procedures.

A general review of the scientific journals in the field of communication reveals that a great many communicative studies in natural contexts (that is, excluding laboratory studies) merit the criticism of *endemic methodological weakness*. However, what is also observable, and on an increasingly widespread scale, are *important advances involving the*

use of sophisticated methodological resources which enable much greater rigor [18]; although not all of them come from studies conducted in natural contexts they would nonetheless constitute adequate analyses in many of them provided that adequate data were available.

2.3. Complementary use of methodological options

In the above sections we have considered the appropriateness of qualitative and quantitative perspectives in the first and second stage, respectively, of the observation of communicative behavior. The logical succession of stages in an organized way should enable this change of perspective (from qualitative to quantitative) to occur smoothly, and avoid creating tension within the procedure to be followed.

The two methodological perspectives can mutually benefit one another, and indeed they are often used together, thus assuring their complementarity. Although it is true that this option may pose serious problems in terms of time and money, or due to the lack of trained personnel, the aim is to overcome the idea of opposing perspectives.

The nature of most — if not all — communicative situations in which the adequacy, complexity and multifaceted character of observational methodology are justified implies methodological diversity in terms of how such situations are approached. For even those authors most strongly associated with the quantitative perspective recognize that no method holds the patent on scientific correctness.

This situation is helped by the fact that research is increasingly being carried out by multidisciplinary teams which, using a variety of techniques, seek to join forces in order to achieve greater research rigor (Anguera, 2004). Thus, the way ahead is increasingly clear, although considerable effort will still be required to consolidate new possibilities for collaboration.

2.4 Privileged position of observational methodology for the study of communication in terms of the complementarity between qualitative and quantitative approaches

Our starting point here is that the very nature of observational methodology enables it to be used for studying communicative behavior in contexts that are natural or usual for the individual or group.

We can then ask to what extent observational methodology is consistent with the above description of qualitative methodology in an initial stage and the application of quantitative methods in a second stage. Although we have always argued in favor of this compatibility, support for such a view can also be found in the work of two prestigious authors. Bakeman and Gottman [19] specifically define systematic observation as a particular way of quantifying behavior and, indeed, they code and analyze it rigorously; furthermore, they dedicate several chapters of their book to explaining and exemplifying recording methods, as well as their subsequent coding, the point where qualitative and quantitative approaches meet. *We can thus categorically state that observational methodology is the one which best reflects the complementarity between qualitative and quantitative approaches* [16] as, in highly simplified terms, it will always require the development of an *ad hoc* instrument on the basis of which a recording (qualitative methodology) can be made, this then being subjected to quality control and an adequate analysis (quantitative methodology).

Obviously, empirical studies of communication conducted according to such a perspective produce data by translating reality into systems of written notation. However, there will be an initial and provisional dichotomization (not a real dichotomy) depending on how this is done, which in turn will depend to a great extent on the nature of the problem at hand. To give an example of an unusual case, in a study of gaze exchange times between a mother and child, data collection will involve a certain type of data which will no doubt be expressed in conventional time units (seconds, tenths of a second, milliseconds, etc.). However, there are many fields of study in which "data" are produced but where it is not possible to operationalize them, or where this is not feasible without resorting to excessive reductionism. For instance, if we consider programs that provide health and/or social services to multi-problem families, in which there is a clear communicative relationship, the question is whether it would be feasible to conduct a quantitative count of a given phenomenon. The answer is no, due to the multiplicity of existing problems, the poorly defined nature of some of them, the need for contextualization, and the various factors involved, among many other aspects.

2.5. Is integration possible?

Finally, having established the complementarity of qualitative and quantitative methodological options in studies of communication [16] brief consideration should be given to their possible integration. Bericat [20] considers that such integration is both possible and useful within the framework of a pluralistic attitude toward methodology, and regards it as a step beyond "legitimate and recognized plurality" (p. 31).

This shift toward integration is already being undertaken by mathematicians and social data analysts on the basis of two premises [20]: The first of these recognizes that a great amount of the information dealt with by many researchers in the field of communication, and within the social and behavioral sciences, is qualitative in nature; thus, attempts are being made to develop suitable analytic mathematical models. According to Alvira [21], this work is being carried out on three fronts: Firstly, by finding ways of transforming something qualitative into a quantitative form by means of advances in measurement theory; secondly, by developing new statistical techniques that use qualitative data; and thirdly by creating formal languages, which are not necessarily numerical, that enable data treatment, for example, the analysis of correspondences, *logit* and *probit* analyses, and graph theory.

The second — and more radical — integration premise is based on the idea that what can be postulated is not a quantity but rather a predetermined quality, and vice-versa, i.e., that what can be postulated is not a quality but rather a predetermined quantity [22] [20]. In other words, quality and quantity lose their meaning unless viewed in light of one another.

Although the road may be long and tortuous it would seem that we are now closer to a point where this reciprocity between quantity and quality will materialize in empirical studies of communication; although Bericat [20] argues that their complementarity already implies an initial degree of integration we believe that sustained developments will occur on other levels.

3. From the complexity of the perceived situation to the descriptive recording

3.1. The importance of perceivability

Communicative reality can be regarded as largely perceivable since, although there is undoubtedly a cognitive factor, we are concerned here with its behavioral aspect, regardless of the specific setting to be studied. Initially, recording a perceived situation involves a *transduction* of reality, that is, its representation within another format.

The recording process involves a number of common characteristics, whose purpose is to obtain information about communicative behavior in the situation studied, as well as about its context. The step from perceived reality to the descriptive recording forms part of the research strategies on which scientific method is based in the behavioral sciences, as well as in others such as the social sciences.

Although all the various forms of recording will be characterized by the kind of data collected, they should be classified according to their nature; this gives rise to the taxonomic system proposed in Table 1, in which direct and indirect observation complement one another (the latter being focused here on verbal behavior capable of being transformed into documental material), and where there is the possibility of gathering documental and graphic material [23], of great importance in studies of communication.

Table 3.1 Taxonomic criteria regarding ways of accessing reality according to perceivability.

DIRECT OBSERVATION	Total perceivability	Narrative recording Descriptive recording Coded recording
INDIRECT OBSERVATION	Partial perceivability	Documental material obtained in its original form Verbal behavior able to be transformed into documental material

This ranking covers the range of possibilities between data obtained from the recording of perceivable behavior — which are the easiest to code and subsequently quantify — and those gathered from documental sources (reports or dossiers), in which such data treatment is practically impossible.

Anyone wishing to study the reality of perceivable communicative situations must pay special attention to objectivity when collecting data, and this will mean respecting a number of prior methodological safeguards which will, in turn, lead to a series of actions. Obviously, the decisions made in this regard will be determined by the purpose of the research, the nature of the setting, the people involved in the study, and any practical limitations or issues of feasibility.

The problem and question arising out of all this is how to begin the process of obtaining information about communicative behavior in the home, classroom, hospital, therapist's room, department store, office, street, etc., about which nothing is yet known.

3.2. Defining the boundaries of the observational design

The observational design acts as a criterion or guide throughout the empirical process, but especially when collecting, managing and analyzing data. Various criteria can be established in drawing up a map of possible designs.

The model of Anguera, Blanco & Losada [17] comprises eight zones divided into four quadrants, which correspond to the eight different observational designs (Figure, 3.1).

The vertical axis refers to the units of study (interactive dyad, small group of participants carrying out a shared task, etc.), the horizontal axis to the temporal dimension of the evaluation (from one session to a series of sessions over a period of time), and the concentric circles to the dimensionality.

The upper pole of the vertical axis refers to an *idiographic study* (of units), for example, that of communication in a mother/child dyad or a small group of communicating people considered as a single unit. In contrast, the lower pole refers to a *nomothetic study* (group of units), such as that of a group of elderly married couples taking part in leisure activities.

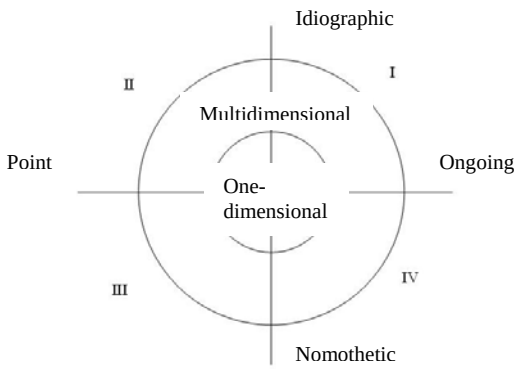

Figure 3.1 Observational designs (Anguera, Blanco & Losada, 2001)

The left-hand pole of the horizontal axis refers to a *point recording* (normally, a single session), while the right-hand pole is for *ongoing* recordings, such as the total number of group psychotherapy sessions included in a program for people who wish to stop drinking.

The inner concentric circle refers to a *one-dimensional design*, when what is of interest is just one type of observed element, for example, a single communicative channel. The outer circle refers to a *multidimensional design*, used in situations where the aim is to study a multi-channel communication (or a single channel one that can be broken down into different parts, for example, in gestural behavior, where different examples of such behavior can be derived topographically from different parts of the body).

3.3. Segmentation of the communicative 'continuum'

Anyone wishing to collect data about communicative data must address a number of issues that have proved controversial since the beginnings of the discipline, for example, the pyramidal structure of the molecularization-molarization *continuum* and the definition of units according to the communicative aim, among many others.

The flow of communicative behavior appears as a continuous succession of episodes, events and actions, etc., which develop into a session-based structure governed by established temporal rules (such as professional activities that involve a given duration),

although these may also be absent (as in the spontaneity of interpersonal communicative relationships). Given that a session is usually understood as an uninterrupted recording time, adequate criteria must be established in order to break up the session conceptually into elements containing the minimum amount of information, which will then be taken as the units of recording, coding or analysis.

The nature of these units may vary widely. Although there is a *continuum* between the molar and the molecular levels [19], it should be remembered that these terms are somewhat relative, since, for example, a conversation between man and wife may be considered as a molecular unit in accordance with certain study objectives. However, it could also be regarded as a molar unit in another study whose aim was to analyze the multi-channel integration of dimensions involving, for example, speech, gestures and gaze exchange which appear during the succession of various episodes, each one of which will have a (relatively) molecular nature; however, each one — for example, a communicative action in the form of a gesture — could also be considered as a molar unit if it forms part of a kinesic or movement study, in which they have all been broken down into units of displacement and of gesture (Figure 3. 2).

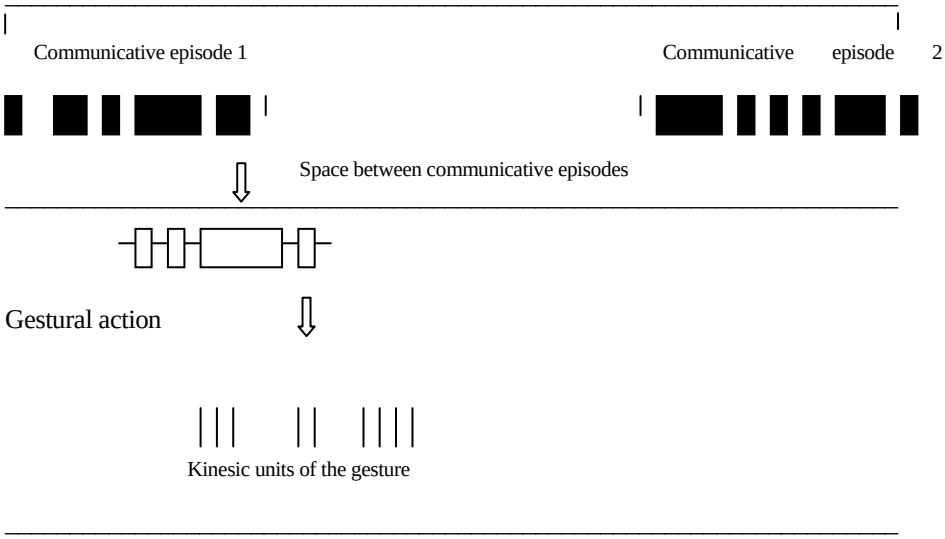

Figure 3.2 Hierarchical structure of behavioral units, where it can be seen that a unit of given molarity is broken down into further molecular units across a continuous dimension.

The continuous dimension to which we have referred stretches between two poles, the molar and the molecular, and this dichotomy is characterized by a number of advantages and disadvantages [24] [25], as shown in Table 3.2:

Table 3.2.Advantages and disadvantages of the molar/molecular dichotomy.

	Advantages	Disadvantages
Molecular	Greater objectivity	Disconnectedness
Molar	Greater interconnectedness	Risk of subjectivity

The decision regarding which criteria to use in segmenting the flow of communicative behavior is far from easy, and the specific aim of the study must always be the main criterion upon which this decision is based. The various possibilities must be considered and evaluated in each case, the investigator being aware that this will influence the results obtained. However, these differences appear not to be relevant if we adopt the position taken by Dickman [26], according to which groups of untrained observers confirm the tendency to detect certain "cut-off points" along the behavioral continuum which, although they do not always coincide, are generally consistent with what are termed the *modal division*, or most relevant cut-off points.

There is no inevitable equivalence or assimilation between event and molecularity, on the one hand, and states and molarity, on the other. One could imagine the study of a communicative episode consisting of a conversation (Figure 3.2), something which, on a highly ordered hierarchical scale, would constitute the highest level of molar behavior and be a point from which we would descend successively through various communicative actions along the molecular scale. However, there may be great mobility and variability in the channel corresponding to the gestural behavior of upper extremities, while the seated body posture remains constant. In this case, we would need to consider events for gestural behavior and states for body posture, although this does not mean that this body posture cannot readily be molecularized by means of approaches such as that of Birdwhistell [27].

Also worth noting in this context is the work of Barker & Wright [28], who established *segmentation indicators* by means of which untrained observers marked the boundaries of behavioral segments. These could be applicable to certain communicative episodes, and thus we have adapted them to communicative behavior:

a) Change in the type of communicative episode.
b) Change in the communicative action.
c) Change in the implied communicative channel.
d) Change in the identity of the transmitter and/or receiver.
e) Change in the behavior setting.
f) Change in the action modulators.

In our view, how the boundaries of the behavioral unit are defined will inevitably depend on the specific objectives which are set, and must also be consistent with the following modulatory criteria [24] [25]:

a) It must be possible to define the boundaries of each behavioral unit; in other words, to define and distinguish it from the previous and subsequent unit.
b) It must be possible to name each behavioral unit. Assigning a specific name is enormously helpful in terms of the unit acquiring its own identity, and in differentiating it from other similar behavioral units.
c) For a behavioral unit to be considered as such, it must be able to be defined in a way that captures its particular features.

Having fulfilled these three requirements, and in accordance with the stated aim, each study will then proceed to establish the size and characteristics of the behavioral units.

4. From the descriptive record to analyzable data

4.1. From the descriptive to the systematized recording

Although the raw information is always obtained at the point of recording, the nature of this recording may take any one of an enormous variety of forms. The taxonomic criteria also cover a wide range of possibilities.

When it comes to recording communicative behavior we believe a relevant approach is that adopted by Martin & Bateson [29], who propose three types of description: *a) Description of the structure, appearance, physical form or temporal patterns of the behavior*. Behavior is described in terms of the subjects' posture and movements, which may involve a great amount of detail, and a skilled observer is thus required in order to perceive subtle differences. *b) Description in terms of consequences*, or effects of the behavior on the context (in the widest sense, and including both other subjects and material objects and their particular arrangement) in which it takes place, or on the subject producing it, but without reference to how these effects are produced. This is easy to distinguish from the previous category, and as such it is obvious that "hanging up during a telephone conversation" is a description in terms of consequences, whereas "using a finger to press the appropriate key on a mobile phone" or "putting a traditional telephone back on the hook" is a structural description. *c)* A third form of description can be made in terms of the *spatial relationship* between subjects in a given setting, the emphasis here being on where and with whom subjects do something rather than what they do. For example, "moving closer" can be defined in terms of changes in the spatial relationship between subjects.

If a flexible approach is adopted to the question of which descriptive levels are the most suitable, such that there is a continuum which includes a range of intermediate levels between its two extremes, then there will be a better fit and interconnectedness between the perception of the communicative behavior and its interpretation, or the capturing of its meaning, and this will improve the quality of the observational recording. In most cases, the inclusion of several descriptive levels within the same recording will produce an overlap of various units and enable the behavioral "continuum" to be covered; thus, different types of analysis will also converge.

When studying communicative behavior we are interested in studying the process rather than the result, and therefore the *transduction* of the behavioral flow into the recording is of particular importance. In this regard it is necessary to consider whether we can always guarantee that a description of a behavioral episode captures its essential aspects and all the required nuances, let alone provide a perfect correspondence between data collected by means of descriptions located on different levels, between the use of strictly empirical terms and others which are far more conceptual in nature. Moreover, one can ask whether there will be reciprocity between the 'communicative event' and its corresponding description.

The empirical stage of the observation starts at the point when the observer begins to gather and classify information about events or behavior. These first data, the result of a transduction of reality, must be progressively systematized and this process may involve many intermediate steps (from passive to active observation) which usually follow on from one another, at least partially, as the observer develops increasing knowledge about the behavior studied and the specific approach adopted unfolds.

Firstly, as in quantitative studies, it is important to confirm that the data are complete, of good quality and in a format that facilitates their organization. Furthermore, any

transcriptions that are meant to be *word for word* must be checked to ensure that this is indeed the case.

The main task in organizing qualitative data involves developing a way of indexing the material; for example, lists that match the identification numbers of material with other types of information such as dates and places of data collection.

Given the aim described earlier, any recording involves selecting those behaviors considered to be important and then, on the basis of their characteristics, the chosen recording technique and the resources available, it is necessary to choose a system (which nowadays will be almost entirely computerized) which facilitates their simplification and storage. Programs such as *The Observer* [30], SDIS-GSEQ [31], *State Space Grids* [32], *ThèmeCoder* [33] and *Match Vision Studio* [34] are easy to use in the study of various communicative settings.

However, this level of recording will be insufficient if what we are seeking is, as stated above, the subsequent elaboration — and quantification — of spontaneous behavior represented through systematic observation. Hence the need, by means of *coding*, to develop and use a system of symbols (which may be of various kinds) that enables the measurements required in each case to be obtained.

The complete systematization of communicative behavior is achieved through a system of codes (iconic, literal, numerical, mixed, chromatic, etc.) which may adopt the form of a string, module or cascade, etc. Naturally, the coding used may be binary (presence/absence, which could be coded, respectively, as 1/0) or focus on a single type of element, for example, verbal interactive behavior. Alternatively, it may be useful to *simultaneously code several concurrent aspects*, for which the researcher may develop a *complete syntax for any observation situation*, which reaches a maximum degree of systematization without the need for any descriptive term. In this case, it would be necessary to draw up a *coding manual*. Obviously, this transformation would have to be validated in terms of how feasible decoding was, that is, the process through which the corresponding descriptive recording would be obtained in its original non-systematized form; indeed, it is precisely in those cases where this operation does not work (the descriptive record obtained having been distorted or deformed by the decoding) that we can diagnose the nature of the errors committed during coding.

The coding manual comprises two different parts. The first will include all the terms (behaviors) used in the systematized recording, along with the corresponding code which represents them, and without any limitations being placed on the type of code used. The second part of the coding manual must contain the syntactic rules which govern the use of the codes, and specifically set out the syntax of the code combinations and the sequences of these combinations.

4.2. Notational system

A notational system transforms the behavioral flow into a certain kind of unit [35]. The need for the recording of units to be as objective as possible, at the same time as being efficient, is the key issue in the debate about the role played by a notational system in obtaining data. The literature on this issue illustrates the disappointment felt by scholars in the field as a result of the proliferation of individual systems and the disagreement this generates. This pessimism is clearly set out by Badler & Smoliar [36], who refer to:

[…] *an almost total lack of agreement on how movement should be described. It is almost as if each research project started from scratch with an arbitrary set of movement characteristics to be observed* (1979, p. 19).

Donaghy [37], following on from the work of Frey & Pool [38] and Hirsbrunner, Frey & Crawford [39], locates the notation system problem in terms of the attempt to develop a vocabulary of symbols for representing the positions and/or patterns of body movement which the human eye can discriminate. Given that there is an unlimited number of discernible movements in non-verbal communication, a notational system must inevitably function as a low-resolution instrument if the aim is to develop a useful and efficient system. According to Bernese Time-Series Notation [38], the methodological basis for using a limited vocabulary of codes is the recording of "moment-to-moment" movement. In each time interval unit, regardless of its size, a localized movement is identified by its location along the cardinal plane in which it takes place, and a gesture (e.g., of the hand) by the form (e.g., closed). Its space-time or figurative definition is a scale value assigned in accordance with its perceived position along the cardinal plane, or the presence of an attribute in the case of a gesture. Through this procedure, almost every body movement can be notated by using a limited alphabet of codes which distinguish one type of visible behavior from another according to the spatial dimensions (e. g., sagittal dimension: *Up/down tilt head*) or characteristics of the specified form (e. g., closure dimension: *Opening/closing of fist*). It should be noted, however, that the most important aspect of the Bernese Time-Series Notation is not the codes it proposes but the structuring principles of the system: "moment-to-moment" notation and the selective assignation of characteristics and reference points that may be considered pertinent. Thus, for each notation problem it is necessary to define the relevant codes [37]:

The system is designed to code nonverbal behavior obtained from individuals sitting in a chair and conversing. If an investigator is interested in coding persons standing or walking and talking, many of the coding dimensions and reference points would have to be changed (1989, p. 301).

Izquierdo & Anguera [40] have continued the debate about notational systems within the theoretical and technical framework of observational methodology in psychology [41]. Unfortunately, for many investigators of non-verbal communication, systematic observation continues to be no more than a technique for obtaining and recording direct or recorded data, and moreover the study of the kinesics present in everyday written texts and literary works is overlooked [42]. Given such a limited approach, it is unlikely that Donaghy's proposed solution to the problem faced by the notational system for movement will go beyond the practice described, that is, an agreement regarding the two criteria which structure the coding process, namely, temporalization and restrictive coding. When direct observation is considered as a methodology [17], the perceptual/linguistic framework of the observer/analyst and the way in which this is represented through the chosen observational design become central issues when it comes to addressing the structural criteria and rules of use which may be shared by investigators when developing and adopting a notational system for non-verbal behavior. Although we accept that the criterion of "moment-to-moment" coding must be preserved, we believe that the notational system could be more readily normalized through the addition of new theoretical and methodological rules regarding how to achieve a restrictive coding which truly represents the morphokinetic

characteristics of human action, whether observed live or through photographs, films or videos, and not forgetting the reading of written texts.

The progress made towards a new approach that normalizes the structure and use of notational systems for body movement [43] [40] [25] [44] has crystallized in the proposed *Common Morphokinetic Alphabet* (CMA) (in press). The basis of this theoretical and methodological conception of notation is that it combines the perceptual/linguistic process of the observer/analyst with the choreographic approach [45] [46]; it also adopts field formats as the observation instrument [41].

With respect to the choreographic approach there are three systems with a sound scientific basis: those of Laban [47], Benesh [48] and Eshkol-Wachman [49]. Apart from the differences between them their writing sequence provides information about the following basic questions: What moves?; What has changed?; and How has it changed? The search for answers to these questions structures the perceptual/linguistic behavior of the observer/analyst and means that the description of demonstrable movement (What has changed?) is rooted in the recognition of the communicative functions related to the expressive capacity of body zones and the use of the body through space [50] [51] [52] [53]. One way to ensure that the linking of codes (or morphokinetic phrase) which transcribes the motor event (what is seen and the order in which it is seen, in accordance with the search for answers to the above three questions) remains cohesive (rather than aggregated) is by assigning a phrase marker grammatical structure [54] [55] to the string of concurrent morphokinetic codes in one time unit of the recording. The formal grammatical model of morphokinetic syntactic categories (Figure 4.3) provides a rule-based morphokinetic phrase as a reference point, although this does not, of course, imply the need to translate the dynamic body movement observed into natural language:

$$^{K}[_{NG}[_{F}{}^{[codes]}{}_{F}\ {}_{S}[_{P}{}^{[codes]}{}_{P}\ {}_{O}{}^{[codes]}{}_{O}\ {}_{T}{}^{[codes]}{}_{T}]_{S}]_{NG}\ {}_{DG}[_{Det}{}^{[codes]}{}_{Det}\ {}_{M}{}^{[codes]}{}_{M}]_{DG}]_{K}$$

Figure 4.3 Phrase marker structure [K] of the string of morphokinetic codes. The block NG comprises the codes "what moves?" [F] and "what has changed?" [S]. The block DG refers to contextual characteristics: how has it changed?

Thus, two further criteria can be added to the previously mentioned criteria of agreeing "moment-to-moment" notation and restrictive coding: these are the structured perceptual/linguistic search for movement and the syntactic comparison of the string of codes which go to make up the morphokinetic description.

The second aspect of the CMA's theoretical and methodological framework, and one which also provides criteria for agreeing on how to use notational systems, is the adoption of field formats as the observation instrument.

4.3. Breaking down dimensions and field formats

All authors in the field agree that communication is multidimensional in nature, dimensions being understood as the levels of response or channels that are activated in every communicative process, and which correspond to those considered in the four multidimensional observational designs. Furthermore, each of these dimensions may be broken down into others of lesser depth. In other words, the hierarchical structure of communication should correspond to the various dimensions or channels or levels of response, each one of which would have its corresponding codes for use in the recording.

Obviously, given the enormous range of behaviors which are generated in a communicative episode, the development of an *ad hoc* observation instrument is perfectly justified. As it is almost impossible to categorize the perceivable behaviors corresponding to each one of the channels (since this would imply meeting the requirements of exhaustiveness and mutual exclusivity) the only instrument which can be used in the study of communicative behavior is that of field formats; this approach does not necessarily require a theoretical framework and is open (and therefore deliberately non-exhaustive), multidimensional, based on multiple codes and self-regulatable [41] [24] [43] [40][25].

The following diagram illustrates the role of a field format (comprising six criteria or dimensions) and provides an example of a recording made by means of a series of configurations (rows of the recording matrix); these show concurrence between all the codes recorded (in each row of the matrix) and the succession of configurations (rows) is ordered sequentially over time.

Episode XXX
Action YYY

Dimension A = A1 A2 A3 A4 A5 A6 A7 A8 A9A10 A11 A12 A13
Dimension B = B1 B2 B3 B4 B5 B6 B7 B8 B9
Dimension C = C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12C13 C14 C15
Dimension D = D1 D2 D3 D4 D5 D6 D7
Dimension E = E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11
Dimension F = F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14

} Field format

4 ‘’ A3 B7 C15 D2 E3 F9 → Configuration 1
9’’ A9 B7 C11 D5 E11 F9 → Configuration 2
6’’ A9 B1 C8 D7 E10 F13 → Configuration 3
5’’ A7 B1 C8 D4 E11 F10
8’’ A2 B1 C5 D7 E4 F10
.....
9’’ A7 B5 C14 D6 E10 F11

} Recording (n configurations)

In terms of its characteristics the recording obtained from the field format is no different from the notational structures — also in the form of matrices — proposed by Frey, Jorns & Daw [56], Frey *et al*. [57] and Hirsbrunner, Frey & Crawford [39], and which are known as *time-series notation*.

In both cases the content of the matrix reveals, through a simple example, the enormous complexity of information contained within the communicative flow, and constitutes a meeting point between the qualitative and quantitative perspectives on research into communicative behavior. Once data are available in the form of codes, with whatever transformations may be necessary, they can be subjected to quality control procedures and subsequently analyzed. This analysis may adopt various perspectives: relationship between dimensions, cross-section with respect to time, sequential patterns of codes for one or several dimensions, etc.

4.4. The code as datum and its transformations

Although we have referred to various recording options, in all of them it is necessary to decide how to obtain the clean data which will be extracted from the recording.

Technological progress has enabled the development of various computer applications capable of recording generically every perceivable behavior, and they can also be used to record sports behavior in real time [58]. A rough estimate suggests that there are currently around two hundred computer programs which can be used to conduct observational recordings, and some of these were mentioned above.

Obviously, the codes themselves are interchangeable as they are merely labels which enable data to be collected by means of a given appearance, the aim being to gather information about reality in a way that is manageable and suitable in terms of the transformation which will be carried out, where necessary, and which allows the data obtained to be subsequently subjected to quality control and analysis. Thus, the same recorded session could be recorded using many different types of codes.

Although both primary and secondary parameters may be considered we believe the former to be essential for the study of communicative behavior. Here we present them as levels that progressively acquire greater power in terms of data and their progressive order of inclusion [24]. The primary parameters are: Frequency, order and duration.

Frequency consists merely in counting behavioral episodes. It is without doubt the weakest parameter, although it has probably been the most widely used.

Order involves describing the sequence of the different behavioral episodes. In addition to information about frequency it also provides information that enables sessions to be distinguished from one another, whereas they may appear to be identical when considering the *frequency* parameter alone.

Duration is the most consistent recording parameter and that which contains the richest information, as it encompasses the *order* parameter and also indicates the number of conventional time units (minutes, seconds, etc.) corresponding to each behavioral episode; this additional information enables sessions which may appear identical when only contemplating the *order* parameter to be distinguished from one another.

Most computerized recording programs take account of these three parameters. If a recording is based on the order parameter, there are various programs which can be used, for example, the SDIS-GSEQ [31], using the options sequential event data, sequential interval data or sequential multi-event data. In terms of the duration parameter it is useful to distinguish between programs such as SDIS-GSEQ (SDIS module), which records in seconds (for the options sequential state data and sequential event data with time), and *Codex* [59], with respect to the program *ThèmeCoder* [33], which records in frames. Similarly, the program *Match Vision Studio* [34] is able to record in both seconds and frames.

4.5. Quantitative analysis on the basis of basic parameters

Traditionally, observational methodology suffered from being used in research lines in which the many different ways of analyzing its data were put to the test. The main reason for this was probably the superficial approach used in obtaining the data or, consequently,

their inconsistent nature. However, observational methodology is a particular strategy within the scientific method which aims to quantify the spontaneous behavior occurring in unprepared situations, and this requires that an ordered series of stages be followed. Its aim is quantification precisely because the mere recording of behavior as a form of data collection in direct observation is, by nature, qualitative. The purpose of the behavioral record in direct observation is to be found in the verification of problems (of description, covariation, causation, sequentiality, etc.) that arise in relation to the behavior of subjects in their habitual context. Clearly, therefore, there are a number of minimum requirements which must be fulfilled, for example, setting an objective, planning the study in stages, optimizing the data collected and matching the analytic strategy to the objective.

The data analysis used will depend on the proposed observational design [17] and the nature of the data recorded, that is, on the recording parameter chosen. Once the coded recording is available and the data quality is shown to be satisfactory, then the data can be analyzed.

Obviously, it is necessary to conduct a qualitative analysis of the recording made. Indeed, the staunchest supporters of qualitative methodology accept no other way of treating information, which they then triangulate and reduce in size before drawing conclusions.

However, this radical approach, under the pretext of capturing the wealth of information, suffers from a serious drawback, namely, the high risk of subjectivity [60]. In an earlier section of this chapter we argued that observational methodology occupies a privileged and unique position that bridges qualitative and quantitative procedures. Indeed, it is possible to capture the wealth of information by means of adequate recording, coding and the development of an *ad hoc* instrument, while at the same time using analytic techniques to ensure maximum rigor is applied in obtaining objective results.

According to their defining characteristics each one of the eight observational designs suggests certain kinds of data analysis, without these being imposed in any restrictive sense [17]. Once again, observational methodology can be seen to be characterized by the duality of flexibility, on the one hand, and precision, on the other.

The various ways of analyzing data now available within observational methodology provide a fertile ground within the field of evaluation, and offer a range of alternatives which must be properly chosen and used. However, it should be remembered that almost all data are categorical in nature (with the exception of time, which is continuous), and this constitutes an important limitation. On a purely anecdotal level it is worth noting the somewhat “deceptive” nature of the abovementioned time-series notation, since the technique of analyzing time series is not actually possible due to the categorical nature of such data.

5. Epilogue

In this chapter we have sought to offer a dynamic overview of a methodological process whose aim is the objective observation of perceivable communicative behavior. This process will depend on the extent to which it is possible to represent this communicative reality in a recording before systematizing it, coding it and obtaining data which can be subjected to quality control, thus converting raw into clean data. It is

in this sense that observational methodology can be regarded as an attempt to quantify behavior.

6. References

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