Modality Effects: Iconicity in Taiwan Sign Language[*]

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Iconicity in signed languages is re-examined in the context of modality effects. Iconic devices in Taiwan Sign Language (TSL) are identified. It is argued that iconicity rather than arbitrariness should be taken as a fundamental property of language. The apparent arbitrariness in spoken languages is due to the dilution of iconicity in the one-dimensional auditory-oral channel of human communication. The difference between signed and spoken languages in the duality of patterning suggests the possibility that human language had evolved from gestures before speech was developed.

Key words: iconicity, arbitrariness, signed languages, modality effects

1. Introduction

Signed languages had not been treated as natural languages on a par with spoken languages until Stokoe and his associates started serious research on signed languages in 1960s. Bloomfield (1933:39) treated signed languages as 'gesture languages' which are merely developments of ordinary gestures and of which the complicated gestural signs are based on the conventions of spoken languages. Hockett (1960) compared human languages with various animal communication systems and concluded with a list of thirteen key design features in human languages which are absent in animal communication systems. The first feature on the list is the vocal-auditory channel. Obviously, these design features are based on spoken languages. Even in Chomsky (1967), he characterized language as the correspondence between sound and meaning (Klima and

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Bellugi 1979:31).[1]

The research started by Stokoe and his associates (Stokoe 1960, Stokoe, Casterline, and Croneberg 1965) was further advanced by Klima and Bellugi (1979), and later by Liddell (1980, 2003), Fischer and Siple (1990), Siple and Fischer (1991), and more recently by Emmorey (2002) and Meier, Cormier, and Quinto-Pozos (2002). The research on signed languages over the past forty-some years has demonstrated that signed 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, signed 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, signed languages have 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 (Scientific American, August 2002). In short, it is 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.

Most of the research on signed languages in the past forty-some years has striven to demonstrate that signed languages are natural languages and in every respect, no different from spoken languages. As a result, possible modality effects such as iconicity and non-discreteness in signed languages have been de-emphasized, perhaps because researchers are concerned that iconicity bears a stigma to the status of natural language, of which the form-meaning pairings have long been assumed to be arbitrary. In discussing the two faces of signs and signing, Klima and Bellugi (1979) made three remarks concerning the iconicity in signed languages: (1) signs exhibit different degree of iconic motivations yet they can be analyzed as composites of elements with formal properties; (2) the non-iconic, arbitrary formal properties of signed language predominate in coding and processing at most levels; (3) iconicity of signs is often submerged in grammatical processes, even though signed languages are far more freely mimetic than spoken languages.

However, signed languages are visual-oriented. They allow simultaneous representation of objects and events in the three-dimensional world. Thus, both in lexicon and syntax, signed languages are by far more iconic than spoken languages. They show

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[1] 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)

the infelicities of both Saussure's (1916/1959) two principles of linguistic sign:

> Principle I: The bond between the signifier and the signified is arbitrary.
> Principle II: The signifier (being auditory) is linear in a single dimension span.

The pervasiveness of iconicity in signed languages and their implications for the nature of human language deserve further reflections. The purpose of this paper is to identify some important iconic motivations in the lexicon and syntax of Taiwan Sign Language and to draw some implications for the property of human language.

A few words about Taiwan Sign Language (hereafter, TSL) are in order here. TSL is widely used by approximately 110,000 deaf and hearing-impaired citizens of Taiwan.[2] It belongs to the Japanese Sign Language family, not the Chinese Sign Language family used in Mainland China (Smith 1989, 2005). In Taiwan, in addition to TSL, Signed Chinese was also invented by educators for the purpose of instruction in schools for the hearing-impaired. Signed Chinese in Taiwan adopts the grammar of Mandarin Chinese and its signs are mainly character-based. Hence TSL and Signed Chinese are very different in their vocabulary and grammar. Taiwan Sign Language is known as *ziran shouyu* 'natural sign language', while Signed Chinese is known as *wenfa shouyu* 'grammar sign language' (Smith and Ting 1979).

To properly understand iconicity in human language, it is not only desirable but also necessary to examine iconicity in the broader context of modality effects. Therefore, the following section is devoted to the discussion of iconicity as a modality effect.

2. Effects and non-effects of modalities

Meier (2002) refers to those design features of human language shared between singed and spoken languages as non-effects of modality, and the differences in structures between the two as due to modality effects. The non-effects of modality Meier has identified are:

(a) conventional vocabularies as learned pairings of form and meaning.
(b) duality of patterning by which meaningful units of form are built of meaningless sublexical units.

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[2] According to the latest census from the Ministry of the Interior, there are about 110,000 deaf and hearing-impaired citizens in Taiwan. The census does not provide information for the actual population using TSL. However, according to Smith (1989), there are approximately 30,000 deaf and hearing-impaired citizens who use TSL as their primary language in Taiwan.

(c) productivity in expanding vocabulary through derivational processes, compounding and borrowing.

(d) same parts of speech, embedding structures, and trade-offs between word order and agreement in marking grammatical relations.

(e) similar time table for acquisition.

(f) lateralization in left hemisphere.

It seems that each of the shared properties listed above between signed and spoken languages would show some fine-grained differences under further scrutiny. For instance, the acquisition context for deaf children is very different from that for hearing children. About 90 percent of deaf children are born to hearing parents. They do not have native models in the home for them to develop signed languages, as in the acquisition of spoken languages. They are thus relatively freer in creating their own conventions in the pairings of form and meaning. This fact contributes to the preservation of transparency of iconic motivations and variations, individual as well as dialectal, in signed languages. Even with the duality of patterning, there is a significant difference between signed and spoken languages. While the phonemic elements /s/, /t/, /o/, /p/, composing the meaningful words 'stop', 'tops', and 'pots', are meaningless, the basic handshapes composing the meaningful signs can be meaningful by themselves, at least, in Taiwan Sign Language. Furthermore, these basic handshapes exhibit clear iconic motivations, or metonymic/metaphorical associations. It is as if the phonemes /s/, /t/, /o/, /p/, each could have their own meanings when uttered alone. This difference may or may not have significant consequences in language processing, but it does compel us to rethink the arbitrariness as a fundamental design of human language. This difference may also have a consequence in our understanding of language evolution (Corballis 2002). We will touch upon this point in the conclusion of this paper. It appears that duality of patterning and conventionality in pairings of form and meaning are both fundamental design features of human language, but not arbitrariness.

Meier (2002) has also identified four possible sources of modality effects from which different properties between signed and spoken languages can be derived. The first source is from the articulators, the second from the perceptual systems, the third from greater potential of the visual-gestural system for iconic and indexic representation, and the fourth from the youth of signed languages and their roots in nonlinguistic gesture. Being more interested in exploring the effects than in non-effects of modality, Meier treated the four sources separately and made many pertinent remarks for each source. Yet, it can be seen that the four sources all contribute to the iconicity in signed languages in different ways.

Let us start with the articulators. The oral articulators are largely hidden within the

oral cavity and are basically invisible to the addressee except the part that provides clues for lipreading. In contrast, the manual articulators are relatively larger than oral articulators and are visible to the addressee. Besides, many signs are produced with the coordination of both hands, and thus are able to depict the shapes and relative location and movement of objects and events, and thereby sketching the iconic images and diagrammatically iconic relations standing for relative locations of two objects or the trajectory of movement of objects.

Spoken languages are produced orally and perceived auditorily. Being auditory, spoken languages is essentially linear in a single dimension span, as stated in Saussure's principle II. The spoken signifiers constitute an inventory of arbitrary symbols and their concatenations. The multi-dimensional visual imagery must be mapped onto a one-dimensional serial auditory signals. Naturally, the one-dimensional auditory-oral channel cannot preserve iconicity as much as the multi-dimensional visual-gestural channel. With one-dimensional channel, temporal sequence of events can easily be reflected by means of word order, as clearly manifested in Chinese word order (Tai 1985, 2002). Other aspects of iconicity are harder to be expressed in spoken languages, but their remnants can be discerned in this channel at close examination (Haiman 1980, 1985, Tai 1993, 1994, 1997, 1999).

As mentioned earlier, 90 percents of deaf children do not have native signing models, being born to hearing parents. They are thus relatively freer from the rein of conventions of established linguistic community and are provided with opportunities to create new vocabularies and grammatical features, and thereby preserving the transparency of original iconic motivations. Furthermore, the gestures that are used among deaf children and hearing parents may be incorporated into the vocabulary and grammar of signed languages. These gestures generally hold natural rather than arbitrary form-meaning associations. Thus the youth of signed languages and their roots in nonlinguistic gestures both contribute to the iconicity in signed languages.

The most crucial factor contributing to the iconicity of signed languages has to do with their great capacity for visual representations and for ostensive identification of referents. In fact, ostensive identification of referents by pointing is the most iconic representation of referents. Various kinds of visual representation in signed languages are not as faithful as portrayal in painting and photography. They can, however, signify size, height, and length absolutely or relatively. They can also sketch shapes of objects and their trajectory in movements. As pointed out earlier, signed languages as well as spoken languages can reflect the temporal order and other kinds of order in conceptual world. In spoken languages, sound symbolism is able to loosely representing the relative size, length, and distance (Hinton et al. 1994). Perhaps, the only area which spoken languages are more capable of mimic the reality than signed languages is onomatopoeia,

since it is very hard for visual representations to imitate sounds, and most objects and actions do not make sounds. All in all, the potential of visual-gestural modality for iconic representation is by far greater than auditory-oral modality.

3. Iconic devices in Taiwan Sign Language

Iconic devices in American Sign Language (ASL) have been studied by Mandel (1977) and more recently by Taub (2001). In exploring iconic devices in TSL, we will synthesize and simplify both authors' frameworks for the purpose of the present analysis. Iconic devices in TSL are identified below with illustrative examples.

3.1 Direct presentation

Pointing is a very useful device in both oral and visual communications. To refer to a person or an object nearby, one can always conveniently point to that person or object in signed as well as in spoken languages. But, signed languages use this device to name body parts by pointing to the signer's body parts. Thus, both ASL and TSL name body parts (e.g. nose and head) by pointing to them as a convention of pairing form and meaning. Pronouns in both languages are derived from directed pointing at the spatial location of their referents. Thus, the signer can point to anyone around with the index finger to mean 'you'. The singer can also direct his thumb of the non-dominant hand toward a male person with the index finger of the dominant hand pointing to the thumb to mean 'he' (Fig. 1). In the same vein, the signer can direct his pinky of the non-dominant hand toward a female person with the index finger of the dominant hand pointing to the pinky to mean 'she' (Fig. 2).

Figure 1: The sign of "he"

Figure 2: The sign of "she"

3.2 Number representation

In TSL, the number of referents is directly indicated by the number of fingers. Taub (2001) referred to this kind of representation as "number for number iconicity." The logical upper limit for the most transparent one-to-one mapping from the number of fingers to the number of referents is obviously ten with both hands. However, the TSL signs for numbers "one" through "ten" are all expressed by the dominant hand. Thus, numbers "one" through "five" are expressed by the number of fingers. Numbers "six" (Fig. 3) to "nine" are expressed by adding fingers to the thumb of the dominant hand which now stands for "five". "Ten" is expressed with the curved index finger of the dominant hand (Fig. 4).

Figure 3: The sign of "six"   Figure 4: The sign of "ten"

In TSL, the plurals of first, second, and third persons (e.g., we two, you three, they four) can be formed by pointing with the number of fingers (Fig. 5).

Figure 5: The sign of "we two"

3.3 Shape representation

In this kind of representation, the signer uses his certain handshapes and hand-forearm configurations to depict shape images of the referents. Mandel (1977) referred to this device as 'substituted depiction'; and Taub (2001) referred to this as 'shape-to-shape iconicity'. A good example for TSL is the sign for "tree" (Fig. 6). In this sign, the non-dominant hand and forearms stands for the ground, the dominant forearm for a tree trunk, and the spread dominant hand for the branches. The sign for "tree" in ASL is very similar to that in TSL (Fig. 7).

Figure 6: The sign of "tree" in TSL

Figure 7: The sign of "tree" in ASL
(Taub 2001:20)

Another major device for shape representation is to trace the shape of the referent in signing space. For example, in TSL, "paper" is represented by tracing a square space with index fingers of both hands (Fig. 8). Similarly, TSL "moon" is represented by tracing the shape of a crescent moon with the thumb and index finger of the dominant hand (Fig. 9). In this device, the hand movement doesn't depict the movement of the referent over time but only traces the shape of the referent in signing space. This device was referred to as 'virtual depiction' by Mandel (1977) and as 'path-for-shape iconicity' by Taub (2001).

Figure 8: The sign of "paper"

Figure 9: The sign of "moon"

3.4 Size representation

This method of representation can represent both absolute and relative sizes of the referents. For instance, in TSL, the absolute size of a piece of paper, if small enough, can be accurately traced in the signing space. The relative size of a piece of paper can also be expressed by the extent of tracing in space. The absolute sizes of the referents are also shown when the signer uses the device of direct presentation to point to the referents or to point to the signer's body parts to refer to body parts. The size representation also applies to length representation and distance representation (Fig. 10, Fig. 11, Fig. 12, Fig. 13).

Figure 10: The sign of "large"

Figure 11: The sign of "small"

Figure 12: The sign of "long"

Figure 13: The sign of "short"

3.5 Part-for-whole representation

This device uses the characteristic part of the referent to represent the referent. This method is very productive in TSL as well as in ASL. For example, DOG in TSL is represented by the two hands flapping both sides of the head (Fig. 14). The representation is a depiction of the head of a dog with two ears flapping back and forth. For another example, HOUSE in TSL is represented by the two hands touching to form a shape of the sliding roofs of a house (Fig. 15). This kind of device is also employed in TSL to represent actions. For instance, WALKING can be represented by moving index finger and middle finger alternatively (Fig. 16). The two fingers represent two legs of a human body. The part-for-whole representation is also pervasive in spoken languages. Nonetheless, the visual representations of the characteristic parts in sign languages are more direct and iconic.

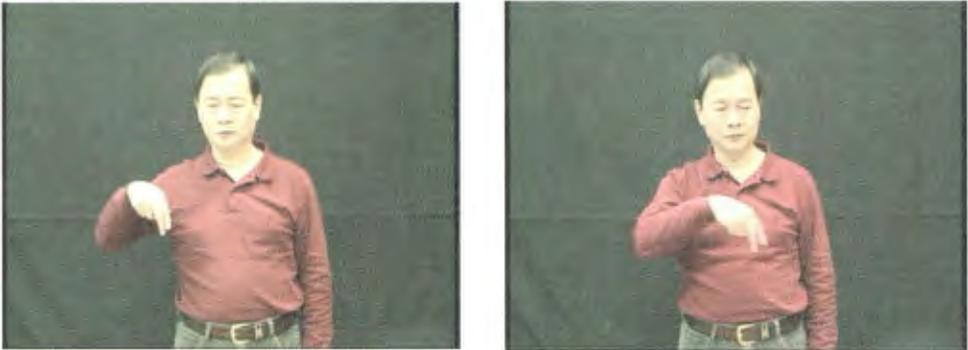Figure 14: The sign of "dog"

Figure 15: The sign of "house"

Figure 16: The sign of "walking"

3.6 Proform representation

This kind of representation seems to be universal for signed languages. It has to do with classifier predicates. This can be illustrated by "the dog is entering the house" in TSL. (Fig. 17). In this sentence, both "dog" and "house" are represented by forms which are different from their respective original lexical forms. The "dog" is represented by a pronominal-like animal classifier, and the "house" by its partial form. In Chang, Su, and Tai (2005), they have adopted Talmy's (2000) analysis of motion events and observed that classifier predicates occur mostly with the Figure and partial form mostly with the Ground of an action. Thus, both the form for Figure and that for Ground are treated as proforms. Proforms for Figure have an additional function as classifiers based on various cognitive and semantic reasons for grouping.

Figure 17: The sign of "the dog is entering the house"

3.7 Temporal order representation

In addition to the three-dimensional visual world in space, signed languages also have the fourth dimension of time. Thus, in signed languages, the order of presentation tends to follow the order of occurrence of events in real world or in conceptual world. We have noted earlier that with respect to word order in spoken languages, Chinese exhibits temporal order iconicity more clearly than English and other languages (Tai 1985,

2002). It appears that both TSL and ASL are very strict in keeping with temporal order representation. It also appears that the temporal order representation in signed languages is more thorough and entrenched than in spoken languages. Thus, as pointed out by Talmy (2003:233), classifier predicates are also iconic with visual parsing in its representation of temporal progression of the path trajectory of Figure. We can use Talmy's example "The car drove past the tree" to illustrate the point (Fig. 18). In TSL, as in ASL, the Figure hand, in its pronominal form for car, progresses along the Path, approaching the Ground hand, in its partial representation of the "tree" sign, passing the Ground hand. One may be tempted to think that the word order in the sentence "The car drove past the tree" in spoken English somehow also follows the order of representation. Yet being linear in spoken languages, we cannot say the word "car" all the way through and beyond the word "tree".
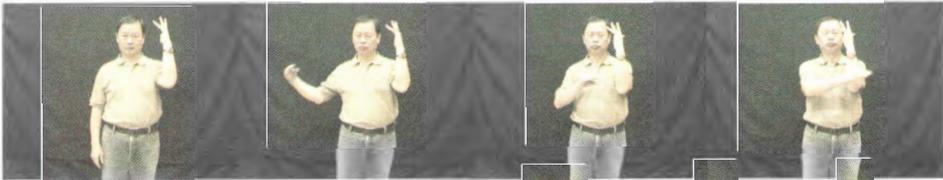

Figure 18: The sign of "the car drove past the tree"

3.8 Metonymic/metaphorical representations

Like in spoken languages, abstract ideas can be expressed through metonymic and metaphorical representations. Metonymic devices express abstract ideas by means of association. For instance, in TSL, the sign for "hungry" is to use both hands to press the signer's stomach lightly (Fig. 19). In contrast, the sign for "full" is to move both hands out from the signer's stomach (Fig. 20). Metaphorical devices express abstract concepts through metaphorical mappings. For instance, TSL uses the thumb to stand for "male" (Fig. 21), and the pinky for "female" (Fig. 22). The sign for "to marry" is then expressed by putting these two fingers together (Fig. 23). In contrast, the sign for "to divorce" is to move these two fingers away from each other (Fig. 24). Metonymies and metaphors abound in spoken languages as well as in signed languages (Taub 2001). It requires a separate paper for a full-fledged study to see how different kinds of metonymic and metaphorical devices are employed in TSL.

Figure 19: The sign of "hungry"

Figure 20: The sign of "full"

Figure 21: The sign of "male"

Figure 22: The sign of "female"

Figure 23: The sign of "marry"

Figure 24: The sign of "divorce"

The above list of iconic devices in TSL is neither complete nor exhaustive. We can expect other devices to be uncovered in further studies. Moreover, the iconic devices identified also exhibit in ASL and other sign languages. In sum, TSL's iconic devices,

like those in other signed languages, are based on: (i) our perception of overall shapes, locations, and movements signified by means of hands, arms, and fingers; (ii) on our ability to see the structural correspondence between human bodies and animal bodies; and (iii) on our ability to represent particular activities with body movements.

4. Conclusion

We have examined iconicity as a modality effect on the structural differences between signed languages and spoken languages. We have also identified several kinds of iconic devices in Taiwan Sign Language. During the course of discussion, we have compared spoken languages with signed languages with respect to the extent and nature of iconicity in these two modes of human language. It is obvious that iconicity is to a very great extent diluted in spoken languages mainly because of the one- dimensional linearity of spoken signifiers. It is also clear that signs in signed languages may lose their original iconic motivation over time and through conventionalization, Nonetheless, the iconicity is highly preserved in syntax, since it is grounded in the four dimensional world of space and time. As shown before (Fig. 18), the syntax in the sentence "The car drove past the tree" is in every aspect iconic with our conceptualization of the real event in reality. In fact, in this case, even the individual signs exhibit their iconic motivations. Thus, from the vantage point of signed languages, iconicity is a fundamental property of human languages, contrary to the long established assumption that arbitrariness is the inherent properties of human languages. It is the existence of arbitrariness in spoken languages which calls for explanation.

Besides the one-dimensional linearity, the loss of semantic motivations over time through conventionalization also contributes greatly to the apparent arbitrariness in spoken languages. This happens to individual words naming objects and actions, compound words, morphological constructions, and syntactic patterns. It also appears that arbitrariness in spoken languages is also closely associated with duality of patterning, which allows individual meaningless phonemes to form meaningful words. In signed languages, there is a small set of handshapes (fifty-some in TSL) for forming signs. These handshapes function like phonemes in spoken languages. Nonetheless, as the case in TSL, each of these handshapes has its own recognizable iconic meaning. It is when they are used to form signs, they may lose their original meaning. This is where the duality of patterning arises in signed languages. Furthermore, as pointed out by Armstrong, Stokoe, and Wilcox (1995), individual signs have the same basic structure as a sentence. Indeed, in TSL, there are many signs which can both denote to the action and the object involved in actions. For example, the sign for 'basketball' is the same sign for 'to play basketball' and the sign for 'egg' is the same sign for 'to break an egg'.

Here the distinction between signs-as-words and signs-as-sentences is blurred. Here signs and sentences are built up from basic handshapes which are iconic by themselves. This phenomenon not only somewhat takes away the mystery out of duality of patterning in human languages, as argued recently by Corballis (2001), but also the mystery of the arbitrariness in human languages. As a matter of fact, Corballis (ibid) treated the generativity of individual signs as the first step for the generativity of sentences and explained the emergence of duality of patterning to begin with in signed languages. He further proposed that the duality of patterning in spoken languages can also be accounted for, if we accept the thesis that human language evolved from manual and facial gestures and not from speech to start with.[3]

Research on signed languages has changed our view on the nature of human language, particularly, the design features of human language such as arbitrariness, duality of patterning, and discreteness. It can also shed light on the structure of spoken languages. Thus, the classifier predicates in sign languages may help us to understand the existence of classifiers in Chinese and other languages. In the TSL example "The dog is entering the room" (Fig. 17), the animal classifier for dog in TSL has a counter part in spoken Chinese, namely, the classifier *zhi* for animals. Similarly, classifier predicates in signed languages provides us with fresh perspective to understand intricate verb roots of motion conflated with Figure in Atsugewi (a Hokan language of northern California) as reported by Talmy (2000, Vol.2, p.58). For example, the verb root *-lup-* is used for small spherical objects to move or to be located, and the verb root *-caq-* is used for slimy lumpish objects to move or to be located. More comparative studies of the structural similarities and differences between signed and spoken languages would definitely provide us with new and different perspectives for the structural analysis of human languages in both modalities.

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[3] Deacon (1997) offered a highly elaborated account of the origin of language, arguing that the development of symbolic thinking led to the emergence of language. His account appears to be biased toward the development of spoken language. It would be significant and challenging to re-evaluate Deacon's theory along with re-interpretations of many neurolinguistic findings.

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