

The methodological, linguistic and semiological bases for the elaboration of a written form of French Sign Language (LSF)

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Abstract

This paper takes up the question of elaborating a graphical representation for French Sign language (LSF), beginning with the specificities of the socio-cultural context in which this question arises for those most directly concerned, that is the Deaf. We underline especially the vigilance required, when confronted with the influence of the written form of the Vocal language on linguistic (and therefore graphical) representations of Sign language (SL). We then present the results of a field survey, which allow us to justify and define our objective: write and not transcribe LSF. Next we explain precisely how the admitted limitations of current graphical systems for SL call into question the validity of the principles of segmentation adopted by consensus, which results from the influence of model of dominant alphabetical writing systems and of the focalisation only on lexical signs taken out of context, at the expense of the structural specificities of SL. We present on these bases the major principles of the alternative method begun for LSF, based on the descriptive model proposed by Cuxac (2000). We wish in particular to explore and evaluate his hypothesis of low-level morpho-phonetic segmentation, thus opening the way for an at least partial morphemographic representation.

1. The Specificities of the context in which the question of elaborating a graphical representation for SL is raised

No writing system of any language has ever been elaborated by anyone other than the speakers of the languages in question. In this sense, it is difficult to imagine, that a written form of SL could be elaborated without a close collaboration with those who use these languages. Several characteristics of the linguistic and political situation of the Deaf render the addressing of this evident truth, however, rather complex.

The question of electronic representations of sign languages (SL) is of great importance not only for the recognition, the dissemination and linguistic and cross-linguistic study of these languages but also for the constitution of available resources to teach them. This digitalised representation brings into play all that pertains to the video capture of SL and of its treatment by computer. This raises however the closely related question of their representation in a graphical form, quite a different problem from the preceding one, since it implies the elaboration of a meta-language translated into another modality (here, the graphical modality). The present paper takes up this last point, and to do this relies on reflections and research carried out on these topics in the last few years in the framework of national projects and international cooperation ((Garcia & Boutet, 2003, 2006).

In order to determine the linguistic and semiological implications of the problem of elaborating a graphical formalisation for SL, and here especially, for LSF (see sections 3 and 4), two preliminary tasks are indispensable. First of all, we must recall the specificities of the historical, social, cultural and educational context in which the question, for the Deaf, of providing their languages with a graphical form is situated (section 1). These specificities in fact allow us to take stock of the preliminary conditions and demands, which are as much linguistic and methodological as they are deontological, and which are required in order to perfect the evaluation of graphical representations for these languages. The second task that is necessary to help in determining the semiological and formal choices of the projected graphical system consists in specifying which functions we wish to assign to such graphical representations (section 2).

We know the consequences for a language due to the fact of its not disposing of a written form, in terms of status, of political and cultural recognition and in terms of its power of dissemination. For the institutional SL practiced by the Deaf in Western-World societies, these consequences are still greater. As they are languages without geographical specific definition, and their political recognition remains quite fragile, these SL are obliged to exist side by side with languages that are in reality doubly dominant: they are vocal languages (VL) and they dispose of a written form which is the unique national written language, so that this written form constitutes for the Deaf the only means of gaining access to information and to knowledge. This problem is compounded in the vast majority of these countries by an additional difficulty for the Deaf, who are in most cases deprived of any reasonable access to the written form of the national language. For France, the only figure available estimates the level of illiteracy at 80% among the Deaf (Gillot, 1998). These enormous difficulties, observed in most countries having an institutional SL, are above all the result of a choice made in most cases decades before by educational authorities to make use not of SL – the only natural language – but of the national VL as instructional language for the education of the Deaf (e.g. Chamberlain *et al.*, 2001).

This reality has two crucial consequences for our undertaking. First of all, it has produced a very

ambivalent relationship on the part of the Deaf toward the written form of the VL, and moreover, to the written word in general. A survey that we recently carried out in France with Deaf users of LSF (Garcia & Boutet, 2006) has shown among other things that the Deaf feel a form of oppression, of forced dependence and have a mental block toward written French and toward written forms in general; but they simultaneously have a tendency to consider the particular alphabetical and linear form that it takes for the VL as sacred, and see in it the only possible form of writing. Another serious consequence is that the absence of any mastery of the written form on the part of Deaf signers makes it difficult for them to gain access to linguistic knowledge and accumulated reflections on languages in general, and on SL in particular, as for instance the history and the semiology of writing systems. This alone would yet enable them to step back from their own language and from the written forms, which is necessary for the elaboration of an adequate graphical meta-language.

Conversely, we must stress the consequences that its written form has on any language, which affect our manner of perceiving it and of describing it and which consequently could affect its evolution. As regards VL, many studies have shown to what extent the standards for spoken forms are permeated by those of written forms, and how on a meta-linguistic level, the written form conditions the perception that linguists have of spoken forms and, as a result, the description that they give of them (e.g. Blanche-Benveniste, 2000). One could go even further by insisting, as did Stokoe (1991), on the fact that the conceptual foundations of general linguistics have been to a large extent elaborated from the study of the written forms of VL. The elaboration of a graphical form for SL, which are profoundly and literally *face to face* languages, is therefore for these languages and for those who use them, not a trivial undertaking. On the contrary it can very strongly orientate the representations, the description and the very evolution of these languages. The particular political and social condition of SL implies an additional risk: the influence the dominant written form of the national VL can exert on these socially fragile languages. In fact SL are not exempt from all forms of graphical representation, and the noteworthy point here is precisely the influence, hitherto recognised, of the written forms of VL on these languages and on their description, through the choices of graphical representations made to date for the SL. I will return to this point later, limiting myself here to stress the particular implications of such influences for these languages operating in another modality, and which in fact display very strong structural specificities.

It therefore seems to us that two requirements should be stated as the basis for any undertaking that purports to elaborate a graphical form for SL. On the one hand, there is the setting in place of collaborative structures to create the conditions for a real and priority involvement of Deaf signers in the process of reflection on the graphical representation of their language¹. On the other, particular care must be taken as to the exact

correspondence between these graphical forms and the structural specificities of SL, and as regards the levelling down of these specificities that can be induced, directly or indirectly, by the social et cultural dominance of the written forms of VL.

On this basis, the other major question is that of the needs which should be addressed by a graphical formalisation of SL. What functions should it fulfil? It is obviously essential to answer this question, in order to determine the linguistic and semiological choices to be made, that is, the form of the graphical system itself.

2. The functionalities of a graphical system for SL

Any notation indeed, regardless of the form it takes, is evidently not a simple reflection of language in absolute terms. It is based on the integration of a certain number of more or less explicit theoretical hypotheses about what structures this language, but also on the formal choices (choices notably in the level of analysis and of encoding), which both depend on the potential uses and users of the system. So these uses and users have to be identified.

2.1 Transcribe

The first essential type of function that a graphical system of SL should assume is inherent in the linguistic description and is precisely what has dominated nearly all notation systems elaborated up until now for SL. These are functions that answer to the needs of researchers, as much for the constitution of dictionaries as for the transcription, the preservation and the exchange of corpus data for the SL under study. The issues at stake here are of a specific nature. The transcription should indeed be representative of the phenomena observed by the linguist, and it must make the structures that he brings to light (and which he has hypothesized) “appear”, at the particular level of analysis that he finds of interest (phonetic, phonological, morphological, syntactic, or discursive) and in accordance with his point of view and objective. Due to its heuristic aim, the transcription system should also allow the researcher to note, at the level of analysis he has chosen, as many details as possible – even those details that he perhaps was not expecting. In the perspective of exchanges between researchers and especially for cross-linguistic research, it is equally important that these graphical representations allow for the exact mental reconstitution of the language data transmitted in this way.

This very specific function of transcription is however not the only one that a graphical system for SL must fulfil. One of our first questions was in fact to know whether there were, in the community of Deaf signers of LSF (who had never been consulted on this point), needs relative to the specific graphical representation of their language. This was the reason for our qualitative survey mentioned above. For us it was a matter of evaluating -together with Deaf signers - whether and by what means the cognitive, social and cultural functions of writing are fulfilled for these Deaf citizens of societies based on the written word, and, if

¹ On this account, the *LS Script* project includes as one of its partners the IRIS association, which brings together Deaf teachers working in bilingual educative structures (Toulouse).

they are not, whether and how they could be.

2.2 But also and above all to write

This investigation forms the foundation for the totality of our work toward a written form of LSF. It has made it possible to directly involve the French Deaf community in the process of reflection, and also to bring up the fact that there are a number of situations in which, in fact, neither written French—even when it is mastered—nor video are regarded as being satisfactory. Our first major observation is this: Deaf signers (including those who could be considered as illiterate) dispose of very many specific graphical practices, the aim of which is to notate LSF—regardless of how well they master written French. Here it is exclusively a matter of practices for oneself, or between members of the Deaf community. The one encountered most frequently, even if one masters written French, is a specific use of the latter, that those interviewed designated in terms of either “*LSF-French*” or “*written LSF*”. This involves the lining up of French words, following—according to them—the syntax of LSF and what they refer to as “sign-words”. The weaker their mastery of French, the more this LSF-French is mixed with drawings, until it becomes literally based on drawings and other graphical symbols. This can lead to the development of completely original graphical systems, often individualised and more or less standardized, from which any “sign-word” is absent. We will insist in what follows on those situations in which the Deaf who we encountered have recourse to such specific practices even when they master written French, since, they claim, the latter is ill-adapted to their needs. These practices correspond to as many functions as could be assigned to a specific graphical form.

First of all, this concerns situations in which one has recourse to graphics in its primary function as support for the construction of thought, for example to prepare a production in SL (a conference or an appointment). Most often, and especially for those who have only some, little or no command of French at all, one has recourse to the continuum mentioned above, which runs from “*LSF-French*” to the exclusive use of idiosyncratic graphical symbolisations. In any case, as the thought process functions in LSF, this situation is presented as being one of the most frustrating—while even this use of the written word as a support for a cognitive elaboration corresponds to one of its key functions. Another problematic situation occurs with any written support for an “oral” presentation in LSF, the equivalent of notes for a hearing conference speaker. The particular difficulty is then that the utilisation of written French as a support disturbs the fluency of the production in LSF and incites to produce signed French. Both problems that we have just mentioned are to be found, according to the teachers we encountered, in the instruction of LSF in a school setting, where the pupils, for exercises of self-correction or for evaluation, have to prepare and then give a production in LSF in front of the camera.

We will mention two other problematic situations: first, that of note-taking from a course, a conference or a meeting in LSF, any recourse to French often being deemed inadequate, and even more so if one wants to

conserve a specific formulation in LSF. Then there is the case, moreover, where one creates a literary or artistic type of production in LSF, of which one would like to retain the graphical expression, allowing one to memorise it and conserve it, but also to re-work it in detail—which the video format is not flexible enough to allow for. It is a case such as this which has given rise to the most systematised graphical inventions, even if most often, their use is limited to a very few persons.

According to those interviewed, at least a part of the functions of the written word are for SL, already fulfilled or about to be by video and the new visual technologies—which they often consider as the “written form” of LSF. However, to a majority of them, there are currently certain limitations for video and the new visual technologies that will never be extended. First, as regards the access to SL data banks (search engines): the predicted potential in the medium term concerning digital image recognition (for movement and form) are still far from being equal to the economy of means inherent in the formulation of query *via* a specific graphical representation of language data being sought. More fundamentally however, for the majority of persons encountered, video presents intrinsic limitations which prevent it from specifically playing the role of support for the elaboration of a reflection, and for which as we have seen, written French, even when mastered, is ill-adapted. This is due firstly to the maintaining of the visible physical presence of the signer: video, by this very fact, remains bound to the face to face communication; it forbids, above all, the distancing that the written form authorises, *a fortiori* when it's a matter of one's own image. It is secondly due to the fact that video, through its streaming in time, does not allow for the simultaneous view of what is being recorded and what has already been recorded—a simultaneity which yet serves as the basis for the inherent potentials of writing.

These various observations argue for the elaboration of a graphical system that allows for written production in LSF, and for this reason, the development of a writing system is the prior objective of our *LS Script* project. From this point we must insist on the fact that here it is a question of quite a different function than that of transcription mentioned above. As a mode of communication on its own and having specific functions itself, a writing system allows for the direct production of propositional content, and in reception, a direct access to meaning which does not issue from an oral production beforehand. The function of a transcription system is on the other hand to graphically represent utterances first produced in an oral form, spoken or signed. The difficulties encountered by linguists who describe spoken forms of VL to transcribe their corpora are a true reflection of the gap that exists between writing and transcription. Indeed, writing systems only manage to fulfil the function of transcription imperfectly, and at the price of a great compromise of conventions (Blanche-Benvéniste, 1997; Habert *et al*, 1987).

Keeping in mind this necessary distinction between writing and transcription which has rarely been taken into consideration, it is helpful to analyse the linguistic and semiological choices that were made while devising the systems of notation and of annotation that have

already been elaborated for SL, and then to address the problems such an analysis can bring to light.

3. Questions raised by existing systems of notation and of annotation for SL

A good many graphical systems have been specifically created for SL. In the great majority however they have been conceived by researchers in response to their own research needs². These are transcription systems that can be divided into two main types: on the one hand, there are autonomous systems, *i.e.* systems of notation based on rules and on particular modes of representation requiring no knowledge of another written form (e.g. Bébian, 1825; Stokoe, 1960; HamNoSys, 1989)³; on the other hand, there are systems of annotation, characterised by the fact that the medium of representation takes a pre-existing written form, that of the national VL (e.g. Johnston, 1991; Bouvet, 1996; Cuxac 1996).

3.1 The Limitations of current systems of notation and of annotation

Several recent studies have stressed the limitations of these two groups of systems for transcription itself as well as for writing (Pizzuto & Pietrandrea 2001□Garcia & Boutet 2003, 2006). The greater part of notation systems proceed, more or less explicitly, from the analysis of conventional signs taken out of context—and notably, out of their spatial context—into parametric elements from their visual aspect and rendered in linear form, the selected parameters being more or less those identified by Stokoe (1960 and 1965) following, moreover, the analysis *princeps* of Bébian (1825). It is hardly surprising then that they permit a readable and representative graphical restitution neither of simultaneous phenomena, nor of the internal variations of signs in discourse nor, more generally, of the phenomena of the spatializing of semantic and grammatical relations. Annotation systems, devised to make up for these limitations, only manage in reality to *describe* these discursive phenomena through the recourse to the written form of the VL. For the graphical expression of lexical units, these systems can integrate existing notations and/or avoid the problem of any notation whatsoever of the internal structure of these signs and of their variations in discourse through recourse to the conventional principle of glossing⁴. What the analysis of present-day systems of notation and annotation of SL finally reveals is the existence of a hiatus between on the one hand, notations centring on the unit of the sign and inadequate for the recording of discourse, and on the other, systems of annotation for

discourse in which the recording of these signs in context is relayed (masked) by the recourse to the written form of the VL (gloss). This hiatus, in itself, calls into question the relevance of the segmenting principles that have been adopted.

3.2 Indirect forms of influence by the written forms of VL

It seems to us that two essential problems are able to account for these limitations. The first concerns the influence exerted indirectly by the written forms of VL. If we remember that the historical diversity of writing systems of VL themselves results from the typological diversity of these languages, it is difficult to see how the models for the written form of VL could be suited, as such, to languages as typologically different as SL – unless we consider that languages of the audio-oral modality have exhausted the totality of all possible graphical forms. However, the fundamental semiological principles of existing systems of notation for SL, *i.e.* the encoding of the mere formal aspect of units considered as the equivalents to phonemes and linearization, result from a very direct adaptation of alphabetical principles elaborated for VL. They thus completely overlook what is one of the most marked structural specificities of SL, that is, the spatializing of nearly all semantic and grammatical relations. The one notation system that has truly innovated in terms of the semiological exploitation of the graphical modality is the *Sign Writing* system (Sutton, 1999), *via* its direct utilisation of graphical surface as an *analogon* of the space in front of the signer and the exploitation of the position of symbols on this surface as referring analogically to the relative position of bodily articulators thus symbolised. One of the aspects of our work consists in a systematic exploration of the semiological potential inherent in the visual-graphical modality, notably in the two areas of the notation of non-linguistic bodily movement and of phenomena exploiting topological spaces (conventions utilised in molecular chemistry).

The other problem is concentration of inventors of notation systems on lexical signs. The difficulty here owes not only to the fact that they most often begin from the analysis of these signs outside of discursive context, but equally to the fact of considering them, on the one hand, as the principal if not the only linguistic unit of SL, on the other, as the ultimate unit of meaning. We can see in this exclusive concentration an indirect form of influence of writing alphabetical systems (the “word”). The theoretical model we have adopted, that of Cuxac (2000, 2004) allows us to pose the question differently. This model notably integrates at the very centre of its preoccupations number of (signed) productions which are, in part, usually considered in the literature as not belonging to SL (*i.e.* as “ungrammatical”, e.g. Liddell, 2003) – whereas they are extremely frequent, especially in story-telling (see Sallandre, 2003). These structures, which Cuxac calls “highly iconic structures” (HIS), are characterised by a very strong iconicity and by the fact they include only little or no lexical signs (“standard□ signs”).

On these grounds and unlike earlier approaches, we choose to *start from* the structural specificities of SL and

² *Sign Writing* (Sutton, 1999) constitutes in this sense a notable exception.

³ See (Miller, 2001) for an inventory

⁴ On the various problems posed by this recourse to glosses, *i.e.* to words of the written VL and, especially, the way in which they distort the representations and the description of SL, see (Cuxac, 2000), (Pizzuto & Pietrandrea, 2001) and (Pizzuto *et al* in the present proceedings). It clearly appears that working towards a written form of SL is presently the best means of making the transcription systems themselves progress.

to reckon on the necessity, as well as the possibility of imagining alternative graphical ways. This by no means excludes the recourse at some stage to the range of semiological graphical processes put in place in the written forms of VL —other than phonographematic ones.

4. The initial lines of inquiry: re-thinking low-level segmentation

To start from the specificities of SL —at least LSF— considered in the framework of Cuxac’s model, which seems to us to reproduce them most exactly, means that this formalisation should concentrate on two key aspects. On the one hand, an alternative investigation of low-level structuring, and on the other hand the modelling of phenomena appertaining to a pertinent utilisation of space. In this paper, I will only develop the first point, which has been the object of our most extensive investigations to date. As regards the graphical formalisation of spatial phenomena, and particularly, the constructing of reference and processes for the constructing of co-reference (anaphora), I will limit myself here to a remark. The graphical system to be elaborated does not aim at a representation of previous oral productions that it would simply transfer to a graphical form, like some visual anamorphosis in two dimensions of three- or four-dimensional phenomena. The true semiological challenge is to succeed in elaborating a graphical *interpretation* that respects what is structurally relevant in SL. In this sense, the original semiological choice made by *Sign Writing* to simply represent a visual phenomenon by another visual form, that is to exploit 2D graphical space as a “flattened” *analogon* (lacking depth) of the signing space, seems to me to be also one of its limitations, especially for the restitution of sophisticated phenomena concerning the spatializing of *loci*, and of anaphora.

The issue at stake in low-level modelisation is to determine the principles legitimating the choice of graphical units. In their great majority, current descriptions of SL propose a phonological type of modelisation, whether the reference would be that of the new phonological theories or that of a functional type of phonology. It is to this latter model and to the “phonetics” that it implies that existing notation systems including *Sign Writing* refer— whether explicitly or not. Here the lexical signs are analysed according to purely formal parameters aiming to explain their visual form (configuration, orientation, location, movement, ± facial expression), these parametric units being assimilated either to phonemes or to phonetic units. Beside the admitted awkwardness of these notation systems, the theoretical motivations for calling these parametrical principles into question are many. One of them, long remarked (Studdert-Kennedy & Lane, 1981; Jouison, 1995), is the difficulty encountered when trying to assimilate these parametrical elements to phonemes, since many of them carry meaning. Another difficulty is precisely due to the limited framework of the original source of these parametrical elements, which is the “standard sign”. In the perspective of a description of LSF that places the HIS at the heart of the model, another important type of minimal unit has to be taken

into account: units of “transfer”⁵, a part of whose constitutive elements are non discrete.

The hypothesis defended by Cuxac is based on a low-level structuring that is not phonemic, but from the outset, morphemic, with minimal elements resembling bound morphemes; it opens up an important alternative route to the modellisation of SL as well as for their graphical formalisation. This hypothesis calls for the morphemic compositionality of standard signs, analysed as minimal units of production comparable to molecules compounding atoms of meaning, elements that are partially commutable but non autonomous. This hypothesis remains to be validated. It is toward this direction that our work is orientated, which consists in taking the inventory, parameter by parameter —over the totality of the LSF lexicon presently accounted for (Girod *et al*, 1997)— of the lowest level morphemic components, and by ranking their values. The objective is to establish the productivity of these morphemic elements and to identify any possible rules of compositionality. The analysis, which is under way, has been concerned up until now with the configuration, the location and the direction of movement. It confirms the existence of a strict organisation of morphemic values and the coincidence of the most productive among them with those attested as constituents of HIS. It allows us moreover to highlight a number of cases of interdependency between parameters, and in particular, between the configuration and the direction of movement (Boutet, 2005; Garcia & Boutet, 2006).

For us, such a modelisation is doubly interesting. In part at least, these morphemic elements seem common to standard signs and to HIS: identifying what then would be form-meaning constants would put (us) on the trail of graphemes transversally common to two types of structures, HIS and standard signs. Moreover, a morphemic analysis opens up the possibility of an at least partially morphemo-graphical notation and no longer merely formal, and motivates the recourse to certain combinatory methods exploited by this kind of writing systems: the association of “phonetic” determinatives (ideo-phonograms) or semantic determinatives to these morphemograms (combinations of morphemograms in the manner of Chinese syllogigrams). The demonstration of systematic interdependency between parameters should permit besides to limit the final number of units to be retained for the notation.

One of the challenges of this long and exacting work (of which I only give a glimpse here) directly concerns one of the topics covered in this conference, that I will mention to finish with; that is the constitution of dictionaries for SL. The form taken by these lexicons and dictionaries that have been elaborated since the 18th century is a direct result of the absence of a historical written form for these languages⁶. For a number of them,

⁵ Cuxac discerns three major types of transfers, which constitute the HIS: personal transfers (the signer “becomes” one of the actants of his utterance), transfers of form (which allow one to describe any type of form) and transfers of situation (which allow one to represent the movement of an actant in relation to a stable localising referent).

⁶ As regards LSF, we refer the reader, for an analysis and a very exhaustive inventory of these dictionaries, to the work of

and at any rate for the only dictionary presently existing for modern LSF (Girod *et al.*, 1997), the method of classification and of description consists in fact in associating a given sign in LSF (possibly represented by a drawing) with one or several words in written French. Jouison (1995) pointed out the simplistic character of such a representation, which he considered as an indirect form of influence exerted by the written form of the VL, and which focussed the attention (especially of linguists) on this one level of analysis. Cuxac (2004) stresses the problem posed by these dictionaries: where the dictionaries of VL propose an average of 50,000 entry words for these languages, the dictionaries of SL offer at best 5,000. Rather than come to a conclusion as to the lexical indigence of SL, one must once again question the structural relevance of the method of classification, which does not take into account the true bases for the structural organisation of SL. The alternative solution would be a system of entry words by morphemic element⁷, and if at all possible by morphemo-graphical element.

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F. Bonnal (Bonnal, 2006).

⁷ Bonnal (2006) proposes, on the basis of Cuxac's hypothesis, a sample of what such a dictionary for LSF could be like.