

Deaf around the World

The Impact of Language

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OXFORD

UNIVERSITY PRESS

2011

CHAPTER 7

Sign Language Humor, Human Singularities, and the Origins of Language

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INTRODUCTION

Analysis of creatively artistic sign language shows exploitation of several human singularities—that is, properties uniquely characteristic of humans as opposed to other animals and to machines. These singularities are inextricably embedded in the very nature of sign language. This finding is consistent with the claim that sign language arose at the same time as (or after) these other human singularities, but not before, and, inasmuch as that claim is correct, supports the hypothesis that sign language preceded spoken language in human evolution. In this chapter we give a quick history of the existing literature on the question of whether sign language preceded spoken language and then turn to a discussion of conceptual integration networks.

We then explain sign languages' extensive use of productive (as opposed to frozen or established) signs, which in turn depends on conceptual integration networks that coincide with other human singularities.

HISTORY OF THE LANGUAGE-ORIGIN QUESTION

Many have proposed that the first human languages were sign languages (see, for example, critique of older works in Hewes 1977, as well as Deacon 1997; Donald 1998; Rizzolatti and Arbib 1998; Gentilucci et al. 2001; Corballis 2002, 2004; Gentilucci 2003; Rizzolatti and Craighero 2004; Armstrong and Wilcox 2007; Fox 2007; Armstrong 2008). Kendon (2002) gives a critical overview of this theory throughout Western history, detailing the reasoning by which various people have come to the same conclusion, much of it having to do with the proponents' understanding of the communicative function of gestures.

Indeed, literature from a variety of disciplines that study language evolution suggests that, despite controversy on multiple issues, a considerable number of scholars today consider the default position to be a continuity of language development from gestural origins to the addition of (not supplantation by) speech over a period of hundreds of thousands of years (see several of the papers in Givón and Malle 2002; Christiansen and Kirby 2003; Pinker 1998). Johansson (2005) presents evidence of evolutionary pressure toward language more than half a billion years ago.

Many other scholars, however, argue against the gradual development from gesture to (the addition of) speech (Bickerton 2003, 2005; MacNeilage and Davis 2005a, 2005b; Emmorey 2005; Seyfarth 2005; and, for an overview, Fitch 2005). Further, many of these scholars, as well as others, espouse the alternative view that the language faculty developed recently and suddenly, which is the topic of this chapter—and they take speech to be the first language (see Hauser, Chomsky, and Fitch 2002; Fitch, Hauser, and Chomsky 2005).

We are unconvinced by either side.

Many of the arguments frequently given for the claim that sign language preceded spoken language are consistent with signs developing before spoken words, but that's all. They are far from conclusive, and they seem to us to involve a certain misunderstanding of the nature of sign languages as languages as opposed to specific individual signs that are created by manual and facial gesture. Certain motor elements in sign languages that correspond to other gestures made by natural human movements—grasping, pushing, swiping, and so on—have become conventionalized in sign languages, but that alone is not evidence that their conventionalized language form came before speech. That is, gesture alone is not language because language involves an entire system. While many websites and some popular books claim that babies learn individual signs before individual spoken words, they learn the languages (that is, the grammatical systems) at the same speed (Newport and Meier 1985). Likewise, there were signs in Britain, for example, long before there was British Sign Language (BSL) simply because Deaf people signed, but it wasn't a fully formed sign language like the one that we know now. The gestural element that matches these compressed images now shows up in sign languages as an essential component, but that does not tell us that signed languages preceded spoken ones. If it tells us that individual gestures/signs preceded individual vocalizations/spoken words, then all well and good, but for the next step we require evidence that these gestures/signs were part of sign languages (full-fledged languages) that preceded spoken ones (full-fledged languages). It's a long hop from a gesture and a vocalization to a sign language and a spoken language.

Rather, from the linguist's point of view, what we call language emerged when it emerged—that is, the language faculty in the brain evolved at some point—and whether the modality was spoken or signed is largely irrelevant. Indeed, the information that biologists present on the evolution of a so-called

language gene makes no distinction between sign language and spoken language. In particular, information on the FOXP2 variant (which may have occurred more than four hundred thousand years ago in the hominoid ancestor for both Neanderthal and modern humans—see Krause et al. 2007) suggests nothing about which modality of language arose first (although it involves our ability to make speech sounds—but certainly our hands, which were busy picking fleas off our bodies, were capable of precise sign articulations long before this).

Second, an increase in human brain size occurred about one hundred thousand years ago that may well have allowed the development of language—equally either signed or spoken language (Striedter 2005). Larger brain size allowed changes in the linkage of both vocal production and visual areas to motor areas (Holloway 1995)—hence paving the way for both language modalities. Additionally, probably ninety thousand years ago or less, there was a saltation (a discrete genetic change) associated with cerebral lateralization—and this jump in genetics paved the way for the evolution of language (Crow 1998); crucially, again, this abrupt development is in no way associated with a particular language modality.

However, the crucial nature of each of these points concerning the emergence of language is disputed. Language might well have existed before the occurrence of the FOXP2 variant, depending upon one's definition of that faculty. By comparing the anatomies of living species rather than sticking solely to fossil data, one notes that the larynx descended long ago, probably at the beginning of hominoid evolution, and allowed for phonation (Fitch 2000; Nishimura et al. 2003). Further, some argue that brain linkage is not overly dependent on brain size and may have occurred at least two hundred thousand years ago (Calvin and Bickerton 2000). Finally, cerebral lateralization is found in some nonhuman primates, which certainly casts doubt on the idea that the need for language is the evolutionary impetus for lateralization (Hopkins and Vauclair forthcoming).

A cascade of biological effects led to language, but in what order they came and over how much time they occurred are open questions whose answers keep shifting as the new fossil evidence pours in and as comparative anatomical studies among living creatures are carried out. Language evolution is a field that changes not decade by decade but month by month.

However, recent findings in semantic phonology may allow us to approach the issue of language origins in a new way, and that is what we focus on here. Armstrong (2008) summarizes some of the more recent work in semantic phonology (which started with Armstrong, Stokoe, and Wilcox 1995; Stokoe 2001; Wilcox 2001) to explain how gesture can be employed to create minigrammatical units that can compose larger language utterances. Semantic phonology has its foundations in the cognitive approach to conceptual integration theory.

CONCEPTUAL INTEGRATION THEORY

Many cognitive abilities appear to be distinctively human, leading to singularly human activities such as art, music, dance, mathematics, and language. Among these is the ability to express metaphor, metonymy, analogy, category extensions, framing, counterfactuals, and grammatical constructions, all of which are exemplified in the next section. Conceptual integration theory (CIT) proposes that these human singularities are the product of conceptual integration networks that operate dynamically (e.g., Fauconnier and Turner 2002; Fauconnier 2005; Fauconnier and Turner 2008a, 2008b). "The gist of the operation is that two or more mental spaces can be partially matched and their structure can be partially projected to a new, blended space that develops emergent structure" (Fauconnier and Turner 2008a, 133).

The interesting hypothesis for us now is that the human singularities listed earlier (or, at least art, music, dance, and language) all arose at pretty much the same point in human evolution, a moment that has been dubbed the "great leap forward" (Diamond 2006, among many). As expected, the very existence of such a leap is controversial. Some say there is evidence that all sorts of human singularities, including the use of bone tools and aquatic resources, more specialized hunting, and (importantly for us), art and decoration are found in scattered sites separated by great distances and long periods of time (McBrearty and Brooks 2000; Mellars et al. 2007). Thus, they argue that these singularities developed gradually over tens of thousands of years. For the purposes of this chapter, we set aside the controversy and instead work with the great-leap-forward hypothesis to see what conclusions it leads us to with respect to the evolution of language.

According to Fauconnier and Turner (2008a), no one has so far been able to account for the fact (in their view) that the emergence of language was contemporaneous with these particular human singularities, which, they argue, call for conceptual integration networks. For example, a drawing of a person hunting an animal relies on multiple correspondences: between the drawing of a person and a person in the real world, between the drawing of an animal and an animal in the real world, and also between the spatial relationship between the drawing of the person and the drawing of the animal and the spatial relationship of a person and an animal in the real world. All of those correspondences then enter into a metaphor that allows us to understand the drawing as representing that a person is hunting an animal. A general schema for conceptual integration networks of this type is given in figure 7.1. (Schemas like that in figure 7.1 are introduced in Fauconnier and Turner 1998.)

In the example we have just given of the drawing of a hunt, generic space would include mappings between certain beings and others and between certain traits and others. In generic space we have all the information common to the input. We have people and animals; we have bushes and meadows; and

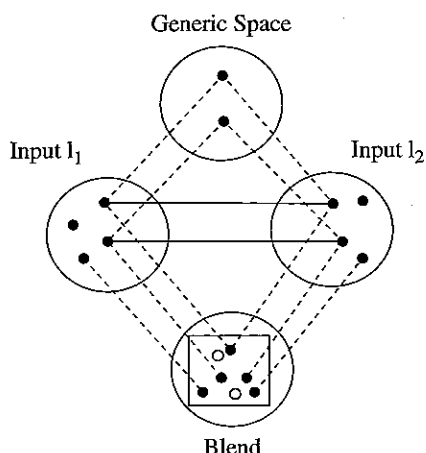


Figure 7.1. Conceptual Integration Networks

we have tools for hunting. But we do not have specific information about specific events. Input 1₁ (location 1) would be human space, with a person hunting, hiding behind bushes, holding tools at the ready. Input 1₂ (location 2) would be animal space, with the animals grazing in a meadow flanked by bushes. Blended space would be the drawing itself, in which the inputs come together to allow us to see that the drawing represents what happened in that meadow. Given that these other human singularities call for conceptual integration networks and that language emerged at the same time, Fauconnier and Turner conclude that language itself is the product of the evolution of conceptual integration networks.

Their argument is missing something crucial. Just because X happened contemporaneously with Y and because Z was crucial to X does not mean that we can conclude from that alone that Z is crucial to Y. More concretely phrased, just because the emergence of human singularities happened (as they claim) contemporaneously with the emergence of language and because conceptual integration networks were crucial to the emergence of human singularities, we cannot conclude from that alone that conceptual integration networks are crucial to the emergence of language. Language certainly calls for abstract correspondences between the phonetic shape of words and their meaning. Indeed, some scholars (looking pretty much exclusively at spoken language) have treated this kind of correspondence as the bare bones that the flesh of language is shaped upon. However, the bare bones alone cannot be taken as evidence of conceptual integration networks. Crucially, animals also express this kind of bare bones communication; animal growls, ear swivels, tail waggings, and many other things can carry meaning. While lexical items with very specific meaning (English *assassinate* or French *tour jeté* [turn while leaping], for example) seem to be limited to human language, low-information lexical

items (*kill* or *run*, for example, which are highly polysemous and appropriate for a wide range of contexts) might well be part of animal communication, although, certainly, motivation in the immediate environment is essential to animal communication (Goodall 1986; Gallistel 1990), whereas it is not to human language (Chomsky 2008). What (perhaps most of all?) distinguishes human language from animal communication is the presence of syntax. Moreover, it isn't obvious that syntax need have any relationship to conceptual integration networks at all. In particular, syntax need not depend upon tropes such as metaphor or analogy; for example, even though word order often matches the order in which events happened, it need not.

However, another and at least equally important distinction between human language and animal communication is the ability to symbolize in such a way that we can evoke cognitive images and shape our understanding of reality (Chomsky 2004, referencing François Jacob). In human language, symbolism consists of the abstract correspondences between the phonetic shape of an utterance and its meaning. We needn't enter here into the question of the arbitrariness of the sound-meaning relationship, so we address only the fact that the correspondences between sounds and meanings are themselves abstractions. The question we pose is, to make those correspondences, must we appeal to metaphors and analogies?

Some have argued that metaphor is as intrinsic to language as it is to thought and that certain concepts neurally bind together (proponents point to brain-imaging technology for support; see "The Neural Theory of Language and Thought" n.d.), making metaphor a biological fact; accordingly, a language without primary metaphors is inconceivable (Lakoff and Johnson 1999; Feldman 2006). Primary metaphors are those that stem from common, shared perceptions. For example, since we visually perceive the direction "up" as connected to augmentation when we add books to a stack or liquid to a bottle, we universally (or so the claim goes) form metaphors using the direction "up" when augmentation is involved (e.g., "Prices went up").

There are problems with this approach, however. Who is to determine which metaphors are primary? Furthermore, given that there are perhaps as many as seven thousand spoken languages in the world (and who knows how many sign languages), who can verify that primary metaphors occur in all of them? However, mostly we question the reasoning behind Lakoff and Johnson's (1999) conclusion. The state of brain-imaging technology is not yet so sophisticated that it can track cognitive activity with great specificity. Nonetheless, even if future technology can show specific brain activity and even if that tracking proves that specific concepts are bound together, that still doesn't mean that language must realize that binding through primary metaphors. So, for example, the brain might bind augmentation to the direction "up" without language necessarily incorporating the word for "up" in expressions of augmentation.

In defense of this claim, we note that it is not uncommon for a language to bypass the potential for metaphor. In fact, spoken languages often do just that. For example, the time-space metaphor that we see in the use of "short" in sentences such as "It takes only a short time to drive from Boston to New York" is simply not used in Italian. Corresponding to English "short" we find Italian *breve* to modify time situations, *corto* to modify length situations, and *basso* to modify height situations. Italian certainly expresses other primary metaphors, but the point is that language can bypass these metaphors. Given that, a language without primary metaphors is therefore conceivable.

Let us back up a moment, though. What we just said needs to be qualified—and therein lies an important piece of information relevant to the origins of language: Spoken language can manage just fine without explicit or implicit analogy and with only primary metaphor (through a detached medium of typically arbitrary sounds) and without framing and counterfactuals and the other complexities mentioned earlier (though it will surely be impoverished without them)—but what about sign language? We argue in the following section that these other human singularities are essential to sign language. Hence, the emergence of sign language could not have preceded the emergence of these other human singularities; sign language must have emerged either contemporaneously with or after them.

We discuss the conclusions that follow from this observation after we have established its truth.

SIGN LANGUAGE CREATIVITY AND HUMAN SINGULARITIES

Within Deaf humor Sutton-Spence and Napoli (2009) comment extensively on a subset of sign language humor—that is, humor that plays with the linguistic structures of the language. This creativity is highly prized in the Deaf community. A prime example is a story in British Sign Language performed by Richard Carter. Here is a précis of the initial part of that story:

It's Christmas Eve. A little girl picks up a snow globe. She shakes it and suddenly gets sucked inside—into the snow globe world. She walks through this new, snowy world and finds a house. She wipes off the window pane so she can peer inside. Father Christmas is sitting there, reading the newspaper. Time is passing—it's nearly midnight on December 24. Outside, his long-suffering reindeer is waiting, pawing the ground. The little girl hides and watches. Finally, the reindeer taps on the window, and, once he has gotten Father Christmas's attention, he signs, YOU LOOK-AT-THE-TIME! LATE COME-ON! READY WORK GET-UP. READY CHRISTMAS. WILL LATE COME-ON!" Father Christmas jumps to it and puts on his hearing aid, pockets his mobile communicator, and jumps into

his sleigh. He picks up the reins and is ready to go. The exasperated reindeer reminds him to use his magic powder. Father Christmas sprinkles some over the reindeer, whose nose starts to glow. Off goes the sleigh, flying through the sky on its way to deliver presents.

As it turns out, this simple opening of the story uses all of the human singularities related to the cognitive ability of language listed earlier: metaphor, metonymy, analogy, category extensions, framing, counterfactuals, and grammatical constructions. Let us consider each of these in reverse order.

The story is told in BSL, so, naturally, it uses grammatical constructions—that is, the language itself has a grammar.

As for counterfactuals, one normally uses that term to refer to sentences such as “If Newton hadn’t proposed gravity, a contemporary surely would have” or “If pigs had wings, they’d surely be able to at least hop high.” In general, a counterfactual is a statement about what would have happened if a condition had been met but, in fact, wasn’t. Now consider this story: We are moving from the real world of the little girl to the world inside the snow globe, so the whole story is built on hypotheticals. In fact, since one cannot actually go inside a snow globe, the entire story is about what would happen if one could do something that one cannot do—the story itself is a giant counterfactual situation. In this sense all fiction is one giant counterfactual.

The framing in the story is clear: the familiar Christmas characters who have a familiar job to do. The meaning of a word or phrase and, in this case, a whole story is understood in relation to that frame—that is, in relation to what language users know about the context. Audiences for this story know that Father Christmas should be busy on December 24. They also know that he keeps magical reindeer that fly. We are told that the man inside the house is Father Christmas, so we understand that the reindeer outside belongs to him. When Richard Carter first mentions a reindeer, the frames for the sign REINDEER in this context are activated. When Father Christmas picks up the reins, we know they are the reins of the reindeer that will pull a sleigh through the sky. Much of the humor in this story comes from the audience members’ ability to frame the meaning of the signs they see in relation to what they know. Audiences know that deaf people use sign language, wear hearing aids, and carry their mobile communicators when they go out. They thus understand that Father Christmas is Deaf (and so, probably, is the reindeer). Highly underspecified signs, such as that for picking up the reins (simply showing that Father Christmas holds something long and flat in both hands), are given full meaning through the framing, as audiences know that where Father Christmas and a reindeer are on December 24, there will also be a sleigh.

To see how the other human singularities are involved, we need only consider the fact that Father Christmas’s reindeer can sign. Thus, we have extended the category of signers to include not just humans but reindeer as

well. Anthropomorphization of this type is an important part of humor in both spoken and signed languages (for examples, see, among many others, Bouvet 1997 on French Sign Language; Ogawa 1999 on Japanese Sign Language; Russo 2000 and Pietrandrea 2002 on Italian Sign Language; and Emmorey 2002 on general issues in sign metaphor using American Sign Language [ASL]). Importantly, we usually find in these signed jokes and stories that nonhumans (as well as inanimate objects, such as the wings of a biplane in Bouchauveau 1994) typically sign rather than speak.

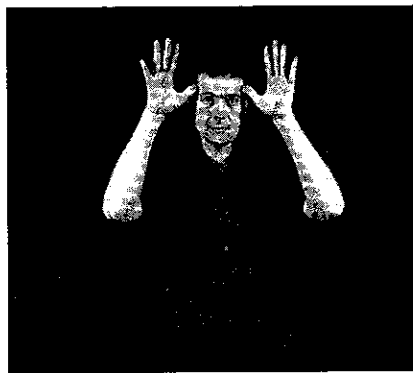
At this point a bit more information about the BSL story helps us to gain a deeper appreciation of both the creativity and the humor of the story. How on earth can a reindeer sign? After all, a reindeer has no hands, a primary articulator in signs.

Carter selects the reindeer's antlers and highlights the common understanding that they are similar in outline to hands and, thus, we are led to understand that they have a very similar shape but are intended for a very different function rather than the reality that they have neither the same biological origin nor function. Antlers are signed in BSL (as in ASL) with both hands in the 5 handshape on either side of the top of the head, giving a close visual representation of their form and location.

Richard Carter extrapolates from the homomorphism between hands and antlers, asking us to accept the less obvious but logical possibility (within this hypothetical world) that the reindeer can use his antlers to sign—and does. Carter reanalyzes the sign REINDEER so that the handshapes representing the antlers are shown to be the hands themselves, while the fingers, instead of linguistically representing bifurcating antlers, become fingers, which are then recruited to sign just as human fingers would. What could be a better example of analogy at work?



5-handshape



BSL sign REINDEER

Figure 7.2. Forms seen in Carter's poem

Carter pushes the conceit to its limit. He signs the reindeer's sentences with a consistent change in location, as all of the signs are made from the top of the head (Figure 7.3). This is, of course, because that's where the reindeer's antlers are. So Carter keeps reminding us that the reindeer is a reindeer, not a person, even as he anthropomorphizes it. The antlers are antlers, and the idea that they are hands is a particularly humorous metaphor.

The members of the audience are invited to look beyond the apparent interpretations to see the intended meaning. They can resolve the incongruity of flexible, moving antlers by reinterpreting them as hands. Here Carter is taking us into a compression (hands are like antlers in shape > hands can move > antlers can move > in particular, hands can sign > in particular, antlers can sign > hands are not anchored at the head > signs anchored at the head must be minimally modified to enable the audience to interpret them) and then back out of it. This is a remarkable example of conceptual integration networks and a lovely pushing of the counterfactual context: Reindeers don't sign, but if they did, all of these other things could follow.

The only human singularity on the list that we have not yet touched upon is metonymy. To see that, one needs to understand a linguistic characteristic of sign language: the use of classifiers. The concept of classifier handshape use in sign languages is perhaps most quickly illustrated by an example. Let's assume that we are talking about a cat. Once we've introduced the cat into the conversation and wish to give more information about its actions, experiences, or appearance, we don't move the sign CAT around in space to show what it did, nor do we alter it to show what was done to the animal. Instead, we have a range of particular handshapes to use for representing the cat as it moves through space or is acted upon by others. All the different handshapes to represent the animal and its movement are frequently termed classifiers in the discussion of sign language. Some handshapes represent the whole body of the cat, either moving or stationary. Other handshapes employ the mechanism of metonymy, indicating only a part of the body, such as the paws, the ears, or the tail, to represent the whole (Wilcox 2000).



Figure 7.3. Second part of the sign CHRISTMAS articulated at the head, rather than waist height

Richard Carter represents the reindeer at more than one point with both hands in the 5 handshape, making a walking movement at waist level to represent the hooves; the animal is reduced to hooves that paw at the ground. However, the metonymy, although it is a reduction lexically, is just the opposite visually. Focusing on the hooves allows a close-up shot like a viewfinder on a camera or a telescopic lens. It makes us empathize with the reindeer's determination to get Father Christmas into the sleigh. Carter, true to fine storytelling technique, underscores this with facial expression and body movement as part of his characterization of the reindeer.

We could have picked from dozens of other jokes and humorous stories to demonstrate that sign humor revels in these human singularities. The point, however, is not that sign humor is so very creative but, rather, that all of the things Carter does in this story and all of the sign language devices we find in other jokes and stories are typical in ordinary, daily sign language use. Examples may be seen in almost any utterance of a fluent signer.

The very lexicon of sign languages draws on metaphor, metonymy, and analogy (Russo 2000; Wilcox 2000). This, however, is not proof that sign languages must draw on these human singularities. One could definitely make up a sign language whose lexicon did not draw on metaphor, metonymy, or analogy. Indeed, even in sign languages that use analogy freely, this particular figure of speech can go only so far. Many objects are not even remotely homomorphous to (parts of) the human body, and even those that are hit brick walls quickly. For example, the V handshape is analogous to two legs, and that analogy is exploited in the sign *STAND* (common to many sign languages).

We can play with the V handshape and easily make other signs, such as *JUMP* and *KNEEL*, in which the movement of these two fingers mimics the



V-handshape



the sign *STAND*

Figure 7.4. An example of metonymy in sign language

movement of the legs. However, we can't do anything with this handshape alone (that is, unaided by additional signs or classifiers) to make the sign for the ballet movement *plié*, in which the knees bend and straighten again while the feet turn out, because the joints of the fingers do not allow that kind of movement. This argument can be further strengthened by cases in which the joints of the fingers *do* allow a certain kind of movement, but that movement is still not exploited by some sign languages to express the meaning associated with the *plié*, yet it is so exploited by other sign languages. In the case of running, the fingers of the V handshape could theoretically be made to resemble a pair of legs running, yet in ASL it is rare to see the V handshape used to express the concept of running. Rather, other classifiers must be used. In BSL, however, this V handshape may indeed be used to express the concept of running, especially if the running is not in a straight line—for example, upstairs or downstairs or around a football field. The fact that different languages elect to use certain visually motivated metaphorical signs, while some do not, demonstrates that there is no requirement to do so.

It's not surprising that mature sign languages frequently have many (indeed, probably a majority of) signs in their vocabulary for which the (phonetic) form of a sign is at least partially arbitrarily related to its meaning. That is, the motivation for a particular location, handshape, movement, orientation, or other aspect of the phonetic shape of a given sign is not obvious to a non-signer (or even to fluent signers in many instances) without explanation. Indeed, were that not so, people who didn't know a given sign language would easily be able to guess what signers were conversing about most of the time, which they cannot. Furthermore, if that were not so, all sign languages would have pretty much the same lexicon or at least mutually comprehensible lexicons, which they do not. However, the considerably increased visual motivation of signs means that signers with a clear understanding of sign formation processes and the motivational (frequently metaphorical) processes driving them are frequently more able than nonsigners to discern the meaning of vocabulary in sign languages with which they are unfamiliar. This is further evidence to support the view that the production and understanding of sign languages requires the use of conceptual integration networks that coincide with other human singularities. When signers can apply their knowledge of metaphor, metonymy, analogy, category extensions, and so on, they are able to interpret the meaning of signs (see Pizzuto and Volterra 2000).

Nonetheless, this discussion holds only for those signs that one might find listed in a dictionary—what have been called *frozen* or *established* signs. Sign languages, however, also have productive signs not found in any dictionary (McDonald 1985; Brennan 1990; Taub 2001; Russo 2004; and others, building on the distinction in Klima and Bellugi 1979 between linguistically conventionalized and visually transparent parameters for signs). Frozen signs form the established vocabulary of any sign language and identify

senses in general categories such as objects, actions, and states of being (DOG, RUN, HOT). However, they give no further indication of the specific type of dog, the way in which the running was done, or what or who is hot. Frozen signs can also convey referents (that is, which dog we are talking about or which particular event of running we want to indicate), and, again, alone they identify a referent that has no more information than the bare sense of the sign. Often frozen signs are combined with something else to add more information about the referent. For example, we might add a pointing sign to a frozen nominal to indicate the particular referent that has the sense contained in that lexical item.

Productive signs, however, do not convey a general sense and instead rely upon strong visual images behind the sign formation to indicate the specific referent under discussion. Signers will show perhaps what the dog in question looked like and how it behaved. They may show how it moved and where it went. In order to express an idea of running in this context, we may see the path taken by the dog or the manner and the duration of the running. To understand the way that the referent might be described as being hot, we could see a visual representation reflecting the dog's experience of heat or its appearance when hot.

Frozen signs, accordingly, are appropriately used in a wide range of contexts because the information they convey is so general. However, individual productive signs are appropriate in many fewer contexts because they carry a great deal of information specific to an event. Typically, a signer will articulate a frozen sign to let us know what sort of object, action, or state we're talking about and then follow it with a productive sign that might be a classifier predicate, showing the particular referent (of the type indicated by the frozen sign) performing a particular act (of the type indicated by the frozen sign). When signing about a dog, for example, the handshapes may be selected to represent the whole dog or some part of it (paws, tail, or ears), so the handshape parameter becomes a morpheme, and the hands will move to represent the manner and direction of running. Thus, movement becomes meaningful. The sign may also be combined with facial expression to show how hot the dog was at the end of the run, so facial expression also becomes meaningful by expressing information via the eyes, mouth, and head movement, which might be seen as prosodic markers or suprasegmentals, akin to intonation in spoken language (Sandler and Lillo-Martin 2006). And the sign that carried all of this meaning is not to be found in any dictionary.

Productive signs are founded on metaphor, metonymy, analogy, and categorical extensions. Signers analogize the space in front of them (where they locate the hand movements) to the space that the dog actually ran in (which might be in another city). The movement of the hands along the path are a metaphor for the dog's movement along the ground (or wherever else it ran). The hands themselves, depending on the shape they assume, can show

metonymy for the dog. Wagging the hand or finger can, by extension, represent the wagging of the dog's tail. And this happens over and over and over again. In an ASL poem titled " $e=mc^2$," by the duo known as The Flying Words Project (Cook and Lerner 2004), the sign SNOW has a gentle, slow, primary movement of parallel hands downward in neutral space, with a secondary trill of the fingers. However, as the snow gets heavier, the movement changes: The hands push downward, showing the weight of the snow. While this duo creates art, any signer could make similar changes of the movement parameter of SNOW to show light, drifty snow or heavy, driving snow or a wild blizzard. Sign poets, comedians, and storytellers make use of devices that are already employed in everyday language.

There are many sign languages in the world; no one knows how many, though, since countries often do not include them in their census data, but surely where there are communities that have a use for signs, there are sign languages. Most of these languages have not yet been studied by linguists, but all of those on which we have any information have both frozen and productive signs. We find it impossible to imagine a sign language that does not make use of productive signs, although they may use them to different degrees. Meir et al. (2007) claim that Al-Sayyid Bedouin Sign Language (ABSL) does not exhibit some types of verb agreement that appear in many sign languages, types that might be instances of productive signs. However, other kinds of productive signs do appear in ABSL. If their findings are correct, it would be further evidence that sign languages vary in the extent to which they use productive signs. A sign language that did not make use of productive signs would be failing to exploit the very fact that sign languages are visual—and that would be absurd. Many of the items of frozen, established vocabulary in any signed lexicon probably started life as productive signs (see, for example, Johnston and Schembri 2007), so they, too, draw on this motivational source. Mature sign languages, therefore, cannot exist without metaphors, category extensions, and analogy via mimicking—the heart of productive signs. Several writers (including Bienvenu 1994 and Rutherford 1993) have observed that, in particular, humor through a mimicking use of facial expression develops early, as Deaf children learn to become expert observers of their visual world. Rutherford (1993, 108) explains that imitations "are a traditional pastime of children at the residential school and can also be seen at Deaf adult gatherings where skits or other entertainment are being performed." Imitation results from careful studying of the people around one (in Rutherford's example, the children are bored in class and have nothing better to do), and it is useful to the child to be good at it and have that skill be acknowledged and appreciated by others.

Sign languages are built on conceptual integration networks. Every time one uses a classifier handshape, one is making an analogy. Every time a classifier predicate moves through space, one is relying on overarching

principles to draw comparisons between unlike objects doing unlike activities. Blended mental spaces are part of almost every sentence, as Liddell (2003) shows, since partial matchings must constantly be made. Compression is the rule in sign language.

To present a simple example, we offer the following joke, which holds in any sign language so far as we know. To appreciate it, the audience needs to understand that most signs are made with a movement of a certain size and that if the movement path of the signs is larger or smaller than expected, there is a change in the intention behind the signing. Here's the joke:

A Deaf couple have an argument. The woman gets heated and begins moving her hands in a larger path than normal. The husband then signs, "NOT NEED YELL. I DEAF NOT BLIND."

Clearly, the husband has made a cognitively sophisticated compression. By saying that articulating a larger movement path is tantamount to yelling, he's drawing a comparison between signing and speaking, in which signing with a large movement is equivalent to speaking loudly, an equivalence that is based on a comparison between the size of a space and the intensity of a sound, which, in turn, depends on a comparison between seeing and hearing. In just two sentences, he's brought us from the production of language in two different modalities to the reception of language in two different modalities, with all of the relevant correspondences between them supporting the punch line. The important thing for us is that the joke here is not based on this sophisticated compression—but on the punch line. Indeed, in ordinary conversation, if one signs with an unusually large movement path, one might be doing the equivalent of shouting (and signing with an unusually small movement path might be equivalent to whispering). So the husband here has used a compression that is typical of daily language.

Clearly, sign language depends upon blending and compression.

CONCLUSION

Almost any sign utterance demonstrates blending of the type discussed in works on conceptual integration theory. New linguistic forms are constantly created by conceptual blends that exploit an existing grammatical apparatus as they compress and make analogies, metaphors, and category extensions, often between things as disparate as human beings and the wings of a biplane. In conceptual integration networks, sign language is a playground for mental spaces and their relationships.

Crucially, it is hard to imagine a time when sign language couldn't do such a thing. Indeed, what would sign consist of otherwise? Signs, by calling for the cooperation of so many body parts in the act of communication, beg for the

signer to blend the various human singularities. It would be nonsensical to sign without them. And that means that all sign languages must be able to avail themselves of them. This means that sign language simply could not have developed in the absence of conceptual integration networks.

As we noted earlier, the particular human singularities of language (the ability to compress and to make analogies, metaphors, and categorical extensions) have all been claimed to have arisen at the same time in human evolution (Fauconnier and Turner 2008a). Thus far an account of the hypothesized coincidence is elusive. We have one giant convergence that just happened—who knows why? Since spoken languages need not avail themselves of these other human singularities (with the possible exception of primary metaphors), the emergence of spoken language could logically have preceded, coincided with, or followed the emergence of any of them.

Sign languages, however, are quite different in this regard. Sign language necessarily holds hands with these other human singularities. That means that the emergence of sign languages could logically have coincided with or followed the emergence of these other human singularities, but could not have preceded them. This point is by no means a knock-down argument that the first languages were signed. Instead, it indicates only that the hypothesized coincidence of the emergence of language with these other human singularities is somewhat less of a mystery if the first languages were signed than if they were spoken.

Note

We thank Richard Carter for his kind permission to use his story of the Snow Globe, Jami Fisher for being our ASL model, and Tim Northam for being our BSL model. We thank Gaurav Mathur for comments on an earlier draft. We also thank Maggie Tallerman for discussing with (one of) us some of the controversies about language evolution.

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