Representing signed languages in written form: questions that need to be posed

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1. What we need to consider on the road towards electronic representations of Signed Languages

The purpose of this paper is to point out, and briefly discuss, some key questions which we believe must be clarified, or at least explicitly formulated, *prior* to focusing on the main issue this workshop aims tro address, i.e. how to represent Signed Languages (SL) electronically[1]. Our observations are based on both previous and ongoing research conducted primarily on Italian Sign Language (LIS) within our group (Fabbretti & Pizzuto, 2000; Pennacchi et al, 2001; Pietrandrea, 2000; Pizzuto & Pietrandrea, 2001; Pizzuto et al., 2000a; Russo, 2000), and on recent work undertaken within a comparative crosslinguistic project on LIS and French Sign Language (LSF) (Pizzuto & Cuxac, 2004; Garcia & Dalle, 2005) . However, the poblems discussed below are not language-specific, and constitute a major obstacle for developing appropriate cross-linguistic investigations of sign languages (Pizzuto et al., 2000b; Pizzuto & Cuxac, 2004).

Our considerations are grounded upon a more general theoretical-methodological and socio-cultural framework, sketchily outlined in this section, and should be related to those formulated, in the same line of thinking, by Garcia and by Di Renzo et al (in this volume).

We think that in order to devise more appropriate means for representing SL it is necessary, in the first place, that hearing and Deaf researchers working on SL adopt a broad semiotic and socio-cultural perspective for defining and describing SL, and the communities of Deaf signers, much more clearly than it has been done so far. Most past and current research provides an oversimplified view of SL and Deaf communities. For example, though of course everybody recognizes that 'native signers' constitute an extremely small proportion (5% or less) of all signers, most descriptions of institutionalized, national SL are based on data drawn from this very small sample of SL users.

By comparison, very little attention is devoted to characterize accurately the extremely complex linguistic, sociolinguistic and sociocultural variation that is found among SL users, due to the fact that the remaining, vast majority of signers (95% or more) are not native, and acquire their national SL at very different ages, and in very different conditions. Non-institutionalized SL, such as 'home-sign systems', and Primary or Emergent SL used by Deaf individuals who grow out of contact with other Deaf persons, or who develop SL in micro-communities, also need to be taken into account (Fusellier-Souza, 2004). This rich variation needs to be explored and assessed very carefully for defining the 'object' we wish to represent: do we want to represent only, or primarily, the variety used by an extremely small sample of users, or the many varieties that we know exist?

Second, it seems to us equally necessary that Deaf signers at large, and Deaf researchers in particular, become much more significantly involved in the scientific and cultural issues at stake. The active participation of Deaf signers in research teams working on SL (an obvious 'must' for any serious team) is not sufficient, per se, to ensure that the issues we face are addressed appropriately. What is needed is that Deaf researchers contribute to articulate in new and meaningful directions a much needed discussion of major issues that are crucial for developing written representations of SL. Within the limits of the present paper, we briefly discuss only two such issues: (a) the distinctions between languages with and without a written tradition; (b) the differences, and relations, between writing and transcribing.

1.1. Written vs. unwritten status, writing vs. transcribing

It is unquestionable that, until now, none of the SL used in the world has autonomously developed a written form. Different writing codes have been proposed, since Bebian's (1825) early attempts to "normalize" LSF and, in the last decade especially, a writing system such as Sign Writing (SW), designed by Valerie Sutton (1999), seems to gain a growing consent in several community and educational centres around the world. However, at present we certainly cannot say that wether these "signs of writing" will lead to a real evolution of written SL.

SL must thus be assimilated, under many respects[2], to spoken languages with an oral-only tradition, learned and transmitted in face-to-face interaction. As recalled by Di Renzo et al (this volume) this feature is not unusual because it is proper of the vast majority of human spoken languages, but the crucial differences between "oral" and "written" languages and communication need to be taken

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[1] For the sake of clarity, it may be useful to specify that signed language data are already electronically "re-presentable", in a trivial sense of the term, since they can be stored on, reproduced from, and (partially) searched/retrieved, via/on different electronic devices and supports: videotapes, CDs, DVD. The problem we explore here is how to represent signed languages via appropriate written and/or graphic codes that mirror, and allow us to reproduce SL form-meaning patterns *indirectly*, via conventional codes functionally comparable to those available for storing, analyzing and dexcribing spoken/written data.

[2] Note that, unlike oral-only languages used in a specific geographical area, SL are characterized by a peculiar diglossic situation, within "literate" societies (see later in this paper), and lack geographic unit within each national community (e.g. there is no "LIS-land" or "LSF-land" comparable to the "x-land" of a geographically delimited oral-only language).

fully into account (Halliday, 1985; Ong, 1982, among others).

The "oral" or "face-to-face" status of SL is relevant with respect to the question of variability of SL lexical and grammatical structures. Primarily oral languages lack one of the main drive toward a "common standard" i.e.written texts. Written texts and written grammars afford socially approved models of "well formed" language structures and thus greatly contribute to language standardization processes. In developing written representation of SL, the issue of variability is clearly at stake. Which forms and structures, which of the different lexical and grammatical variants are to be codified in a written form? It is obvious that this question can be answered only by Deaf signers, and the related "norms" require extensive involvement of Deaf communities (see Garcia, this volume).

For all the language communities that use it, a *writing system* is a socially shared code employed for the transmission of texts, overcoming time and space limitations. Different kind of "communicative needs," can be at the origin of a writing system (e.g. the possibility of fixing and trasmitting a shared body of laws, the transmission of literary texts, the elaboration of written dictionaries and grammars for educational purposes). Writing system are thus created in order to respond to communicative, artistic and educational needs and are designed to do that.

Writing systems undoubtedly provide an analysis of language structures which must be sufficient to achieve particular ends, and which is not an exhaustive analysis of the language structures. The linguistic structures which are codified in a writing system are the ones necessary to vehiculate the meanings which are communicated in particular settings and for particular purposes or usage. Thus different societies and cultures (e.g. the chinese written culture vs. the western tradition) choose different aspects of a language in order to better achieve these ends. This always occurs through a social process of elaboration, diffusion and institutionalization of the writing system.

On the other side *transcription systems* are tools that are useful for researchers in order to analyse linguistic structures, and are developed in order to represent the linguistic features that are studied by the researcher. Most importantly, transcription systems do not influence language usage and language varieties, while writing systems do. Indeed, as noted, writing systems contribute to the standardization processes and thus influence linguistic norms, provinding structures that are to be conceived as a model of a socially approved, "well formed" way of using a language.

The history of writing systems demonstrates that in general the possibility of transcribing texts is always subordinated to the emergence of a writing system. Writing systems involve a particular form of metalinguistic awareness by providing a segmentation of the linguistic structures. This kind of metalinguistic awareness becomes an integral part of language users' linguistic competence, and thus transforms language usage. Transcription systems are facilitated by the emergence of a writing system because writing provides a representation of linguistic competence that is socially shared and commonly agreed upon.

In this frame, and limiting our attention to our "literate" societies, Deaf researchers and signers at large are in a peculiar, culturally disadvantaged position that

needs to be highlighted. As remarked in this volume by Di Renzo et al, Deaf signers live in a diglossic environment, in which their unwritten face-to-face SL must co-exist with the dominant spoken and written language used by, and in interaction with, the surrounding hearing community. However, due to well known difficulties engendered by deafness, most Deaf signers, including several highly skilled and qualified Deaf researchers, do not develop appropriate literacy skills in the dominant written language (see also Garcia, this volume).

We cannot underestimate the difficulty these researchers encounter when they try to ground the distinction between writing and transcribing on their own language experience. Their SL is not written, and this fact by itself renders very problematic drawing the distinction between writing and transcribing *with respect to their own SL*. For the same reason, in the absence of a written form, it is certainly not easy, for Deaf researchers, to evaluate the appropriateness of the various "notation" and "transcription" tools that have been proposed for their SL (see section 2 below). One could argue that Deaf researchers can still draw the distinction between writing and transcribing resorting to their knowledge of the dominant spoken/written language which they also use. We may grant that this can be done. Yet the very little discussion that there has been thus far over these themes, along with unfortunate practices that, for lack of better tools, continue to be used in SL research (see section 2), indicate that much remains to be clarified. In any event, the problems pointed out above with respect to SL remain unresolved, and need to be faced.

From a more general perspective, we believe that the complexity of the issues to be faced demands a significant cultural effort, to be carried out jointly by the hearing and Deaf communities involved: we need to create appropriate conditions that allow Deaf signers, and especially Deaf researchers, to have extensive access to, and elaborate, relevant information and theorizing on the problems linked to the representation of SL. We can no longer ignore, nor underestimate the "language barriers" that severely limit Deaf signers's access to much relevant information on their own community.

2. Questions that need to be posed

We turn now to consider specific questions we believe need to be posed with respect to: (a) comparing SL vs. vocal language (VL) corpora; (b) the limits of Stokoe-based notations for representing SL; (c) the misuse of so-called "glosses" in SL research; (d) the issue of writing vs. transcribing.

2.1. SL vs. VL corpora

There is one implication of the unwritten status of SL that is rarely, if at all, discussed in current research. Given their unwritten status, SL should be naturally assimilated to, and studied as, languages with an "oral-only" tradition (but see footnote 2). At the very least, as remarked in different studies (Fabbretti & Pizzuto, 2000; Pietrandrea, 2000; Pizzuto & Pietrandrea, 2001; Pizzuto & al, 2000a; Russo, 2000; 2004; 2005), an appropriate investigation of SL would benefit from taking seriously into account the frame of reference developed for spoken/oral (as distinguished from written) forms of language (e.g. Biber et al. 1999; Halliday 1985; Ong 1982).

In this frame, our first question is the following.

Q1: How many studies do we know that have taken fully into account the primarily "face-to-face" or "oral" (in the broad sense of the term) status of SL? How many appropriate crosslinguistic and crossmodal comparisons have been performed between SL and VL corpora, most notably *text corpora drawn from actual usage*?

From the answers we can provide to these questions we can measure the gaps in our current knowledge of SL as unwritten languages. The representational issue is obviously crucial.

2.2. The limits of Stokoe-based notations

In spite of the remarkable progresses made since the modern study of SL began with Stokoe's (1960) seminal work on American Sign Language (ASL), we still do not have efficient, widely standardized notation/transcription tools for representing SL (Bergman et al, 2001). As argued in different studies produced within our group (e.g., Pizzuto & Pietrandrea, 2001; Pizzuto & al, to appear; Russo, 2000), this lack of appropriate tools can be most readily appreciated when we try to represent *signed texts*, or even very short sequences of signs in units characterized (often without clear definitions) as "sentences", "clauses", "utterances".

The main issue to be faced, in our view, is a somewhat paradoxical theoretical and methodological problem. The kind of notation originally proposed by Stokoe has been subsequently employed in the investigation of many (almost all?) SL, with more or less extensive expansions and modifications, and/or significant implementations for the computational representation of SL as for example in the HamNoSys (Prillwitz & al, 1989 -- see also the collection of papers in Bergman et al, 2001 and Streiter & Rocha Costa, 2004 for overviews of current notation tools). However, Stokoe-based notations can be succesfully employed primarily for notating single, decontextualized signs, as in the citation forms listed in SL dictionaries.

But this notation cannot be used for segmenting and transcribing individual signs and signs' sequences occurring in the actual flow of signed conversation, with all the morphological modifications noted in discourse. The limits of this notation are also evidenced by the fact that, to our knowledge at least, there are no *monolingual* dictionaries or reference grammars that rely on this notation as the primary and only means for representing the signs they describe. The "representation-by-notation" given in such reference tools is not autonomous, but it is always substantially integrated with text descriptions in a specific written language (e.g. English, Italian, Spanish), and graphic, pictured or filmed illustrations of the signs described. These descriptions are in no way comparable to those we find in dictionaries and reference grammars for spoken languages.

Q2 can thus be formulated as follows: are we sure that our analyses of the linguistically relevant manual and nonmanual elements that compose the signs, and allow their organization and segmentation in discourse, are appropriate? Or isn't rather the case, as suggested in related work (see Pizzuto & Pietrandrea, 2001; Russo, 2005, among others), that the difficulties we find in using Stokoe-based notations for transcribing signed texts reveal a need to revise our current analyses of SL structure much more profoundly and extensively than it is commonly assumed?

The latter view appears more plausible in the light of the following considerations. First, it seems highly peculiar that a notation tool assumed to be adequate for representing isolated, decontextualized "lexical units" cannot be used for representing the same units when they occur in context. This fact in itself should generate "suspicion", since it seems to have no parallel in spoken language research. For example, if we were to use the IPA notation for representing decontextualized lexical items of a VL that has never been previously described, it seems unlikely that we would be unable to write down the same items when they occur in sequences of spoken discourse.

There is another peculiar phenomenon that can be noted in much lexicographic work, and which may be linked in part to the use of Stokoe-based notation (but also to the unfortunate practice of "glossing" and to the difficulties of constructing dictionaries from corpora of actual usage -- see Brennan, 2001; Russo, 2005; and below). The signs that are included in SL dictionaries are for the most so-called standard signs (though this definition is far from being clear and somewhat circular, since the very inclusion of a sign in a dictionary is one of the element for classifying it as "standard"). The vast majority of such signs turn out to be units which can be easily translated via single words of the contact/dominant language (e.g. by common words such as "bed, sleep, child, table, glass, see, man, woman" etc.)

Typically missing from dictionaries are complex units that are commonly characterized as part of the "productive lexicon" and encode equally complex meanings for which it is often difficult to find single-word translations. These units include manual and nonmanual components, and have been described with different terms, including "classifiers" "classifier-based" or "polymorphemic" predicates, "polycomponential signs" "productive morphemes" (see among others Emmorey, 2003, for a recent overview, and Di Renzo et al, this volume, for some illustrative examples). In recent research we have found more fruitful to characterize these complex units as Highly Iconic Structures (hereafter HIS), adopting, and extending to LIS, the theoretical-methodological framework proposed by Cuxac (2000) for LSF.

Signers' intuitions and empirical evidence from analyses of fairly large corpora suggest that HIS are a very relevant feature of signed discourse. In research on LSF Sallandre (2003) has found that in some kinds of narrative texts HIS can constitute as much as 70% of the sign units produced. Disregarding terminological differences, work conducted by Brennan (2001) on British Sign Language (BSL), and by Russo (2000; 2004) on LIS provides very similar indications. In addition, both Russo's (2000; 2004) and Sallandre's (2003) studies provide, from different perspectives, important evidence on the large intra-subject variability that characterizes the use of HIS according to different discourse genres and registers.

It is extremely difficult, if at all possible, to capture HIS via a Stokoe-based notation, especially if one wishes to describe accurately the nonmanual components of these complex units. This is an additional indication that a Stokoe-based analysis, and the related notation tools, are not adequate for our descriptions and representations of SL lexical and morphological structure. Since HIS appear to constitute such a relevant dimension of SL structure, these

limitations and inadequacies can no longer be overlooked or underestimated.

2.3. The misuse of so-called "glosses"

Our third question concerns the unfortunate yet widespread practice, in SL research, of resorting to so-called "glosses" for parsing and "writing down" what are considered the "basic meanings" of signs identified in signed utterances and texts. The words used for this purpose are in CAPITAL letters by convention (e.g. "EAT" for a sign meaning "eat").

The term "gloss" is actually a misnomer for the labeling operation that is performed in SL research. In fact, glosses as appropriately used in the annotation of spoken/written language data are always an *ancillary* device that *does not replace, but accompanies*, in a reference language known to the author and the reader of a given study*, an independent representation of the language data object of inquiry*. The example in (1) below, taken from Pulleyblank's (1987: 988) description of Yoruba (a Nigerian language) illustrates this point.

(1) ó   gbé   e   wá
    he/she   carry   it   come
    'He/she brought it'

The first line in (1) provides an independent, orthographic representation of the constituent units parsed in the Yoruba utterance described. The second line provides, in a one-to-one correspondence, English glosses for the elements represented on the first line, while the third line provides the English translation. This is a plausible and useful use of glosses, as ancillary notation tools that help the reader to understand (via labels in a familiar language) the lexical and morphological patterns of the Yaruba sequence. But the constituent elements of the original sequence are and must be represented independently, otherwise we simply would have no idea of the form-meaning patterns of the language investigated.

Quite differently, in SL research glosses are used as the *primary* and indeed *only* means for representing signs in a written form. For example, a 'glossified' rendition of a LIS sequence with a meaning comparable to that in (1) could be:

(2) INDEX-a   INDEX-b   BRING

A text (in English, Italian etc.) would then accompany the representation in (2) describing, for example, where the "INDEX" signs were directed and located in space, whether the verb labelled as "BRING" was/was not dislocated in space, and the like. The point is that, in the kind of "representation" provided in (2), the reader has no way to reconstruct the LIS forms that were produced. *There is no independent representation of the signs,* hence nothing is being "glossed". What we have is just "word-labels" for the meanings we assigned to forms that plainly are not "there". By the same token, any so-called transcription of SL data via labels of this sort cannot be defined a "transcription" in any appropriate sense of the term.

The use of word-labels has one other major detrimental effect which has been described quite extensively, and we will only mention it here: these labels can grossly misrepresent the structure of both individual signs and signed discourse (Jouison, 1995; Pizzuto & Pietrandrea, 2001). For example, in research on LIS (Pennacchi et al, 2001; Pizzuto & al, to appear) we have shown how word-labels can lead to inappropriate parsing of utterances within a structured sequence of signs. In earlier work, using a fairly detailed notation based on word-labels, we had analyzed a given sequence of signs as consisting of a single utterance composed of five manual sign units. In subsequent work, the same sequence was transcribed using SW symbols. The SW-based representation of the manual and nonmanual components provided markedly different results, leading to identify three utterances, rather than one. It is important to note that both analyses were perfomed with the substantial help of a highly competent native LIS signer (Rossini, co-author of the present paper). The different results obtained in the two analyses appeared thus to be significantly influenced by the representation tool employed.

The question we want to pose on the ground, then, is the following.

Q3: If we all agree that segmenting and labeling the signs occurring in signed texts via word labels is very inadequate, and even dangerous, why do we continue to do it? Even granting that there are, in fact, practical reasons why this unfortunate practice continues, why is the problem still so widely underestimated in much current research on SL?

2.4. Can writing be bypassed?

The last question we would like to formulate is apparently very simple, but dense of implications for much current research on SL.

Q4: Are we sure that, in our attempts to develop appropriate notation/transcription tools for SL, we can "bypass" the development of some form of writing, before proceeding any further?

As researchers who have been actively involved in the study of SL for rather extensive periods of time we have always been extremely surprised by the lack of interest, when no overt opposition, that most researchers in the field appear to manifest towards the issue of "writing SL". We must admit that we find difficult to understand the reasons of this state of affairs. As noted earlier with respect to spoken languages, the possibility of transcribing texts is rather naturally subordinated to the existence and use of writing systems. It is hard to imagine why this should be different for SL. We think that, as researchers, we should reflect on the question formulated above, and try to address the issue it raises, motivating on theoretical and/or empirical grounds the reasons that may lead us to provide an affirmative or negative answer.

3. Searching keys lost in the dark

Anyone who has confronted him/herself with the task of analyzing and describing meaningful linguistic patterns and structures in SL corpora drawn from actual signed discourse knows from direct experience, as we do, how difficult it is to perform this task with the "transcription" and notation tools currently available, and most widely used. The intellectual uneasiness one experiences is no less relevant, especially with respect to the use of word-labels for "pretending" to represent signs connected in discourse, especially if we try to compare what we do with

(and on) SL to what one would normally do, or not do, in VL research.

We believe that no field linguist would try to uncover and describe the lexical and grammatical structure of a VL "X" that has never been explored using, as a major "notation" tool for "fixing down on paper" the patterns of "X", the words of his/her own spoken/written language (e.g. English). But this is exactly what happens, in SL research, everytime we use word-labels to parse signed discourse, and pretend to represent form-meaning patterns via words of a spoken/written language. Since the *signed forms* are in no meaningfull sense represented, no form-meaning patterns are described. In addition, this "representation" can seriously distort and prejudice our analyses. Yet the unfortunate practice of word-labels for signs continues, questioned by many, but apparently not questioned enough to be abandoned. Different, but no less relevant criticisms can be raised with respect to Stokoe-based notations, as we tried to illustrate above.

To use a deliberately provocative metaphor, it seems to us that this way of proceeding could be likened to that of the character of a well-known story who, in a dark night, lost his keys and was searching them under a street-lamp light. Questioned by a passing-by policeman whether he had lost his keys right there, under that street-lamp, he replied: "actually not". Further questioned as to why, then, he was looking under the lamp, the man replied "at least there is some light here"[3].

We believe that the work we have begun on "writing and transcribing LIS signs with the glyphs of SW", reported in this volume by Di Renzo et al, provides indications for at least beginning to face the problems discussed in this paper, while avoiding the fallacy of searching in wrong (though perhaps more familiar) places the keys we need to "unlock" these problems.

We wish here to comment briefly on some aspects of this work that we have found particularly promising. As we observed how signers composed their written texts, and how these were read by other signers, it seemed evident that the written forms produced mirrored the signers' internal competence, and allowed them to express their "LIS-grounded thoughts" directly and effectively, in a way they had never experienced before (e.g. with respect to how signs were parsed, how relevant manual and nonmanual components were selected).

We found of special interest the fact that the written texts included not just so-called standard signs, but also a fair amount of HIS, and that the the SW glyphs could easily represent signs organized in a multilinear fashion, mirroring the coarticulation in space of distinct signs in a single temporal unit that is found in signed discourse.

On the other hand, the use of SW for transcribing signed texts, and the comparisons that could then be done with written texts, allowed signers to quite literally "see" key structural differences between written and face-to-face

texts that would have never emerged without a written representation of *both* kind of texts. The distinction between what one "knows" (when producing a written text), and what one actually "does" (when producing a signed text) thus became much clearer, because it could be grounded on a written representation of form-meaning patterns, in the signers' own native language, in different modalities of language expression. This posed the basis for a much deeper, theoretically and empirically motivated understanding of the crucial distinctions between writing and transcribing (see Di Renzo et al, this volume). The discussions we had give us good reasons to think that the insights that were achieved could never have been gained without the help of a written code.

All of this indicates that a system such as SW has the potential for encoding structures and morphosyntactic organizational patterns that are highly specific of SL, and that emerge not only in their face-to-face form but also, and most interestingly for us, in their written form. It also suggests to us that, at least in principle, and if appropriately implemented from a computational standpoint, SW could be effectively employed in the future for creating, along the lines proposed by Russo (2005), a much needed reference lexicon of LIS based on corpora drawn from actual usage, and representing the important variation we know exists in LIS.

These promising indications certainly must still be carefully tested, and much more theoretical and empirical work is needed before we can say anything more conclusive. For example, the metalinguistic observations and discussions that have been stimulated, in our group of LIS signers, by the opportunity of "objectifying on paper" the forms of their language have suggested the need to explore more in depth the links, and distinctions, between written and "face-to-face" forms of language, and to achieve a clearer understanding of the similarities and differences between signed and spoken/written languages with respect to this dimension. The need of knowing much more on the history of writing in general, and of different writing systems has also arisen. We expect that comparisons beween written and transcribed texts of LIS and French Sign Language (LSF) we have planned to conduct in collaboration with our French colleagues will provide additional, valuable information (Garcia & Dalle, 2005).

From a broader socio-cultural perspective, we are obviously aware that, since writing is an inherently cultural process, the experimentation we have started within a very small group of LIS signers must be validated through a thourough confrontation with the larger Italian Deaf community. Whether a written form of LIS will or will not evolve will depend entirely from this community, and its cultural needs. What seems unquestionable to us is that whole issue of writing SL (as distinguished from transcribin and/or coding) needs to be considered much more carefully than it has been done thus far. This may open new, meaningful perspectives in our search for a clearer understanding of SL structures, and of more appropriate means for representing them.

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[3] *As I learned after submitting this paper for publication, the original story, in a slightly different version, is attributed to Nasrudin, a philosopher / wise man character of the East/Middle-East but also Mediterranean popular tradition, usually assumed to have lived in Anatolia or Persia between the 11th and the 14th century. I thank Elena Tomasuolo for bringing this information to my attention.*

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5. Acknowledgements