

Essays on Contemporary Linguistics and Language Studies

Eastward Flows the Great River

Festschrift in Honor of
Professor William S-Y. WANG on his 80th Birthday

Edited by PENG Gang, SHI Feng



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On Modality Effects and Relative Syntactic Uniformity of Sign Languages¹

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Abstract

Human language can be expressed in two modalities, visual-gestural modality of signed languages and auditory-vocal modality of spoken languages. These two modalities of human language share several fundamental necessary properties of human language. However, there are also modality effects which contribute to the drastic differences between signed and spoken languages in lexicon, morphology and syntax. Two most important effects are iconic representation of objects and actions and indexic/ostensive identification of referents in signed languages. The two modality effects, on the other hand, render relative uniformity in morphology and syntax across signed languages. At the same time, signed languages share some similarities with creoles because of their similar ambience of language acquisition. The paper attempts to tease apart the syntactic structures due to iconicity vs. structures due to creolization.

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1. This paper is a revision of the paper with the same title presented at the Joint Meeting of 14th Annual Conference of the International Association of Chinese Linguistics and 10th International Symposium on Chinese Languages and Linguistics. I take great pleasure in contributing this paper to honor Professor William S-Y. Wang on his 80th birthday. Professor Wang has inspired me to delve into the evolution of human language, of which the study of sign language is a necessary subject. In preparation for this paper, I have benefited from discussions with SU Shiou-fen and CHEN Yi-Chun. I am, however, solely responsible for all possible errors and infelicities herein.

1. Introduction

Research on sign languages in the past three decades has clearly demonstrated that human language can be produced in two modalities, visual-gestural modality of signed languages and auditory-vocal modality of spoken languages. It is therefore not only desirable but also necessary to consider both signed and spoken languages in studying language universals and specifics, and the closely related issue concerning language uniformity and diversity. Relative concepts define each other. Just as language universals and specifics define each other, so does language uniformity and diversity. In this chapter, we hope to approach the issue of language diversity from the point of view of sign languages.

The two modalities of human language share several fundamental necessary properties of human language. They range from fundamental design features of human language, to linguistic forms, to language acquisition, and to hemisphere lateralization. At the same time, there are also modality effects responsible for the structural differences between signed and spoken languages in lexicon, morphology, syntax, and semantics. Two most important effects are iconic representation of objects and actions and indexical/ostensive identification of referents in signed languages (Meier 2002). Furthermore, a more crucial question has been raised by Liddell (2000, 2003) as to whether signed languages also utilize general non-linguistic spatio-cognitive principles to construct meanings.

On the other hand, cross-linguistic comparisons among sign languages that have naturally arisen among the Deaf communities in different parts of the world show striking similarities in morphology and syntax (Newport and Supalla 2000), even though they differ greatly in vocabularies and are unintelligible to each other.² In contrast with relative diversity of spoken languages, signed languages exhibit relative uniformity in morphology and syntax. Thus, all natural sign languages reported contain three classes of verbs: plain verbs, agreement verbs, and spatial verbs. Furthermore, most plain verbs are body-anchored across sign languages. Agreement verbs use agreement mechanisms to indicate the subject-object relationship. Spatial verbs do not indicate the subject-object relationship. They use the hand movement to indicate the change of location of a person, animal or object, reflecting the layout of events in the real world (Klima and Bellugi 1979; Sutton-Spence and Woll 1998). Being isomorphic with visual world, spatial verbs across sign languages almost invariably involve classifier predicates in which the classifier systems are based on the same set of object properties underlying the classifier systems in spoken languages (Emmorey 2003). In word order, sign languages show a general tendency towards topic-comment construction, resulting in OSV and SOV orders. In morphology, sign languages tend to use repeated movement to mark temporal aspect or to distinguish nouns from verbs. Sign languages also use facial expressions to indicate sentence types, declaratives, questions and conditionals.

2. We do not refer to signed languages patterned after the grammars of spoken languages such as Signed English or Signed Chinese. They are not natural sign languages.

While Meier (2002) attributes the relative uniformity of signed languages to modality effects as well as to their youth.³ Aronoff, Meir, and Sandler (2005) single out the modality effects as the major factor, especially the iconic motivation in the visual-gestural modality of sign languages. They compare sign languages with creole languages (Bickerton 1975, 1981; Mufwene 2001). They observe that while both types of languages are young languages, young creole languages do not exhibit rich inflectional morphology as sign languages. They thus argue that inflectional morphology in sign languages are due to modality effects rather than the youth of sign languages. The main purpose of this paper is to further explore the modality effects on the structure of sign languages, centering the relative uniformity of signed languages in the setting of the relative diversity of spoken languages.

2. Sign Language as Natural Language

Systematic research of sign languages has a relatively short history. There was a misconception about sign languages among linguists, and the misconception has remained intact among the general public. The misconception is that sign language is a combination of gestures and pantomimes without grammar. Bloomfield (1933, 39) regarded sign languages as ‘gesture languages’ developed from ordinary gestures with their complicated structures derived from the conventions of spoken languages. On this view, sign language is merely parasitic upon spoken language, rather than an autonomous system of human communication expressed in visual mode. Spoken language, the auditory mode of human language, was equated to human language. In the same vein, Hockett (1960) compared spoken languages with animal communication systems to identify more than a dozen of design features in human language. To him, the most obvious feature is the auditory-vocal mode of communication. Associated with this mode of communication are design features such as arbitrariness and discreteness of linguistic symbols. We now know that these design features are of very different nature in sign language and deserve further scrutiny. Even Chomsky (1967) characterized language as the correspondence between sound and meaning.⁴ This characterization is still prevalent in linguistic literature.

The misconception was first unveiled by William Stokoe and his associates (Stokoe 1960; Stokoe, Casterline, and Croneberg 1965) whose research on American Sign Language demonstrated that signs, like words, are constructed from a small number of elements according

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3. Along with the youth of sign languages, Meir (2002) has identified their roots in nonlinguistic gesture as a contributing factor to the iconic motivations in sign languages. In this respect, creoles are different from sign languages, even though both types of languages are young languages.
 4. Chomsky has since modified his view on the nature of human language by incorporating both signed and spoken languages: “...the language faculty is not tied to specific sensory modalities, contrary to what was assumed not long ago. Thus, the sign language of the deaf is structurally very much like spoken language, and the course of acquisition is very similar.” (Chomsky 2000, 121)

to certain formation principles. Thereafter, through several years of study of American Sign Language (hereafter ASL) by a group of dedicated linguists and psychologists led by Klima and Bellugi in 1970s at the Salk Institute for Biological Studies, the structural properties of sign language began to be largely uncovered. Klima and Bellugi (1979) have clearly demonstrated that sign language as exemplified in ASL has a complex structure grammar with the fundamental properties linguists have posited for all human languages. The journal *Sign Language Studies* was also established in 1970s. The ensuing two decades have witnessed a steady progress in the study of sign language. Some of the representative works include Liddell (1980, 2003), Fischer and Siple (1990), Siple and Fischer (1991), and more recently by Emmorey and Lane (2000), Emmorey (2002) and Meier, Cormier, and Quinto-Pozos (2002). The research on sign languages over the past forty-some years has demonstrated that sign languages are natural languages produced and perceived through gestural-visual means, yet with all necessary properties that distinguish human language from animal communication systems. Like spoken language, sign language is a rule-governed system. It is composed of a set of symbols and rules of concatenation and operation over these symbols. Thus, like spoken language, sign language has elaborated systems of phonology, morphology, syntax, semantics, and pragmatics. Neurolinguistic findings in the past two decades also suggest that the brain's left hemisphere is dominant for signed languages, just as it is for spoken languages (Emmorey 2002). It is now well established that there are two modalities for human language to be produced, namely, auditory-vocal modality of spoken languages and visual-gestural modality of signed languages.⁵

3. Modality Non-Effects and Effects

The discovery that language can be expressed not only through the vehicle of speech but also through the vehicle of sign has profound implications for linguistics, psychology, anthropology and other disciplines under the umbrella of cognitive science. It should be taken as one of the most crucial research findings in the study of language. No longer can we equate language with speech. Nor can we discuss design features of human language solely based on the data from spoken languages. Language universals as well as language disparities can only be drawn from both signed and spoken languages. Language universals can now be approached from the set of properties shared between signed and spoken languages, or the non-effects of modality. These non-effects of modality as identified in Meier (2002) are: (i) conventionality of pairing between form and meaning; (ii) duality of patterning by means of which meaningful units are built of meaningless sublexical units; (iii) productivity of new vocabulary through derivational morphology, compounding, and borrowing; (iv) syntactic structure building on syntactic categories such as nouns and verbs and embedded clauses such as relative and complement clauses; (v) similar timetables for acquisition; and (vi) lateralization in left hemisphere.

5. As reported in Quinto-Pozos (2002), the tactile-gestural modality, the third modality, is used by deaf-blind signers of American Sign Language.

It appears, however, that these non-effects are only first approximations. Under further scrutiny, these non-effects are likely to exhibit more detailed differences between the two modalities. Let me briefly comment on each of the six non-effects aforementioned. First, although conventionality of pairing between form and meaning holds true to both modalities, iconic motivations are much more pervasive in signed languages at both lexical and syntactic levels. In contrast, arbitrary association is the general rule for spoken languages, although iconicity in syntax (Haiman 1980, 1985) and onomatopoeia and sound symbolism in phonology (Hinton, Nichols, and Ohala 1994) have been documented for spoken languages.

Second, duality of patterning, one of the most important design features of human language, holds true to spoken languages as well as to signed languages. Like spoken languages, signed language use a small limited set of basic elements, i.e., basic handshapes, in conjunction with other parameters such as location of articulation, hand movement, and palm orientation, to form basic vocabulary of the lexicon. However, there is also a difference here. While the phonemic units in spoken languages are meaningless units themselves, the basic handshapes in signed languages are often meaningful by themselves. It is only when they serve as sublexical units, their iconic motivations are submerged. It appears that the preservation of iconic motivation for the whole lexical units forces the sublexical handshapes to function as meaningless units. For instance, in TSL the basic handshape /hand/ by itself stands for hands, but it can be used to form lexical items such as HOUSE and NOW in which it becomes meaningless sublexical units. This difference between the two modalities may have some important implications for the emergence of duality of patterning in the course of evolution of human language (Tai 2005).

Third, like in spoken languages, signed languages create new vocabulary through derivational morphology, compounding, and borrowing. However, derivational morphology appears to be more limited in signed languages than in spoken languages. This may be attributed to the youth of signed languages rather than modality effects (Aronoff, Meir, and Sandler 2005). In contrast, compounding seems to be the most important mechanism in creating new vocabulary in signed language, but not necessary so in spoken languages. As to the mechanism of borrowing, while the borrowed words in spoken languages are subject to phonological regulations of the borrowing language, the whole signs can be borrowed from one sign language to another sign language without much alternation. Thus, the same sign HOUSE are used Chinese Sign Language, Japanese Sign Language, and Taiwan Sign Language.⁶ Furthermore, since all these three sign languages use Chinese characters, character spellings are not uncommon in these languages. Both Chinese characters and signs are both visual languages, and they are more compatible with each other than with speech. In alphabet languages, figure spelling is used instead. The use of figure spelling can alter the basic handshape of a sign through initialization (Battison 1978, 2004).

Fourth, the statement that all sign languages have the same parts of speech as in spoken languages needs to be qualified. It seems that prepositions are absent in all sign languages. It is no accident that in their most recent book on sign language and linguistic universals (Sandler

6. In terms of language families, Taiwan Sign Language and Japanese Sign Language belong to the same family, but not Chinese Sign Language.

and Lillo-Martin 2006), there is no mention of prepositions at all. It may have to do with the fact that spatial relations as expressed in English prepositions 'in', 'on', 'at', 'from' and 'to' can be expressed in signed languages visually and iconically without explicit morphemes⁷. The category of auxiliaries is in general absent in sign languages. Smith (1989) first found three auxiliaries in TSL and claimed that TSL is the only sign language with auxiliaries. It should be noted that these three auxiliaries all play the role of agreement and are very different in nature from the auxiliaries in spoken languages. Later, Fischer (1996) has shown that something like AUXI in TSL exists in Japanese Sign Language, Sign Language of Netherlands, and Danish Sign Language. As concluded by Fischer (1996, 117) that this something like AUXI sign appears to have the fundamental function of agreement. In sign languages, it is often the case that many nouns are signed by actions associated with the actions. In ASL and other sign languages, these semantically related nouns and verbs by signing the nouns with smaller and restrained but repeated movement (Supalla and Newport 1978). It is, however, not the case in TSL. Thus, the distinction in TSL can only be made in syntactic or discourse contexts. Furthermore, embedding in relative and complement clauses in sign languages are often expressed by nonmanual facial expressions. One of the most difficult tasks in sign language analysis is to identify such expressions and their structural relationship with manual expressions. As to the trade-offs between word order and verb agreement, all the sign languages reported so far have the class of agreement verbs. In addition, all sign languages use the topic-comment structure. With agreement verbs and topic-comment structure, sign languages appear to have relatively freer word order than most of the spoken languages.

Fifth, regarding similar timetable for language acquisition, deaf children acquiring sign language also go through the "babbling" stage when they practice different locations, movements, and handshapes by hands (Lillo-Martin 1999). As a matter of fact, deaf children produce their first words as early as 5-month old, about six to seven months earlier than hearing children who normally produce their first words in spoken language around one-year old (Newport and Meier 1985). Furthermore, according to Siedlecki and Bonvillian (1993), deaf children seem to master locations first, and then movement, and finally handshapes. Thus, the order of phonological acquisition is different from that of spoken languages. It is safe to assume that further studies on the order of acquisition will reveal more differences between these two modalities with respect to the order of acquisition.

Sixth, neurolinguistic findings in the past two decades suggest that the left hemisphere of the brain is dominant for spoken languages as well as signed languages. The left brain has been known to be more important for language and the right is more important for vision and spatial activities. Evidence from brain-damaged deaf people however suggest differences between signs using syntactic space and signs using topographic space (to be discussed in the following

7. In TSL and ASL, there is a sign with downward movement of the cup-shape hand which indicates the existence of an object at a certain location. This sign functions like the locative verb 'zai' in Chinese rather than preposition 'at' in English.

section). Syntactic space involves the left hemisphere, whereas the topographic space involves the right hemisphere.

In sign languages, nouns denoting objects can be represented either by shape features or part features of the objects or by actions associated with the objects as we have mentioned earlier. Using fMRI technique, Chiu et. al. (2005) have found that the neural substrates mediating the representation took different dynamically distributed forms. Modality effects certainly deserve further and deeper study when we developed more sophisticated neurolinguistic techniques.

In sum, it can be expected that the six general statements on the modality non-effects made by Meir (2002) will have to be further qualified with minor but non-trivial differences as we know more about sign languages from different linguistic analysis, facts of language acquisition, and psycholinguistic and neurolinguistic evidence.

At the same time, the possible modality effects, such as the iconicity and non-discreteness in sign languages, need to be reexamined more carefully. We will focus on the iconicity in this paper. In the sections below we will show that the relative uniformity of sign languages in syntax are largely due to the pervasiveness of simultaneous morphology with iconic motivations.

4. Relative Uniformity of Sign Languages

4.1 Three classes of verbs

One very important contributing factor to the relative uniformity of sign languages is that all natural sign languages reported contain three classes of verbs: plain verbs, agreement verbs, and spatial verbs. For example, American Sign Language (Padden 1983) and Taiwan Sign Language (Smith 1989; Chang, Su and Tai 2005) are not related, but they both have these three classes of verbs each of which exhibit similar syntactic behaviors in these two languages. This is true despite that the same concept may be expressed in one language as plain verb and yet as in another language as agreement verb, and vice versa. For instance, LOVE in TSL is an agreement verb, while it is a plain verb in English; LIKE in TSL is a plain verb, while it is an agreement verb in English. The distinction between plain verbs and agreement verbs are not entirely based on the semantics of the verbs as Aronoff, Meir and Sandler (2005, 322) would like to believe. Rather, the distinction is made whether the signs for the verbs are body-anchored nor not. Plain verbs are body-anchored and allows only small local movement of the hand, while agreement verbs are not body-anchored and allows the hand to move from one direction to another in signing space (Tai and Su 2006). Thus, the sign LIKE in TSL is body-anchored but is not in ASL. Conversely, the sign LOVE is body-anchored but is not in TSL. Such contrastive examples aside, most agreement verbs identified in Tai and Su (2006) are also agreement verbs in ASL. Presumably, membership of spatial verbs doesn't vary from one to another sign language. And all spatial verbs in all sign languages exhibit classifier predicates regardless whether they

express static spatial relations or dynamic spatial relations involving change of location. What varies from one sign language to another is the use of different classifier handshapes in classifier predicates involving spatial verbs (Emmorey 2003).

Both agreement verbs and spatial verbs move hand from one direction to another, but the hand movement in these two kinds of verbs are of very different nature. While agreement verbs use syntactic space, spatial verbs use topographic space. Topographic space is used to present a schematized layout of the entities and events as they exist in the visual world. For example, to sign "The book is on the table," the topographic space is used to show the spatial relationship "on" between the book and the table. The sign for "book" must be placed above or on top of the sign for "table" in the signing space. For another example, to sign "The car bumped along past the tree", the topographic space is used to show the path trajectory of the moving of the sign for "car" toward, and then past the sign for "tree". Thus, in representing both static and dynamic spatial relationship in sign language, topographic space is able to create a spatial layout which reflects the spatial relationship between the entities involved in the real world.

Spatial verbs in sign language use topographic space. They are thus able to give a visual information about path, trajectory, speed, and even manner and aspect of the movement of action by the verb. They are also able to give information about the location of the action as in signing "The dog is running around in the house." In contrast, syntactic space is used to express abstract concepts and relationships in signing space. Thus, different handshapes can be placed in different areas of the signing space to represent various concepts. For example, in ASL, the sign for "candy" is placed on the chin, the sign for "summer" moving before the forehead, and sign for "train" moving before the dorso (see Klima and Bellugi 1979, 42). In TSL, the sign for "yesterday" is placed above the shoulder, the sign for "now" moving before the stomach, and the sign for "days of the week" moving from the armpit. In all these examples, the location of the sign does not reflect location of entities in the visual world, nor does the moving represent a trajectory in the real world. Syntactic space can also be used to show the contrast between two groups of different people or two different abstract concepts. Thus, in describing people belonging to two opposing political parties, the signer might place a sign referring to one group on the left of his/her signing space, and the other group on the right side. It is also not uncommon for a signer to place the concept of HEALTH in one area of the signing space, and WEALTH in another area to show the relative merits of the two. Furthermore, syntactic space allows the moving in signing space between two defined points to express grammatical relations as in "I sent a book to my friend in Japan." Here the location of "my friend" in the signing space is not the location in the real world, but rather than where the book is directed. In short, plain verbs and agreement verbs in sign languages use mostly syntactic spaces.

Although not all linguists find the distinction between syntactic space and topographic space significant (Liddell 1990; Johnston 1991), we find it is very useful for characterizing three types of verbs in sign languages including TSL. Furthermore, there is evidence from brain-damaged deaf people and experiments on healthy signers that supports the distinction. As mentioned in Section 3, although sign languages are visual languages, they are primarily located in the left hemisphere of the brain. However, the evidence shows that while the use of topographic space

in sign languages also engages the right hemisphere of the brain, the use of syntactic space is restricted to the left hemisphere (Poizner, Klima, and Bellugi 1987; Emmorey, Corina and Bellugi 1995).

4.2 Iconicity and simultaneous morphology

The iconicity in the use of topographic space is highly relevant to the theory of signs proposed by Peirce (1932, 2: 247, 277–82) in which a crucial distinction is made between “imagic” and “diagrammatic” iconicity. In imagic iconicity, a sign resembles its referent with respect to some visual or conceptual characteristics. In diagrammatic iconicity, none of the signs necessarily resembles its referent, but their relationships to each other mirror the relationships of their referents in visual or conceptual world. Thus, photographs and statues involve imagic iconicity, but maps and technical diagrams involve diagrammatic iconicity.

The visual-gestural modality allows the abundance of simultaneous morphology for sign languages in both lexicon and syntax. Even monomorphemic signs have a simultaneous appearance. The pioneering phonemic analysis of ASL monomorphemic signs by Stokoe (1960) consists of three phonetic parameters (hand configuration, location, and movement) to be simultaneously initiated. Although later Liddell and Johnson (1986) demonstrated the existence of sequential phonology in terms of LML (location-movement-location) in a sign syllable, the same hand configuration spans over the whole LML sequence, yielding an appearance of simultaneity. Signs in sign language tend to be monosyllabic and often preserve iconic motivations, and thus are iconic images. Simultaneous compounds are also abundant in sign languages. For instance, many TSL verbs incorporate the /MAN/ handshape on the weak hand to express actions such as TELL, LOVE, HELP, LEAD, and KILL. Furthermore, moving the /MAN/ handshape and the /WOMEN/ handshape together means MARRY, while moving the two handshapes apart means DIVORCE. Possible examples of simultaneous affixation also exist in TSL, and the clearest case involves both prefix-like and suffix-like negation markers (Myers, ms).

Topographic spatial relationships in sign languages necessarily preserve spatial arrangement of the entities in the real world. They are expressed in sign languages with diagrammatic iconicity which involve simultaneous initiation of more than two monomorphemic signs. This kind of diagrammatic iconicity holds true in the representation of both static and dynamic spatial relationships in sign languages as illustrated by the two examples above, “The book is on the table” and “The car bumped along past the tree.” In the second example, in TSL as well as in ASL, not only is the manner of car moving along iconic to the “bumping” in the visual world, but the trajectory of the car moving past the tree is also iconic to the visual world. The iconicity of manner of moving cannot be properly classified either as “imagic iconicity” or “diagrammatic iconicity”. Nor can the trajectory of moving be properly so characterized. They are visually iconic, but are neither “iconic images” nor “iconic diagrams” as in Peirce’s original taxonomy of signs. They are expressed with simultaneous morphology in the classifier predicate

where the classifier hand configuration representing the entity in question, movement of the entity, and the manner and the path of the movement all clustered together along the temporal dimension. In essence, by simultaneous morphology, the classifier predicate represents the static spatial relationship in the three-dimensional world, and the dynamic spatial relationship in four-dimensional world, three-dimensional entities moving along the temporal dimension.

In addition to verb agreement and classifier predicates, all sign languages use simultaneous morphology to indicate various kinds verbal aspects, such as continuative, frequentative, intensive, iterative, and resultative. These aspectual modulations are expressed through the different manners of moving the same hand configuration. These manners consist of different combinations of iconic features such as reduplicated, even, tense, fast, elongated and end-marked (Kilma and Bellugi 1979). These iconic features simultaneously accompany the movement of the hand configuration of signs to indicate verbal aspects.

4.3 Word order freedom

Word order is relatively freer in sign languages than in spoken languages, despite the fact that sign languages vary in their preferred word order as do spoken languages. Three factors seem to contribute to the relative freer word order in sign languages. The first factor has to do with the fact that all sign languages have agreement verbs. One of the most important function of word order is to indicate the subject-object relationship. However, this relationship can also be expressed by verb agreement in both signed languages and spoken languages. Thus there are trade-offs between fixed word order and verb agreement for indicating the subject-object relationship.

The second factor is that sign languages in general are topic-comment languages. Li and Thompson (1976) have proposed a typological distinction between topic-oriented languages like Chinese and subject-oriented languages like English. Sign languages have been described as topic-comment languages like Chinese. For instance, ASL has been described as topic-comment language since Fischer (1976). TSL is also a topic-comment language. In both signed and spoken languages, the topic sets up spatial, temporal, or nominal frameworks for the predications. Sutton-Spence and Woll (1999) characterize topic in BSL as: (1) it comes first (2) it is followed by a pause (3) the eyes are widened during the topic, followed by a pause (4) it can be accompanied by a head nod (5) it may be signed with one hand while producing the comment with the other hand. Based on our limited study, topic in TSL also possesses these syntactic characteristics. In both BSL and TSL, both nouns and verbs can be marked as the topic, resulting in SVO, OSV, and VOS orders. Topic structures as well as verb agreement allows null arguments (Lillo-Martin 1991). While this typological feature holds also true to spoken languages, the prevalence of this feature in sign languages can be attributed to the modality effects.

The third factor is that real world knowledge allows more flexible order in sign languages. Thus, in both BSL and TSL, either MAN NEWSPAPER READ or NEWSPAPER MAN READ, in addition to MAM READ NEWSPAPER. It is because our knowledge of the real world tells

us that man can read newspaper but not vice versa. It is only when real world allows both possibility, we have to resort to SVO order or agreement in sign languages. This kind of word order flexibility also exists in spoken languages like Mandarin. But it is very common in sign languages.

4.4 Grammaticalized facial expressions

Facial expressions are used universally to indicate the emotional states of surprise, anger, happiness, fear, sadness, and disgust (Ekman and Friesen 1975). Yet in sign languages, facial expressions are grammaticalized to distinguish sentences types, namely, declaratives, yes-no questions, wh-questions, conditionals. Furthermore, in addition to the marking of topic as mentioned in 4.3. embedding structures such as restrictive relative clauses is also marked by facial expressions as in ASL (Liddell 1980). Facial expressions are also used to express agreement in TSL (Tai and Su 2006). These nonmanual signals in sign languages are based on brow raise, head tilting, lip raising and forward or backward of the head and the body. As they are grammaticalized, their assignment of linguistic functions may vary from one language to another (Kegl, Senghas and Coppola 1999). They present formidable challenges to the analysis of sign languages even for sophisticated sign language researcher.

4.5 Structures shared with young creole languages

Finally, relative syntactic uniformity of sign languages can be further observed from the structural similarities between sign languages and young creole languages. It has been pointed out by previous researchers in ASL (Fischer 1978; Gee & Goodhart 1988) that ASL exhibits striking similarities to young creole languages in grammatical structures. As summarized in Aronoff, Meir, and Sandler (2005), "These commonalities include: no distinction between tensed and infinitival clauses, no tense marking but a rich aspectual system, no pleonastic subjects, no true passives, the occurrence of transitive verbs with agent subjects as intransitives with patient/theme subjects as well, pervasive topic-comment word order; both young creole languages and ASL make extensive use of content words as grammatical markers; neither young creole languages nor ASL use prepositions to introduce oblique cases; both use preverbal free morphemes to express completive aspect; and both rely heavily on prosodic cues like intonation for expressing certain syntactic relations (such as those encoded by relative clauses and conditionals in other languages)." (ibid 307)⁸

8. It is worth noting here that most of these structural features also exhibit in Mandarin. While Mandarin definitely is not a young language, one wonders if Mandarin has evolved from a creolized language to begin with.

As pointed out by Aronoff, Meir, and Sandler (2005), there are three factors which likely contribute to these similarities between sign languages and young creole languages: language origin, conditions of acquisition, and age. Let us take a quick look at these factors. Citing the emergence of Nicaragua Sign Language in 1980s, take the position that sign languages, like pidgins, arise spontaneously when people do not share a common language need to communicate. Although the spontaneous emergence of Nicaragua Sign language is recently disputed by Polich (2005), it is true that deaf children use home signs and gesture to communicate with each other before they enter the deaf school for formal education. Even ASL was argued by Woodward (1978) to have resulted from the creolization of French Sign Language which was brought to the United States in 1816. The conditions under which sign languages are acquired also resemble those under which the youngest creole languages are acquired. Less than 10% of the deaf children are born to deaf parents. In other words, more than 90% of the children are born to hearing parents who do not sign. Thus, most deaf children are not exposed to a full-fledged language in early childhood and they have to develop a linguistic system on the basis of impoverished and inconsistent inputs. This situation is no different from the situation in which creole speakers of the first generation develop a language from a pidgin in the mixed environment of other languages. Just as young creole languages evolve from pidgins and other ambient languages, sign languages develop from inconsistent and mixed sources of home signs and gestures. They differ from young creole languages in that each generation of deaf children faces the same conditions of inconsistent and impoverished inputs. In this sense, sign languages are re-creolized with each and every generation of signers (Fischer 1978). The development of full-fledged sign languages depends a lot on the establishment of schools for the deaf. The education system gathers deaf children together to form a stable community with its own cultural and social institutions which in turn sustain the conventionalization of linguistic system. The establishment of schools for the deaf in Europe began in late eighteenth century. ASL can be traced back about two hundred and fifty years old, while TSL can be traced back to early nineteenth century when schools for the deaf were established shortly after Taiwan was colonized by Japan in 1895.

4.6 Sequential morphology

An important distinction can be made in sign languages between simultaneous morphology and sequential morphology. As examined briefly in 4.1, simultaneous morphology in sign languages is largely inflectional and general patterns of agreement, classifier predicates, and aspectual modulations exhibit across different sign languages, notwithstanding their variations from one language to another. Compared with the abundance of simultaneous morphology, sequential morphology appears to be very limited. It is true to ASL and ISL (Aronoff, Meir and Sandler 2005) as well as to TSL (Myers, Ms). Furthermore, sequential morphology is derivational and is specific to individual sign languages. Sign languages allow individual variations more than spoken languages. But, individual variations in sequential morphology are considerably larger than simultaneous morphology. A final point worth mentioning is that while simultaneous morphology is more transparent in iconic motivations, the sequential morphology appears to be arbitrary.

5. The Young Language Puzzle

We have cited Aronoff, Meir and Sandler (2005) in 4.5 for an enumeration of structural similarities between sign languages and young creole languages. Since they are both young languages with similar language ambience in acquisition. At the same time, these two kinds of young languages differ drastically in that young creole languages normally have little morphology, inflectional or derivational. Aronoff, Meir and Sandler (2005) refer to the rich inflectional morphology in sign languages as the young language puzzle. They solve the puzzle by means of modality effects. They argue that inflectional morphology in sign language is not due to age as in case of spoken languages where inflectional morphology takes longer time to develop than derivational morphology, but rather due to modality effects on sign languages where iconic simultaneous morphology based on spatial cognition are more suitable than arbitrary sequential morphology.

6. Conclusion

In this paper, we have shown that modality effects can account for fundamental structural differences between signed languages and spoken languages on the one hand and the relative uniformity of signed languages in morphology and syntax on the other hand. Even with respect to each of the six modality non-effects identified by Meier (2002), we have identified further minor differences. It seems to be clear that the surface structure of signed languages are very much shaped by modality effects rather than by modality non-effects, resulting in the appearance that typologically, signed languages are relatively uniform, whereas spoken languages are relatively diverse.

Meier (2002) attributes the relative uniformity of signed languages to modality effects as well as to their youth. However, Aronoff, Meir, and Sandler (2005) take issue with their youth as a contributing factor, arguing for the modality effects, especially the iconic motivation of sign languages, as the major factor. We feel that while the simultaneous morphology (inflectional or derivational) and grammaticalized facial expressions in sign languages can clearly be attributed to modality effects, it would take further research to tease off the modality effects from the youth factor as well as from other typological parameters such as topic-comment structure which may cut across both signed languages and spoken languages. In other words, we propose three major sources for relative uniformity of syntax in sign languages. They are modality effects, the youth factor, and other typological parameters shared by both modalities. Furthermore, the interaction of these three major sources may not so uniform in sign language as we know more about the structure of individual sign languages. For instance, we have noted that word orders in sign languages have resulted from the joint forces from modality effects of agreement and topic-comment typological parameter, which may or may not have anything to do with either age or modality effects.

Whereas sign languages display a more limited range of typological variation than is true of spoken languages, individual signers of a sign language appear to vary much more than individual speakers of a spoken language. This is true not only in syntax but also in vocabulary. Here again, we don't know if this is due to age, acquisition ambience, or modality effects, or all the three factors together. To the best of our knowledge, there is so far no research on this issue. In any case, relative freedom for individual signers to vary their vocabulary and syntax in a deaf community present another puzzle for sign language researchers. It is especially interesting and challenging when we consider relative freedom of individual variations in a deaf community along with relative uniformity of typological variations in sign languages.

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