Transcribing and evaluating language skills of deaf children in a multimodal and bilingual way: the sensitive issue of the gesture/signs dynamics

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Abstract

Transcribing and evaluating the narrative productions of 6 to 12 year-olds deaf children in their multimodal and bilingual dimensions confront us to the central question of gestures/signs distinction. This paper aims to discuss how the narrative skills of 30 deaf children schooled in different education settings – oralist, bilingual and "mixed" – led us to create transcription/annotation tools in ELAN allowing to take into account the dynamics between verbal and non-verbal material involving especially within the gestural modality. We will focus on two central points of our reflections. How to delimit productions in units into taking into account the semiotic and the structural dynamics aspects of production? How to describe and categorize the gestural processes non systematized in a linguistic form to report the developmental dynamics?

Keywords: multimodality, deafness, gestures/signs dynamics, transitional skills

1. Introduction

Our contribution proposes to envisage the thematic of the interplay between sign language corpora and lexicons in a particular way. We emphasize the issues raised by the evaluation of the skills of deaf children schooled at primary school. The aim of this paper is to approach the sensitive issue of the gestures/ signs distinction in deaf children's productions whose language skills are still in linguistic development. The reflections that we have propose to expose here concerning the transcription/annotation tools are based on corpora of language productions, lexical and narratives, of 30 deaf children aged 6-12years and schooled in different education setting – oralist, bilingual and "mixed". Given the diversity of the deaf children profiles in terms of familial environment, educational background, degree of deafness etc., our corpora constitute a representative sample of the reality of the schooling spaces in the context of deafness. Our approach of the deaf child orality[1] development is thus fundamentally empiric, anchored in actual data.

We will first anchor the theoretical context of our research in the light of the hypotheses on the multimodal aspect of language in the hearing context. Then, we will focus on two central points of transcription/annotation schemas which we have built in ELAN. Firstly, we have will argue how specific gestural dynamics, and in a more broader perspective bimodal dynamics, in deaf children's production incite to shift the focus away from the linguistic production to conceive an integrative approach to the interplay of the verbal and non-verbal material. More specifically, we have narrowed down the idea of global units of segmentation that we have propose for a transcription/annotation grid. We – Agnès Millet and I – have worked in ELAN to transcribe deaf children productions in the multimodal and bilingual aspects. Secondly, we will focus more specifically on the sensitive issues of the criteria used to distinguish gestures and signs. These issues led us to develop tools which allow to catch, in a more dynamic way, the state of the development of the deaf children's gestural symbolizations skills as well as their evolution, regardless whether these skills are systematized in a linguistic form or not. We will conclude by exposing the limits of our transcription / annotation schemas, in their current state of elaboration. And finally we will open the prospects which are still to be explored in order to provide answers to description challenges emerging from the specific shapes of the language dynamics involved in the orality development in the context of deafness.

2. Theoretical context of the research

2.1. Crucial issues of a multimodal approach to the orality in the deafness context

The multimodal aspect of the language has been less explored in the context of deafness and, in particular, in later language development. However, given the diversity of the sociolinguistics contexts in which the deaf children make their first steps in language, the linguistic skills of deaf children in primary school are still under development and especially in sign language (SL) – 90% of deaf children are born into hearing families and thus, for the most of them, are not exposed to a SL model before beginning school. Although this observation is largely shared by many researchers, locally and internationally, current research focus on the linguistic level of the competence, and even, for the most part, on a single linguistic component of the skills developed by the deaf child : exclusively in SL (Schick et al., 2005) or exclusively in Vocal Language (VL) (Spencer

[1] Given the ambiguity how the term "oral" is used in the context of deafness which is always used in a interchangeable way or in the place of the term "vocal" to refer to speech and to avoid therefore a misunderstandings of the concept of *orality*, we have to precise at the outset that this concept is used here to an opposition with *scripturality*. As my approach takes a multimodal perspective, *orality* has to be conceived here in its broader sense as to include all vocal and gestural resources, in their verbal and non-verbal dimensions.

and Marschark, 2006). Only a few recent studies are take into account the sociolinguistics realities in which the development of deaf child orality is anchored in approaching the question of the interplay of the two oral components of linguistic skills – i.e. in SL and VL – (Plaza-Pust and Morales-Lopez, 2008). Indeed, the deaf child is led, through the diversity of his daily interactional contexts which he has to face, towards building in bilinguality [2]. Although these studies integrate bilingual dynamics of the skills of deaf children, most of these studies focus on a linguistic perspective of description/evaluation too. However, the point is, as for us, to capture the set of language dynamics which are implied in symbolization development skills of deaf children, as broadly as possible, and then no matter whether and how far these skills are systematized in a linguistic form or not. Therefore, in this reasoning, multimodality offers an unique perspective to understanding the transitional states of the development of deaf children's symbolic abilities, and especially in the gestural modality.

2.2. Cross-boundaries of bilingualism and multimodality perspectives: An integrative approach

Then, on the margins of the majority of researchs in the context of deafness, our approach of the orality is anchored in an effective application of the concept of *communicative competence* proposed by Hymes (1984), integrating a broad conception of language – *i.e.* including these verbal and non-verbal dimensions – such as elaborated by McNeill (1992). The orality in the context of deafness and its development offers the opportunities to dialogue perspectives of the research fields of bilingualism and multimodality : deaf bimodality is indeed implied specifically in a both verbal or non-verbal potential. The deaf children's orality development thus offers an unique window on the multimodal aspect of language : gestuality and vocality are both in tense to a linguistic potential, respectively up to a SL (LSF, in our context of research) and up to a VL (French, in our context). So, cross multimodality and bilingualism constitutes an integrated perspective to fully explore the inter- and intra-modality dynamics, in their whole, at work in the development of the *integrated* (McNeill, 1992) bimodal language system, bilingual in progress. The transposition of the Kita's information packaging hypothesis (Kita, 2000) allows us to highlight the perspectives opened by the language development in the context of deafness.

2.3. Proposal to modelling deaf orality development

The key idea of the cognitive hypothesis proposed by Kita is that the hearing speaker has at his disposal in bimodality two alternative or concurrent manners of organizing the representation of the events supported by two modes of thinking. One is linked to the manner how to perceive events in the concrete world, which is underlain by *spatio-motric thinking*, and, the other, conforms to the way of organizing the information in a decontextualized and hierarchically structuring form in a particular language, which is underlain by the *analytic thinking*. The application of this hypothesis to evaluate the symbolization skills under linguistic development opens perspectives, particularly relevant for the application to deaf children. Indeed, Kita arguments that the concurrence/complementarity between these two modes of thinking is revealed on-line in the production of hearing children and in particular in the gestures-speech discordant combinations. These types of bimodal combinations can be interpreted as a symbolization acquired in the spatio-motric thinking but not yet systematized in a linguistic form. So, bimodal combinations give a direct insight on the transitional phase of two modes of thinking and allows to investigate, in a more sensitive manner, the question of phases of language acquisition. Note that if in hearing children, the transition takes place between gestures and speech, concerning deaf children, a double transition is implied concurrently in both modalities : from gestures to signs in one part, and from onomatopoeias [3] to words in the other. So, on the basis of Kita's hypothesis, our proposition of modelling language development in deaf children can be represented as follows :

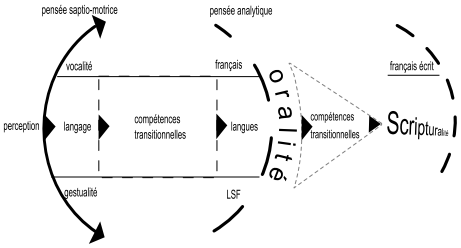

Figure 1: Proposal to modelling the deaf orality development

Indeed, in deaf children development, gestuality and vocality are both anchored in the movements of a symbolization i) firstly anchored in the sensorimotor perception : visual for the one, auditory for the other – most of deaf children have actually hearing aids or have a cochlear implant – ii) and then gradually moves away from this perceptive anchors to integrate a decontextualized and hierarchically structuring way to encoding the information in a particular language, in a SL for one and in a VL for the other. We know that, given the deafness, primary symbolic abilities of deaf children are developed in the gestural modality no matter of the presence of a SL in their familial environment – see Da Cunha Pereira and De Lemos (1994), Goldin-Meadow (2005), Mohay (1994), Van den Bogaerde (2000). Given the importance of the contact with the VL, this transition is initiated concurrently, nonetheless

[2] No matter of the education setting – i.e. oralist or bilingual for example – in which they are involved in their childhood and no matter otherwise of the type of their family environment (deaf or hearing) in which they have grown up, deaf adults are used to use and combine the two languages – SL and VL – and the two modalities – vocal and gestural – in order to manage their daily interactions. Then deaf adults become, to varying degrees, bilingual bimodal (SL/VL) speaker – our observations (Millet et al., 2008) are consistent in this point with other works (Lucas and Valli, 1992; Van den Bogaerde, 2000).

[3] "Onomatopoeias" are conceived here in a broader sense than usually subsumed under this term, and must be interpreted as designing all "symbolic vocalisations" which are not necessary specified in a conventional meaning as it is the case for the cock crow for example.

too, although later, in the vocal modality[4]. Nonetheless, the fact that skills of deaf children integrated progressively the manner of encoding events linguistically in a particular language will depend on the presence and on the accessibility of the linguistic models in their environment, familial initially and at school in subsequently. So, we can assume that the symbolization abilities developed in each modality which are not totally still in range in perception but which are not yet systematized in a linguistic form will be represented a more longer transitional phase, which can be pursued beyond the pre-linguistic period up to schooling and even maybe beyond this period. So therefore we propose to conceive these skills as an intermediate state between language – in its broad sense – and languageS – in its restricted sense of linguistic component – under the concept of *transitional skills*. These *transitional skills* include all the forms of symbolization developed by the deaf child which index the exploration of the potential range of organizing the events in the two channels that are at their disposal – a linear and temporal organization underlies the VL system, and a spatial organization which takes more place for simultaneity underlies the SL system – and then index a progression up to the analytic modes of thinking. The development of bimodality in deaf children thus provides an unique insight on the cognitive processes implied in the language development, in their diverse phases of transition between spatio-motric and analytic thinking which represent a constant transition in different aspects of language acquisition during childhood.

Given the theme of the workshop, this paper focusses particularly on the questions emerging from the dynamics involved in the gestural modality. Nonetheless note that bimodal dynamics in their whole, including dynamics involved on vocal modality too, open a lot of perspectives on the comprehension of the language development in the context of deafness in particular, and in a broader context, of childhood in general. These perspectives must be briefly introduced in order to replace the gestures/signs reflections in their global context.

2.4. Issues emerged from the evolution of gestural symbolization abilities : to welcome the plurality of deaf children's development trajectories

The heterogeneous gestural development trajectories of our corpora shake up, in different levels and by different manners, the boundaries between gestures and signs. Indeed, deaf children who have not been formally exposed to LSF develop transitional gestural symbolic skills that we cannot ignore. Note that our observations are consistent with those by other researchers : their gestural skills differ nonetheless remarkably from the gestures used by their hearing peers (see, Estève (2011),Estève and Batista (2010)) and are close in many ways to the linguistic processing existing in SL (see, Fusellier-Souza (2004),Goldin-Meadow (2005)). These trajectories of gestural development are not less legitimate than those which have developed, before their entry at school, linguistic skills in SL. So, tensions between gestures and signs observed in deaf children of our corpora have led us to re-consider the transcription/ annotation tools for gestures and signs and to re-think the *a priori* fixed categorization between verbal and non-verbal gestures – whose the apply is not without problems for the description of deaf adults discourse too. Our perspective is, beyond providing information on the heterogeneity in deaf children's orality skills, in a more long-term perspective, the elaboration of tools assessment which can be used to situate each deaf child in a specific progression between spatio-motric and analytic thinking. These tools assessment will allow us, in the longer run, to provide the reflections on adapted didactic practices which will be able to support this progression up to the development of the linguistic skills in SL – and more broadly, in our research interests, in the two languages.

In this paper, we are focussing on some central points of the challenges emerging from the deaf children's language realities of our corpora to which we are trying to answer in our grid of transcription/annotation elaborated in ELAN in a multimodal and bilingual perspective of description. We will emphasize specifically on two of the central points emerged from the description of deaf children's skills which are still in development :

- How to delimit units into taking into account the semiotic and the structural dynamics of the production ?
- How to describe and categorize the gestural processes non systematized in a linguistic form in order to report the developmental dynamics ?

These points raise a lot of other sub-questions which will be tackled in more in details in the progress of the argumentation.

3. Methodological aspects

The corpora on which our reflections are conducted is composed of narratives productions of 30 deaf children schooled in divers settings : oralist, bilinguals – LSF/written French *vs* LSF/oral and written French – and "mixted" – designing a class in which children with different educative projects, integrating or excluding the LSF, are taught together. The profiles of children are heterogeneous not only on the education setting, but also concerning their family environment (hearing *vs* deaf), their degree of deafness (severe to profound), their age (5 up to 12 years old), their level of schooling (GS up to CM2), etc.The narrative tasks consist on a retelling of a *Tom & Jerry*'s cartoon.

4. Delimiting units : towards a global approach on verbal/non-verbal phenomenona

The multidimensional aspects of the issues raised by the gestures/signs dynamics in deaf productions fundamentally challenge the existing tools used for transcribing and annotating non-verbal gestural resources. Tools usually adopted to describe the gestural productions of hearing children cannot be applied as such to report deaf children's gestural production. Rather we have to transpose these by rethinking them, in a more dynamic way, in relation with those used to the linguistics gestures. Integrated in an international

[4]The delay of VL skills development in deaf children has been highlighted by a lot of works : see, amongst others, the works of Lederberg (for a synthesis, see Lederberg and Spencer (2001)) and Pizzuto et al. (2001) on the vocabulary development.

project conducted by J.M. Colletta on the later multimodality development in children in different languages, our reflections on tools have precisely been anchored in this challenge of the necessity to adapt an existing grid, developed to transcribe and annotate the narrative conducts of hearing children – for a global presentation of this grid, see Colletta et al. (2009). The first issue raised by the specific shapes of the dynamics involved in the gestural modality in the context of deafness is to rethink the separately approaching of verbal/non-verbal resources. Rather than conceived these two kinds of resources as independently, it will be necessary to capture, in a single perspective, the co-constructed production as a whole. Therefore, the first step of our reflections was to investigate the question of segmentation units.

4.1. State of the art in the fields of SL and multimodality

Challenges emerging from the description of SL and multimodality data are joined together in numerous transcription/annotation points. Transcribing SL and transcribing multimodality data have in common the fact that they confront researchers with the problem of taking into account of the productions of distinct articulators which can interact simultaneously to contribute to the elaboration of utterances. However, in most of the studies in these two fields of research, even if the transcription adopted is multi-linear, these lines does not seem to be hierarchically organized and take place more as an exhaustive list integrating a transcription's line for each resource or each articulator involved in the expression. In hearing multimodality research, the delimitation units of gestures and speech are usually considered independently and their transcription/annotation is generally carried out in two separate blocks of lines. This common practice can be explained by the fact that the perspective of description is still linguistic-centered. Indeed, in most multimodal transcription systems, the central line for transcribing/segmenting productions is usually speech and the semiotic contribution of gestures is generally reported to the content of the speech syntactic units with which they are temporally linked. This is the perspective adopted by Colletta et al. (2009) to transcribe bimodal narrative productions of hearing children. Otherwise, in the research on SL, the most common system adopted is centered, for the manual components, on lexical glosses – correspond to the lexical unit in VL which is the closest to the semantic content of the lexical signs produced. The non-manual components – head, eye gaze, facial expressions, etc. – are generally transcribed in separate lines. And, in the same way as with what is observed in systems for multimodal data, the interplay of the multi-articulators contributing to the elaboration of discourse is reported to a line conceived as central: that of manual components, in link with lexical elements. Let us underline that, in the case of the SL, the contribution of the articulators is situated more at a morpho-syntactic or morpho-lexical level than at a semiotic one. Given these shared practices of transcription in the SL and VL research fields, it is not surprising that researchers who have looked at the bimodal bilingual practices of SL/VL bilingual speakers use parallel transcriptions, splitting global production into two separate lines: VL production on one first line and the SL production on a second one [5].

To our knowledge, in all existing systems of transcription, the vocal and gestural modalities are usually approached as two parallel productions and the question of a global unit of segmentation that would integrate all interplaying resources is still left open. The specifics language shapes of deaf children's productions have led us to rethink a unit of segmentation at the global production level in order to grasp the intra- and inter-modality dynamics that contribute, trough complex semiotic interplay, to the elaboration of utterances.

4.2. Towards a global unit of segmentation: an effective application of *growth point* (McNeill, 1992)

Indeed, the diversity of language configurations in the utterances produced by deaf children provides arguments supporting the language conception of the utterance formation proposed by McNeill (1992, 35),which he has conceptualized under the term of *growth point*[6]. As the following example (see the figure 2) illustrates, in the utterances of deaf children each resource can play both a specific and a complementary role in the elaboration of the structural and/or semiotic aspect of the utterances. While each unit is meaningless on its own, together they contribute to compound a global production that takes on complex meaning, through this interplay of plural resources. This example illustrates a typical structure, amongst others, of specific dynamics observed in deaf children's productions: one resource introduces the theme – tin this case, the French in this case 'the baby bird', another introduces the rheme – in this case, gestures in this case which depicting the trajectories of the baby bird (still an egg at the point in the cartoon) – and a third one is adjoined to specify a characteristic of the action for example – in this case, ononomatopeias underlining the brief and repetitive aspect of the egg's jump. Each resource represents an essential element of the structural and/or semantic aspect of the global production, without which the latter would be incomplete. The meaning of the following example acquired, through the complex interplay of verbal/non-verbal resources, can be translated as : there is a baby bird, an egg, and suddenly he has jumped everywhere a lot.

Therefore, in our grid, we opt for a unit of segmentation at the level of bimodality which corresponds to an effective application of the concept of *growth point* integrating all resources, vocal and/or gestural, verbal or non-verbal involved in the elaboration of utterances. Then, the first encoding action of the transcription process consists, in fixing

[5] See for examples of transcriptions: the grid recently proposed in ELAN by Pichler et al. (2010) to transcribe hearing children productions growing up in deaf families or more anecdotally (Bishop et al., 2006; Emmorey et al., 2005; Van den Bogaerde, 2000).

[6] "[...] when gesture and speech combine, they bring into one meaning system two distinct semiotic architectures [...] The GP [growth point] is the name we give to an analytic unit combining imagery and linguistic categorial content."(McNeill and Duncan, 2000, 144).

Noa	
frs:	le petit oiseau et là
French:	*the baby bird and then*
onom.:	poum poum poum poum poum poum
gestes:	2M jointes (conf.boule) rebondissent en différents points de l'espace
gestures :	*2Hands joined (conf.bawl) are jumping in various points of space*

Figure 2: Examples of the interplay of resources in theme/rheme elaboration

exclusively temporal boundaries, in order to delimit coherent semiotic sets by taking account of all resources that participate in elaborating each utterance. This takes place on a central line, which conditions the others 4 major lines of transcription – French, Onomatopoeias, LSF and Gestures –, In addition to semiotic criteria, syntactic criteria are used to delimit units where applicable. Given the state of development of linguistic skills in deaf children, the criteria of syntactic segmentation cannot always be operated. Therefore, we define these units under the concept of *semantic-syntactic units*. A *semantic-syntactic unit* can be built on one resource exclusively, vocal or gestural, verbal or non-verbal, or plural resources used in diverse combinations, either simultaneity or in sequentiality, as the following figure illustrates. This extract from the narrative of Driss, 5 years 1 months, schooled in an oralist setting, can be delimited into 4 *semantic-syntactic units* compounded by two units supported by bimodal non-verbal combination (unit 1 and 4), one unit supported by verbal/non-verbal combination (unit 2) and one unit supported by a non-verbal resource (unit 3).

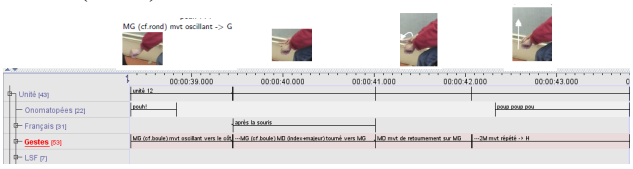

Figure 3: Examples of *semantic-syntactic* units segmentation

Thus integrating verbal and non-verbal resources in a single segmentation of language units allows us, at this primary step of description, to make the question of gestures/signs distinction less crucial and, in a broader sense, to do the same for the question of verbal and non-verbal status of the productions. Indeed, delimiting narratives on *semantic-syntactic units* allows deaf children's productions to be captured in their entirety without considering the question of their status and no matter the language form in which they are expressed.

4.3. Verbal and non-verbal resources dynamics : an unique insight into skills under development

Adopting an integrative perspective towards description, enables the effective symbolic abilities of deaf children to be accounted for, as a whole, no matter their state of development and no matter how far they have systematized them in a linguistic form. As illustrated by the following example (see figure 1), an extract from the narrative productions of Abdel, a young deaf child (6 years 4 months) schooled in an oralist setting, this perspective allows us to take into account the complex gestural processes that can be elaborated by deaf children despite not having been formally exposed to LSF.

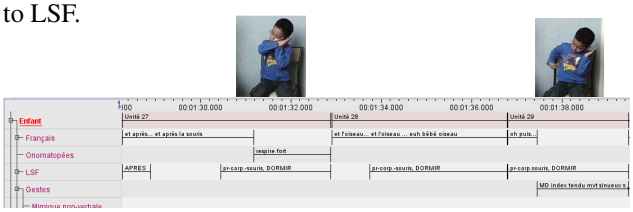

Figure 4: Example of complex gestural processes elaborated by a deaf child schooled in an oralist setting

Abdel make use of the principles of spatiality and simultaneity that underpin encoding of events in the gestural modality so as to represent complex narratives events and parallel action, *i.e.* the egg arriving on the back of the mouse which is sleeping. As this extract shows, gestural productions of deaf children, even if they are not formally exposed to LSF, are not, in most cases, isolated gestural units contrary to what can be observed in the gestural productions of hearing children. The differences are more striking when it comes to description of cartoon scenes involving simultaneous actions, as we has shown elsewhere in a comparative analysis between the narrative productions of young hearing and deaf children schooled in an oralist setting in the first year of primary school (Estève and Batista, 2010; Estève, 2011). While deaf children represent the scene in space by making use of the possibilities for simultaneous representation afforded by gestures, the gestures of hearing children follow the linear and temporal description of the scene in keeping with linguistic encoding in French. The two following chosen examples correspond to the retelling of a sequence of the cartoon during which the baby bird is picking the chair on which the mouse is sitting.

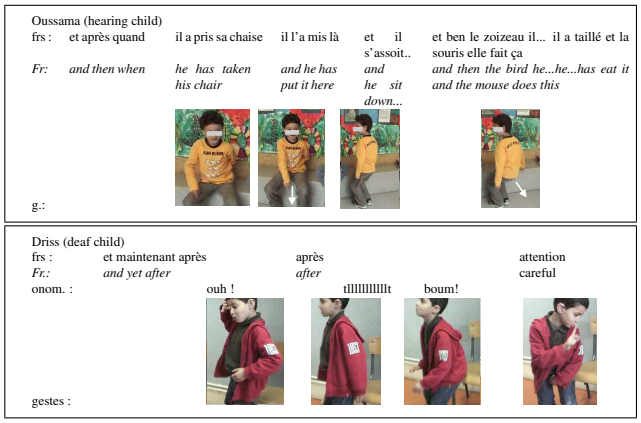

Figure 5: Comparative gestures processes used by hearing and deaf child for a scene implying simultaneous actions

So, as these examples suggest, for deaf children, the gestural modality is not simply an alternative way in which to represent events closest to the manner to perceive their organization in the real world as it's the case for hearing children. Rather it represents an alternative way to encode the information in a hierarchically organized and decontextualized symbolization, underlying the specific manner to encode events linguistically in SL. This way of representing the events is, given the deafness, closer to the way deaf children perceive and conceive of the events and is therefore their preferred manner of organizing and encoding the

information. This contrast between hearing and deaf children's gestural production give full weight to the concept of *transitional competence* that we have developed : these crucial differences in gestures productions have to be linked with the fact that gestural skills in deaf children, even if they are not formally exposed to LSF, are in tension towards a linguistic potential.

4.4. Towards a linguistic potential: Some crucial cues for linguistic acquisition in progress

In the previous examples, Abdel (see figure 4) and Driss (see figure 5), both deaf children non formally exposed to LSF, re-invent, indeed, the processes used in narratives conducted in LSF. The *corporal proform* (Millet, 2002) – that other researchers consider as a *body classifier* (Morgan and Woll, 2003) – to refer to the mouse in the two cases – is maintained in action across successive units – the sleeping mouse for Abdel, the sitting mouse for Driss. This allows the simultaneous actions of the second character to be represented in parallel. Driss uses vocal resources to describe on onomatopoeic way the simultaneous action of the baby bird which is pecking at the chair on which the mouse is sitting. Whereas Abdel uses his other hand, which is not mobilized in the representation of the mouse's actions, to describe in gestures the trajectory of the baby bird – still in the egg at this point in the story – which is arriving behind the sleeping mouse. These two productions, and especially the Abdel's one, are consistent with the processes observed in adults' narratives behaviour within our copora. It should be note that in contrast to observe in this child production, for the same event of the cartoon, adults integrate in the movement, depicting the trajectory of the egg, the conventional manual configuration used to refer to a small and round object in LSF (*stf-objet-rond*).

Figure 6: Examples of narratives processes used by adults in LSF

This formal difference in the manual configuration led us to consider these units as a *manual proform* (Millet, 2002) in adults production. In contrast, in the child production we have considered this description as gestures and not signs. Thus, this observation can provide argument to evaluate more precisely the state of gestural skills development. Indeed, this deaf child seems has to be integrated some lexical or more precisely morpho-lexical elements of narrative process specific to the SL, and more specifically those implies in the anaphoric references : the *corporal proform*. While others are still not being systematized in a linguistic form, as it is the case for the manual anaphoric manner to represent a referent : *manual proform*.

On the other hand we have to note that, in the production of this child, the recourse to French serves the need to introduce a new referent in an isolated NP ("la souris" [the mouse], "le petit oiseau"[the baby bird]). And then the gestural representation of the two referents constitutes to a certain degree an anaphoric reference to the referent introduced in French. This specific cross-modal construction of the narratives processes is very frequent in our corpora.

The example from Abdel's narrative allows illustrates the fundamental complementarity of the symbolic skills that this deaf child, at his stage of language development, had developed in both vocal and gestural modality. Gestural and vocal skills of this child seem to be implied in contrasting steps of progression towards analytic modes of thinking, in contrasting steps of linguistic systematization, and in contrasting levels of the linguistic competence : lexical for vocal modality and morpho-lexical/morpho-syntactical for gestural modality. Indeed, on the basis of this examples, Abdel's competence can be evaluated as follow regarding the contrasting skills developed in the vocal and gestual modalities : he appears to have systematized some lexical skills in French and some morpho-lexical and morpho-syntactical skills in SL and more broadly in the gestural modality, which have not yet been integrated in a linguistic form in keeping with a particular SL, *i.e.* LSF.

So, Abdel's language behaviour provides strong arguments to underscore the crucial importance of taking into account how deaf children mobilize, combine and make progress in the two alternatives forms of encoding events which are available in the two channels of communication. On the one hand, in the vocal modality, a temporal and linear mode of speaking underpins the manner to represent events and, on the other hand, in the gestural modality, they call upon a spatial mode of speaking giving more place for representing simultaneity. Our integrative perspective allows to situate more precisely the deaf children's skills by integrating in the evaluation processes all the effective symbolic skills developed in each modalities. We can be able therefore situate each child in a particular state of progression towards analytic modes of thinking in two different modalities languages.

While the segmentation into *semantic-syntactic units* allows us to apprehend dynamics intra- and inter-modality as a whole, evaluating deaf child's symbolic skills more precisely implies also calling into question the tools used to transcribe and annotate each resource in order to be able to describe, in a more dynamic way, the evolution and continuity between non-verbal and verbal resources in the development trajectories of each child.

5. Evaluating the value of gestural units: when productions entail rethinking boundaries

5.1. Criteria for distinction between gestures/signs

The criterion used to distinguish between gestures and signs is, as usually, the reference of the deaf adults productions. However, not only their application is in fact very sensitive but the reference of adults productions does not solve all the issues surrounding the central question of gestures/signs distinction in the narrative productions of deaf children whose gestural skills are stills in development. On the one hand, this criterion tends indeed to set a separation between gestures and signs and it does not allow to take into account the proximity or the tension with SL. This tension

incite in fact to consider the emerging of an intermediary language value between the both, which we have proposed to design under the concept of *quasi-linguistic*(Cosnier, 1982). Moreover, given the fact that narrative processes in LSF corresponds to the same basic processes that are used in the gestures of hearing speaker, but that have been systematized in a linguistic form in LSF (Millet and Colletta, 1997), fixing boundaries between gestures and signs is not without difficulty. And last but not least, applying this criteria implies necessary interpretation mechanisms (over-interpretation ?) of the gestural production and thus inevitably normalization mechanisms which can lead to aligning the children's productions with an "adultomorphic representation" (*représentations adultomorphes*) (Morgenstern, 2009). These transformation/transposition processes remove the materiality of the effective formal realization of the gestural production. This not only tends to freeze deaf children's productions in an adult form, but can also lead to substantial bias due to the fact the transcriber interprets children's production through a normalizing mechanism aligning them with an adult standard model.

Applying the criteria of adult references therefore implies a certain numbers of sensitive mechanisms. In order to reduce the part and place of the individual instinct of the transcriber, and given the state of description of narrative structures in LSF, we collected a corpus of 3 deaf adult narrative discourses retelling the same cartoon. The complexity of the examples which we have to confront with in our child corpora have lead us, to conceive annotation tools of gestures which are able to report the gestural shapes in their childhood reality.

5.2. Categorizing the non-verbal processes : proposition for a typology

The existing tools destined to annotate gestures of hearing children cannot be applying directly to the annotation of gesture's value for hearing gestures in the existing grid (Colletta et al., 2009) can't be apply to deaf children productions. Indeed, the category which retains our attention is the one of *referential gestures* which is conceived as "*gestures which have for function to design a referent if their can be perceived or representing it in space*" (Millet and Colletta, 1997). The perspective of the suggested typology is to detail all the gestural processes supporting common matrices shared between the hearing and the deaf, and which are particularly used in the encoding of narrative events. The following table summarizes some of the most frequent kinds of gestures used by deaf children of our corpora and which approach, in various ways, the narrative processes used in LSF.

Types of gestures	Description
Mimetic-action	mimics the action or the behaviour of a referent by a global corporal interplay
illustrative	describes the characteristics of a referent (size, form, etc.) by the manual configuration or depicts the referent or a characteristic of the action in the space
Spatiographics	depicts in space the arrangement of the elements of the referential universe and/or gives a topographic representation of the arrangement of the elements in the actual space
Endophorics pointing	manuals or cephalics pointing gestures which refers to a locus, before (anaphoric) or later (cataphoric), assigned to a referent
Trajectory-mimetic	manual gestures depicting the trajectory of the referent

Table 1: Typology proposed for the annotation of more frequent gestures used by deaf children

This typology is a first response to re-thinking the dynamics between gestures and signs in order to qualify how the processes that have not been systematized in a particular SL approaches verbal processes. Nonetheless, in their actual state of development, these tools do not enable us to assess precisely to the degree of proximity of these non-verbal processes structuring with the linguistic processes in LSF and the degree of the systematization of the units compounded the structure of these gestural processes. The perspectives opened by this final remark are still in exploration or waiting to be explored.

6. Less a conclusion, than a beginning

Rather than concluding, we will outline the perspectives and directions for further reason that our propositions have opened up. Of the numerous research questions raised by our propositions we shall start by pinpointing the key issue of delimiting gestural units, and especially which are not systematized in SL. Questions emerged both in the delimiting processes implied within the sets at the level of *semantic-syntactic* units and inside the blocs at the level of the units compounding a gesture. Indeed to situate precisely the evolution of gestural skills we have to be able to describe, with a fine granularity perspective, the degree of appropriation of the elements integrate in the gestural narratives process elaborated by deaf children. We therefore had to describe each piece of information encoded in the gestures categorized as non-verbal. Rather, this set of information is usually considered and transcribed as one single gesture. The example of Driss' narrative (see example 3) provides essential material for this discussion. Gestures used by this child – that we have transcribed as single gestures in the current transcription – can be describe in a more fine-grained perspective. For for bi-manual gestures, for example, it will be necessary to detail independently each gesture product and their components as different units – as manual configuration and movement amongst others. This description will allow us to contrast gestural processes elaborated by children in our corpora which encode different pieces of information in their gestures and which are nonetheless categorized as the same kinds of gestures in our current typology. These different encodings however provide cues on contrasted states of appropriation of the spatial encoding structure as the comparison of the extract from Driss and Abdel narratives shows. For example, it can be emphasized on the appropriation of the gestural processes which can support a double perspective of description, manual and corporal or manual/manual, for simultaneous actions. A fine-grained description of units will allow the precise identification of what kinds of elements of the specific manner of the linguistic encoding information in a particular SL are integrated. At this point, it will be necessary to consider in which way tools for SL description could be applied to gestures.

Furthermore, this article has concentrated on the gestural dynamic, especially given the focus of this workshop, but the reality of the bimodal dynamics encourage to think over, in a more general sense, of the way in which non-verbal/verbal dynamics are integrated in the transcription/annotation tools. A crucial challenge is supported by

taking into account the *transitional skills*, inherent to the development processes, and emerging alongside the continuum between the verbal and non-verbal extremes which are usually conceived as two static states of skills. The "non-verbal" components of school-age deaf children's productions are particularly neglected in the schooled context as in research. While our corpora based on a representative sample of heterogeneity of deaf children primary age-schooled show the importance of the deaf children skills which are not systematized in a particular language(s) – no matter it is vocal or/and gestural. These language realities incites to concentrate our efforts of comprehension of the later development in the context of deafness on the crucial issues raised by *transitional skills*. In our view, these challenges involve two central points: providing the elements about individual development trajectories in the context of deafness and modelling the various steps of language progression up to linguistic skills on them multiple forms. Our current work engages precisely with these two perspectives. A longitudinal corpora is currently being compiled, with 17 nursery school children and 25 primary school children. For the first time, this will provide cues on the heterogeneity of the transitional steps between language – in a broader sense – and linguistic skills in SL and VL.

7. References

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