Observational guidelines of communicative exchange: An ecological approach to referential communication*

Humbert Boada
Maria Forns
Universitat de Barcelona

This paper describe some problems related to the evaluation of human communicative behaviour. Along these lines, a solution of sorts is sought to the subject through an attempt at combining the two existing paradigms. This new type is called referential-ecological analysis and its most original contribution is the notion of including the guidance of the adult experimenter as part of the communicative exchange. A detailed categorization system is presented for the communicative behaviour of the speaker, the receiver and the adult, justified by the previous contributions of various authors. A study of the reliability of the encoders is also presented. Finally, an example of this new encoding system of the communicative exchange is displayed.
Key words: Referential communication, observational methodology, coding system of communicative behaviour.

En este trabajo se exponen algunos de los problemas encontrados en la evaluación de la conducta comunicativa humana. Y dentro de esta línea se pretende aportar cierta solución al tema mediante un intento de unión de los paradigmas ya existentes. El nuevo tipo de análisis presentado es denominado referencial-ecológico, cuya innovación más relevante es la de incluir la tutela mediadora que ejerce un adulto experimentador en el intercambio comunicativo. Se presenta un detallado sistema de categorización de las conductas comunicativas del emisor, del receptor, y del adulto, justificadas a partir de trabajos precedentes. Se incluye también un estudio de la fiabilidad entre codificadores. Finalmente, se presenta un ejemplo del sistema de codificación del intercambio comunicativo.
Palabras clave: Comunicación referencial, metodología observacional, sistema de codificación de la conducta comunicativa.

Human beings communicate in many ways: some intentional, others involuntary. Contextual variables and cultural influences have a considerable effect on strategies of communication. In human language, a privileged communicative tool, they consolidate two broad communicative functions: a private one, represented by soliloquy, and a social one, represented by communicative exchange. Both are necessary for establishing effective adult communication. The interrelation of all these elements produces a high degree of complexity, which makes the study of human communication difficult.

A considerable amount of literature has appeared in recent years which places emphasis on communicative processes. The analysis of these processes involves the study of cognitive skills, including linguistic skills and social skills in terms of the conventions of the specific sociocultural group. Both types make up communicative competence, giving humans double control: interactive control with others, making it possible to adapt to the interactions necessary to communicate effectively, and control over one's own behaviour as a speaker or listener of communicative exchange.

Many different methods have been used to study communication leading to numerous attempts toward the creation of a taxonomy capable of organizing the wide range of data obtained. One of these attempts was presented at a conference in Madison, where Dickson (1981) established two lines of research which he called the «referential tradition» and the «sociolinguistic tradition». Both terms, but particularly the former, have become very popular and are now paradigms for communication studies.

The referential tradition can be traced back to Piaget's first research studies on psychology (1923) and began to attract attention in the United States at the end of the 1960s with the work by Glucksberg, Krauss and Weisberg (1966), which developed this line of research. Research based on this paradigm views communication as the capacity to distinguish, as both speaker or listener, what is a referent and what is not. All the conditions of the procedure were strictly defined within the experimental framework.

Criticism of this paradigm was principally aimed at the artificial nature of the situations created. It was argued that impeding mutual perception between the speaker and listener deprived the subjects of the use of some of their communicative skills. Other critics pointed out the generalized results (Dickson, 1981) because verification was lacking as to whether the data obtained via this procedure agreed with the communicative reality the subject would encounter in real life. Although these criticisms appear to be pertinent, they are exaggerated to a large extent because, in real life, human subjects are often limited to very formal situations. Therefore, a number of contexts –including those created in the classroom and/or professional life –have much in common with the communicative situations created using the referential communication paradigm. Regardless, many authors are aware of the difficulties involved in discussing the results obtained in the method inherent to this paradigm and insist on a reorientation of the research (e.g., Beaudichon and Ducroux, 1985).

The sociolinguistic paradigm brings together studies from a variety of sources designed using different disciplines as starting points. It includes the

study of all spontaneous behaviour obtained in natural situations and attempts to explain communicative behaviour in terms of social and contextual variables while paying little or no attention to individual cognitive processes. The most obvious conclusion to be obtained from this paradigm is that communication appears early on in ontogeny, contrary to what the results of referential research show. This should not cause as much surprise as it seems to, because the two methods analyze different communication processes. It is our opinion that effectiveness is being confused with communicative adaptation, which is a necessary aspect for effective communication, but insufficient by itself.

The importance of making a distinction between effectiveness and adaptation needs some explaining. Effectiveness refers to the success achieved between speaker and listener in the proper execution of a task, which is measured by comparing it to the referent model proposed by the organizer of the test. Frequently, the only criterion used is the listener's final execution. For communication to be effective, the issued message must precisely describe the task or referent and the listener must understand it and execute it appropriately. Adaptation is a part of this process. It is the degree of agreement between the message issued (which may or may not coincide with the reality of the referent) and the comprehension of this message (manifested through the listener's execution), regardless of the effectiveness of the communication. Problems with adaptation inevitably lead to communicative failure. At the same time, it may be possible to achieve appropriate adaptation even though communicative effectiveness has not occurred at all. Table 1 provides a brief outline of the difference between both communicative concepts.

TABLE 1. COMMUNICATIVE EFFECTIVENESS AND ADAPTATION

Effectiveness: contrast between A and D			
A REFERENT	**B** SPEAKER 1* Grasps referent 2* Formulates message	**C** LISTENER * Grasps message * Plans execution	**D** EXECUTION, RESULT
	Adaptation: contrast between B-2 and D		

The referential tradition analyzes communication in terms of the effectiveness of the performance of a task of greater or lesser cognitive degree, by contrasting the specific referent (A) with the final execution (D), whereas the sociolinguistic tradition deals primarily with the adaptation to communicative exchange of variable content, by contrasting any message (B-2) with the final execution (D).

Most authors agree that the two traditions should be merged. To achieve this, the referential tradition's experimental method needs to become more natural, bringing it closer to an ecological situation; likewise, the sociolinguistic tra-

dition should place greater emphasis on the phenomena of cognitive content transmission. Until now, attempts at integrating the two traditions have been few: Ackerman (1981), Sinclair (1981), Jackson and Jacobs (1982), Lloyd (1988) and Lloyd, Boada and Forns (1992).

This paper can be included in the line of synthesis between the two schools. Its origins are found in Boada and Forns (1989) and Forns and Boada (1993). To this end, a communicative task was designed which was typical of the referential model, but it was given a slant characteristic of the sociolinguistic tradition, with all the advantages of the aspects of negotiation and free cooperation. This synthesis will provide a more accurate approach to the study of communicative processes. The element of coordination comes from the presence of an adult as a participant in the communicative exchange with the basic mission of redirecting and guiding the communicative process. The adult's mediating activity was inspired by the Vygotskian concept of the «zone of proximal development» (Vygotsky, 1978) and by the work of Feuerstein (1979, 1980), where the adult becomes a good mediator in the student's learning experience and modifies the cognitive strategies of the learning process.

In order to achieve this goal, a communicative situation was set up as well as a system for categorizing the utterances of the speaker, the listener and the adult, their mutual interactions and the effects on the listener's performance.

The task and the experimental situation of communicative exchange are described first, followed by a detailed outline of the categorization system units. The indices of the analysis of agreement between encoding terms are also provided and a schema is presented for transcription and encoding.

TASK

The communicative task proposed is called «Organizing the room». In this task, communication is established where the spatial deictics call for a certain degree of cognitive complexity. The deictic context focuses on the «here and now» of the speaker. Benveniste (1966) shows the strength of deictics in the communicative act because, although these terms belong to language, they cannot be defined without alluding to their use. Moreover, deictic terms make it possible to specify the referent in any communicative context from daily life to the most organized contexts such as teaching environments. The semantic categorization of deictic terms is not easy and these terms also vary greatly from language to language (Bowerman, 1989). Plumert, Ewert and Spear (1985) recently distinguished different types of spatial landmarks in a task involving locating hidden objects in the classroom: those that indicate a support relationship («on», «in») and those that express a proximity relationship («next to», «behind»). They showed that the latter are more difficult to understand than the former. The proposed communicative task calls for the use of both types of spatial landmarks.

The task involves the use of two boards: one for the speaker and the other for the listener. The speaker's board has drawings of a table and a shelf and eight

objects distributed throughout (a large red cup, a small green cup, a pink bottle, a green bottle, a ball, a hat, a small cat and a large cat). The listener's board contains only the drawings of the basic objects (table and shelf). The other eight objects are separate and ready to be distributed in the drawing according to the speaker's instructions.

Describing the exact placement of these eight objects calls for the use of different cognitive skills. The referents «ball», «hat» and «green bottle» are easy to describe because the message relative to their position involves the use of linguistic terms acquired early on. According to Bowerman (1989), they are support terms (above/below, on top of/under, on, etc.) whose verbalization allows for the production of a basic quality message which facilitates fairly competent execution from the listener. However, in order to produce a suitable message, the referents «large cup / red cup» and «small cup / green cup» require the addition of the use of more complex spatial deictic terms such as «left/right», which are difficult to use for children under the age of seven. The coordinates necessary for correct placement of the objects are clearly explained in the speaker's drawing. There is greater complexity in the construction of suitable messages for «big cat» and «small cat» given that, besides the support location, the speaker must create a system of spatial relationships for objects which do not have clear spatial coordinates in the speaker's drawing. Finally, the referent «pink bottle» is included in the set of complex description referents because it not only lacks clear coordinates as to its position, but it is also the only one for which it is necessary to indicate its specific orientation in space.

EXAMINATION SITUATION

The design of the examination situation was inspired by Krauss and Glucksberg (1969) and consists of the exchange of information between two children of the same age who are separated from one another by an opaque screen. The examiner sits between the children, shows them the listener's material and proposes that they produce two identical boards. The examiner asks the speaker to tell the listener where the objects are on the board. The adult asks the listener to situate the items in the place on his/her own board indicated by the speaker and also suggests he/she ask as many questions as necessary.

The difference between this design and that of Krauss and Glucksberg (1969) is the presence of the adult examiner between the children, who is a participant in the development of communicative interaction. The examiner's explicit mission is to intervene when he/she deems it necessary to avoid communicative failure. The task, therefore, is to reestablish communication, avoid communication breakdowns and, in general, help the children to execute the task. His/her role is similar to that of a teacher trying to achieve successful performance of a task. In this sense, the adult is not given more specific instructions in order to preserve the ecological nature of the test.

Figure 1 shows the speaker's board, the listener's board and the spatial schema of the three participants.

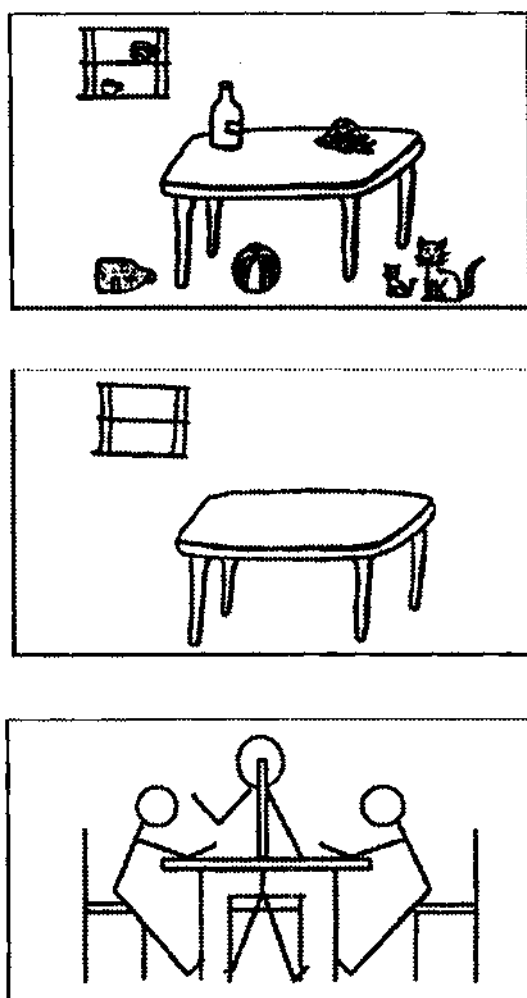Figura 1. The speaker's board, the listener's board and the spatial schema of the three participants.

INSTRUCTIONS

The instructions for performing the task are expressed as follows:

– The examiner addresses the children, shows them the listener's material and says:
«Here is a drawing with a table and a shelf. All these things (holding the set of objects) are the objects that we must put in their proper place. We're going

to play a game together. One of you will tell the other where to put each thing. The idea is to end up with two boards that are exactly the same. Do you understand? Let's see if you can do it.»

– The examiner then places the screen between the children and tells them:

«To make this game more interesting and fun, we're going to put a screen between you. You won't be able to see one another. You can only talk.»

– The examiner then gives each child his/her material and tells the speaker:

«On this board, the objects are all in their proper place. You have to describe their position very clearly to your friend so that he/she can put them in the right place. You have to do a good job so he/she can do a good job.»

– To the listener he/she says:

«You have to do what he/she tells you. You can ask questions about anything you don't understand.»

– Finally, the examiner asks the speaker to begin. The instructions can be repeated as often as necessary. The only essential requirement is that the children should not be given models of the messages they are to produce and the listener should not see the speaker's board.

UNITS OF ANALYSIS

Two levels of analysis are considered: communicative units and utterances.

– A communicative unit is made up of the verbal and manipulative production between the three interlocutors present in the experiment regarding the objects on the board. A communicative unit starts when one of the subjects begins to speak about an object and ends when another object is selected and described. The length of the communicative unit is defined by the number of times a different person speaks.

The communicative unit usually begins with a message formulated by the speaker. Throughout the communicative exchange, the speaker can modify his/her initial message either on his/her own initiative or in response to the verbal interventions of the listener or the adult.

Different kinds of communicative units have been distinguished:

a) Communicative units containing only one message.

b) Communicative units with reformulated messages. These units have at least two messages –the initial one and the final restructured message– but can contain different restructured messages which are modified throughout the interactional exchange.

c) Communicative units with repeated messages. These units contain more than one message without any informative difference between them.

– The utterance is the functional verbal product made by the speaker, listener or adult. There are different kinds of verbal utterances according to their function. Gestural productions replacing verbal expressions are also considered. These gestural productions have the same significant relation as verbal expressions and include gestures such as nodding or shaking the head.

Each time someone speaks, many different kinds of utterances may be produced. Therefore, the following guidelines have been established:

An utterance is considered to take place every time a different person speaks and contains only one functional verbal product.

If one speaker's turn contains more than one functional verbal product, it is considered as follows:

Different types of utterances are encoded if they are addressed to different interlocutors, including the person speaking as an interlocutor involved in private language.

However, in some cases, the utterance addressed to the same interlocutor contains different functional verbal products. In this case, only one utterance is encoded, consisting of the one with the highest cognitive content. The continuous degree of cognitive weight is expressed in the categorizing system, which shows the decreasing order of presentation of each kind of utterance.

In speaking turns containing a message, other additional utterances may also be encoded.

CATEGORIZATION SYSTEM

Table 2 shows the basic units of the categorization system according to the interlocutor who has produced them. In this paper the catalan abreviation have been mantained. Each category is made up of different variables covering the following aspects:

– Utterances whose informative content is related to the specific referent. They include five basic categories: *Messages, Contributions, Questions, Guiding interventions and Interlocutor regulation.* They are characterized by their explicit effect on the communicative process and refer primarily to the formulation of informative elements of the message or cognitive aspects of the task.

– Private language aimed at controlling one's own behaviour. They are utterances without public communicative intention. A single type called *Internal regulation* was considered.

– Utterances that provide information not related to the specific referent are grouped in a basic category called *Weak regulation.* This includes a wide range of utterances whose function is to regulate the communicative exchange without providing new information about the key elements of the message.

A. Messages

This is the most commonly analyzed skill in referential communication studies. However, sufficient information is not available on this skill to provide a model through which the development of children's communication can be measured. All the authors who have written on the subject focus on the absence of ambiguity as an important characteristic of communicative effectiveness. This ambiguity would seem to be the main problem in the construction of children's

Type of information	Basic categories	Speaker	Listener	Adult
Information on the referent	* Message Referent object General location Relationship between objects Specific relationship Position	O DL R R_1 P_t		
	* Contributions to message Referent object General location Relationship between objects Specific relationship Position		APO APDL APR APR_1 APP_t	
	* Questions Referent object General location Relationship between objects Specific relationship Position Vocabulary questions General questions/answers	PAO PADL PAR PAR_1 PAP_t PV PG/RG		
	* Guiding interventions			IG
	* Interlocutor regulation Task planning Information correction Information clarification Regulation of examiner	RALPL RGAL RGALAC RGEX		
Private language	* Internal regulation	RGI		
Exchange unrelated to referent	* Weak regulation – Task stimulation: simple suggestions reduction of verbal rate indication of completed task expression of positive emotion provocation of discouragement self-discouragement – Maintaining communication channel open: inability to hear demanding attention controlling motor behaviour repetition of utterance – Passive expressions: acceptance negation	sg sgr sgf e en rdg -a at cm rep acp neg		
	– Distracting interventions critical comments information unrelated to referent playful utterances	cc c cl		

messages because youngsters are little aware of the fact that their message could be ambiguous or incomplete (Robinson, 1981; Sonnenschein, 1984).

The ideal message is often considered to be one that lacks ambiguity (Lloyd and Beveridge, 1981). Within the referential paradigm, this type of message is labeled contrastive, thus distinguishing it from redundant or incomplete messages (Whitehurst, 1976). Contrastive messages offer the necessary characteristics for the message to be informative; redundant messages offer more characteristics than those strictly necessary and incomplete messages offer fewer.

For a message to be effective, it must also be adjusted to the listener. Experience shows that not all technically informative messages have the same degree of effectiveness for all listeners (Sonnenschein, 1985). As Beaudichon (1982) states, children have little skill with their verbal expression when an imposed referent is before them. Along these lines, Peterson, Danner and Flavell (1972) stress the limited ability of four-year-olds to restructure messages when they are told that the information given is insufficient.

Given the complexity that can arise when describing the referent, it is necessary for the message encoding and analyzing system to allow for the detection of evolutionary changes that occur. In this sense, the system should enable the detection of the prototypal message for each age group and its successive approximation to the adult message.

Thus, the message is looked at from two perspectives: (a) analytically, to contemplate the objective characteristics of the cognitive description of the message and (b) more generally, to synthesize the analytical information in message styles according to informative quality.

a) *Cognitive description of the message*

The objective is to identify the informative quality and quantity of the messages produced. The following elements are taken into account:

• *Object name (O)*:
The objects described are encoded with the first letter of their name. The basic common objects (table and shelf) need not be explained because the speaker knows that they are fixed elements on the listener's board. But if messages are provided on these objects, they are also encoded:

In Catalan

P	pilota	(ball)
B	barret	(hat)
T	tassa	(cup)
G	gat	(cat)
A	ampolla	(bottle)
O	taula, prestatgeria	(table, shelf)
Obj	aquest, això	(this, that)

The objects cup, cat and bottle are encoded with another initial if the attribute that determines the referent is provided: Big (g) or small (p) for the cats; pink (r) or green (v) for the bottles and any of the four indicators (g, p, r, v) for the cups. All the objects except for the ball and hat can include the indicator for the plural (s).

Example:

Big cat	Gg
Small green cup	Tpv
Pink bottle	Ar
Cats	Gs

• *Object location:*

An object can be described by indicating its basic and specific location.

The basic location (DL) includes the first deictic approximation with regard to the three basic referents (floor, table and shelf).

The specific location adds information as to the placement of the object. We distinguish three types: a specific spatial relationship (R), a grouping relationship (R_1) and a position (P_i). They can all occur simultaneously. The «R» relationship adds a specific spatial indication to the basic location (DL) that helps to specify the relationship between the referent object and the other referents having the same basic relationship. The relationship between objects that can be grouped (R_1) is applied only to the referents «cats» and «cups». In the specific case of «cup», a decision was made to apply the R relationship to the use of the words «above» and «below» and the R_1 relationship to the words «left» and «right», depending on their position on the shelf. Expressing the correct position of the pink bottle is indicated through the P_i encoder.

Example:

The ball (P) under the table (DL), in the middle (R).
The big cat (Gg) on the floor (DL), near the table (R), to the right of the small cat (R_1).
The small cup (Tp) on the shelf (DL), below (R), to the left (R_1).
The pink bottle (Ar) lying (P_i) on the floor (DL).

Each specified unit (O, DL, R, R_1, P_i) can be expressed correctly by accurately indicating the referent and its characteristics (+), incorrectly or erroneously (–), ambiguously (a) or the necessary information can be omitted (o).

Example:

The hat on the table on the right side	B⁺ DL⁺ R⁺
The ball on the table	P⁺ DL⁻ R°
The cat near its mother	Gᵃ DL° R° R₁ᵃ

Children usually produce an independent message for each object (or referent), but in certain cases they produce messages that include information referring to more than one referent. We call these *related messages*. This occurs frequently with the objects that can be easily grouped (cups and cats).

On other occasions the child takes advantage of information that has already been given in previous messages or has been contributed by the listener. The speaker omits part of the information that nonetheless forms part of the communicative context, treating it as tacit information. These we call diachronic messages. Following is an explanation of how we encode related messages and diachronic messages.

Related messages:

The types of utterances include:

– Use of the plural. The speaker describes the referent in the plural. The resulting sentence is encoded as if it were a single message.

Example:

The cats on the floor $\quad$ Gs$^+$ DL$^+$ R$^\circ$ R$_1^\circ$

– Use of the plural to refer to the referents and expression of specific information for each object. Two messages are encoded.

Example:

The cups on the shelf, the small one below $\quad$ Tp$^+$ DL$^+$ R$^+$ R$_1^\circ$
and the big one above. $\quad$ Tg$^+$ DL$^+$ R$^+$ R$_1^\circ$

– Use of the conjunctive link to refer to the referents and unified expression of the rest. Two messages are encoded.

Example:

The green bottle and the hat on the table. $\quad$ Av$^+$ DL$^+$ R$^\circ$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ B$^+$ DL$^+$ R$^\circ$

Diachronic messages

In these cases, all the information expressed is encoded and the fact that tacit information is involved is indicated by placing it in parentheses. Here are a few examples:

– The speaker uses information expressed in previous messages.

Example:

Speaker:	The red cup on the shelf, above.	$Tr^+ DL^+ R^+ R_i°$
Listener:	Right!	
Speaker:	The other green cup below.	$Tv^+ (DL^+) R^+ R_i°$

– The speaker restructures the message as the result of a communicative exchange:

Example:

Speaker:	The bottle on the table	$A^a DL^+ R°$
Listener:	Where?	
Speaker:	To the left	$(A^a DL^+) R^+$

When the speaker uses information provided earlier by the listener, we make a distinction between two situations:
– The listener gives additional information:

Example:

Speaker:	The green bottle	$Av^+ DL° R°$
Listener:	On the table	
Speaker:	Yes! Yes!	$(Av^+ DL^+) R°$

– The listener gives additional information on elements of the message through confirmatory questions:

Example:

Speaker:	The green bottle	$Av^+ DL° R°$
Listener:	On the table?	
Speaker:	Yes	$(Av^+ DL^+) R°$

b) *Message styles*

The analysis made thus far on the objective characteristics of the message is synthesized in seven types or styles that express the quality of the information contained in the message.
– Erroneous message: Contains mistaken information on any of the basic elements: O^- and/or DL^-.

Example:

The hat under the table   B⁺ DL⁻ R°

– Non-informative message: Contains information that cannot be adequately encoded by the listener. The message is made up of pronouns (this, that) and adverbs (here, there). The overall message is incomprehensible.

Example:

Put this here   Objᵃ DLᵃ R°
Take this   Objᵃ DL° R°

– Minimum message: Contains partial information (correct or ambiguous) on the basic elements O and DL. The following cases can be produced: O° Dlᵃ; O° DL⁺; Oᵃ Dl°; Oᵃ Dlᵃ; O⁺ DL°.

Example:

The cat   Gᵃ DL° R°
This on the table   Objᵃ DL⁺ R°
A bottle here   Aᵃ DLᵃ R°

– Minimum relational message: This is a minimum message that expresses related elements. The total is incomplete and the missing elements cannot be identified by the context. At least one of the relational terms expressed must be correct or ambiguous.

Example:

The big cat to the right of the small cat   Gg⁺ DL° R° R₁⁺

– Basic message: Contains information on the object and the basic location (O, DL). At least one of these two elements must be correct.

Example:

The green bottle on the table   Av⁺ DL⁺ R°

– Basic relational message: This is a basic message that is accompanied by the relational statement (R, R₁, or Pᵢ).

Example:

The green bottle on the table, on this side   Av⁺ DL⁺ Rᵃ

– Basic complex message: Utterance that contains all the necessary information to correctly describe the referent.

Example:

The cup on the shelf, above, on the right   Tr^a DL$^+$ R$^+$ R$_1$$^+$

B. Contributions

Contributions include any relevant information on the referent given by the listener. In general, in their role as listeners, preschool children do not show inordinate skill in providing contributions to the message. Most authors agree that this skill is acquired later. Although there are considerable gaps in the data we have on this subject, it can be deduced that this skill is undeveloped because of the lack of deliberative control when evaluating the message, as was stated above in the section on messages. It appears that children feel they have sufficient information to interpret the message even when the message is ambiguous or incomplete. This fact is interpreted in different ways. Camaioni and Ercolani (1988) believe that the inability to recognize ambiguity is linked to difficulties in comparing and identifying differences between referents. Another interpretation refers to a problem of representing reality, which cannot be resolved until «what is said and what is thought» are differentiated (Beal, 1988, Bonitatibus, 1988). Robinson and Robinson (1983) state that although very young subjects have the pertinent cognitive elements to identify an ambiguous message, they are unable to perform the operation of detecting the ambiguity of the message because they are simply unaware that messages can be ambiguous. In fact, Glucksberg, Krauss and Higgins (1975) focus on the ability to specify additional information necessary to clarify the message and consider it to be the most active role the listener can perform.

In our categorization system, these contributions are encoded as «Ap». They are elements of the message contributed by the listener, especially after the first trial, at which time the listener can use information acquired previously.

It is necessary to distinguish between contributions on the object (Apo), its basic location (Apdl), the relationship between the objects (Apr), the specific relationship (Apr$_1$) and the position of the bottle (App$_1$). The following examples show the different types of contributions (shown on the right) that can be produced after messages (shown on the left).

Examples:

Speaker messages	Listener contributions	
The bottle on the floor	– the pink bottle	Apo
Put the hat	– on the table	Apdl
The cups on the shelf	– one above and one below	Apr
The cups on the shelf	– the red one above on the right	Apr
	and the green one below on the left	Apr$_1$
The pink bottle on the floor		
to the left of the table	– on the floor with the neck pointing	
	toward the table	App$_1$

C. Questions

The most valuable strategy the listener has for eliminating ambiguity from the message is to ask for information (Pa). In this situation, the listener evaluates where the problem resides and requests new information.

It would seem advisable to bear in mind that not all questions are equally complex or effective. The skills necessary to produce questions that focus on the relevant distinctive element in order to eliminate ambiguity from the message are developed slowly and the recent work done by Bonitatibus (1988) and Courage (1989) show how infrequently these questions occur among preschoolers.

The system proposed here for categorizing these skills is based on the version by McTear (1985) and the taxonomy developed by Garvey (1979). Questions aimed at clarifying the message (Pa) are differentiated from general questions (Pg). The former are further differentiated between those aimed at distinguishing the referent object (Pao), those that are asked to clarify the basic deictic aspects of the message (Padl) and those asked to request information on relational aspects of the objects expressed in the message (Par, Par_1, Pap_1). As they get older, the subjects are expected to request information in the presented order of increasing cognitive complexity. Included in this type of questions are those that elicit verbal information on the name of the object (Pv).

Questions not aimed at clarifying specific elements of the message, but at requesting general information about the task itself and obtaining information on the communicative exchange, are treated in this categorization system as general request strategies (Pg). The replies to these general requests are also included in this section (Rg).

Question formulation can highlight self-regulatory skills insofar as the question is formulated to detect message ambiguity.

Example:

Types of questions depending on what is asked:

object	Which bottle should I place?	Pao
location	Where should I put the cup?	Padl
relationship	On the table near the bottle?	Par
specific relationship	What is on the right?	Par_1
position	What direction does the bottle face?	Pap_1
vocabulary	What is this? What's it called?	Pv
general question	Do you have anything else?	Pg
general reply	I have placed everything	Rg

D. Interlocutor regulation

These are utterances designed to direct the interlocutor's actions. The content of these utterances is related to the message or the referent, but does not pro-

vide new information. They are often linked to solving joint problems in a situation of cognitive conflict. Garton and Renshaw (1988) have produced one of the few papers on this subject. The work of Beaudichon, Legros and Magnuson (1991) recently showed that the communicative structure behind this regulation does not begin to develop in a remarkable way until the age of 10

Obviously, the concept of regulation is very broad and goes beyond the type of analysis done in this categorization. In a broad sense, most of the categories included in this system can be viewed from the perspective of regulation. Four types of verbal utterances have been included that attempt to affect the other's behaviour. Planning regulation (Rgalpl) is a verbal aid that fosters task planning. Correction regulation (Rgalc) is an utterance whose content corrects information given previously. Clarification regulation (Rgalac) provides helpful information or confirms something, without providing new information. Explicit regulation aimed at the examiner is encoded as Rgex.

Example:

– I've already told you everything about the cats and cups, now I'll tell you something different	Rgalpl
– Not on top! I said under	Rgalc
– I just put the green cup on the right	Rgalac
– Tell him how he should put the cups. You can see it!	Rgex

E. Internal regulation

These are utterances said to oneself, without the intention of influencing the interlocutor and aimed at guiding or controlling the speaker's own behaviour. They are also referred to as self-regulation. According to Bibler (1983-84), they are internal dialogue forms. Vygotskian theory sees them as underdeveloped forms of internal speech which are still linked to the egocentric period (cf. Hickman, 1985).

The main methodological difficulty of studying internal regulation involves the problem of accessing inaudible language. The only accessibility comes from this egocentric language which has a functional continuity with internal language. Research on the subject (e.g., Beaudichon and Melot, 1973) shows that, in general, despite the little data provided, Vygotskian theory finds experimental data to be justified (cf. Girbau, 1993).

The indicators we take into account for detecting internal regulation include a lower tone of voice, repeating elements of the message or giving oneself instructions on the task at hand and a high degree of concentration or focus on the task. These utterances are often related to the cognitive conflict the children have to resolve.

Example:

(Softer) The hat on the table. (Reflectively repeating a message just given, while selecting and placing the hat)	Rgi

F. Guiding interventions

The analysis of the adult's participation in the communicative exchange represents the most original contribution of our work. The adult's influence on experimentation has received extensive treatment, because even in the most neutral tests, the mere presence of the person who presents the experiment exerts some kind of effect on the results. This is particularly the case when the subjects examined are very young.

In our case, instead of skirting or overlooking the analysis of the examiner's influence, we feel that his/her interventions throughout the communicative exchange form part of our analysis and represent one of the few attempts to study the role of the guiding adult in referential communication, a subject which has received scant attention to date (cf. Robinson and Wittaker, 1986, Brown and Ferrara, 1985).

Guiding interventions produced by the adult to prevent communicative failure are categorized as «ig». Their content controls specific information on the message while attempting to keep communication channels open.

Example:

(Adult to speaker) Tell him/her where to put the cup   ig

G. Weak regulation

Weak regulation involves mild regulatory utterances which, at the same time, are of considerable importance because they often avoid communicative failure and attempt to reestablish communication when it has failed. Garvey (1987) points out that weak regulation can be a source of feedback between interlocutors. Following is a description of the five forms of weak regulation that share the common characteristic of constituting communicative exchange unrelated to the referent.

The first group of weak regulation utterances consists of stimulation to perform the task and can be produced by any of the three interlocutors: simple suggestions to stimulate the continuity of the task (sg), to regulate the rhythm of production of the dialogue by adapting it to the interlocutor (sgr) or ways of informing the interlocutor that the task is finished (sgf). This group also contains positive emotional expressions to encourage the interlocutor (e), emotional utterances to discourage the interlocutor (en) and self-discouraging comments (rgd).

The correct transmission of information may be affected if the information does not arrive in good condition to the interlocutor. Weak regulation exerted by any of the three interlocutors aimed at keeping the communicative channel open may include: asking him/her to speak louder (-a), controlling attention (at), or controlling motor behaviour (cm). The adult may also repeat the message

formulated by the speaker in order to channel it appropriately (rep). Utterances in this last category are rarely produced by the speaker or listener.

Another group of weak regulation utterances refers to passive expressions such as simple acceptance or negation (acp/neg), which may be formulated by any of the three interlocutors.

Also included under the category of weak regulation are those utterances unrelated to the referent that do not contribute relevant information and do not lead to communicative effectiveness because they transmit irrelevant information. They have been labeled «distracting» interventions. Their presence constitutes inadequate communication which is unable to direct the interlocutor's attention toward fundamental attributes (Ochs and Schieffelin, 1979). The following distracting utterances have been differentiated: critical comments that do not contribute effective information on the task (cc), comments that provide information unrelated to the situation and the task (c) and playful utterances (cl). These utterance are not applicable to the examiner.

The set of weak regulation utterances represents a system that facilitates or impedes conversation without which, as Garvey suggests (1987), it would be impossible to operate. Although they are common in referential communication situations, they are not welcome. Their abundance indicates a lack of concentration on the task, though paradoxically, they may produce the same feedback as a stronger guiding intervention from the examiner.

Examples:

* Stimulation of the task:
Come on. What else?	sg
Wait. Not so fast.	sgr
I'm finished. What else?	sgf
You're doing a good job.	e
I don't understand you at all!	en
I don't know how to do this!	rgd

* Maintaining communication channel open:
Say it again; I can't hear you.	-a
Come on. Time to start.	at
Sit still.	cm
(Simple repetition of the last intervention.)	rep

* Passive expressions:
Yes, good.	acp
No.	neg

* Distracting interventions:
The hat is stuck here.	cc
Look, my shoe is broken.	c
La, la, la. I'm singing!	cl

TRANSCRIPTION AND ENCODING

The utterances of each pair of children were transcribed as shown in Appendix 1. The format chosen makes it possible to see the utterances of each interlocutor, as well as the pointing gestures that replace verbal communication of the speaker and/or listener.

The interlocutors' utterances follow one another logically to facilitate reading the communicative flow. This communicative flow also includes the execution of the task, which is encoded in terms of the degree of adaptation to the verbal message (communicative adaptation aspect) and the arrangement of the board or referent (communicative effectiveness aspect).

Once the transcription is finished, the verbal exchange is encoded according to the system presented here.

RELIABILITY OF THE CATEGORIZATION SYSTEM

Reliability between encoders was calculated using Cohen's Kappa index (Cohen, 1960; Bakeman and Gottman, 1989). Five psychologists encoded the utterances of 18 pairs of children (six pairs aged 4, 6 and 8, respectively). Each psychologist received the transcriptions and the encoding system as described above. Ten Kappa indices were obtained for each age group as a result of the combinations of the five encoders taken in pairs.

The Kappa indices were analyzed at three levels of complexity. The first analysis consisted of 28 categories. Secondly, given the number of indicators classified in the categories of weak regulation and interlocutor regulation and the limited number of indicators into other indicators, the decision was made to reorganize the categories into 15 types, and then reclassify them again into the eight broadest categories (Message, Contributions, Questions, Interlocutor regulation, Internal regulation, Weak regulation, and Guiding interventions). Table 3 shows the codes grouped according to type. The last category includes encoding omissions.

Table 4 shows the different Kappa indices for the three ages analyzed according to the different groupings of variables (in 8, 15 or 28 categories).

In the four-year-old age group and in the bracket with the maximum number of categories, from a total of 214 observations, the agreement indices between two encoders showed an overall Kappa index of .687. The highest agreement index obtained between two encoders was .742 and the lowest .626. In the same age group in the 15-category bracket, the overall Kappa index was .704. In this case, the highest index between two encoders was .756 and the lowest .638. Finally, when this age was classified in the 8-basic-category bracket, the overall Kappa index was .772 with a maximum agreement index between two encoders of .795 and a minimum of .732.

In the six-year-old age group, from a total of 191 observations, the Kappa indices obtained were slightly better in the 28- and 15-category brackets and slightly worse in the 8-category bracket than those of the four-year-old age

TABLE 3. ENCODING CATEGORIES OF SPEAKER, EXAMINER AND LISTENER UTTERANCES:
ORGANIZED IN 8, 15, 28 CATEGORIES

8 Categories	15 Categories	28 Categories
* Message	* Message	* Message
* Contributions	* Contributions	* Contributions
* Questions	* Vocabulary questions	* Vocabulary questions
	* General questions and questions abaout the message	* General questions * Object questions * Location, relationship and position questions
*Guiding interventions	* Guiding interventions	* Guiding interventions
* Interlocutor regulation	* General replies	* General replies
	* Interlocutor regulation	* Rg correction * Rg planning * Rg clarification * Rg examiner
* Internal regulation	* Internal regulation	* Internal regulation
* Weak regulation	* Suggesting the task	* Simple suggestions
	* Stimulation and maintenance	* Encouraging * Discouraging * Slow down * Inaudible * Pay attention * Motor control
	* Passive replies	* Negation * Acceptance
	* Self-discouraging regulation	* Self-discouraging regulation
	* Distracting interventions	* Critical comment * Unrelated comment * Playful behaviour
	* Repetition and suggestion of end	* Repetition and suggestions of end
* Encoding omissions	* Omissions	* Omission

group. The 28-category bracket showed a Kappa index of .701 (minimum: .589; maximum: .800). In the 15-category bracket the index was .729 (minimum: .612; maximum: .818), and in the 8-category bracket it was .766 (minimum: .657; maximum: .874).

In the eight-year-old age group, from a total of 187 observations, the Kappa index in the 28-category bracket was .689 (minimum: .644; maximum:

TABLE 4. KAPPA INDICES FOR THE THREE AGES ANALYZED ACCORDING
TO THE DIFFERENT CATEGORY GROUPINGS

Age Number of observations	Age 4 214	Age 6 191	Age 8 187
28 Categories			
Overall Kappa index	.687	.701	.689
Agreement percentage	.722	.754	.755
Disagreement percentage	.113	.176	.212
p < .001			
15 Categories			
Overall Kappa index	.704	.729	.716
Agreement percentage	.744	.781	.778
Disagreement percentage	.136	.189	.217
p < .001			
8 Categories			
Overall Kappa index	.772	.766	.741
Agreement percentage	.832	.831	.816
Disagreement percentage	.264	.279	.289
p < .001			

.712); the index was .716 in the 15-category bracket (minimum: .682; maximum: .768) and .741 (minimum: .712; maximum: .784) in the 8-category bracket.

All the Kappa indices obtained can be considered adequate (Fleiss, 1981). Encoding in eight categories gives excellent reliability indices for all age groups. In the future, when analysis is done using detailed categories, reliability can be considered adequate and the quality will improve the more general analysis is performed on communicative behaviour.

FINAL CONSIDERATIONS

The work presented here attempts to make some of the large communicative areas operational within the so-called ecological-referential framework and to introduce the encoding system and give an idea of its reliability. The good degree of agreement between the evaluators at all three analysis levels justifies the work done and encourages the continuance of the project. The analysis system of the established basic categories can be considered adequate and applicable to communicative flow between the children and the adult. However, in this respect, a few critical points must be mentioned.

It will be noted that some of the categories have not been analyzed in as much detail as the categorizing system offers. For example, the Message and Contributions categories can be broken down into various indices and yet the considerable specificity involved in their detailed analysis made it advisable to deal with them in the reliability study as overall categories. The Guiding inter-

ventions and Internal regulation categories are dealt with in all cases in all their extension because in this system they are presented as single categories; however, their interest and complexity make it possible to delve into them in studies focusing specifically on these subjects. In other categories, the opposite occurred, where a detailed reliability analysis was presented. This was the case of Interlocutor regulation and Weak regulation, where all the possibilities were addressed.

All communication studies consist of specifying the effectiveness of communicative behaviour in terms of the complexity of the referent. To do this, the message produced by the speaker obviously represents a basic element of analysis. Unfortunately, there is little agreement among researchers as to the evaluation criteria to be used. For this reason, our study considers different perspectives for analyzing the message, such as the type of information and message styles. This form of evaluation can often lead to excessive fragmentation of the results obtained, making it necessary for each work group to adapt its analysis system to the specific situation in the quest for comprehensive, global measurements.

In order to communicate, human subjects use skills other than the mere formulation of the message. With this in mind the aim of this study is to find a framework from which to analyze the different communicative exchange skills. Some of the aspects deserving special consideration are the ability to reformulate messages, the elements that trigger reformulation, the interlocutor's adaptation, the awareness of the ambiguity of messages and the strategies for resolving this ambiguity. Greater regulation of these skills produces greater communicative effectiveness. To achieve this, interlocutors can use a myriad of strategies.

These strategies are not independent, but are triggered and organized in communicative sequences of distinct value. The identification of these key behaviours, their value in relation to the age of the interlocutors, the development of these communicative processes with age and the analysis of the background and consequences of communicative behaviour (organization in patterns) are the aspects that must guide communication studies today.

It is obviously too early to come up with broad-based communication theories. We can see, however, that the referential paradigm –which has been largely experimental to date– is gradually emerging from its primitive schemata and allowing for the introduction of new analysis schemata, thus offering the informative richness of studies in the sociolinguistic tradition.

REFERENCES

Ackerman, B. P. (1981). The understanding of young children and adults of the deictic adequacy of communication. *Journal of Experimental Child Psychology, 31*, 256-270.

Bakeman, R. & Gottman, J.M. (1989). *Observación de la interacción: Introducción al análisis secuencial.* Madrid: Morata.

Beal, C. R. (1988). Children's knowledge about representation of intended meaning. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind* (pp. 315-325). Cambridge: Cambridge University Press.

Beaudichon, J. (1982). *La communication sociale chez l'enfant*. Paris: P.U.F.

Beaudichon, J. & Ducroux, N. (1985). L'approche du contrôle cognitif de la communication chez l'enfant: quelques données, quelques problèmes. In J. Bideaud et M. Richelle (Eds.), *Psychologie développementale. Problèmes et réalités* (pp. 139-159). Bruxelles: Dessart.

Beaudichon, J., Legros, S., & Magnusson, M. (1991). Organisation des régulations inter e intrapersonnelles dans la transmission d'informations complexes organisées. *Bulletin de Psychologie, 399*, 110-120.

Beaudichon, J. & Melot, A. M. (1973). Nature and instrumental function of private speech in problem-solving situations. *Merrill-Palmer Quarterly, 4*, 117-136.

Benviste, E. (1966). *Problèmes de linguistique générale*. Paris: Gallimard.

Bibler, V. S. (1983-1984). Thinking as creation: Introduction to the logic of mental dialogue. *Soviet Psychology, 22* (2), 29-54.

Boada, H. & Forns, M. (1989). *Methodological data for the analysis of referential communication from an ecological perspective*. Report UB-DPB-88-13. Departament de Psicologia Bàsica. Universitat de Barcelona.

Bonitatibus, G. (1988). What is said and what is meant in referential communication. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind* (pp 326-338). Cambridge: Cambridge University Press.

Bowerman, M. (1989). Learning a semantic system: What role do cognitive predispositions play?. In M. L. Rice & R. L. Shiefelbusch (Eds.), *The teachability of language* (pp. 133-170). Baltimore: Paulh Brookes Publishing Co.

Brown, A. L. & Ferrara, R. A. (1985). Diagnosis zones of proximal development. In J. V. Wertsch (Ed.), *Culture, communication and cognition* (pp. 273-305). New York: Cambridge University Press.

Camaioni, L. & Ercolani, A. P. (1988). The role of comparison activity in the development of referential communication. *International Journal of Behavioral Development, 11* (4), 403-413.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.

Courage, M. L. (1989). Children's inquiry strategies in referential communication and in the game of twenty questions. *Child Development, 60*, 877-886.

Dickson, P. W. (1981). Introduction: toward an interdisciplinary conception of children's communication abilities. In P. W. Dickson (Ed.), *Children's oral communication skills* (pp. 1-10). New York: Academic Press.

Feuerstein, R. (1979). *The dynamic assessment of retarder performers. The learning potential assessment device. Theory, instruments and techniques*. Baltimore: University park Press.

Feuerstein, R. (1980). *Instrumental enrichment: an intervention program for cognitive modifiability*. Baltimore: University Park Press.

Fleiss, J.L. (1981). *Statistical methods for rates and proportions*. New York: Wiley.

Forns, M. & Boada, H. (1993). Evaluación de habilidades comunicativas en situación referencial: unidades de análisis. In M. Forns & M. T. Anguera (Comps), *Aportaciones recientes a la evaluación Psicológica* (pp. 137-158). Barcelona: P.P.U.

Garton, A. F. & Renshaw, P. D. (1988). Linguistic processes in disagreements occurring in dyadic problem solving. *British Journal of Developmental Psychology, 6*, 275-284.

Garvey, C. (1979). Contingent queries and their relations in discourse. In E. Ochs & B. Schieffelin (Eds.), *Developmental pragmatics* (pp 363-372). New York: Academic Press.

Garvey, C. (1987). *El habla infantil*. Madrid: Morata.

Girbau, D. (1993). El llenguatge privat i social en la comunicació referencial i sociolingüística. Tesis doctoral. Universidad de Barcelona.

Glucksberg, S. Krauss, R. M., & Higgins E. J. (1975). The development of referential communication skills. In F. D. Horowitz (Ed.), *Review of child development research* (Vol. 4, pp. 305-344). Chicago: Chicago University Press.

Glucksberg, S., Krauss, R. M., & Weisberg, R. (1966). Referential communication in nursery school children: Method and some preliminary findings. *Journal of Experimental Child Psychology, 3*, 333-342.

Hickman, M. E. (1985). The implications of discoursive skills in Vygotsky's developmental theory. In J. V. Wertsch (Ed.), *Culture, communication and cognition* (pp. 236-257). New York: Cambridge University Press.

Jackson, S. & Jacobs, S. (1982). Ambiguity and implicature in children's discourse comprehension. *Journal of Child Language, 9*, 209-216.

Krauss, R. M. & Glucksberg, S. (1969). The development of communication competence as a function of age. *Child Development, 40*, 255-266.

Lloyd, P., Boada, H. & Forns, M. (1992). New directions in referential communication research. *British Journal of Development Psychology, 10*, 385-403.

Lloyd, P. & Beveridge, M. (1981). *Information and meaning in child communication.* London: Academic Press.

Lloyd, P. (1988). *Referential communication as teaching: adults tutoring their own and other children.* Comunicación presentada en la Third European Conference on Development Psychology. Budapest.

McTear, M. (1985). *Children's conversation.* Oxford: Blackwell.

Ochs, E. & Schieffelin, B. B. (1979). *Developmental Pragmatics.* New York: Academic Press.

Peterson, C. L., Danner, F. W., & Flavell, J. H. (1972). Development changes in children's response to three indications of communicative failure. *Child Development, 43,* 1463-1488.

Piaget, J. (1923). *Etudes sur la logique de l'enfant, le langage et la pensée chez l'enfant.* Neuchâtel: Delachaux et Niestlé.

Plumert, J.M., Ewert, E. & Spear, S.J. (1995). The early development of children's communication about nested spatial relations. *Child Development, 66,* 959-969.

Robinson, E. J. & Robinson, W. P. (1983). Children's uncertainty about the interpretation of ambiguous messages. *Journal of Experimental Child Psychology, 36,* 81-98.

Robinson, E. J. & Wittaker, S. L. (1986). *Learning about verbal referential communication in the early school years* (pp. 155-171). Beckenham, Kent: Croom Helm.

Robinson, E. J. (1981). The child's understanding of inadequate messages and communication failure: a problem of ignorance or egocentrism?. In W. P. Dickson (Ed.), *Children's oral communication skills* (pp. 167-188). New York: Academic Press.

Sinclair, A. (1981). Young children's referential communication abilities. *Archives de Psychologie, 49,* 115-133.

Sonnenschein, S. (1984). Referential communication: why do preschoolers confuse quantity whith quality?. In L. Feagans, C. Garvey, & R. Golinkoff. (Eds). *The origins and growth of communication* (pp. 251-263). Norwood, N. J.: Ablex.

Sonnenschein, S. (1985). The development of referential communicattion skills: some situations in which speakers give redundants messages. *Journal of Psycholinguistics Research, 14* (5), 489-508.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge: Harvard University Press.

Whithehurst, G. J. (1976). The development of communication: changes with age and modeling. *Child Development, 47,* 473-482.

APPENDIX 1

Transcripcion, Encoding and Schema of a Communicative Exchange in an Ecological-Referential Situation

Example

Speaker: Jonathan
Listener: Benjamin
Age: 4

Transcription and encoding
Broad encoding system
28 categories

Speaker Gestures	Speaker utterances	Adult-examiner utterances	Listener utterances	Listener gestures and execution
Communicative Unit 1				
Pointing to bottle	This, here. **Obj^a DL^a R^o**			
			What? **Pg**	

Very good, very good!
Benjamin, ask him if
you don't understand
something →
                    e
← He said, What?
                    sg

a bottle
$A^a (DL^a) R^o$

the bottle
                    rep

Execution
He takes the
bottle and places
it on the shelf.

---

*Communicative
Unit 2*

← Come on.
What else?!
Jonathan, you have to
tell him more things
because he can't see
you. If you don't,
he won't know
where to put them.
← Come on, tell him
more things, tell him
more things.
                    sg

pointing to the   the ball
ball $P^+ DL^o R^o$

                                        where?
                                        Padl

on the floor
$(P^+) DL^+ R^o$

← Tell him well so he
can understand you
                    sg

the ball on the
floor
$P^+ DL^+ R^o$

Execution

Places the ball on
the floor to the
right of the table

He said the ball on
the floor
          →

O.K.? →
sgf

(acp)   nods his head

← O.K!
sgf

---

*Communicative
Unit 3*

← Come on.
sg

pointing   the two glasses ⁚
where... the
glasses are
Ts⁺ DLᵃ Rᵒ R₁

Picks up a cup

← Come on, tell him
again.
I don't think he
understood you. Tell
him more because
he can't see you.
The screen is here and
he can't see you. Tell
him more things.
sg

pointing to
the cups   The two jugs
are where... the
two glasses are...
Ts⁺ DLᵃ Rᵒ R₁

Where?
Padl

Pointing to
the shelf   on, on, ... on
the iron
(Ts⁺) DLᵃ Rᵒ R₁

Execution
Places the cups
on the shelf.

---

*Communicative
Unit 4*

← Come on, tell
him more!
sg

A bottle is on
the floor
Aᵃ DL⁺ Rᵒ Pᵒ

			Execution Puts the yellow bottle on the floor

Communicative
Unit 5

		← Tell him more! **sg**	
Points to hat	The cap is on the table **B⁺ DL⁺ R°**		
			Execution Puts hat on the table

Communicative
Unit 6

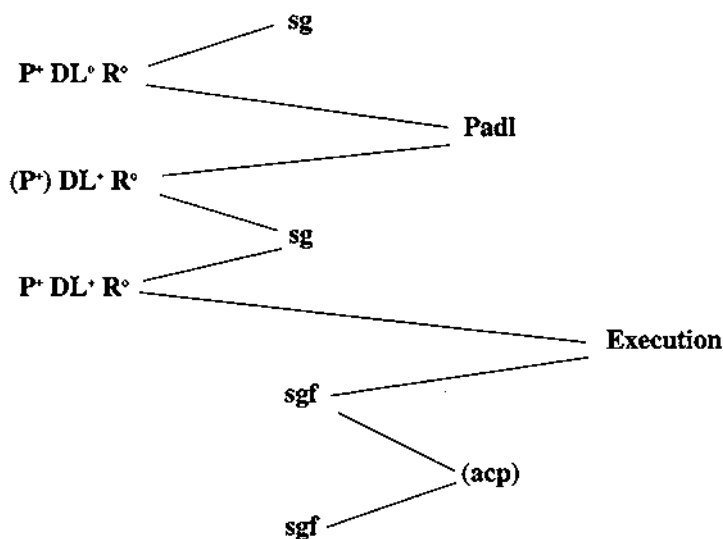| Pointing to the cats	and the two cats are on the floor **Gs⁺ DL⁺ R° R₁**		
			Execution Puts cats on the floor
		← Have you finished? **sgf**	
Nods head	(acp)		

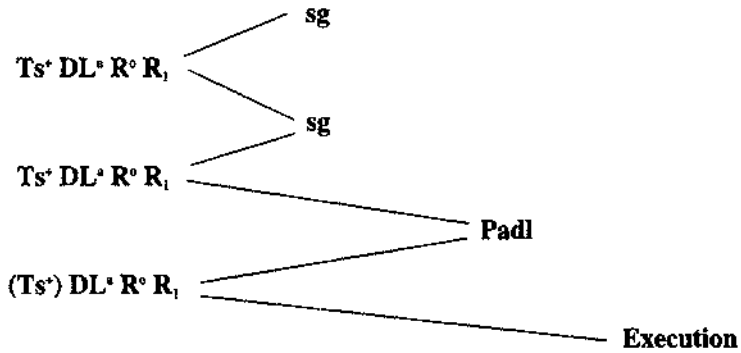**Encoding schema**
Broad encoding system
28 Categories

Speaker Gestures	Speaker utterances	Adult-examiner utterances	Listener utterances	Listener gestures and execution

Communicative Unit 1

Obj^a DL^a R^o ——————————————

                                    Pg

                        e ————

                          sg

A^e (DL^e) R^o ————

                        rep ————————————

                                                Execution

Communicative Unit 2

                            sg

P$^+$ DL^o R^o ————

                                    Padl

(P$^+$) DL$^+$ R^o ————

                            sg

P$^+$ DL$^+$ R^o ————

                                                Execution

                        sgf ————

                            (acp)

                        sgf ————

Communicative
Unit 3

$$Ts^+ \; DL^a \; R^o \; R_1 \begin{array}{c} \diagup \; sg \\ \diagdown \\ \diagdown \; sg \end{array}$$

$$Ts^+ \; DL^a \; R^o \; R_1 \diagdown$$

$$\text{Padl}$$

$$(Ts^+) \; DL^a \; R^o \; R_1 \diagdown$$

$$\text{Execution}$$

Communicative
Unit 4

$$A^a \; DL^+ \; R^o \; P^o \begin{array}{c} \diagup \; sg \\ \diagdown \; \text{Execution} \end{array}$$

Communicative
Unit 5

$$B^+ \; DL^+ \; R^o \begin{array}{c} \diagup \; sg \\ \diagdown \; \text{Execution} \end{array}$$

Communicative
Unit 6

$$Gs^+ \; DL^+ \; R^o \; R_1 \diagdown$$

$$\text{Execution}$$

$$sgf \diagup$$

$$(acp) \diagup$$