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Through the signed language glass: Changing and converging views in spoken and signed language research

1 Introduction

Looking back over our own several decades of working in the field of signed language research, we've observed that increasingly many signed and spoken language researchers are expressing similar views on several topics, a moving together which has influences on evolving underlying linguistic theories.¹ We began thinking more generally about past and current signed and spoken language research after reading Guy Deutscher's (2010) book that intrigued us both: *Through the Language Glass: Why the World Looks Different in Other Languages*. As an historical linguist, Deutscher takes the reader through centuries of raging academic wars in which different theories for observed phenomena are proposed, dominate for a while, followed by changed or expanded theories.

Deutscher's historical review of changing assumptions about spoken languages motivated us to look at evolving views of language also 'through the signed language glass'. Many of the views we will be looking at are, of course, not all that recent. Liddell, for example, wrote several years ago that

... it is much more likely that spoken and signed languages both make use of multiple types of semiotic elements in the language signal, but that our understanding of what constitutes language has been much too narrow. (Liddell 2003: 362)

Several researchers have already pointed out that most of the first, and many of the still current, descriptive models of signed languages have been based on assumptions derived from models of spoken languages. Individual characteristics which never quite fit into early models were typically discussed in terms of oddities stem-

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Penny Boyes Braem, Forschungszentrum für Gebärdensprache (Center for Sign Language Research) FZG, Switzerland, e-mail: boyesbraem@gmail.com

Virginia Volterra, Istituto di Scienze e Tecnologie della Cognizione (Institute of Cognitive Sciences and Technologies) CNR, Italy, e-mail: virgi.volterra@gmail.com

ming from signed languages' use of a modality of production and perception that is different from that of spoken languages. What we have found additionally interesting, however, is that in recent years some linguists have begun discussing characteristics of language as it is spoken (versus as it is written) in a way very similar to how signed language researchers have for years described the elements which they viewed as being uniquely relevant to visual-gestural languages. This has included, for example, considering to be linguistically important the factor of iconicity and the arbitrariness of gradient categories (e.g., Dingemanse et al. 2015; Clark 2016, 2019) as well as discrete linguistic categories (e.g., Langacker 2008; Albano Leoni 2009, 2022; Wilcox and Occhino 2017). These more recent views also bring into question the traditional dichotomy between elements that have been considered to be "linguistic" and those that had often been seen as "paralinguistic" or "non-linguistic".

Some researchers from both within the field of signed language research and beyond have already called for new models and paradigms to better accommodate these more recent views, as Cienki (2017) comments:

Whereas we started with a model of language that, in the traditional view, had a clear boundary, we might sketch an alternative model in which the spoken words and grammar, the intonation patterns, the non-lexical sounds, and the gestures each are categories with fuzzy boundaries that overlap in dynamic ways. (Cienki 2017: 175)

What we also find interesting is the fact that rarely have researchers from other disciplines mentioned the work contemporaneously being done in signed language research as being relevant to their areas. An exception has been Dan Slobin, a psycholinguist specializing in acquisition and cross-linguistic research, who has explicitly pointed out that moving towards a new understanding of language has been pushed by signed language research:

Sign language linguists have begun to create tools with which to arrive at a deeper and more comprehensive understanding of human language, human cognition, and human social interaction. Indeed, old paradigms are fading, and revolutionary new ideas are growing up across disciplines, languages, and countries. The habitual molds are being broken and new molds are beginning to be formed. (Slobin 2008: 129)

To review all the evolving theories is beyond the scope of this contribution. Our aim here is simply to focus a light on three areas, which seem to be especially relevant in this pushing towards new models and paradigms by linguistic researchers, not only of signed and spoken language, but also researchers of gesture and symbolic development. These are:

1. The view of language as a form of action
2. The attention to multimodal behaviors
3. The recognition of the role played by iconicity at all levels of language and in major linguistic activities

While we will discuss these areas and related issues separately, we fully recognize that they are, of course, deeply interrelated. Although it clearly would be impossible to review *all* the literature that addresses these points, we will try to give relevant examples of these ideas for each area.

2 Areas of evolving theory

2.1 Area 1: The origin of language acquisition in action

At the beginning of research on signed languages in the 1960s and 1970s, we, like many other early signed language researchers, tried to show in our early descriptions of the signed languages we were documenting that the linguistic sign was something far from a simple motor action or gesture.

However, in that same period, our research on language acquisition of hearing children was taking us in a completely different direction.² We were finding that all infants already in their first year of life start to perform a series of motor actions in their explorations and manipulations of objects in their world. Then, thanks to the environment around them and especially to those who interact with them, these motor actions acquire a symbolic meaning and are then progressively used as communicative gestures to represent an object or an event even outside the communicative context in which they had been originally produced. These studies on gesture used by young hearing children in different cultures (Australian, British, English Canadian, Italian, Japanese), show how gesture functions as meaningful action in relationship to speech (Pettenati et al. 2012; Marentette et al. 2016; Cattani et al. 2019). Action, gesture, and word combinations contribute to the general meaning of the first crossmodal (gestures and words) utterances at both the semantic and pragmatic levels and pave the way to multi-word sentences (e.g., Capirci et al. 1996; Capirci and Volterra 2008; Iverson et al. 2008; Sparaci and Volterra 2017; Volterra et al. 2017, 2018).

The strong relationship between action-gestures performed by infants and the first words that they comprehend and then produce has also received strong support from neuroscientists exploring the role of mirror neurons, which confirms a neural

² For a review, see Volterra et al. (2005).

substrate common to gesture and speech. Research on the early stages of child development has thus supported the hypothesis that these neural bases are part of the human genetic makeup (see Arbib 2012). Today, there is a growing recognition among researchers from several disciplines (e.g., Arbib 2020) that this “origin in action” is not something specific to signed languages, although it is more visible in this form of language.

The presence and relevance of gestures do not disappear in the spoken communications of children as they grow older and become adults. The psycholinguist David McNeill (2012) has clarified the role of gesture not only in the process of what Slobin (1987) has called “thinking for speaking”, that is in the transition from thought to linguistic units, but has also looked at the possibility of expressing more than one meaning through the simultaneous production of gesture and word. Gesture used by speakers can reinforce meaning expressed vocally, or it can express a further meaning that is not expressed in speech, or it can further specify a concept that is expressed vocally only in vague way (see also Alibali, Flevares and Goldin-Meadow 1997; Goldin-Meadow 2003).

Adam Kendon (2004) in his book *Gesture: Visible Action as Utterance* was one of the first gesture researchers to stress the continuity and similarity between co-verbal gestures and signs in signed languages, showing how both speakers and signers use semiotic strategies that involve categorical as well as gradient aspects. For some researchers in both gesture and signed language research, however, an earlier view remains that there is a “cataclysmic break” between the status of gesture and language, based in part on the assumption that gradient aspects of signs are gesture (Singleton, Goldin-Meadow and McNeill; Goldin-Meadow and Brentari 2017). Other researchers (Emmorey and Herzig 2003; Occhino and Wilcox 2017) have countered this claim by arguing that rather than a cataclysmic break, we should view language (signed or spoken) as not wholly categorical, and view gesture as not wholly gradient. Kendon (2015, 2017) has proposed a new terminology which rejects the opposition of “gesture” vs. “sign” by referring to both as “visible action as utterance”, a formulation that makes clear the relationship between action, gesture, and sign. Some spoken language linguists, for example the Italian linguist De Mauro (2008), have long taken the view that not only voice, but all our speaking, understanding, and knowing of language is rooted in all our body, a view which, although coming from a different European linguistic tradition, is very close to the “embodied language” approach taken today by cognitive linguistics.

Important for the action-gesture language continuum are the symbolic representational strategies used by children, which are grounded in basic embodied motor acts. These four basic strategies are: (a) the person’s own body enacting the action and/or the character; (b) the hand enacting how an object is held or manipulated; (c) the hands becoming/representing an object; or (d) the hands representing the size/shape of an object.

The same basic strategies have been reported in studies in several disciplines – spoken and signed language acquisition, symbolic development, and gestures as well as in descriptions of signed languages (e.g., Marentette et al. 2016; Volterra et al. 2018). Researchers in these different fields, however, have used different terminology for strategies of symbolic representation (see Table 1). These strategies will look very familiar to researchers of different signed languages who sometimes refer to them with such varying terminology.³

Table 1: Terminology that has been used in the developmental, gesture and signed language literature for the four strategies of symbolic representation reported.⁴

Strategy	Terms in studies of gestures of adults and children	Terms in studies of signed languages	Examples
A The whole body represents the action or the character	– own-body – personification – mime/ pantomime – action gesture – character viewpoint	– constructed action – role-playing – body classifier – enactment – person transfer	
B The hands assume a grasping configuration recalling the action	– hand as hand – handling – manipulation – action gesture – function gesture – character viewpoint	– constructed action – handling – classifier – manipulator – person transfer	
C The hands represent the object	– hand as object – modelling – form gesture – function gesture – observer viewpoint	– whole entity classifier – instrument classifier – polycomponential signs – substitutor – situation transfer – form transfer	
D The hands trace the shape or the size	– size and shape – drawing – delimitation – observer viewpoint	– size and shape specifier – tracing – form or shape transfer	

³ For example, the same symbolic strategies have been used to produce what has been called by American researchers “classifiers” (Frishberg 1975), “polycomponential signs” (Slobin et al. 2003), “productive signs” or “constructed actions” (Cormier, Smith, and Sevcikova-Sehyr 2016; Schembri, Jones and Burnham 2005), “depicting constructions” (Liddell 2003), by Norwegian researchers, “depicting signs” and “enactments” (Ferrara and Halvorsen 2017), by French researchers, “highly iconic structures” (Cuxac and Sallandre 2007), and by German researchers, “image-creating techniques” (Langer 2005).

⁴ Table 1 is adapted from Volterra et al. (2022).

The choice of which symbolic strategy to use is determined by different factors, for example by the nature of the referent and the context. In many signed languages, both the object ‘hammer’ and the action of ‘hammering’ involve a hand-as-manipulator strategy of grasping of the instrument and showing the action of hammering. In the sign for ‘scissors’ in many signed languages, it’s not the action but rather the V-shape of the object itself that is represented using a hand-as-object strategy. Age is another potential factor in the choice of strategy, although in spoken language acquisition, the question is still insufficiently researched of whether children use different strategies at different stages of their language acquisition (Volterra et al. 2019; Tomasuolo et al. 2020). Different preferences for strategies have been found between hearing persons’ gestures and signers’ signs. For example, Sutton-Spence and Boyes Braem (2013) found in their study comparing the data from the same task done by American hearing mimes who had no knowledge of any signed language and British deaf signing poets, that the gestures of the hearing mimes most frequently involved the “hand-as-hand” strategy and only very rarely the “hand-as-object” strategy, whereas the deaf signing poets used an abundance of both strategies. Signed languages also seem to differ in their preference for using one strategy over another (Padden et al. 2015).

The continuity and dynamic relation between action, gesture, and word/sign so evident in language acquisition by children and in adult communication is also at the core of the study of language philogeny. This deep interconnection is linked to our evolutionary history with the hypothesis of gestural origins of language gaining support thanks to several studies (among many others, Haiman 1998; Armstrong 1999; Armstrong, Stokoe, and Wilcox 1995; Armstrong and Wilcox 2007; Corballis 2003; Tetel Andresen 2014; Arbib 2020). The theory that a form of integrated speech-gesture communication preceded the dominance of both spoken languages and signed languages is further supported by the possible development from gestures not only of lexical items but also of grammatical elements of signed languages (e.g., Janzen and Shaffer 2002; Janzen, Shaffer, and Leeson 2016; Wilcox 2004a, 2007, 2009; Wilcox and Wilcox 1995; Wilcox, Rossini, and Antinoro Pizzuto 2010). As Müller (2018) points out, this historical process involves no cataclysmic break, no sudden rupture transforming gesture into sign from one moment to another.

To sum up this first area, a more integrated perspective has been emerging that views the language faculty as manifesting itself in both the visual-gestural and phonic-acoustic channels (see e.g., Perniss, Özyürek, and Morgan 2015). As has been widely supported by the gestural studies literature, the linguistic act can be achieved by gesture as well as by spoken words, which can interact in dynamic ways based on the intention of the speaker. This opens the way to linguistic or semi-otic models, which consider multimodality as one of the fundamental aspects of human languaging.

2.2 Area 2: Multimodality

As we have discussed in the previous section, hearing infants are clearly able to communicate with their environment long before they are able to use spoken language, in that they are already able to produce several gestural and vocal modes of communication, which pave the way to the emergence of spoken words and sentences. Communication, including languaging, is thus from the very beginning, multimodal. Many researchers have come to the view that what has been called “linguistic” comprehension and production in fact entails many kinds of elements (including gestures, facial expression, head and body movements, prosody, intonation, etc.). Adults as well as children can continuously communicate using channels and modes in addition to that of speech, means which have traditionally been called non-verbal communication.

Because of these developing views, the prosodic and gestural behaviors produced simultaneously with speech are now considered by many researchers to be truly linguistic phenomena and should be integral parts of the description of spoken languages. In the past, researchers and scholars from other disciplines interested in the study of human language were not able to observe and describe in detail such characteristics. Thanks to continued technological development, especially of video recordings, the prevalence of these phenomena has become clearer and fully visible. These elements in the past were relegated to a kind of limbo along with other phenomena considered “nonlinguistic”, partly because they could not always be analyzed as discrete elements, which hampered their categorization and classification.

On the signed language side, the level of basic units was considered by many very early researchers to involve mainly manual components (i.e., only the hands). Some of us when looking back at the very early days of signed language research can even remember discussing whether the head and face needed to be in the picture frame. Again, aided by evolving recording technology, the recognition grew quickly over the succeeding decades that not only must the behaviors of the hands be considered as basic linguistic components, but also different parts of the body such as the positions of the torso, shoulders, head, elements of facial expression and oral components such as mouth gestures and mouthing, as well as direction of eye gaze (e.g., Dudis 2004). The concept of multimodality and multi-channels became the topic of more research in both signed and spoken languages. Linguists interested in speech began devoting more attention to gestures and prosody (e.g., Magno Caldognetto and Poggi 1997) and linguists interested in signed language began more studies of oral elements such as mouthings (e.g., Boyes Braem and Sutton-Spence 2001).

Research on signed languages began documenting the important roles these non-manual elements play not only at the lexical level, but also at the levels of

syntax and discourse. No longer considered merely “non-manual” elements, these visible and often gradient components are now considered to be formal elements in descriptions of signed language by many researchers (e.g., Wilbur 2000; Aristodemo and Geraci 2017; Lepic and Occhino 2018; Dotter 2018; Perniss 2019; Sandler 2018).

These non-manual elements have been found to be more difficult to master. Early studies of the acquisition of non-manual morphology in American Sign Language (ASL) found that “once children are producing multi-signed utterances, we see a consistent, developmental patterns in which manual signs take developmental precedence over non-manual behavior. . . Deaf children use a linear, lexical strategy before they tackle the complex simultaneous facial morphology” (Reilly and Andersen 2002: 179). In recent Italian Sign Language (Lingua dei Segni Italiana, or LIS) studies involving sentence repetition tasks, the non-manual components were also found to be more difficult for deaf signing children to acquire and execute than were the manual components (Rinaldi et al. 2018). The inclusion of these non-manual components in this study thus put a focus on a developmental factor that had not been considered in most sentence repetition tasks with children conducted up to that time. Finally, non-manuals are not only difficult to master by children, but also by adults learning a signed language (as educators of signed language interpreters have often informally reported to us).

For both spoken as well signed languages, the problem has been how to describe and transcribe such behavior, the features of which could not easily be broken down into discrete components, were often continuous and gradient, and usually were produced simultaneously with behavior in other channels. Most of the expressive gestural aspects, along with prosodic variations, remain almost completely outside the sphere of graphic reproduction in written representations of the languages, not only due to the difficulty of their categorization and classification, but also because their simultaneous productions are complicated to capture in the linearity of most written forms (see Antinoro Pizzuto and Garcia, this volume). One of the most striking features of visual multimodal behaviors is that they can be simultaneously produced by different articulators. Slonimska and her colleagues have called this the linearization problem: “. . . an event that occurs simultaneously in the world that has to be split in language to be organized on a temporal scale” (Slonimska, Öyzürek, and Capirci 2020: 14). Not only can the facial, head, body and manual behaviors occur simultaneously, but the three-dimensional space around the signer can also simultaneously give information enriching what is being communicated.

Fortunately, in more recent years many of these problems have been mitigated by the development of new technology for tagging video media in which written annotations could be directly linked to the raw videotaped data. Software such as

the free application ELAN,⁵ developed for other kinds of research and for all computer platforms by the Max Planck Institute in Nijmegen became widely used by signed language researchers for annotating longer signed texts. However, while having the raw data always available is helpful, it does not really solve the problem of giving different glosses to the same sign by different researchers in different projects at different times. One technological attempt to overcome this problem is the iLex software developed at the University of Hamburg (Hanke and Storz 2008; Konrad 2011). The iLex tagging technology is like that of ELAN but has the additional advantage of linking the same written gloss in all corpus files to the same sign lemma in a central lexicon.

The development of media tagging technology has thus meant that large corpora of multimodal data can now be in a form that makes possible the discovery and analyses of new kinds of research questions in all kinds of contexts, signed by different types of users. One of the first, and to date the largest signed language corpora, is the long term (2009–2024) project for documenting the “everyday” lexicon of German Sign Language (Deutsche Gebärdensprache, or DGS), drawing data from a wide variety of users and contexts (Prillwitz and Zienert 1990).

For signed languages, these advances in methodologies have involved not only a growing recognition of the importance of the wide variety of communities of users but also the increased involvement of these users in the collection of data collected and the methods of analyses. Deaf signers researching their own language often begin to change their assumptions about it, often adopting some of the *academic* norms – their *metalinguistic* awareness is awakened and enlarged. In many countries (such as Italy and Switzerland), these changing assumptions about their language get transmitted to the larger community of signers. Then, the community of users themselves, with changed assumptions, can in turn begin to influence how the language they use changes (Fontana et al. 2015).

Signed languages have traditionally been “transcribed” primarily by using spoken word-labels (called glosses) as a primary representation tool (for overviews see, e.g., van der Hulst and Channon 2010; Boyes Braem 2012). Glosses using written words run into the danger, however, of misrepresenting the meaning and the structure of signed languages (see Pizzuto, Rossini, and Russo 2006). In response to signed language researchers’ need to be able to document the phonological features of these languages, several notation systems have been developed for lexical items.⁶

⁵ <http://www.lat-mpi.eu/tools/elan/>

⁶ Among the most widely-used notation systems are Stokoe notation (Stokoe 1960), the Hamburg Notation System or HamNoSys (Prillwitz and Zienert 1990), and Signfont (Newkirk 1987). The Berkeley Transcription System (Slobin et al. 2001) was developed for notating morphemes. Valerie Sutton adapted a system of choreographic notation for signs to create SignWriting in 1981. SignWriting

In early signed language linguists' attempts to show that signed languages have a grammar and syntax, comparisons were usually made not just to the models based on written forms of spoken languages, but also mostly to the models of Indo-European languages. These attempts often resulted in trying to find formal distinctions, for example, between nouns and verbs, or to identify a fixed order of elements in the sentence based on categories such as subject, object, and verb. At the same time, it often involved neglecting sign structures that were too different and not often easily analyzable with the instruments available from spoken languages, such as role-taking, productive structures involving classifier handshapes with simultaneous components, and using the space around the signer for linguistic purposes. Even the signed language research pioneer William Stokoe in his later years began trying to convince people to be careful about making too rigid classifications of signed languages, underscoring how a single sign could already represent enactment indicating the agent, the action, and the object of an event. Slobin (2006, 2013) as well as Schembri et al. (2018) have pointed out the fundamental mistake of trying to put signed languages typologically in an inappropriate class of languages. Slobin has argued that signed languages, due to their manual/visual multimodality are more like head-marking languages (like those of native Americans, parts of the Caucasus, the Far East, and Oceania) than they are like dependent-marking languages (Indo-European languages) with overt morphological marking of syntactic relations. Signed languages are more verb-framed as opposed to satellite-frame, topic prominent as opposed to subject prominent. Slobin notes that spoken languages also have access to the simultaneous channels of gesture, gaze direction, and facial expression in face-to-face communication, i.e., they are multimodal. The effect of recognizing this multimodality has added to a demand for new language models, a need which Perniss (2018) has expressed as:

The conception that 'language' is that which is linguistic, while communication is something different. . . is not given by necessity. As such, it is time to reconceptualise our object of study and to usher in a new paradigm of language theory, a paradigm that focuses on multimodal language, that aligns with the real world use of language and focuses on *doing language*. (Perniss 2018: 2, italics in original)

To conclude this discussion of multimodality, one could say that the facial, gestural, and other prosodic behaviors produced simultaneously with either speech or signing had traditionally usually been relegated to a kind of limbo with other phenomena that were considered "paralinguistic" or "nonlinguistic". They were

also uses symbols and graphic representations for representing many multi-channel (hands, face, head, trunk) behaviors, which can greatly facilitate crosslinguistic research (Petitta et al. 2013; <https://www.signwriting.org>).

not easily decomposable into discrete components, which hampered their categorization within the linguistic models being used. Multimodal elements, including gradient ones, are now considered by many researchers to be relevant linguistic phenomena.⁷ This changing view has contributed to more diverse typologies being considered in the analyses of both spoken and signed languages. This process has been greatly aided by evolving computer and media technologies in these years, particularly in the development of usage corpora for both signed and spoken languages.

2.3 Area 3: Iconicity

Although most early researchers recognized there were some aspects of signed languages that had representational, iconic aspects, these were thought not to be important for the linguistic structure of a proper language. Also in this regard, early researchers wished to demonstrate that signed languages should not be understood as mere loose gesturing and pantomime, forms of communication that were not true or full languages. To be like spoken languages, signed languages should have elements which were not only discrete and categorical, but also arbitrary, based on the tenet that arbitrariness of a small set of subcomponents makes it possible for their recombination into new elements with different meanings.

The concept of arbitrariness has often been conflated with the concept of iconicity, where the form of an element has some connection to its meaning. Many early signed language studies reinforced this bias against iconicity. Historical research comparing old French and historically-related modern ASL signs concluded that the iconic nature of lexical items became more arbitrary over time (Frishberg 1975; Woodward and Erting 1975). Regular grammatical processes that one finds in spoken languages, such as verbal and nominal inflections, were viewed as contributing to this weakening importance of iconic elements in ASL (see e.g., Bellugi and Klima 1976; Bellugi 1980). Other studies found that iconic aspects of signs played little role in the rapid processing of lists of signs or in memory (Bellugi, Klima and Siple 1975.)

In his 1960 pioneering book on ASL, *Sign Language Structure*, William Stokoe coined the term "cheremes" to refer to discrete basic units of signed languages, analogous to phonemes in spoken language phonology. However, it became more and more evident that sign cheremes can have meaning, i.e., can be polysemous in referring to more than one meaning and that combinations of cheremes from

⁷ See e.g., the overview in Müller et al. 2014.

different parameters contribute to the global meaning of the sign. For example, the fist handshape can convey the idea of strength and power, but also a specific kind of grasping or the shape of a small, solid, round object. The signer can play with the polysemous phonological units to create new signs or creatively modify existing signs for poetic purposes (e.g., Bauman 2003; Sutton-Spence 2005). Stokoe himself (1991) later proposed a “semantic phonology” in which semantic dimensions are present in the articulation. This moving away from his original view of arbitrary cheremes, however, presents a challenge to Hockett’s (1960) design feature of duality of patterning, in which arbitrariness is a necessary characteristic of the sublexical level of linguistic structure (see e.g., Armstrong 1999).

The idea of duality of patterning itself also came under criticism from spoken language linguists for several reasons. One of these reasons was that not all phonological elements even of spoken languages are easily analyzable into meaningless, discrete, separate categories. The Italian linguist Albano Leoni (2009, 2022), among others, has shown how in spoken communication, speakers do not usually perceive and produce words as discrete categories but rather as wholes or *gestalts*. Various other experiments (e.g., Albano Leoni and Maturi 1992) have shown that sound segments do not have a single identical physical realization, but one can perceive them within the context of the sentence.

Some early signed language studies approached the problem of iconicity by asking the question of “how really iconic are signs?” by looking at how much non-signers understand their meanings from just seeing their forms. Hoemann (1975) found the meanings of only 30% of 200 very common ASL signs were correctly identified by hearing non-signers. Bellugi and Klima (1976) found that hearing non-signers performed no better than chance at guessing a sign’s meaning. For LIS, Grosso (1997) also found that Italian hearing non-signers guessed correctly only approximately 22% of the signs shown them. These studies seem to verify the opinion that iconicity isn’t all that important in signs.

Several other early researchers focused more broadly on iconicity in individual signed languages, among them in ASL (e.g., Friedman 1975; Mandel 1977; DeMatteo 1977; Boyes Braem 1981), and British Sign Language (Brennan 1990). In her early study of Danish Sign Language (*dansk tegnsprog*), Engberg-Pedersen wrote that the space around the signer is “semantically loaded from the moment the signer starts signing” (Engberg-Pedersen 1993:78). A decade later, Wilcox (2004b) also began to look at iconicity within the framework of cognitive grammar, culminating in an article discussing cognitive iconicity in French, American and Italian signed languages.

In the following years, a great many more studies found that iconicity plays a role in the modulation of signs to express space, location, quantity, quality, modality, aspect, as well as agentivity. Russo (2004) suggests that iconicity, and especially

dynamic iconicity, is in part related to some structural features of signs (i.e., in coarticulation and simultaneous syntax) and factors in the dimension of variability versus standardization, as well as in relation to different discourse registers. In their overview of much of this research Meir et al. (2013) write that grammar does not necessarily suppress iconicity but also, different types of iconicity can play active roles in the structuring of grammars. Van der Hulst (2022) points out in his history of sign phonology that the various approaches he reviews “share the idea that iconicity and phonology are not incompatible, and this view is gaining more support within the field” (van der Hulst 2022: 37). These expanding views of iconicity have resulted in models such as that proposed by Cogill-Koez (2000a, 2000b) which attempts to account for both more visual and more linguistic types of representation in signed languages.

In spoken language linguistics, although Roman Jakobson wrote as early as 1966 that “the representation by likeness is superior to the use of arbitrary signs” (Jakobson 1966: 348), linguists using more current theoretical perspectives have often downplayed iconicity, usually noting that it is a phenomenon found in only a small number of lexical items. There were, however, linguists who did not take this view. Reviews of the different ways iconicity has been viewed for spoken languages (e.g., Perniss, Thompson, and Vigliocco 2010; Perniss and Vigliocco 2014; Dingemanse et al. 2015), describe the many kinds of iconicity that have been reported, especially in descriptions of non-Western European languages which were already beginning to be done in the mid-19th century.

Some spoken language researchers have been viewing iconicity and arbitrariness as co-existing in a relationship in which a similarity is created corresponding with an extralinguistic acoustic reality. Beyond the well-known examples of the different sounds that are ascribed to a given animal, such as a cow or a pig, in different languages, there are also iconic effects of the phonological properties of some verbs, including length and reduplication, which have been shown to have interpretive effects relating to verbal aspect as duration and iterativity (Haiman 1980, 2008; Dingemanse 2015; Kuhn and Aristodemou 2017). In many languages, the superlative adjective is longer than the neutral form (e.g., in the Italian words for good and very good: *bene* vs. *benissimo*). Iconicity is even more evident when the plural is formed through reduplication, a phenomenon found in many languages of the world (e.g., in Sumerian, sheep *udu* vs. many sheep *udu-udu*).

An important fact to note here, however, is that each language’s choice of sound is arbitrary in the sense that it will use a sound-iconic representation from within its language-specific repertoire of phonology, which might differ from that of other languages. The decision of which iconic strategy to use for representing a meaning seems, among other things, to depend on conventional agreement within the community of users. A meaningful relationship between form (of sign, word,

or gesture) and referent becomes more conventional as it becomes an established cultural feature for the community of users, who can be from a specific geographic or cultural community, or from a deaf community.

To look at how differences in culture and hearing status can interact in ways that influence how people attribute meaning to signs, Corazza and Volterra (1988) showed deaf LIS signers and Italian hearing non-signers the same picture story, “The Snowman”, signed in two regional dialects of LIS (Trieste and Rome), in another European signed language (Danish), and in a non-European signed language (Chinese). The attribution of meaning revealed three groups of signs: (a) those understood by everybody, indicating there are some language- and culture-free, presumably universal highly iconic, often pantomimic, features like ‘looking-out-from the-window’; (b) those understood more by deaf signers of any signed languages than by hearing non-signers, indicating there are potentially more linguistically encoded universals, often classifier-based elements such as ‘light falling of snowflakes on the ground’ which probably obey similar organizational principles across different signed languages; and (c) entirely language-specific elements understood only by deaf signers and only when encoded in their own signed language, such as a lexical sign for ‘mother’.

In a follow-up study, Pizzuto and Volterra (2000) explored the comprehensibility of LIS lexical items by hearing and deaf subjects belonging to six different national cultures and twelve language communities (both signed and spoken) in Denmark, The Netherlands, England, Switzerland, Spain, and Portugal. None of these participants knew LIS. The items for which the participants had to guess the meaning were 20 LIS signs whose meaning was determined to be transparent, in that they had been guessed correctly by at least 50% of the Italian hearing non-signers in the Grosso (1997) study mentioned earlier, together with 20 signs defined as non-transparent, as no subjects (or at most one Italian hearing non-signer) had guessed the correct meaning. The results of the Pizzuto and Volterra (2000) study confirmed the earlier Corazza and Volterra (1988) results. It also added the finding that some signs were guessed more correctly by both hearing and deaf non-signing Italians compared to guesses of deaf and hearing members sharing other cultures, indicating the existence of some culture-specific factors that both deaf and hearing non-signers share.

In signed languages, very often iconicity is expressed through visually-based metaphoric or metonymic relationships in which the sign extends its form to other meanings. For example, the LIS sign for ‘university’ is represented by showing the form of the traditional academic hat of the Italian university student. Studies looking at metaphoric/metonymic iconicity in signed languages began early on by some researchers. Among these are Boyes Braem (1981, 1983), Brennan (1990), P. Wilcox (1993, 2000, 2004, 2007), Taub (2001), and Meir (2010). Overviews of studies

on iconic metaphors, for which an adequate overview would be a chapter in itself, can be found in Cuxac (2000), Pietrandrea and Russo (2007), Cuccio and Fontana (2012, 2017), Meir and Cohen (2018), and Russo and Pietrandrea (this volume). A study by Occhino et al. (2017) found that signers who learned ASL or DGS as their first language, saw signs from their own language as more iconic than those from other signed languages. A possible explanation for the fact that unrelated signed languages often have similar signs for abstract concepts has been hypothesized by Napoli (2017) to be the result of the use of common chains of mappings from different perceptual systems into visual realizations with a semantic sense.

The gestures made by hearing persons have also been found to have meaningful sub-components (see an early study of French co-speech gestures in Calbris 1990). Many of these sub-components are like those of signed languages. For example, the results of the cross-cultural study of Pizzuto and Volterra (2000) were later further analyzed to look at the metaphors which seem to underlie the meanings which the hearing and deaf participants of different European countries ascribed to the LIS signs (Boyes Braem, Pizzuto, and Volterra 2002). This study suggests that the signers seem to attribute different meanings than do the non-signers to these items partly because of (a) focusing on different parameters, i.e., location, handshape, or movement and (b) the tendency to attribute different types of meaning, i.e., the hearing non-signers focusing on the action itself, and the deaf signers seeing action as a reference to an object. For example, the LIS sign meaning ‘to drink’ is an outstretched thumb moving toward the upper body and was attributed the meaning of ‘drinking’ by many hearing non-signers. Some hearing non-signers, however, seemed to focus only on the movement toward the body, seeing this as pointing generally to the self and attributed the meaning ‘I/me’. Most deaf signers seemed to focus on the movement toward the mouth, but attributed not only meanings like ‘drinking’, but unlike the non-signers, also meanings of objects which metaphorically/metonymically are associated with drinking, such as ‘beer’, ‘beer bottle’, ‘water’, or ‘baby’.

The role of metaphor in perception and production of gestures by hearing persons has been the subject of other many gestural studies (e.g., P. Wilcox 2007; Cienki and Müller 2008, 2014; Russo 2008; McNeill 2014; Ruth-Hirrel and Wilcox 2018). Some of these focus on gestures used in special professions. For example, a study of gestures used by orchestral conductors (Boyes Braem and Bräm 2000) found a repertoire of metaphors used by orchestral conductor for musical messages, for example making a “pulling out” movement with a “pincher” handshape to elicit a high thin sound from an oboe, and the same movement but with a rounded palms-up handshape to elicit a fuller sound from a horn.

The issue of iconicity is also involved in the general ability of human beings to express themselves in both spoken and signed languages through the devices of pointing, describing, and depicting (e.g., Ferrara and Hodge 2018). Pointing allows

the locating of a given referent in space. It is possible to describe or label various meanings through conventionalized words or signs of the lexicon, while depiction shows more directly what one is expressing. The assumption could be made that the modality of spoken languages makes it more attuned to describing, while the visual signed languages are more likely to use depicting. Most observers of signed languages have in fact noted that its users make a transition between description and depicting rapidly, subtly, and very often (e.g., Ferrara and Halvorsen 2017). Studies of spoken communication are also re-discovering iconic depicting (Clark 2016, 2019; Dingemanse et al. 2015). One example of many kinds of iconic depiction in spoken language is the lengthening of a word making it assume a depicting function, such as producing the English words ‘grand’ and ‘big’ as ‘graaaande’ or ‘biig’, evoking the concept of something really large.

These views of iconicity have relevance for general linguistic theory. Dingemanse et al. (2015) not only note that there is evidence from studies of both signed and spoken language that seem to indicate that iconicity is not a binary property but comes in different types and degrees but they also make the following interesting more general observations:

A fully arbitrary vocabulary is unlikely to be a stable feature of natural languages, because form-to-meaning correspondences are shaped by cultural evolutionary processes which favour not just discriminability but also learnability and communicative utility. An upheaval is underway in current thinking about the arbitrary nature of linguistic signs. The longstanding view that the form of a word has an essentially arbitrary relation to the meaning of the word is giving way to a perspective that recognizes roles for both arbitrariness and non-arbitrariness in language. (Dingemanse et al. 2015: 603)

Summing up this section, it has been impressive to witness the great proliferation of studies related to iconicity (of which only a very small sample could be cited here) that have found significant iconic alongside arbitrary phenomena in all forms of languaging – signed and spoken language as well in gestures. Signs and words can at the same time be both motivated and conventional, having an original, and sometimes still active—or re-activable—iconic motivation, which is the result of a potentially arbitrary cultural/community choice.

3 Concluding thoughts

Inspired by Deutscher’s (2010) “through the language glass” discussion of historically changing theoretical views, we have attempted here to focus on three areas where the views of an increasing number of researchers from different disciplines (including signed and spoken languages as well as gestures) seem throughout

the past several decades to be moving together. The specific topics of these areas concern the origin of language in action, the comprehension of language as a multimodal system, and the importance of gradient along with discrete components in languages.

We have discussed research which has indicated that an “origin in action” can be found not only in the gestures used by adults, but also in the acquisition of languages by hearing and deaf children. We have pointed out that for both spoken and signed languages, the segments, which the linguist posit in an analysis, don’t seem to be the same kinds of discrete units that are produced or perceived by the speaker or signer in actual multimodal discourse. We have also discussed some of the evidence for the presence of both arbitrariness and non-arbitrariness as co-existing features in these forms of human communication.

All of this has contributed to a push for outlining new models for describing languages, be they spoken or signed, arising from descriptions of what happens between users of face-to-face communication systems. The proponents of these new models will no doubt need to consider a revision of the traditional concept of duality of patterning, impelled by viewing basic linguistic units as not all being meaningless but involving more than one modality or channel, allowing for gradient elements to coexist with discrete and segmental elements.

Researchers of signed languages have played an especially important part in these views, as we’ve been compelled from the onset to deal with these three phenomena due to the visual, bodily, multimodal nature of the face-to-face form of communication we’ve all been trying to describe – we couldn’t avoid it.

One of the signed language researchers who has from the very beginning of his long career recognized and addressed almost all these factors is Sherman Wilcox, who, together with his wife, Phyllis Perrin Wilcox, and his colleagues, has investigated routes from gestures to language, the role of iconicity and metaphor, language multimodality, and has constantly pointed out the need for new models and paradigms. These researchers have, for years, been at the forefront of leading us all to. . .

... a framework for unifying spoken language, signed language and gesture. . . a human expressive ability . . . based on the need of moving creatures to comprehend their environment, resulting in a conceptual system embodied in perceptual and motor systems. (Wilcox and Nogueira Xavier 2013: 88)

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