ICONIC ASPECTS OF PROSODY IN FRENCH FIRST LANGUAGE ACQUISITION

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ABSTRACT

This paper is dealing with children prosodic development in a first language acquisition. It studies some aspects of prosodic structure acquisition in situations of dialogue in French between children and a competent speaker at two stages of acquisition: at the age of 17 and 32 months. The experiment is based on the hypothesis that prosodic events are biologically programmed to intervene as iconic gestures in order to convey the speakers' intentions in verbal interactions and to reveal his state of mind towards the situation of discourse. This prosodic role is all the more important since articulated language is not yet installed. The work presented here leads to the conclusion that even if prosodic acquisition is not a linear process - each stage of acquisition requires its own prosodic strategy - we can put in light prosodic invariants based on iconic strategies in terms of intonative and temporal gestures.

1. INTRODUCTION

In order to validate the cognitive status of our iconic hypothesis, according to the fact that one acoustic event directly expresses pragmatic meaning in verbal interactions between young children and adults, our approach is based on a hierarchical study from a pragmatic analysis in terms of language acts to the corresponding acoustic parameters (for the origine of this enunciative hypothesis, see [15]). The phonetic work is based on the analysis of melodic and temporal variations encountered in a database extracted from video recording of dialogues between two nurses and four children, two boys and two girls from 17 to 32 months old. In total, 1 hour 30 of speech has been segmented and transcribed for the study.

In a first stage, our goal is to present: (i) speech segmentation in pragmatic acts, (ii) prosodic segmentation of these acts and their transcription into intonative units, (iii) computation of temporal variations, (iv) the database analysis. In a second stage, we propose a phonopragmatic interpretation of the database analysis focused around 3 points: (i) we will show how the competent speaker adapts his prosodic strategies according to the age of a child, (ii) we will discuss the pragmatic function of intonative falls and rises in this type of interaction, (iii) a pragmatic interpretation in terms of intonative levels will be given. Temporal variables analysis will be also used to confirm our conclusions regarding the role of intonative variations.

2. THE DATABASE

In this section, we present firstly the development of the corpus, secondly its pragmatic processing, finally its prosodic segmentation.

2.1. Corpus: Text material and recording

The corpus is made of a set of dialogues between 4 children, 2 boys and 2 girls, from 17 to 32 months old and a nurse. Verbal interactions have been recorded during controlled activities or free games organized each morning in a nursery: 3 sessions of observation, of 20 minutes each have been organized during 5 consecutive weeks. Recordings have been made by a cameraman, who was not hiding (panasonic VHS pal, NV1-M1 video camera). The work presented in this communication is focused on 6 sessions of recording (1 hour 30 of speech literally retranscribed).

2.2. Pragmatic processing

Our work is based on the pragmatic notions of "turn of speech" and "speech act" in order to analyse simultaneously dialogue strategies and illocutionary force of utterances. Hence, productions have been at first segmented in turns of speech (each speaker intervention corresponds to one turn), secondly: turns have been coded in terms of speech acts following classical pragmatic approaches [17, 19], completed by A.H. Gardiner's [5] classification and a personal one regarding speech acts produced by children.

2.3. Intonodiscursive segmentation

The prosodic processing has been done in four stages. (i) Each turn of speech has been manually segmented in a string of syllables. (ii) For each syllable, a melodic value has been calculated using UNICE [6] and PHONEDIT [7] softwares. According to the length of a syllable, one or two melodic values have been used to compute the melodic pattern of each syllable which can be marked by an intonative fall, a rise or a plateau (see [1, 21] for this type of modelisation used in other domains of phonetic application). (iii) For each turn, a melodic register has been empirically calculated, which is composed by four melodic levels (or frequentiel spaces): low-pitched (level one) middle (level 2), high (level 3) and extra-high (level 4) (figure 1).

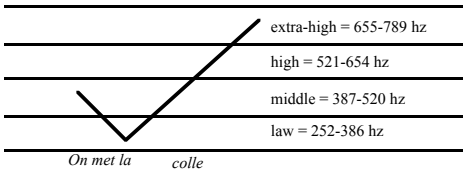


Figure 1. Intonative representation of speech acts in terms of intonative patterns and intonative levels (adult voice, fry mode).

(iv) A paradigm of four intonative classes has been defined in the following manner: class 1 groups the acts produced at level 1 and, if the case arises, at level 2, class 2 is composed of a majority of acts at level 2, the acts which use all the register of a speaker have been listed in class 3, class 4 deals with acts produced at high level (3 and 4) (figure 2).

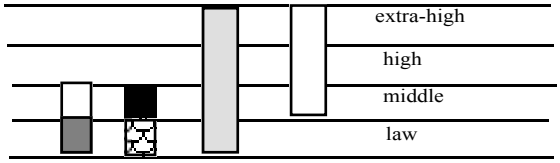
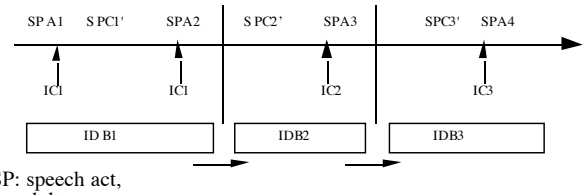


Figure 2. Intonative classes which can be associated to speech acts.

Transitions between those different intonative classes in the succession of speech acts produced by the competent speaker are fundamental here: they give some information about the intentions of each speaker regarding co-enunciative negociation and control of dialogues. This first processing leads us to create intonodiscursive units in the following manner (figure 3): (i) point on the first speech act of the nurse, (ii) compare the intonative shape of this first act to the shape of the following one, if the 2 shapes belong to the same intonative class, group them in the same intonodiscursive bloc (IDB), if not create 2 distinctive IDB, (iii) repeat the processing until the end of a dialogue.



- SP: speech act,
- A: adult,
- C: child,
- IC: intonative class associated to speech act,
- the transition between 2 different intonative classes leads to the segmentation into intonodiscursive blocs: IDB,
- → expresses an intonative transition which will have to be analyzed precisely.

Figure 3. Intonative labelling in terms of intonative transitions.

A temporal study (table 1) has finally been conducted in order to compute children verbal activity. This processing gives some information about (i) a total number of speech acts for each speaker, (ii) the total amount of speech per speaker, (iii) number and duration of pauses for each dialogue.

	Adult	17 mths	Adult	32 mths
TS	13.43	5.72	19.09	6.10
NSA	675	300	784	428
TP	26.56		16.39	
NP	1029		949	

- TS: time of speech (minutes), - TP: time of pauses (minutes),
- NSA: number of speech acts, - NP: number of pauses.

Table 1. Temporal variations, an example on corpus.

3. DATA ANALYSIS

In this section, we discuss the role of prosodic strategies of the competent speaker, and the way they interact with the prosodic behaviour of the child.

3.1. Prosodic strategies change according to the age of a child

The intonative register of the nurse varies according to the age of children, her frequentiel space is larger with older children: intonative transitions are more diversified with the 32 months old children and the nurse complicates the decoding task of prosodic structure (table 2). When she dialogues with the youngest children, she needs to capture their attention, consequently she produces essentially intonative rises in high and extra-high levels. Prosodic strategies must be used to conduct the child to speak and to enter in the co-enunciative relationship: no matter what is said from the moment when it is said. This goal is all the stronger, in the speech of the youngest, since time of pauses is more important than the total amount of speech (57,6 vs. 42,4). It is not the case for older children. In other words, the goal of the nurse is to help the smallest children to develop their communication skills. When she speaks with older children, the goal is not the speech of the child at any price, but to conduct him to increase his verbal competency: he must learn to react correctly to intonative falls and rises produced by the competent speaker (table 2).

Adult intonative transitions when speaking with 17 months old child
Rising transition
Class 1 (law levels) → Class 3 (law and high levels)
Class 2 (law levels) → Class 3
Falling transition
Class 3 → Class 1
Adult intonative transitions when speaking with 32 months old child
Rising transition
Class 1 → Class 3
Class 2 → Class 3
Class 1 → Class 2
Falling transition
Class 3 → Class 1
Class 2 → Class 1
Class 4 (all levels) → Class 2

Table 2. Intonative transitions used by the competent speaker.

This best knowledge of dialogue rules is confirmed at the production level by a weakest intonative instability for the oldest: intonative space in the youngest speech is very unstable and varies randomly along the 4th intonative levels. Those strong prosodic variations can be seen as first attempt strategies: at 17 months of age, a child tries to find the most relevant intonative target in order to be understood. When he has reached a certain step of maturity, he learns to reduce his intonative variations according to their communicative functions.

To conclude this section, we notice that the intonative strategies of the nurse change with the age of children in an opposite direction: when the child is small and his intonation unstable, the nurse stylizes her melodic shapes (only intonative rises) and reduces as she can her melodic register. With the 32th months old children, she diversifies her prosodic strategies, enlarges her frequentiel space and produces different types of intonative transitions, from rises to falls and vice versa (table 3).

Prosodic features	Final melodic contour of a speech act	Registers
17 months old	rises	all levels
Adult	rises	close register
32 months old	rises & falls	close register
Adult	rises & falls	all levels

Table 3. Intonative strategies of speakers.

3.2. Pragmatic values of falling transitions

First, we want to put in light the enunciative function of level 2. It does not only correspond to the middle line of the register which would be only physiologically controlled, it assumes also an evident enunciative function: this level is used by the competent speaker to open and close a verbal exchange. In details, when the nurse finishes a speech act with a rise contour at level 3 and, when a child responds also at level 3, it seems to mark a great degree of communicative harmony. Consequently, after an active verbal participation, where the child shows a good adaptation at the intonative level, the nurse returns at her usual level, with the feeling that the quality of the verbal interaction has been obtained, and the dialogue can be closed.

Regarding now the enunciative function of level 1, when the nurse dialogues with one of the oldest children and reduces her melodic space from one speech act to another one (from class 1-3 to class 1-2), the co-enunciation is broken, even when the second speech act is produced with intonative rises. This phenomenon leads us to give a conclusive function to falling transitions: what can the illocutionary function of the act produced be, when it is produced in a closed and low intonative register, the verbal following behaviour of the child is self-centred, turned to himself, and very often marked by long silences. On the opposite, when the register is larger and higher, the child reacts by questions and a stronger verbal activity. Hence, the child can interpret intonative transitions from level 3 to level 1 in two ways: (i) it can be seen as a conclusive function, (ii) it can assume a metadiscursive function and mark parenthesis clauses which do not ask a response from the infant. On the opposite, the competent speaker uses low intonative levels and falling transitions with a youngest child in order to conduct him to be an active participant of the dialogue. This private or intimist tune is systematically associated with speech acts as requests, questions, offers, etc. This prosodic strategy is often used by the adult when the dialogue is momentarily broken: understanding the intention of the child to break the dialogue, adult produces an unusual intonative transition in a low frequentiel space in order to be more in contact with the infant, to win his confidence and to lead him to continue the conversation. To conclude, the conclusive function generally given to level 1 must be enlarged here: while it frequently marks the end of a dialogue, it can also be used by the competent speaker in order to start again the dialogue presently stopped by a child.

3.3. Pragmatic values of rising transitions

Rising transitions into high and extra-high levels have a clear lexical function: they are used by the competent speaker to focalize all new words which are not yet acquired by children. At the same time, the nurse produces transitions at level 4 in order to maintain interlocutionary tension: level 4 is a frequentiel space reserved for important things and consequently children react also from level 3 to level 4.

In infant productions, extra-high level does not systematically assume a function of focalization. When, for the older children, we can say that level 4 has an interlocutionary function, this function is not present in the productions of the youngest. More precisely, final intonative rises of a speech act at extra-high level as well as intonative transitions from low space to high space are used by the oldest in order to attract the attention of the nurse to a specific object or situation: with this intonative strategy, objects of discourse have a salient position in an utterance. It is also used by infants to underline a break of consensuality in the dialogue, to put in light a difference in his point of view. For instance, when the nurse suggests *on met la colle (we put the glue)*, a child answers *peux pas (I can't)* with a final intonative rise at level 4. On the opposite, the same lack of « consensuality » is expressed by the youngest children with intonative falls in the low level. Different enunciative interpretations can be proposed here: (i) these intonative falls express a withdrawn attitude and a self-centred attitude, (ii) the child in front of a very complex language training, where the segmental level is more and more important with the acquisition of a basic lexicon, forgets for a while the universal function of intonative rises. This example points out the non linearity of language training which supposes trials and errors and very frequently prosodic structuration decreases for a while (apparition of the first lexicon can lead to a disfunctioning in the use of

prosodic patterns). In other words, the prosodic system of a child is not a pure imitation of the one of competent speakers, it contains its own features at each stage of maturity.

4. CONCLUSION

The postulate which has been used to conduct this work is to see prosodic markers as iconic gestures to translate speakers' intentions and his position in front of the text and the situation of dialogue. In order to validate the experimental and cognitive status of this iconic point of view, according to one phonetic events directly express the pragmatic contents, we have proposed a top-down analysis (from the pragmatic interpretation to the acoustic study) of a set of dialogues between young chidren (17 and 32 months) and a paediatric nurse. This strategy of analysis leads us to evaluate the status of prosodic gestures in the negociation of an intersubjective space at two stages of language acquisition.

In details: first, the classification of intonative variations in different prosodic gestures, the representation of these variations in terms of intonative levels associated to the register of a speaker, as well as the study of intonative transitions between 2 successive acts in the competent speaker productions, second the study of the verbal and prosodic responses of children were used to conduct this programme and to conclude on different points:

- We put in light the pragmatic function of intonation in dialogues: with the competent speaker, the child learns to use prosodic parameters (time and intonative variations' control) in order to orientate the interpretation of the receiver and the continuation of dialogue.

- More generally, prosodic variations give information regarding the mutual engagement of speakers in the co-enunciative process: prosody expresses general psychological attitudes and reveals a progressive but not linear learning of communicative roles. A child learns to use the prosodic structuration of an utterance to enter in the language meaning. The space of interaction which is first a perceptual one becomes space of production and verbal exchange by the mean of prosody. In other words, to produce well constructed utterances, a child must go through a communicative experience based on prosodic training. Regarding this point, we saw what kind of verbal – or not verbal – attitude adult's productions generate and how the nurse can redirect her discursive strategies by using different prosodic patterns.

- The reduction of the frequency range in the older children speech acts is a cue of a good verbal activity on a controlled register. This situation is directly associated with more diversified speech acts which always try to take into account the interlocutor. In the same way, prosodic functional features used by the nurse become more and more complex and diversified.

This preliminary acoustic analysis must be completed by psycho-acoustic tests in order to give a perceptual dimension to our study. Indeed, this prosodic communication can be considered like regulations using of vocal forms. And these regulations have several functions : they are useful not only for controlling interaction, but also transmitting semantic information. However, nature of the signs specific to vocal forms is different with the one of lexicon. It is more dependent on mental image. The value is directly linked meaning without having to support on double articulation ; their functioning can be assimilated to the one of gesture which comes with speech.

REFERENCES

[1] Beaugendre, F. 1994. *Une étude perceptive de l'intonation du français*, Thèse de Doctorat, Université Paris XI, Orsay.

[2] Boysson-Bardies de, B. 1996. *Comment la parole vient aux enfants*, Paris, Odile Jacob.

[3] Bruner, J.S. 1987. *Comment les enfants apprennent à parler,* Paris, Retz.

[4] Fonagy, I. 1983. *La vive voix,* Paris, Payot.

[5] Gardiner, A.H. 1990. *Langage et acte de langage. Aux sources de la pragmatique*. Lille, Presses Universitaires de Lille.

[6] Gauvain, J.L. 1989. Mode d'emploi de UNICE, Rapport interne, LIMSI-CNRS.

[7] Hirst, D. Di Cristo, A. and Espesser, R. 1999. Levels of representation and levels of analysis for the description of intonation systems, Theory and Experiment, M. Horne (ed.), Dordrecht, Kluwer Academic Press (in the press).

[8] Kerbrat-Orecchioni, C. 1990. *Les interactions verbales*, T1, Paris, Armand Colin.

[9] Konopczynski, G. 1986. *Du prélangage au langage : acquisition de la structuration prosodique,* Thèse d'Etat, Université de Strasbourg.

[10] Lacheret, A., Ploux, S. and Victorri, B. 1998. Prosodie et thématisation en français parlé, *Cahiers de Praxématique,* 30 : *Les opérations de thématisation en français,* Praxiling (éd.), Université Paul Valéry, Montpellier, 89-111.

[11] Lacheret, A. and Beaugendre, F. 1999. *La prosodie du français,* Paris, Editions du CNRS.

[12] Martel, K., Vivier, J. and Lacheret-Dujour, A. 1998 Aspects prosodiques de la communication orale entre jeunes enfants (17 & 32 mois) et adultes, *International Journal of Psycholinguistics*, Center for Academic Societies, Japan, Osaka (sous presse).

[13] Martel, K., Vivier, J. and Lacheret-Dujour, A. 1998. A l'interface du comportemental et du verbal, *Actes du Colloque International ; Les langues dans l'Europe Communautaire*, Amsterdam, (in the press).

[14] Mendès-Maillochon, I. 1996 Émergences des modalités de phrase en français : étude morphosyntaxique et prosodique, *Thèse de Doctorat d'État*, Université René Descartes (Paris V).

[15] Morel, M.A. and Danon-Boileau, L. 1999. *Grammaire de l'intonation, l'exemple du français,* Paris, Ophrys.

[16] Rossi, M. 1997. Intonation : Past, Present, Future, Papier invité, *Esca Workshop on Prosody,* A. Botinis *& al*. (éds.), Athène.

[17] Roulet, E. 1981. Echanges, interventions et actes de langage dans la structure de la conversation, *Études de linguistique appliquée*, 44, 7-39.

[18] Roulet, E., Auchlin, A., Moeschler, J. *& al.* 1985. *L'Articulation du discours en français contemporain*, troisième édition, Berne ; Berlin ; Paris, Peter Lang

[19] Searle, J.R. and Vanderveken, D. 1985. *Foundations of illocutionary logic*, Cambridge University Press.

[20] Slama-Cazacu, T. 1977. *Dialogue in children*, The Hague-Paris-New York, Minor Mouton Publishers.

[21] Vaissière, J. 1980. *La structuration acoustique de la phrase française,* Annali Della Scuola Normale Superiore Di Pisa, Pisa, Tipogafia Pacini-Mariotti (ed.), 530-560.

[22] Veneziano, E. 1989. Les proto-conversations et les débuts du langage : de l'alternance des tour de rôles aux significations partagées, *Revue Internationale de Psychologie sociale*, T.2 -1, 23-36.

[23] Veneziano, E. 1996. Échanges conversationnels et premières acquisitions langagières, *La conversation chez l'adulte et chez l'enfant*, J. Bernicot, A. Trognon & J. Caron-Pargue (éds.), Nancy, P.U.N.