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Iconicity and metaphor: Constraints on metaphorical extension of iconic forms

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ICONICITY AND METAPHOR: CONSTRAINTS ON METAPHORICAL EXTENSION OF ICONIC FORMS

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Some conceptual metaphors common in spoken languages are infelicitous in sign languages. The explanation suggested in this article is that the iconicity of these signs clashes with the shifts in meaning that take place in these metaphorical extensions. Both iconicity and metaphors are built on mappings of two domains: form and meaning in iconicity, source domain and target domain in metaphors. Iconic signs that undergo metaphoric extension are therefore subject to both mappings (Taub 2001). When the two mappings do not preserve the same structural correspondence, the metaphorical extension is blocked. This restriction is formulated as the DOUBLE-MAPPING CONSTRAINT, which requires multiple mappings to be structure-preserving. The effects of this constraint go beyond explaining possible and impossible metaphors in sign languages. Because of the central role of metaphors in various linguistic processes, constraints on their occurrence may affect other linguistic structures and processes that are built on these metaphors in both sign and spoken languages.*

Keywords: iconicity, metaphor, double-mapping, sign languages, constraints, modality

Socrates. But if the primary names are to be ways of expressing things clearly, is there any better way of getting them to be such than by making each of them as much like the thing it is to express as possible? Or do you prefer the way proposed by Hermogenes and many others, who claim that names are conventional signs that express things to those who already knew the things before they established the conventions? Do you think that the correctness of names is conventional, so that it makes no difference whether we accept the present convention or adopt the opposite one, calling 'big' what we now call 'small', and 'small' what we now call 'big'? Which of these two ways of getting names to express things do you prefer?

Cratylus. A name that expresses a thing by being like it is in every way superior, Socrates, to one that is given by chance ...

Socrates. ... And even if usage is completely different from convention, still you must say that expressing something isn't a matter of likeness but of usage, since usage, it seems, enables both like and unlike names to express things. Since we agree on these points, Cratylus, for I take your silence as a sign of agreement, both convention and usage must contribute something to expressing what we mean when we speak. ... I myself prefer the view that names should be as much like things as possible, but I fear that defending this view is like hauling a ship up a sticky ramp, as Hermogenes suggested, and that we have to make use of this worthless thing, convention, in the correctness of names. (Plato, *Cratylus*, 433–35, trans. by John H. Cooper (Cooper & Hutchinson 1997:149–51))

1. INTRODUCTION. The competing forces of iconicity and arbitrariness that reside in language have intrigued humans for millennia. Language seems to be like the elephant and the six blind men: where you get hold of it determines how you grasp its nature. When examining the nature of the linguistic sign in spoken languages, the word, as Saussure did, arbitrariness seems to prevail. When looking at the structural organization of elements in language, language seems much more iconic or motivated. Haiman (1985:1) argues that 'linguistic forms are frequently the way they are because, like dia-

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grams, they resemble the conceptual structures they are used to convey'. The volume he edited (Haiman 1985) presents a wide array of examples of (mainly structural, or 'diagrammatic') iconicity in language. The most straightforward instance of such iconicity is that the order of clauses in a discourse is understood as reflecting the sequence of events in the world (as exemplified by *vēnī*, *vidī*, *vīcī*). Givón (1985) argues for a correspondence between the degree of accessibility of a discourse referent and the linear position in the sentence of the NP denoting that referent. The form of complex words may also exhibit a certain degree of motivation. The formal complexity of words often corresponds to semantic complexity. While the German word *Schuh* 'shoe' is arbitrary, the compounds *Handschuh* 'glove/mitten' and its derivatives *Fingerhandschuh* 'glove' and *Fausthandschuh* 'mitten' represent in their internal structure the hyponymy between the terms (Haiman 1980:531). Turning to nonderived lexical items, phenomena such as onomatopoeia, sound symbolism, and mimetics (also called 'ideophones'; see Diffloth 1972) indicate that even words are not as arbitrary as they may seem to be, since phonological features may be used in an iconic fashion. One well-known example is the correspondence between vowel quality and size: it has been argued that low pitch is often associated with largeness and high pitch with smallness, as is evidenced by diminutive forms that in many languages employ high front vowels (Jespersen 1922).

The appearance of sign languages on the central stage of the linguistic arena in the last few decades added a new dimension to our understanding of iconicity and arbitrariness in language. Sign languages are natural human languages, with complex structures and expressive capabilities on a par with spoken languages, but they are produced in the manual-visual modality. Because of the modality, sign languages can express concepts, relations, and structures in an iconic way that cannot be paralleled by spoken languages. This is noticeable first and foremost in the lexicon: the vocabulary of any sign language contains many more iconic words than that of a spoken language. This property of sign languages led many people to assume that sign languages are not 'real' languages, but rather a degraded or primitive form of language, or a sort of pantomime. This view, articulated by distinguished linguists such as Bloomfield (1933:39), had its impact on the first decades of sign language linguistic research. In order to demonstrate that sign languages are real languages, as rich, complex, and expressive as spoken languages, many researchers focused on downgrading the role of iconicity in sign languages. It was emphasized that sign languages have many arbitrary signs as well. Moreover, various studies showed that the iconic nature of signs may wear off because of certain changes and operations. Frishberg (1975), comparing American Sign Language (ASL) signs of the 1920s to those of the 1970s, found that signs often become less iconic as a result of diachronic changes. For examples, several signs denoting emotions, such as LIKE, PLEASE, FEEL, and LOVE, were originally signed over the heart, but are now signed at the center of the chest, because of a tendency of signs to move to the center. Meir and Sandler (2008:54) point out that the original sign for CAMERA in Israeli Sign Language (ISL) was fully iconic: one hand was positioned as if holding the camera, while the other 'pushed the button down'. Over time, the sign became symmetrical, and therefore less iconic; both hands 'push the button down'.

Certain morphological operations were also shown to play a role in reducing iconicity, as illustrated by the intensive inflection of adjectives in ASL. This inflection is signaled by a short, rapid, and tense movement, which can be regarded as an iconic representation of the notion of 'intensity'. Yet in some signs this inflection results in a counter-iconic form. The sign SLOW is made with one hand moving along the back of the other hand. But the sign meaning 'very slow' has a short rapid movement, rather

than a movement slower than the base sign (Klima & Bellugi 1979:31). Also, iconicity has been shown not to play a role in the language acquisition of children. Iconic signs constitute only about 30% of the child's early words (Orlansky & Bonvillian 1984),¹ and more iconic forms of verb agreement in ASL are not acquired earlier than less iconic forms (Meier 1982).

As research on sign languages expanded and deepened, and it was no longer felt that the status of sign languages as languages need be established and defended, sign language researchers became more open to investigating the differences between signed and spoken languages (see e.g. Emmorey & Lane 2000, Meier et al. 2003, Vermeerbergen 2006). Moreover, it became obvious that these differences can shed light on many interesting issues that we were not able to study previously, such as the impact of the physical modality on the structure of the language. As part of this new perspective, iconicity became a central issue of investigation, no longer suppressed and downgraded. Rather, the propensity of sign languages toward iconic expressions became acknowledged, and even regarded as fortunate, since this allows for an in-depth study of iconicity in language. More iconicity effects have been discovered, not only in the lexicon, but in other linguistic domains as well. On the morphological level, sign language verb agreement has been shown to represent iconically the thematic notions of source, path, and goal (Friedman 1975, Shepard-Kegl 1985, Johnston 1991, Meir 1998, 2002). Verbs marked for agreement in various sign languages move from a location in space associated with the source argument (i.e. the giver/sender with verbs such as GIVE and SEND) to a location associated with the goal argument (the recipient).² The movement of the hand from the source argument to the goal is an iconic representation of the spatial and conceptual structure of motion along a source-goal path. This iconic representation of aspects of conceptual structure may explain why verb agreement takes a very similar form across many sign languages (Aronoff et al. 2005).

While the field of sign linguistics changed its perspective and emphasis from downplaying iconicity to giving it a central place, general linguistics underwent parallel changes. The issue of the nonarbitrary nature of linguistic phenomena became legitimate and interesting, after being ridiculed and ignored for centuries (see e.g. Simone 1995:viii). It became a principal issue in studies of grammaticalization and metaphors, and in theories such as functional linguistics (e.g. Givón 1979, 1984, Hopper & Thompson 1980, 1985) and cognitive linguistics (e.g. Langacker 1987). It seems that we have reached a stage in our investigation of the nature of human languages, both signed and spoken, in which we can acknowledge that language is both iconic and arbitrary. Iconic units, structures, and processes exist in language side by side with their more arbitrary counterparts. Furthermore, languages may take advantage of the possibilities offered by both, and are shaped by both forces.

In this article, I would like to further explore how these two forces interact with the structure of language, by looking at their behavior with respect to certain processes. The questions to be raised here are the following: Does the iconic or arbitrary nature of a specific form make a difference to the grammar? Do iconic forms exhibit certain characteristics not shared by noniconic forms, other than being iconic? How does iconicity interact with grammatical processes? Does it prevent some processes from applying? Does it encourage certain processes to happen?

¹ Iconicity, however, can facilitate vocabulary learning of adults, when learning a sign language as a second language (Lieberth & Gamble 1991, Campbell et al. 1992). I thank Karen Emmorey for this point.

² Verb agreement in sign languages is described in greater detail in §6.1.

The answers to these questions, again, seem to depend on what we look at. It has been shown that the iconicity of signs may wear off: signs that start off as iconic depictions of certain concepts may lose their iconicity because of phonological changes (Frishberg 1975). But these phonological changes apply to all signs, whether iconic or not. In addition, morphological processes, such as sign language verb agreement, apply uniformly to all signs in the class of agreeing verbs, irrespective of their iconic nature. Similarly in English, onomatopoeic verbs such as *buzz*, *hum*, *tweet*, and *chirp* take the same set of inflection markers as arbitrary forms. These processes, then, do not distinguish between iconic and noniconic words.

When looking at different phenomena, however, it seems that iconicity may make a difference. Some languages, for example, have a set of mimetics or ideophones, word-like units that mimic sounds or other sensations (Diffloth 1972). In some languages, such as Japanese, these word-like elements form a separate domain in the lexicon and are subject to phonological characteristics and constraints that are different from those applying to the core lexicon (Itô & Mester 1995), as well as specific morphological and syntactic behavior (Kita 1997). Sometimes it seems that iconicity makes words or signs more resistant to change. The English word *peep* (*pīpen* in Middle English) did not undergo the Great Vowel Shift of English. The Great Vowel Shift altered Middle English vowels so that all stressed syllables containing /i/ shifted to the diphthong /ai/ (as in *high*, originally /hi/). But the iconic word *peep*, denoting a soft high-pitched noise, retained its original vowel, and did not change into the expected *pipe* (Hock 1986:294).³ In a similar vein, in Meir 2003:133–34, I noted that the grammaticalization chain from spatial prepositions to case markers, which is very common in spoken languages, has not been attested in sign languages. I argued that the iconicity of spatial prepositions in sign languages prevents them from undergoing the semantic bleaching necessary for the development of this grammaticalization chain.⁴

The present article continues this line of research. I suggest that iconicity does make a difference in that iconic forms are subject to specific restrictions that do not pertain to arbitrary forms. Specifically, iconic forms are constrained with respect to the metaphorical extensions they may undergo. The effects of this constraint are not restricted to the semantic level. Because metaphorical extensions lie at the heart of many grammaticalization processes, restrictions on such processes may affect grammatical structure, in that they would channel a language to prefer certain grammatical structures rather than others.

In order to give the readers a sense of what lies ahead, let us look at the metaphor in 1.

(1) The acid ate the iron key.

The verb *eat* is used here metaphorically. Acids are not animate beings, and they do not have a mouth or a digestion system. The use of the verb *eat* in such contexts, however, is not exceptional. Many English expressions use the verb *eat* in a similar way, as in *The house ate up all my savings*, *His wife's illness ate at him*, *What's eating him?*. Moreover, such metaphorical uses of 'eat' can be found in other languages as well. Expressions similar to that in 1 exist in, for example, Hebrew, Arabic, and Russian, and they all include the verb 'eat' with an inanimate, often abstract, referent. What all of these metaphoric ex-

³ I thank Jonathan Fine for this point.

⁴ Adpositions in general are quite scarce in sign languages (Meir 2003:131–33), and quite often they are borrowed from spoken languages. ISL, however, has a few adpositions that seem to be genuine, such as IN and UNDER. In these prepositions, the spatial relations between the two hands is a direct representation of the spatial relations they convey.

pressions have in common is that something is consumed. It is the consumption that is common to the basic meaning of the verb and the metaphorical extension.

When trying to translate such expressions to sign languages, however, one realizes very quickly that such use of ‘eat’ is infelicitous. The sign EAT in Israeli Sign Language, shown in Figure 1, cannot be used in a sentence equivalent to 1 in that language. It looks somewhat bizarre and quite amusing. EAT is not the only sign that cannot be used metaphorically in certain contexts. The sign FLY (Figure 2) cannot be used metaphorically in a sentence such as *Time flies*. As with EAT, the use of FLY in this context evokes an amused reaction, not unlike a reaction to a literal use of a word in an idiom, as in ‘Which bucket did he kick?’.



FIGURE 1. The ISL sign EAT.





FIGURE 2. The ISL sign FLY.

Why these reactions? What accounts for the impossibility of such metaphorical extensions? The explanation I suggest here is that the iconicity of these ISL signs clashes with the shift in meaning that takes place in these metaphorical extensions. Both iconicity and metaphors are built on mappings of two domains: form and meaning in iconicity, and source domain and target domain in metaphors. Signs that are both iconic and metaphorical are therefore subject to both mappings, as suggested by Taub’s (2001) model of the expressions of iconicity and metaphors in sign languages. I suggest that when an iconic sign is USED metaphorically, the two mappings, the iconic and the metaphorical, need to preserve the same structural correspondence; otherwise the metaphorical extension is blocked. The double-mapping constraint, which requires multiple mapping to be structure-preserving, is the mechanism suggested to account for such blocking (§4), and possible and impossible metaphoric uses are examined in light of this constraint in §5. Because of the central role of metaphors in various linguistic processes, constraints on their use may affect other linguistic structures and processes. Two phenomena are presented in §6: the expression of change of state in ISL, and the use of fingerspelled forms in ASL compounds. The concluding section further explores some possible implications of the double-mapping constraint on our understanding of the forces that shape language.

The sign language examples in this article are mainly from one sign language, ISL. These examples were elicited from four native ISL signers, who were asked to translate expressions containing metaphors from Hebrew to ISL, and to give acceptability judgments for metaphorical expressions in ISL. Cases of disagreement between the signers were few and are pointed out where relevant in this article. I also consulted a native ASL signer and incorporated examples from this language as well. When people famil-

iar with other sign languages (e.g. British Sign Language, German Sign Language, French Sign Language, Sign Language of the Netherlands, among others) were presented with the examples discussed here, there was a general agreement that the phenomena described here are not unique to ISL but are found in other sign languages as well. Therefore I regard these phenomena as characteristic of languages in the signing modality. It should be emphasized from the outset, however, that this difference between signed and spoken languages is not a modality difference per se. As I claim in §4, the constraint blocking the metaphorical use of EAT and FLY is attributed to their iconicity, not to the visual modality. Iconicity is much more prevalent, obvious, and rich in the visual modality (as pointed out by many researchers; see e.g. Armstrong et al. 1995, Taub 2001, Meier et al. 2003, and references cited there). Therefore, the effects of iconicity are much more salient in signed languages, making them a useful point of departure for such an investigation. But the phenomena discussed here do not amount to an essential modality difference. Modality plays an indirect role in that it facilitates iconic expressions in the manual-visual channel much more than the audio-aural channel. The restrictions on metaphorical extensions of iconic forms, however, should apply irrespective of modality. And indeed I tentatively suggest certain phenomena in spoken languages as well that may be accounted for by the double-mapping constraint.

2. ICONICITY IN SIGN LANGUAGES. Iconicity can be defined as regular mapping between formational elements of an expression and components of its meaning (Taub 2001, Russo 2004). At the lexical level, this would mean that the basic units of the word, the phonemes, correspond to components of the meaning of that word. Since the form of words in the signed modality is very different from that of words in the spoken modality, I start with a brief description of the formational properties of signs, and then examine how these formational elements function in iconic signs.

2.1. THE FORMATIONAL BUILDING BLOCKS OF SIGNS. From a phonological perspective, signs are comprised of three major formational categories: HAND CONFIGURATION,⁵ LOCATION, and MOVEMENT. Each of these categories is made up of a list of contrastive features, just as the consonant and vowel categories of spoken languages each have contrastive phonological features. In ISL, the signs MOTHER and NOON (Figure 3a) are distinguished by features of the two handshapes  and . This is a minimal pair, because the locations and movements are the same in the two signs, which are distinguished by handshape alone. The ISL signs HEALTH and CURIOSITY (Figure 3b) are minimally distinguished by features of location (chest vs. nose respectively), while ESCAPE and BETRAY are distinguished by movement alone, straight for ESCAPE, and arc for BETRAY (Figure 3c).

The important observation here is that, in the signs of the ISL lexicon, the different handshapes, locations, and movements function as meaningless building blocks, in the same way that phonemes like [t], [k], and [a] do in spoken language. There are constraints on the combination of these units in sign languages as in spoken languages, and their form may change in different (morpho)phonological contexts (Sandler & Lillo-Martin 2006).

2.2. ICONICITY. The formational elements described above constitute the basic building blocks of lexical items (signs) in the language. In many instances, these elements

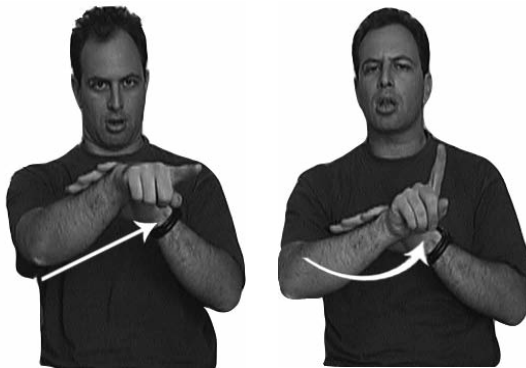
⁵ The hand configuration category has two main subcategories: HANDSHAPE (itself made up of the subcategories of SELECTED FINGER and FINGER POSITION), and ORIENTATION (Sandler 1989, Sandler & Lillo-Martin 2006).



a. MOTHER, NOON, distinguished by handshape features.



b. HEALTH, CURIOSITY, distinguished by location features.



c. ESCAPE, BETRAY, distinguished by movement features.


FIGURE 3. Minimal pairs in ISL, based on (a) handshape, (b) location, (c) movement.

are meaningless, and the form of the sign is arbitrary. Sign languages, however, are much better than spoken languages in conveying concepts in a more transparent, iconic way, because of the spatio-visual modality they are transmitted in, as pointed out above. Iconic signs, as arbitrary signs, make use of the same building blocks—hand configuration, movement, and location. Yet what makes signs iconic (or partially iconic, as dis-

cussed below) is that these formational elements are mapped onto specific meaning components of the concept conveyed.⁶

This mapping can be demonstrated by showing the correspondence between formational elements and meaning components. Taub (2001), in her extensive study of the manifestations of iconicity in sign languages, developed a model that allows for explicit formalization of the form-meaning mapping in iconic forms and also in metaphorical-iconic forms, which are described in the next section. Her model serves as the basis for the analysis of iconicity and metaphor presented here.

Take for example the verb EAT in ISL, illustrated in Fig. 1 above. As is obvious, the sign EAT is iconic in that it resembles in some way the concept it stands for, the action of eating. But how can we account for this resemblance? Obviously, the action and the sign are not identical. The sign does not involve food, activating the jaws, or swallowing. In what ways, then, does it resemble the action? As pointed out by Taub (2001:21), 'Resemblance is not an objective fact about two entities but is a product of our cognitive processing'. According to Taub, the creation of a form that 'resembles' the concept it stands for is a complex cognitive process that involves SELECTING a sensory image to represent the concept, SCHEMATIZING the image so that it can be mapped to formational elements, and selecting the appropriate forms to ENCODE the different parts of the schema. The result is a form whose formational components can be mapped onto meaning components.

The sign EAT illustrates this form-meaning mapping and the various stages involved in creating the form that is amenable to such mapping. The hand in EAT assumes a particular shape , moving toward the mouth from a location in front of it, and this movement is repeated twice. 'Eat' means 'to put (food) in the mouth, chew if necessary, and swallow' (*Webster's New World Dictionary*, 3rd college edn.).

An explicit mapping between form and meaning as a set of correspondences has the advantage of showing which of the various formational elements correspond to which aspects of meaning. This set of correspondences can be represented in terms of a table (see Table 1) listing the essential elements of the concept, the essential elements of the form (iconic representation), and the mapping between these two domains.



		EAT	
	FORM		MEANING
	 handshape		holding an object (food)
	mouth of signer		mouth of eater, agent
	inward movement		putting an object into mouth
	double movement		a process

TABLE 1. Iconic mapping for EAT.

The creation of this form involves first SELECTING a sensory image to represent the concept. In the case of 'eat', the image representing such an event is that of putting a substance that can be held by the hand into one's mouth. Notice that this image does not

⁶ This is comparable to what we find in iconic words in spoken languages as well. Taub (2001:24) analyzes the English word *ding* ([dɪŋ]), showing that each of its phonemes corresponds to each of the three acoustic components in the sound of a bell (sharp onset, initial loud tone, and long gradual fade of the signal). That is, the phonological formational elements of a spoken language may also be mapped onto specific meaning components to create iconic forms.

represent the entire meaning of ‘eat’. It does not represent the consumption of the food, nor does it represent the chewing and swallowing involved in eating. This is inherent in the nature of images as representations; representations are always partial.

The image then has to be SCHEMATIZED, that is, divided into discrete parts, so that each part can be mapped onto a formational element of the language. In an eating event, the following components are identified: an agent with a mouth, a solid substance, and bringing the substance into the mouth. In order to encode this schematized image in a specific language, appropriate forms are selected from the repertoire available in that language to encode each representable part of the image. In EAT these formational elements are the , the mouth of the signer, and the double movement of the hand toward the mouth.

The set of correspondences evident in the various stages of this process has to be structure-preserving, in that the relationship between the different parts of the image and their relationship to the entire image should be preserved in the process of creating an iconic form. The importance of structure preservation in creating iconic forms can be exemplified by the works of Picasso in Figure 4, depicting a human face. Though all of them contain the same components (nose, two eyes, mouth, ears), only Fig. 4a preserves the structural relationship between the different components and the entire image of the original concept, and therefore only this work can be regarded as an iconic representation of the human face.

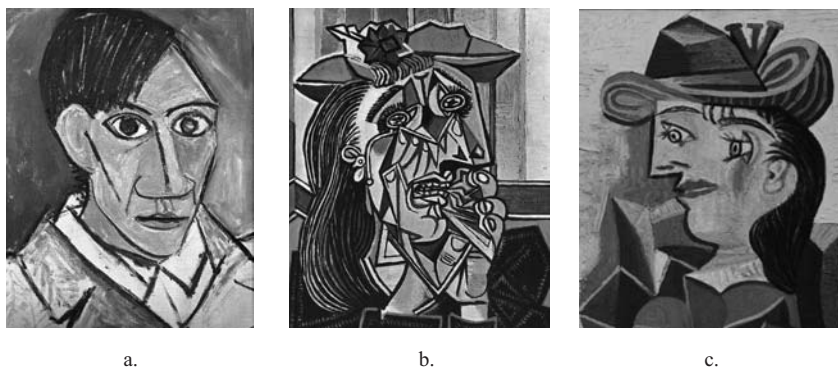



FIGURE 4. Three paintings by Picasso: (a) structure-preserving, (b) and (c) non-structure-preserving.

Often the image selected to represent the concept is related to it by metonymy. For example, in ISL a steering wheel stands for a car, a roof represents a house, a hooked nose represents a witch, and a long neck is the image selected to represent a giraffe. In ASL, the image selected to represent the concept ‘degree’ is a diploma (Taub 2001:53), and the concept ‘funeral’ is represented by an image of people walking in succession. However, once the image is selected, whether by metonymy or not, the creation of an iconic form proceeds according to the stages above. In the case of ISL HOUSE, for example, the image (inclined roof) is schematized into two diagonal lines descending from a common vertex. This schematic image is encoded by two  handshapes touching each other at the fingertips (Figure 5).

Iconicity is not an ‘all or none’ property. In addition to the partialness inherent in the image selection, some signs are only partially iconic in that not all of their formational



FIGURE 5. The ISL sign HOUSE.


components correspond to meaning components. The sign ASK is partially iconic. The hand, in a  handshape, is oriented toward the mouth and moves in an arc path movement outward from the mouth (illustrated in Figure 6). Table 2 shows that the set of correspondences between formational and meaning components is incomplete, in that some of the formational elements do not correspond to any meaning components.



FIGURE 6. The partially iconic sign ASK (ISL).


ASK	
FORM	MEANING
outward movement	something coming from the mouth
 handshape	—
inward orientation	—
arc movement	—
—	words
—	an asking speech act

TABLE 2. Iconic mapping for ASK.

In sum, iconicity is a mapping procedure between two domains, form and meaning. The creation of an iconic form involves selecting an image to represent a concept, schematizing the image so that it can be mapped to formational elements in a given language, and selecting the appropriate formational elements within that language to map onto the components of the image. Crucially, the structural correspondences between the parts and the whole are preserved in the mapping.

3. CONCEPTUAL METAPHORS IN SIGN LANGUAGES: DOUBLE MAPPING. Metaphor, like iconicity, involves mapping between two domains. In conceptual metaphors, the two domains are two conceptual fields, usually one more abstract than the other. The more concrete domain is often drawn from our sensorimotor experience, and the more abstract domain from our subjective experience. Elements from the more abstract domain are described or referred to by means of elements from the more concrete domain (Lakoff & Johnson 1980). Let us look at the following examples.

- (2) I'll never be able to grasp the theory of relativity.
- (3) His ideas went over my head.
- (4) Who put that idea into your head?
- (5) His grasp of the subject is remarkable.
- (6) She got a grip on it.
- (7) I don't get it.
- (8) He holds that this plan is the only solution to the problem.



These metaphorical expressions all draw on the same mapping, namely that understanding is conceptualized as grasping: ideas correspond to objects, and understanding them corresponds to holding them. A failure to hold (as in 3 and 7) corresponds to a failure in understanding.

It is possible to state explicitly the mapping between the two domains. Such a mapping should include a list of entities, relationships, and actions from the source domain and a similar list from the target domain, as well as a demonstration of the correspondence between the two domains (how the elements in the source domain correspond to elements in the target domain). The mapping between the two domains relevant for the sentences in 2–8 is presented in Table 3.

UNDERSTANDING IS GRASPING	
SOURCE	TARGET
objects	ideas
holding an object	understanding an idea
head	mind; locus of mental activities
putting object in a container	putting ideas into the head, learning
failure to hold or catch an object	failure to understand

TABLE 3. Metaphorical mapping for UNDERSTANDING IS GRASPING.

As these examples show, metaphor is not a rare poetic device (Lakoff & Johnson 1980). Rather, we use it all the time in everyday speech. In fact, we cannot avoid it. In many cases, the only way to denote certain subjective experiences is by using expressions from our sensorimotor experience.

Sign languages also use metaphor. Let us look at some examples of metaphorical signs in ISL in Figure 7: the sign GRASP ('understand', Fig. 7a) consists of a grasping movement of the hand in front of the signer's face. The sign LEARN forms a minimal pair with the sign EAT, described above. Both involve a  handshape moving toward a body organ: the mouth in the case of EAT, the temple in the case of LEARN (Fig. 7b). The sign VERY-ANGRY, illustrated in Fig. 7c, is built on the mental image of heated fluid inside a container (Gibbs 1997:363): two  hands moving in an alternating fashion in front of the signer's chest. This sign, when signed in neutral space, that is, further away from the signer's body, means 'boiling liquid', and is used in contexts such as 'the soup is boiling'. Finally, the sign SENSITIVE (Fig. 7d) has the form of the middle finger of the dominant hand touching the back of the base hand and 'bouncing' back.

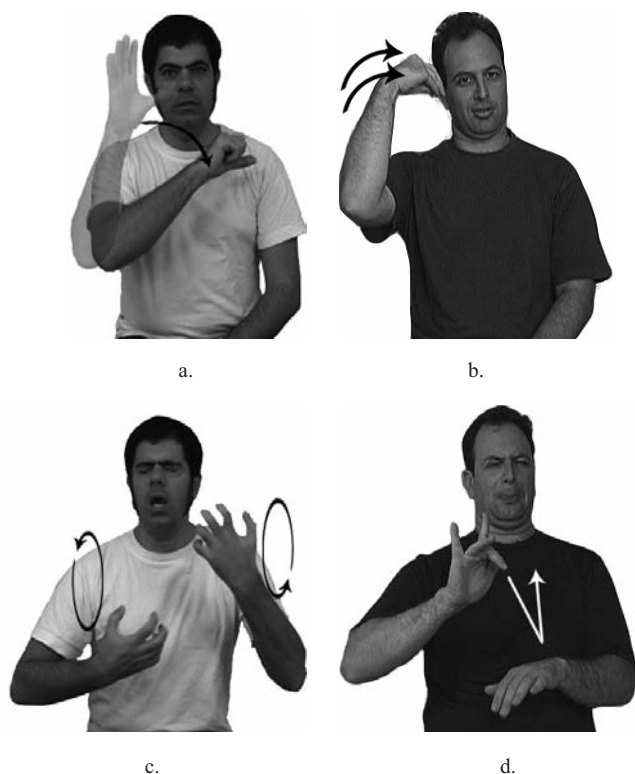


FIGURE 7. Metaphorical signs in ISL: (a) GRASP, (b) LEARN, (c) VERY-ANGRY, (d) SENSITIVE.

What these signs have in common is that they are both metaphorical and iconic. The metaphor is created by mapping from a source domain to a target domain. In GRASP and LEARN, understanding is holding or catching, and ideas/pieces of knowledge are objects to be held or put in a container (our mind). In VERY-ANGRY, emotions are portrayed as a physical substance, a liquid, and the emotional state is expressed as the physical state of the liquid, boiling. In SENSITIVE, emotional sensitivity is expressed as physical sensitivity: a reaction of retracting as if touching a hot surface.

These signs, however, are also iconic: the source domain is represented iconically. The grasping is represented iconically by a grasping movement of the hand. The sign LEARN has the form of taking an object and putting it into the head. The boiling of a liquid, the source for VERY-ANGRY, is represented by the shape and alternating movement of the two hands (and also a specific mouth gesture, the ‘raspberry’ gesture, which is an imagistic representation of the bubbling of the liquid).⁷ And in SENSITIVE, the quick motion of the middle finger toward and away from a surface represents the retracting motion, as if in pain when touching a hot or otherwise pain-inflicting surface.

Metaphorical signs in ISL (and other sign languages), then, are shaped by two mappings: a metaphorical mapping from concrete to abstract conceptual domains, and an iconic mapping between the concrete source domain and the linguistic form that represents it (Taub 2001:97). Table 4 shows the double mapping for LEARN, which is based on the conceptual metaphor UNDERSTANDING IS GRASPING (based on Taub’s table 6.5, p. 103).

⁷ For a description and analysis of iconic mouth gestures in sign languages, see Sandler 2009.

LEARNING		
ICONIC MAPPING	METAPHORICAL MAPPING	
ARTICULATORS	SOURCE	TARGET
	objects	ideas
forehead	head	mind; locus of mental activities
handshape	holding an object	considering an idea
hand moves toward forehead	putting in head	learning
double movement	iterative action	continuous effort

TABLE 4. Double mapping for LEARNING.

The signs REMEMBER and INFORM (Figures 8a,b) are also built on this same double mapping. REMEMBER differs from LEARN in its movement component: a single movement that ends with contact with the forehead, as if gluing an object to the head. In INFORM the hand moves from the forehead toward the addressee, representing the transfer of an object from the signer’s head toward the addressee.

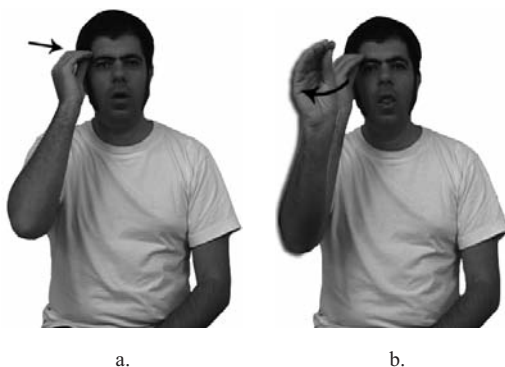


FIGURE 8. The ISL signs (a) REMEMBER, (b) INFORM.

LEARN, REMEMBER, and INFORM, as well as the other signs described in this section, can be regarded as METAPHORICAL SIGNS: they denote abstract (mental, emotional) concepts, and their form is an iconic representation of a concrete source domain. The source domain is the center of the double mapping, in that it takes part in both the iconic and the metaphorical mappings. Metaphorical signs, then, are built on double mapping in their basic form. Many signs denoting abstract concepts in ISL and other sign languages are metaphorical in that sense. This is a basic strategy for expressing abstract notions and actions in sign languages.

Interestingly, it is much more difficult to find parallel examples in spoken languages. I am not aware of any words denoting abstract concepts whose form is an iconic (onomatopoeic) representation of a source domain that is mapped onto an abstract target domain. This is not to say that iconic words cannot be used metaphorically. Take, for example, the English verb *pop*, whose basic meaning is ‘to make a short, sharp, explosive sound’. This verb is used metaphorically in many expressions, for example, *pop in* (for a visit), *pop up* (‘to appear suddenly’), *pop out* (‘to jump out of something’), and many others. Yet the basic meaning of the word is concrete, not metaphorical. If *pop* were to be a metaphorical word, like ISL LEARN, its basic meaning would have been metaphorical, not concrete. Yet, as I said, I could not find any example of this in a spoken language.

A possible spoken equivalent, however, can be found in figurative idioms. An expression such as *give a hand* portrays an image of a hand being extended, and this

image serves as the source domain for the abstract concept ‘help’ (and similarly *pull someone’s leg, throw something in someone’s face*). The difference between the spoken and the signed examples is that the words in a spoken idiom or phrase are not iconic. The mental image is evoked by the meaning of the expression, not by the form (sounds) of the words. In sign languages, a single sign evokes an entire source mental image. Signs can do that, because the body and the hands, which are both involved in the production of a single sign, can each represent a different argument or aspect of the event encoded by the sign (Meir et al. 2007). In that respect, signs are more like idioms. We return to the resemblance between signs and idioms in §7.

The fact that metaphorical signs are built on double mapping has some interesting consequences for the structure of the lexicon. Metaphorical signs that are built on the same source domain often share some aspects of their form as well. The ISL signs LEARN, REMEMBER, and INFORM share the same handshape and location, since all three are built on the mappings ‘understanding is grasping’ and ‘the head is the site of knowledge’. Another well-known example of signs that are built on the same metaphor and share formational elements is that of time expressions. In ISL and many other sign languages, signs denoting future-time expressions such as TOMORROW, NEXT-WEEK, or NEXT-YEAR have a forward movement, while their past-time counterparts have a backward movement. These groups of signs are built on the metaphors ‘the future is ahead’ and ‘the past is behind’. The two conceptual domains involved here are space and time, whereby temporal notions are expressed by spatial terms. The future is conceived of as the space in front of a reference point, and the past as the space behind it. The spatial domain is represented iconically in signs denoting time expressions in ISL by the direction of movement of the sign (for a detailed analysis of the double mapping of ‘the future is ahead’, see Taub 2001:115–18).

In spoken languages, which are much poorer in lexical iconic expressions, metaphorical uses of words are built on a single mapping, the metaphorical mapping. Their form is irrelevant for their use. Words that build on the same metaphorical mapping come from the same conceptual domain, but they do not necessarily share any formational elements, as their form is not an iconic representation of a shared source domain.

4. CONSTRAINTS ON METAPHORICAL EXTENSIONS: THE DOUBLE-MAPPING CONSTRAINT. With the understanding of the double mapping involved in metaphorical signs, let us turn back to the metaphors *The acid ate the metal* and *Time flies*. Why can’t we use the signs EAT and FLY to express these metaphors in ISL? Notice that both verbs are iconic, but they are not metaphorical. They are built on a single mapping, and denote concrete physical actions. The question that is raised here is, why can’t they be USED metaphorically, like their Hebrew and English counterparts?

Let us consider EAT first. The meaning of ‘eat’, as noted above, is ‘to put (food) in the mouth, chew if necessary, and swallow’. That is, the food is consumed as a result of the eating event. Notice that the consumption of the food is not represented iconically in the form of the sign; no formational element corresponds to the consumption. Yet the metaphorical use of *eat* in the above sentence is based on the consumption: *The acid ate the metal* does not mean that the acid has a mouth, nor does it mean that it can bring an object to the mouth. The meaning component shared by the metaphor and the source domain is that of consumption: the acid consumes the metal as the agent consumes the food in an eating event. The two mappings, then, do not match. The meaning component that is active in the metaphorical mapping, the consumption, is not encoded by the iconic form of the sign. And the meaning components of the iconic mapping—the mouth, manipulating an object, putting into mouth—are absent in the metaphor.

In FLY we see a similar situation. The basic meaning of ‘fly’ is ‘to move through the air by using wings’ (*Webster’s New World Dictionary*, 3rd college edn.). The form of the verb in ISL encodes the manner of motion, the flapping of the wings. The metaphor, by contrast, is built not on a specific manner of motion, but rather on an inference of that manner, namely that flying is a very fast way of moving. Again, then, the two mappings do not profile the same meaning components: the iconic mapping highlights the manner of motion, while the metaphorical mapping is based on the inference that moving through the air is fast.

These two metaphorical extensions, which are possible in English and other spoken languages, are blocked in ISL. The mismatch in the double mappings of these verbs suggests that there is some kind of interaction between the iconic form of a sign and the kinds of metaphorical extensions it can undergo. Specifically, the iconic form of a concept and its metaphorical extension cannot be based on different aspects of that concept. This can be formulated as in 9.

- (9) DOUBLE-MAPPING CONSTRAINT (DMC): A metaphorical mapping of an iconic form should preserve the structural correspondences of the iconic mapping. Double mapping should be structure-preserving.

The intuitive idea underlying this constraint is that a process that consists of several sets of mappings is well formed only if the different mappings preserve the same set of structural correspondences. Taub actually posits a similar demand on the different stages of iconic representations: schematization of a mental image should preserve the structural relations between the components of the image, which in turn should be preserved in the form of the sign. Here I suggest that structure preservation applies to the additional mapping built on the same image, the metaphorical mapping.

Let us look once more at the verb EAT in its metaphorical use by stating explicitly the double mapping involved. The iconic mapping is straightforward, and is taken from Table 1. In this mapping, the consumption of the food is not represented. The metaphorical mapping sets an altogether different type of correspondence: the consumption. As can be directly read from the table, the two mappings do not overlap. This double mapping is not structure-preserving and is therefore blocked.

EATING		
ICONIC MAPPING	METAPHORICAL MAPPING	
ARTICULATORS	SOURCE	TARGET
handshape	holding an object (food)	X
mouth	mouth of eater	X
inward movement	putting food into mouth	X
X	consumption of food	consumption of object

TABLE 5. Double mapping for EATING.

The case of FLY works quite similarly. The wing-flapping manner of motion, which is represented iconically, is not part of the metaphorical mapping, and therefore the metaphorical mapping does not preserve the structural correspondences of the iconic mapping. In fact, many manner-of-motion verbs in ISL do not participate in metaphorical expressions. In Hebrew, time can fly, run, and crawl. In ISL, time cannot do those things. In English, one can climb the ladder of success. In ISL, the sign LADDER-CLIMB, which iconically depicts the clasping of the rungs of the ladder, can be used only with real ladders, not metaphorical ones. The metaphor profiles the upward motion (BETTER IS UP), but not the clasping manner of motion. Again, the lack of structure preservation between the two mappings blocks the metaphorical use.

To summarize, this section offers an explanation as to why many iconic signs cannot be used metaphorically. Iconic forms are more restricted in the metaphorical extensions they may undergo because they already consist of a mapping between two domains. Any further mapping should preserve the structural correspondence evident in the other mapping. Taub (2001:97) points out that in ASL ‘it is rare for frozen lexical items from one domain to be used to describe another’. The double-mapping constraint offers an explanation. Many signs in sign languages are iconic to some extent; at least some of their formational elements correspond to meaning components. Therefore they are less free in the metaphorical extensions they may undergo. Arbitrary forms, which constitute a major portion of the lexicon of spoken languages, are not built on multiple mappings, and as a result are freer to get involved in any new conceptual mapping.

5. SOME POSSIBLE AND IMPOSSIBLE METAPHORS IN ISL. The previous section might have given the impression that metaphorical extensions of iconic signs are impossible. This impression is incorrect. Iconic signs may be used metaphorically if the metaphorical mapping preserves the structural correspondences of the iconic mapping. To illustrate a possible metaphor in ISL, consider the sign NIBBLE (Figure 9). This sign may be used in both literal and metaphorical expressions.

(10) The mouse nibbled at the carrot.

(11) The acid nibbled at the iron key.

Table 6 shows the double mapping for the metaphorical use of NIBBLE. The set of structural correspondences of the iconic mapping is present in the metaphorical mapping, hence the acceptability of the metaphor.



FIGURE 9. The ISL sign NIBBLE.


NIBBLE		
ICONIC MAPPING	METAPHORICAL MAPPING	
ARTICULATORS	SOURCE	TARGET
nondominant forearm	substance	substance
 handshape	teeth of agent	causer
H1 moving over H2	agent acting on substance	causer affecting substance
motion across H2	consumption	consumption/destruction
repeated movement of fingers	repeated action of teeth	gradual (nonpunctual) activity

TABLE 6. Double mapping for NIBBLE.

Surprisingly, then, NIBBLE can be used metaphorically, while EAT is more restricted. One major difference between the two signs is that EAT is signed close to the mouth, while NIBBLE is not. This difference seems to be significant in explaining pos-

sible and impossible constraints on metaphorical uses of signs. In many ISL verbs, body organs, which function as the location of the sign, represent a body feature of the subject argument (Meir et al. 2007). The iconic mappings for EAT and ASK (Tables 1 and 2 above) illustrate this point. Both are signed around the mouth, which corresponds to the mouth of the agent argument in these verbs. The iconic device that is used in such cases is that body organs represent themselves. But the body organs are those of the signer, a human referent. Therefore signs signed on body organs are much less likely to be used with inanimate referents. For example, sentences such as *This car eats/drinks a lot of gas* or *The hot water tank eats/devours a lot of electricity* (which are fine in English, as well as in Hebrew) cannot be expressed in ISL using the verb EAT (Fig. 1). Rather, a verb similar in form, which is displaced and signed by the cheek, is used in such contexts (Figure 10). This sign, which can be glossed as BE-CONSUMED, also has a bent handshape rather than a handshape. Its form, then, does not have to do with manipulating objects and putting them into the mouth, but rather some kind of substance disappearing out of sight. ASL has two signs very much like ISL EAT and BE-CONSUMED, and in this language too only the sign BE-CONSUMED, which is signed by the cheek and has a nongrasping handshape, can be used metaphorically.



FIGURE 10. The ISL sign BE-CONSUMED.

Another interesting example illustrating the same point is the ASL sign FIRE (‘to fire somebody’). The sign is built on the mental image of decapitating a person. But the sign is not articulated on the head. The head is represented by a fist hand of the nondominant hand, and the dominant hand moves swiftly over and across it. A similar sign, but one that is signed on the body, with the dominant hand moving toward the neck, means literally ‘take one’s head off’. The metaphorical meaning could be added only when the sign moves away from the body, and its iconic mapping becomes much more schematized (a fist can represent a head, but it can represent any stout object).⁸

Another set of iconic signs in which body organs represent themselves (or equivalent body organs) is that of manner-of-motion verbs. In FLY and CLIMB, described above, the hands and arms correspond to wings and hands, respectively. This use of the hands, together with the movement of the signs, which represents the specific manner of motion, excludes these signs from participating in metaphors, because their form highlights the manner, which is often bleached in the metaphor. The metaphors are built on the direction of motion (‘up’ in the case of ‘climb’) or the temporal qualities of the motion (‘fast’ in the case of ‘fly’) and not on the motion of the wings and hands. A similar

⁸ I thank Carol Padden for this example.

case is that of verbs indicating the type of vehicle involved in motion. In English, not only aircraft take off, but also projects, enterprises, and fashion styles. In Hebrew, the heart may also take off (meaning ‘to be extremely happy’). In ISL, the sign TAKE-OFF (Figure 11a) has a ✎ handshape, which is an iconic representation of an object with two wings extended sideward, the aircraft. The metaphorical use of *take off* (as in *The project took off immediately*) is built on the conceptual metaphor of SUCCESS IS UP; the vehicle is irrelevant. It comes as no surprise, then, that the ISL sign denoting the taking off of aircrafts cannot be used metaphorically. Instead another sign is used, whose form encodes only the upward movement (Figure 11b). This sign has a ✎ handshape, which is often used to indicate directionality in the language, but does not encode any specific entity in motion. Therefore it can be used in various contexts, such as ‘the project took off’, ‘the prices went up’, ‘her idea took off’. Similarly, its antonym also encodes only the downward movement. The sign used to indicate ships sinking, whose form represents a ship, cannot be used in these metaphors. Here again, ASL shows precisely the same distinctions (Carol Padden, p.c. 2010).

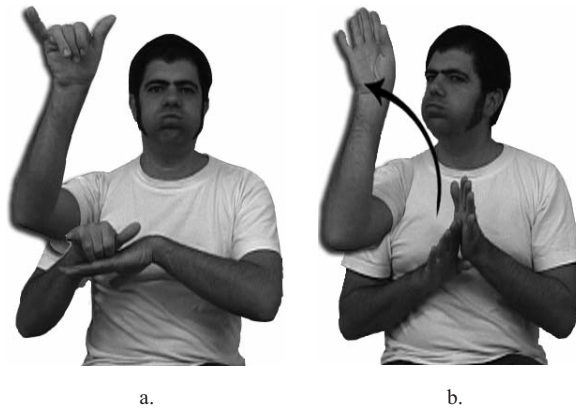


FIGURE 11. Two ISL signs expressing ‘taking off’: (a) an airplane, (b) a general sign.

The above examples indicate that signs whose form is an iconic representation of aspects of specific objects, like the sign in Fig. 11a, are much less likely to be used metaphorically. The various signs for ‘cork/lid/cap’ in ISL provide another illustration of this point. ISL has several signs, each depicting a different type of object used to seal a container: a cork, a metal cap to be opened with an opener, a twist-on lid, a lid for a jar, and also a general sign whose form indicates a flat surface put on a container and preventing its content from getting out. It is only this latter sign that can be used in contexts such as ‘the project got stuck’, ‘the writing of the essay got stuck’, and so forth.⁹

Similarly, there are two signs for translating English *spend (money)*. In one, the two hands take a ✎ handshape, moving alternately from the waist outward, with an opening movement of the fingers. This sign iconically depicts the hands taking money out of one’s pockets and throwing it away. The other sign has the form of an open hand repeatedly moving over the other hand, as if a substance is continuously overflowing. It is

⁹ Not all of my ISL consultants accept the use of this sign in the indicated contexts. Two out of the four consultants do not use a sign meaning CORK at all in these contexts, and preferred the sign STOP. What is important in the present context is that the two consultants who do use the sign CORK in an extended way accept only the more general sign, and not the signs that iconically depict a specific type of cork.

only this latter sign that may be used in contexts other than money, such as wasting time, water, energy, and electricity. The relationship between the objects constituting the mental image on which the form of the first sign is built is not preserved in the extended uses (time, electricity, and water cannot be held in pockets) and is therefore blocked in these contexts.

Notice that in all of the above examples, signs that can be used metaphorically are characterized by specific phonological features: they are signed not on the body, and their handshape does not represent a specific object. This observation raises an interesting point. Signs consist of three major formational categories—handshape, location, and movement—each of which may participate in iconic mappings. They also participate in metaphorical mappings, but to a different degree: handshape and location are more constraining than movement with respect to possible metaphorical uses. Handshapes often represent iconically some visual properties of objects or the way they are being handled by a human hand.¹⁰ Body organs often represent themselves or the activities executed by them (e.g. head: thinking, chest: feeling, mouth: talking). Since they represent themselves, and since the body organs of the signer are necessarily those of a human being, signs signed on the body are in many cases restricted to human/animate subjects and cannot carry over to more abstract domains. Displacing the sign to a more neutral location, such as the space in front of the signer, may free the sign from being human-anchored, like the sign in Fig. 10.

Movement is the most abstract and schematized category of the three formational components of signs, and it is inherently relational. Hence, it does not seem to be as constraining as the other two. In many cases the direction of movement is precisely what is profiled in the metaphor, as in *BETTER IS UP*, *FUTURE IS AHEAD*, *FAILURE IS DOWN*. Signs built on direction of movement with a nonspecified handshape and neutral location are therefore good candidates for being used in different semantic domains.

A word of caution is in order, though, even with respect to handshape and location. Conventionalization and extensive use may weaken considerably the iconic flavor of a sign. Also, contact with the surrounding spoken language may play a role in enabling some loan translations based on iconic signs. One of my ISL consultants informed me that some signers use the expression *ELECTRICITY EAT*, meaning that a lot of electricity is consumed by some appliance. Such use of the sign *EAT* probably reflects Hebrew influence, since in Hebrew the word for ‘eat’ is very common in such contexts. According to the DMC, such usage in ISL should be impossible. This expression is quite restricted in use (it occurs only as an interjection, not as a predicate in a clause), and is not widespread in the community. Nevertheless, it has been attested, indicating that language is shaped by multiple forces, among them usage and conventionalization. However, the DMC can explain why ‘eat’, which is such a rich source for idioms and metaphorical expressions in English, is much more restricted in the contexts in which it may occur in ISL.

Yet if conventionalization may weaken the iconic flavor of a sign and free it to take more abstract, metaphorical meanings, then another question arises. Maybe the difference between *ISL EAT* and English *eat* should not be attributed to iconicity effects but rather to another factor altogether: time-depth. It might be that meaning shifts from phys-

¹⁰ This holds especially of the classifier systems of sign languages, where specific handshapes stand for entities characterized by certain properties (see e.g. Emmorey 2003 and papers in that volume for different descriptions and analyses of classifiers in sign languages). But since many nonclassifier signs are often built on the classifier system, such use of handshapes is characteristic of many signs in the lexicon of any given sign language.

ical to abstract take centuries to develop.¹¹ For example, many English verbs denoting seeing and understanding have their historical roots in words denoting physical touching and manipulation in their ancestral languages, such as *perceive* (< Latin *-cipio* ‘seize’), *examine* (< Latin *ex + agmen-* ‘pull out from a row’), and *discern* (< *dis-cerno* ‘separate’) (Sweetser 1990:32). Meaning changes such as these may take several centuries to crystallize. Sign languages, at least the sign languages studied nowadays, are in general much younger than spoken languages. ISL is only about seventy-five years old (Meir & Sandler 2008), and ASL is about 250 years old. It might be argued that time-depth alone can account for the data presented here: sign languages are simply too young to have developed meaning extensions of extensive portions of their vocabulary.

I argue, however, that time-depth cannot be the sole factor involved here. If time-depth is all there is to it, we would not expect to find the contrast between signs such as EAT vs. BE-CONSUMED, or PLANE-TAKE-OFF vs. TAKE-OFF (Figs. 10–11). These pairs of signs show that signs with specific formational characteristics—those that are not signed on the body and whose handshapes do not represent specific objects—are more likely to be used metaphorically and develop more abstract meanings. Sign languages, then, are not too young to develop metaphorical extensions. But this process does not apply evenly to all verbs in the lexicon. Some verbs are much more constrained than others, and this difference is accounted for by the DMC.

6. POSSIBLE EFFECTS OF THE DOUBLE-MAPPING CONSTRAINT ON GRAMMATICAL STRUCTURE. The DMC is a constraint on the wellformedness of processes involving more than one set of correspondences between domains. Does it have any implications beyond its effects on possible metaphorical extensions of iconic forms? In this section I argue that it does, due to the central role that metaphor plays in language. Metaphor, as pointed out above, is a central mechanism in our thought and language. Moreover, it is one of the main forces driving language change (see inter alia Claudi & Heine 1986, Sweetser 1987), in particular in the initial stages of grammaticalization processes. Grammaticalization, in turn, is a major mechanism for the creation of new grammatical devices in the language (Hopper & Traugott 2003 and references cited there). Therefore, a constraint that targets a particular stage in the grammaticalization chain may leave footprints beyond the scope of the particular stage, as consecutive stages are likely to be affected as well. Take, for example, the grammaticalization cline from a spatial adposition such as *from* to a case marker indicating a causer (*He died from meningitis*). Quite early on in the process, the meaning of the adposition is used metaphorically, building on a conceptual metaphor that can be phrased as CAUSE IS INITIATING MOTION. After such metaphorical extension takes place, the spatial meaning is no longer dominant in certain contexts, and the adposition, which may turn into a clitic and ultimately into an affix, may come to mark causality rather than (or in addition to) source of motion. If the metaphorical extension is blocked in the first place, however, then the rest of the process cannot take place, and the language would need to find other means for marking a causer. And if all spatial adpositions in a language cannot be used metaphorically, then all grammatical systems based on such extensions will not appear; rather, the language would have to resort to other means for performing these functions.

I argue that something along these lines takes place in the expression of change of state in ISL. In English, Hebrew, and other spoken languages, change of state is often expressed by a spatial template, as in *The situation turned **from** bad **to** worse*. ISL, in

¹¹ I thank Greg Carlson for this point.

contrast, does not use a spatial template to express change of state. In a way, this is surprising, since as a language produced in space, ISL is expected to use space more, not less, than a spoken language. I argue that this surprising fact can be attributed to the effects of the DMC. I then present another phenomenon, fingerspelling in ASL compounds, that can be explained by resorting to the DMC.

6.1. THE EXPRESSION OF CHANGE OF STATE IN ISL. It has often been pointed out that many spoken languages use words from the spatial domain to express events in other domains. In the following sentences, the same verb and prepositions are used to depict events in four different semantic fields.

- (12) The messenger **went from** Paris **to** Istanbul. (location)
 - (13) The inheritance finally **went to** Fred. (possession)
 - (14) The light **went from** green **to** red. (identification)
 - (15) The meeting was changed **from** Tuesday **to** Monday. (temporal)
- (Jackendoff 2002:356–57)

All of these sentences denote a CHANGE event: the subject of each sentence undergoes some kind of change. It is being characterized as being at state 1 at the beginning of the event, and at state 2 at its end. The structural and lexical similarity between these sentences derives from the way language conceptualizes CHANGE events: motion (the verb *go*) along a source-goal path (the prepositions *from* and *to*). This is represented schematically by the LEXICAL CONCEPTUAL STRUCTURE (LCS) in 16, where the change is captured by the GO function, and state 1 and state 2 are the arguments of the FROM and TO functions (Jackendoff 2002:362).

- (16) GO (X, [_{Path} FROM (W) TO (Z)])

The use of a spatial template as a basic template for expressing relations in other domains is attributed to the primacy of spatial organization in human cognition (Miller & Johnson-Laird 1976:375), because of its evolutionary priority and its strong linkage to perception (Jackendoff 2002:359). It has been attested in language after language, and is therefore regarded as characteristic of language in general.

Sign languages are spatial languages: the hands move in a three-dimensional space. Therefore they can iconically represent motion along a source-goal path. But although space is an integral part of sign languages, it turns out that in some cases they do not employ spatial linguistic elements where spoken languages (at least some of them) do. ISL and ASL do use a spatial template to express a CHANGE event in the spatial and possessional fields,¹² but not in the identification field. My claim is that the DMC is at work here, in that the iconicity of spatial expressions in sign languages prevents them from being used in the identification domain.

In order to follow the argumentation, I first describe the nature of the spatial-morphological mechanism that ISL uses to express change of location. I then show that these means cannot be employed to express change of state, and provide an explanation for that based on the DMC.

EXPRESSING CHANGE IN THE SPATIAL SEMANTIC FIELD. Let us look at two ISL sentences expressing a change of location.

- (17) HOUSE MY INDEX_a, STORE INDEX_b, I_aWALK_b.
‘I walked from my house to the store.’

¹² And also in the temporal semantic field to a certain extent. For the morphological expressions of the different semantic fields, see Meir 2007.

- (18) JERUSALEM INDEX_a, TEL-AVIV INDEX_b, CAR_aPATH_b.
 ‘The car went from Jerusalem to Tel-Aviv.’

In each sentence, two locations are mentioned. The signs denoting locations are followed by a pointing sign (INDEX) directed at a location in the signing space (indicated by the *a* and *b* subscripts), establishing an association between the real-world locations and loci in the signing space. After ‘localizing’ the two locations, the predicate denoting a change of location ‘moves’ between these loci: its path movement goes from the source location to the goal location. In 17, the predicate is WALK, and in signing it, the signer moves his/her hand from the locus associated with HOUSE to the locus associated with STORE. In 18, shown in Figure 12, the predicate is a sign glossed as PATH. This sign denotes the most general change of location in ISL, similar to English *go*. Here too, the sign starts at location *a* and moves to location *b*. Change of location, then, is expressed in ISL by the following formational means: two locations in the signing space (often referred to as R(efere[n]tial)-loci), and a path movement of the predicate that moves from one location to another. The initial point is the source, and the final is the goal.

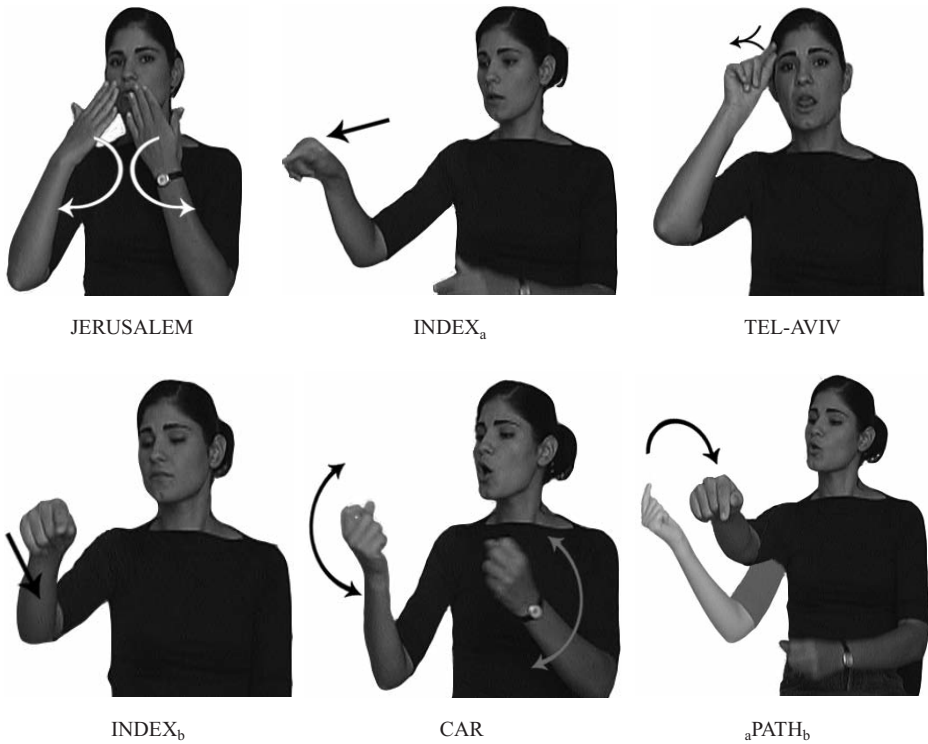


FIGURE 12. Sentence 18, conveying change of location in ISL.

EXPRESSING CHANGE IN THE SEMANTIC FIELD OF POSSESSION. The same morphological mechanism, two R-loci and a predicate whose path moves from the source R-locus to the goal, is used in the possessional field. Change of possession—the transfer of an entity from one possessor to another—is illustrated in 19.

- (19) BOY INDEX_a, GIRL INDEX_b, BOOK_aGIVE_b.
 ‘The boy gave the book to the girl.’

The two pointing signs in 19 are associated with human referents, the two possessors (former and future possessor) in the giving event, and the predicate moves between these R-loci. As in sentences 17–18 above, the path moves from source to goal.¹³

Notice that the representation of the conceptual notions of SOURCE-GOAL PATH is iconic. It is built on the ‘space to space’ iconic device (Taub 2001:80–81), whereby the signing space is mapped onto real space or mental space. This mapping is presented in Table 7.

SOURCE-GOAL PATH	
FORM	MEANING
locations in signing space	locations or entities located in real or imagined space
path movement	the motion of an entity along a path
Loc 1	source location
Loc 2	goal location
Loc1 ≠ Loc2	source ≠ goal
linear ordering of Loc1 and Loc 2	temporal ordering of source vs. goal

TABLE 7. Iconic mapping for SOURCE-GOAL PATH.

So far, languages of the two modalities show a very similar pattern, in that spatial means (choice of lexical items—prepositions and verbs—in English/Hebrew and source-goal path in ISL) are used to convey both change of location and change of possession. We turn now to the third semantic field, identification.

EXPRESSING CHANGE IN THE SEMANTIC FIELD OF IDENTIFICATION. A CHANGE event in this semantic field in spoken languages is often denoted by change-of-state (COS) verbs (e.g. *blush*, *redden*, *get well*). A COS verb encodes, as part of its meaning, the final state of the argument undergoing change. The verb *redden*, for example, specifies that a referent has reached the state of being red, or more red. The initial state is implied, and can be characterized as ‘not final state’. That is, COS verbs can only mean ‘changing from not-A to A’. The verb *redden* can only mean ‘change from not (or less) red to the state of being (more) red’; it cannot mean ‘change from yellow or from any other color to red’ (Carter 1976:38). When expressing a CHANGE event where the initial and final states are not reverse values of the same property, spoken languages often use a spatial template, in which the initial and final states are marked as source and goal respectively, by the English prepositions *from* and *to* (or *into*, in some cases), as in 20–23.

- (20) The light went **from** green **to** red.
- (21) Things went **from** bad **to** worse.
- (22) The witch turned the frog **into** a prince.
- (23) He changed **from** this nice young guy **into** a horrible nerd.

In such sentences, change of properties is conceptualized in terms of change of location. According to Lakoff and Johnson (1999:52), our conceptualization of change of state draws on the primary experience of motion along a path, where change of state is experienced as part of the change of location as one moves.

ISL, like English, has both lexical means (COS verbs) and grammatical means to express change of state. COS verbs in both modalities do not have spatial morphology. Yet

¹³ Though change of location and change of possession show strong formational similarities, there are also important differences between them, most notably in their use of space. In change-of-location events, space is regarded as continuous, but change-of-possession events are made up from discrete subparts (Padden 1988). For a detailed comparison, see Meir 2007.

unlike English, ISL does not use a spatial template to denote change of state. Let us look first at COS verbs.

Verbs denoting change of properties in ISL often have a path movement as part of their phonological structure. The direction of the path is not variable, however; it is lexically fixed, often expressing the direction of a specific change in an iconic way. So in a verb meaning ‘to become fat’, the hands move away from each other, indicating an expansion in dimension, while in its antonym the hands move toward each other; a verb meaning ‘to grow up/grow tall’ has an upward-moving path, while ‘becoming shorter’ has a downward-moving path. In other cases, the direction of the path has a less straightforward meaning, as seen in Figure 13. In BECOME-BETTER/IMPROVE (Fig. 13a), there is a rotation of the wrist outward; in BLUSH (Fig. 13b) the hand moves upward along the face, whereas in GET-PALE (Fig. 13c) the hands move downward.¹⁴ COS verbs, then, differ from verbs in the spatial and possessional domains in that the initial and final states are not independently specifiable, and the path movement of the verb is not variable but rather is lexically determined.

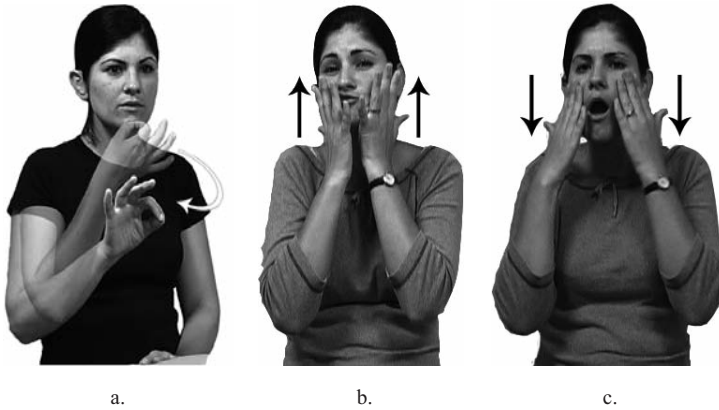


FIGURE 13. COS verbs in ISL: (a) (GET)-BETTER, (b) BLUSH, (c) GET-PALE.

What happens when there is no one lexical item to express a specific change of state? As 20–23 show, English uses a spatial template. If ISL were to use spatial means to express change of properties, a sentence meaning ‘The leaves turned from green to yellow’ would take the following form.

(24) *LEAVES, GREEN INDEX_a, YELLOW INDEX_b, CHANGE_aPATH_b.

In such a hypothetical sentence, the initial state GREEN is localized in point (a), the final state YELLOW in point (b), and the change from one to the other would be denoted by a sign whose path movement is from (a) to (b). As the asterisk indicates, however, such a sentence is ungrammatical in ISL. I suggest that its ungrammaticality can be attributed to the DMC, specifically to the impossibility of mapping R-loci onto properties, and consequently of using path to represent change of properties.

As can be seen from the iconic mapping in Table 7, R-loci are mapped onto locations or entities, that is, referential expressions. Moreover, each R-locus is associated with a

¹⁴ Hebrew has idiomatic expressions that draw on similar metaphors: *ha-dam ala lo lapanim* ‘Blood got up his face’, meaning ‘His face got red’ (usually from anger); *ha-dam azal mi-panav* ‘Blood ran out of his face’, meaning ‘He got very pale’ (usually from fear).

DIFFERENT referent. In the identification field, what is mapped onto the source and goal are the initial and final states of the SAME referent. States, or properties, cannot be associated with locations in the signing space. Any R-locus established in this discourse would be interpreted as associated with the referential expression in the sentence (LEAVES), rather than with its properties. Moreover, since there is only one referential expression in the sentence, the sentence cannot contain two R-loci, because each R-locus is expected to be associated with a different referent. The form of PATH, an actual path movement between two loci, highlights motion between two distinct locations, associated with two distinct referents. The metaphorical mapping, therefore, does not preserve the structural correspondences of the iconic mapping, and is therefore blocked, as is illustrated in Table 8.

CHANGE OF STATE		
ICONIC MAPPING	METAPHORICAL MAPPING	
ARTICULATORS	SOURCE	TARGET
locations in signing space	locations or entities located in real or imagined space	properties of an entity (R _i)
path movement	the motion of an entity along a path	X
Loc 1	source location	property ₁ of R _i
Loc 2	goal location	property ₂ of R _i
Loc1 ≠ Loc2	source ≠ goal	X
linear ordering of Loc 1 and Loc 2	temporal ordering of source vs. goal	temporal ordering of property ₁ vs. property ₂

TABLE 8. Impossibility of double mapping for CHANGE OF STATE.

Why is it that spoken languages can use a spatial template to represent change of state? Since there is no iconic mapping, the arguments of *from* and *to* need not be things that can be located in space, and need not be referential. Also, the actual path is not expressed, but is rather inferred from the prepositions marking the source and goal. The metaphorical extension is actually built on the temporal relations between the two states, which corresponds to the temporal relation between the source and goal locations of a path.

How does ISL express change-of-state events, then? There are two possibilities. One is to use the verb BECOME/CHANGE-TO; the final state would be expressed as a complement of the verb, and the initial state as a modifier of the nominal referring to the entity undergoing change, as in 25. The second is to use a temporal template, where the initial and final states are marked by the temporal adverbials THEN and NOW, as in 26.¹⁵

(25) LEAVES GREEN CHANGE YELLOW.

‘The green leaves turned yellow.’

(26) BOY INDEX_a THEN SICK NOW HEALTHY.

‘The boy that was sick became healthy.’

So, surprisingly enough, sometimes a spoken language uses linguistic elements referring to spatial notions in nonspatial contexts while a sign language cannot, because

¹⁵ A referee pointed out that the ASL equivalent of sentence 25 is: LEAVES GREEN, YELLOW, with the first constituent (LEAVES GREEN) marked as a topic by raised eyebrows. Signs such as BECOME, CHANGE, and the THEN-NOW construction are felt to be too English-like. This shows that different sign languages may resort to different ways of expressing change of state. Importantly, though, ASL does not use a construction that uses R-loci and a path movement. If the DMC is indeed at work here, my prediction is that it would be unlikely to find such a construction in a sign language.

of the iconicity of these elements in the signing modality. Yet once again, the difference is not a modality difference per se. Rather, it is the result of the possibility of and strong tendency toward encoding spatial notions and relations in an iconic fashion in the spatio-visual modality, and the impossibility of doing so in the spoken modality.

6.2. MORE DMC EFFECTS: CONSTRAINTS ON LOAN TRANSLATION IN ASL COMPOUNDS. Like spoken languages, sign languages may borrow lexical items from other languages by using various devices. One device for borrowing words from a spoken language is by means of fingerspelling, or the manual alphabet. In this system each letter of a spoken-language alphabet is represented by a specific handshape. A word from the spoken language may be represented manually by a sequence of handshapes corresponding to the letters of this word. Fingerspelled forms do not conform to the general phonological and morphological restrictions of the core lexicon and are felt to be ‘foreign’ (Brentari & Padden 2001). As part of the foreign domain of the lexicon, however, they may still constitute a nonnegligible part of it. Different sign languages make use of such forms to varying degrees. ASL, for example, uses it quite extensively. Padden and Gunsauls (2003) counted the number of fingerspelled words in narratives of eighteen native signers, and found that on the average, fingerspelled forms constituted 18% of the signs in their corpus. In ISL, by contrast, fingerspelled forms are much rarer, and are used mainly for proper names (though no systematic study of the percentage of fingerspelled forms has been conducted to date).

In ASL, fingerspelled forms interact with lexical items of the core lexicon in various ways. One noteworthy case is compounding, described by Padden (1998). ASL has productive compounding of native forms (Klima & Bellugi 1979), that is, compounds consisting of two core lexical items. Many such compounds are genuinely ASL and do not have English counterparts. Some ASL compounds, however, are loan translations of English compounds, for example, BABY + SIT ‘babysit’, HOME + WORK ‘homework’, and TIME + LINE ‘timeline’. Interestingly, in some loan translations, a fingerspelled form is used for one or both of the members of a compound form. The following examples are from Padden 1998:53–54. Fingerspelled forms are represented by letters separated by hyphens.

- (27) Sign + fingerspelled form: PAY + R-O-L-L, SOAP + B-O-X, EYE + B-A-L-L, BLACK + B-A-L-L (‘to blackball someone’)
- (28) Fingerspelled + sign form: B-E-L-L + BOY, F-O-O-T + WORK, P-R-O-O-F + READ
- (29) Fingerspelled compounds: S-K-Y-L-I-N-E, W-O-R-K-O-U-T

As Padden points out, the existence of fingerspelled forms in compounds is intriguing, precisely because ASL allows for loan translations of English compounds. Why, then, is the English word *line* translated by the sign LINE in ‘TIME + LINE’, but the fingerspelled form is used in S-K-Y-L-I-N-E? Similarly, why is *ball* fingerspelled in EYE + B-A-L-L and BLACK + B-A-L-L? Padden argues that the fingerspelled forms are used in order to preserve the ‘semantic integrity’ of the signs:

LINE refers to a boundary or a conduit ... but not an outline, as in ‘skyline’. The sign translation LINE is disallowed for the latter meaning and the form is fingerspelled to preserve the semantic integrity of LINE. BALL means usually a playing ball held by hand. In ‘eyeball’ and ‘paintball’, the balls are not playing balls nor are they of a size to be held in both hands; a ‘paintball’ is actually a pellet. As in LINE, BALL is disallowed for meanings varying from the semantic category of the sign BALL. (Padden 1998:54–55)

I suggest that Padden’s insights can be explained in terms of the DMC, in that there is a clash between the iconic form of the sign and the extended meaning it takes in the com-

pound. In both LINE and BALL, what is actually depicted by the form of the sign is an aspect of meaning that does not participate in the meaning of the word within the compound. In the case of LINE, the two hands move away from one another, tracing the form of a straight line in the signing space. A straight line is compatible with meanings such as boundaries and conduits, but not skylines (a skyline is a silhouette whose boundaries are typically not straight) nor outlines (Carol Padden, p.c. 2008). The sign BALL iconically depicts a spherical object of the size that can be held by both hands. Both the size and the manipulation by hands are incompatible with its meaning in the above compounds, as pointed out by Padden. In order to avoid violating the DMC, ASL resorts to a mechanism that allows for a noniconic representation of these signs, fingerspelling. In fingerspelled forms, there is no iconic mapping; hence the meaning extensions required in the compounds are shaped only by one mapping, not two, and such forms are felicitous.

7. FURTHER IMPLICATIONS. The starting point of this article was the need to explain why certain metaphorical extensions that seem to be quite common in spoken languages are infelicitous in sign languages. The explanation has to do with the fact that many sign language signs are iconic in form, and therefore any metaphorical use of these signs is shaped by two structural mappings, not one. These two mappings are simultaneously present in metaphorical uses of iconic signs. The impossibility of using some of these signs in specific contexts indicates that multiple mappings are constrained by each other; they should all preserve the same kind of structural correspondences. This interdependency is captured here by the double-mapping constraint, which requires multiple mappings to be structure-preserving. Yet the DMC is not only about iconicity and metaphors in sign languages. It is a constraint on a cognitive process that involves multiple comparisons. Therefore, it has some broader implications, a few of which are mentioned here.

First, to the best of my knowledge, not much work has been done on processes involving multiple mappings. This stands in sharp contrast to the wealth of research on uni-mapping processes such as analogy, metaphor, and similarity (see e.g. Gibbs 2008 and references cited there). The ubiquity of both iconic forms and metaphors in sign languages makes sign languages a good starting point for exploring processes involving double mapping. One question that arises is about the nature of the interaction between the two mappings. These two mappings, the iconic and the metaphorical, both involve correspondence between a source domain and a target domain. Yet the type of correspondence may be somewhat different. Gentner (1983) draws a distinction between analogy and literal similarity. Analogy is based on substantial overlap in relations, whereas literal similarity is based on overlap in both relations and object attributes. It seems that metaphors are like analogies, since they are predominantly relational comparisons, whereas iconic mappings may be more like literal similarity, in that they involve also overlap in attributes, mainly in form. How do these two somewhat different processes interact when they are simultaneously present in a word? Specific object attributes encoded in the iconic mapping may interfere with relational similarities, as is evident by signs with certain specific handshapes or body locations, pointed out in §5. Further investigation of possible and impossible metaphors in sign languages will help us refine our understanding of the interaction between the two types of mappings.

Second, though double mapping is most obvious in sign language forms, it should not be restricted to the manual-visual modality. If it is indeed a constraint on cognitive processes involving double mapping, then we should be able to trace its footprints in spoken languages as well. Spoken-language examples, however, are not easy to find.

Metaphorical uses of onomatopoeic words seemed to be less constrained than metaphorical uses of iconic signs. When describing a bird swooping at a cat, one might say *The bird buzzed the cat*, though no buzzing sound is heard.¹⁶ Does this example indicate that sound imagery mapping works differently from the mapping of gestural iconicity? I leave this question open. But maybe lexical image iconicity, onomatopoeia, is the wrong place to look for double mapping in spoken languages; rather, we should focus on trying to find processes involving dual representations.

Idioms may be a relevant example. A basic feature of idioms is their noncompositional meaning; idioms have to be conventionalized, because their meaning or use cannot be predicted on the basis of the meaning of their components (Nunberg et al. 1994:492). Additionally, idioms often involve a figurative dimension. As Nunberg and colleagues point out, speakers may not always understand the precise motive underlying a certain idiom, but they nevertheless ‘generally perceive that some form of figuration is involved, at least to the extent of being able to assign to the idiom a “literal meaning”’ (1994:492). Figurative idioms, then, have two dimensions: the image invoked by the literal meaning, and the actual sense of the idiom. The literal meaning (the actual form) of the idiom is related both to the image invoked by it, and to its actual sense, which is often the result of metaphorical extension or some other rhetorical device. Does the image invoked by the literal meaning constrain in any way the metaphorical extension on which the actual sense of the idiom is built? Dobrovolskij and Piirainen (2005:14–18) argue that it does, in that the contexts in which an idiom may be used have to be compatible with the mental image invoked by the literal meaning. For example, the idiom *to be caught between a rock and a hard place*, which roughly means ‘to be in a very difficult position; to face a hard decision’, can be used only in contexts in which a protagonist is being trapped between two very difficult obstacles, and not in any situation where the protagonist faces a hard decision.

This behavior of idioms can be captured in terms of the DMC. Idioms are shaped by double mapping: the figurative extension and the mental image evoked by the literal reading. The use of an idiom is felicitous when the figurative meaning does not clash with the relations captured in the mental imagery of the literal reading.

Another spoken-language phenomenon that may involve double mapping is metaphorical extensions of mimetics. As pointed out earlier, some spoken languages have a set of ideophones or mimetics, lexical items whose form evokes certain sensations and impressions. Such forms are often used to describe different types of motion, texture, and also inner states and feelings. For example, Hasada (1998:85) gives the example of the Japanese word *kari-kari*, which can mean ‘a sound produced when something hard is bitten or scraped’. But it can also mean ‘something crisp’ (such as a burned toast), and it could also refer to an emotional state of being nervous. Hasada further suggests that these mimetics evoke concrete mental images, and that Japanese people like using them to express emotions precisely because they are perceived as concrete: ‘sound symbolic emotion expressions are indispensable for the Japanese people, because they can depict the relatively abstract phase of emotion through tangible, semantically expressive images’ (Hasada 1998:93). Mimetics, then, are mapped to a sensational image, which in turn is mapped onto specific emotions, and therefore may be a fruitful domain to explore double-mapping effects. In order to examine whether the DMC constrains metaphorical uses of mimetics, one would need to look for metaphorical uses of highly iconic (onomatopoeic) mimetics. I leave this for future research.

¹⁶ I thank Greg Carlson for the example and for the point.

A third consequence of the DMC and the phenomena it accounts for concerns a major controversial issue in the study of conceptual metaphors: their universality. In the cognitive theory of metaphor, developed by Lakoff and Johnson in numerous works (see Lakoff & Johnson 1999 and references cited there), the implication is that basic metaphors are universal or near-universal because they are rooted in our biology and in the way our body interacts with the world. Others argue against taking this claim at face value. They point out that culture plays an important role in filtering and determining the mental images on which metaphors are based. For example, emotions in European languages are often conceptualized as substances in containers (e.g. ANGER IS A HEATED FLUID IN A CONTAINER). Many non-European languages conceptualize emotions such as anger differently. In Japanese, a key notion in expressing inner feelings is the concept of *Mushi* (Dobrovolskij & Piirainen 2005:133–34), which is roughly translated as ‘the inner worm’ or ‘insect of the soul’. This alien being is believed to reside inside a person and to influence his or her feelings. Many expressions of feelings are built on this concept, such as *mushi no idokoro ga warui* ‘the location of the mushi is bad’ (‘to be in a bad mood’) or *mushi ga sukanai* ‘Mushi does not like’ (‘to dislike someone’) (Dobrovolskij & Piirainen 2005:134). These examples illustrate the central role that culture may play in shaping image schemata and conceptualization of certain notions. Hasada (2002:122) points out that ‘[i]n Japanese society “anger” should not be distinctly shown, and therefore should be suppressed in front of others. *Mushi* is therefore appropriately used in referring to “anger”, since a person can appeal to the *mushi* as a cause’.

Metaphors, then, may be shaped and constrained by different forces: our physiology and physical experience with the world, and our culture. Our physiology may determine, for example, that the future may be ahead or behind, but not above or below. Culture may channel language users to use metaphors of one sort or the other. In cultures where anger is not expressed but rather kept under control, as in Japanese culture, the conceptual metaphor of anger as a boiling fluid in a container is inappropriate. The expression of anger in such cultures would be based on a different mental image or bodily experience, such as an inner worm, *mushi*, that arouses certain feelings and sensations.

In a similar vein, metaphors may also be shaped and constrained by the nature of the form that expresses them. Iconic forms are more constrained because of the requirement for multiple mappings to be structurally parallel. Therefore some conceptual metaphors that are very common in spoken languages are hard to come upon in sign languages. Grammatical and lexical devices that are built on these conceptual metaphors will take a different shape in sign languages. Change-of-state expressions in ISL, as we saw, do not lean on spatial scaffolds but rather on a temporal template. Other relations should also be examined in that light. Causal relations are often expressed by spatial means in spoken languages. Sign languages may offer other ways of expressing causality that are harder to find when looking only at spoken languages, because they cannot use spatial adpositions for such functions. To conclude this article with a metaphor, constraining factors in language may be like impediments to the flow of a river. They force the river to take an alternative route. As new meanders are formed, additional structures and landscapes are exposed, expanding our understanding of the capabilities and potentials of human language.

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