

Pointing in gesture and sign: One tool, many uses

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1. Introduction

When you tell people that you wrote your dissertation on pointing, as we both did, you are sometimes met with blank looks. Occasionally, you also get some ingenuous questions. An eminent linguist once asked one of us, for example: “Now I know that children point, but do adults?” The short answer is *yes*. The longer answer is what we hope to offer in this chapter. Much research has indeed focused on pointing in early childhood and, in particular, on pointing as a developmental milestone (see ###, this volume; Bates 1976; Butcher and Goldin-Meadow 2003; Liszkowski et al. 2012; Tomasello, Carpenter, and Liszkowski 2007; Volterra et al. 2005). But pointing, we hope to convince you, is much more than a milestone. It is a powerful tool used across the lifespan, across cultures, and across contexts—a major way that we humans coordinate attention, anchor words to the world, and build common ground with each other. Pointing is so central to the seamless workings of communication that—like ‘oh’s and ‘um’s, head shakes and nods, ‘this’-es and ‘that’s—it is easy to take it for granted. So much so, in fact, that some of us spend a lifetime studying communication—as a certain eminent linguist did—without giving pointing much thought.

First, some definitions. Pointing is a bodily “movement toward” a *target*—someone, something, somewhere—with the intention of reorienting attention to it (Eco 1976; Kendon 2004; Enfield, Kita, and de Ruiter 2007). Often this gesture is done with the index finger—a pre-

eminently “pointy” articulator that projects an imaginary vector—but it can also be done by tossing the head, pursing the lips, or extending a machete. Pointing is a means of *indicating*—that is, of establishing attention to something by creating a spatiotemporal connection to it (Peirce 1940; see also Clark 2003). It is not the only way of indicating—one can also pat something or hold it up for inspection (Clark 2003). Indicating, in turn, is one of the three major methods of meaning-making that humans have—along with depicting (that is, using *iconic* representations) and describing (that is, using *symbolic* resources) (Clark 2003, 2016; Ferrara and Hodge 2018). On purely theoretical grounds, then, pointing is a “basic building block” of communication (Kita 2003a). And so it is on empirical grounds, too. As already noted, pointing is an early-emerging communicative act—among the earliest, in fact—and it is found universally in both spoken and signed communication (Kendon 2010; Kita 2003a; Morgenstern 2014; Pfau 2011).

Unsurprisingly, this elemental gesture has attracted the attention of both gesture researchers and sign language linguists. However, scholars in these two traditions have looked at pointing through different lenses and have gravitated toward different aspects of it. Gesture researchers, for example, have usually treated pointing as an adjunct to language but not really part of it; sign researchers, in contrast, have usually treated pointing as a core part of sign language grammar (e.g., Meier and Lillo-Martin 2010). These differing frameworks and foci contribute to an impression that—superficial similarities notwithstanding—pointing gestures and pointing signs are, deep down, fundamentally different. Recently, however, there is a new push to compare pointing gestures and pointing signs *directly*, that is, using similar datasets and similar analytical criteria. These direct comparisons underscore the fact that pointing gestures

and pointing signs share many commonalities, and help sharpen our understanding of where exactly the differences lie.

A better understanding of pointing in adults—whether signers or gesturers—will help us ask better questions about pointing in children. Most developmental studies to date focus on pointing in the first two years of life, leaving open questions about how this elemental behavior continues to change beyond that. Implicit in this prevailing focus is the idea that pointing is an all-or-nothing, once-you’ve-got-it-you’ve-got-it behavior. Here, by closely examining adult pointing in all its formational, functional, contextual, and cultural variety, we hope to encourage further work on how pointing blossoms into an unexpectedly variegated behavior. In what follows, we begin by looking closely at the major foci of research on pointing in gesture studies (section 2) and in sign language linguistics (section 3). We then review recent efforts to directly compare the two (section 4), and, finally, close by highlighting several developmental questions raised by our review. A major refrain throughout will be that, contrary to its assumed simplicity, pointing is multiform and multifunctional in both gesture and sign; a major developmental question that arises is thus how pointing becomes that way.

2. Pointing Gestures

As already noted, there is a rich tradition of research on children’s pointing, going back decades and carried out primarily by developmental psychologists (e.g., Bates 1976; Cochet and Vauclair 2010). Research on adult pointing gestures has been more sporadic and diffuse, and has originated from diverse disciplinary quarters—including anthropology, psychology, linguistics, and conversation analysis. Despite this diversity of approaches, these efforts have had a few recurring foci, including: the variety of uses of pointing, with some uses considered “primary”

and others “secondary”; the relationship of pointing to spoken language; how pointing varies in form from one use to the next; and how pointing varies across cultures. We now consider these foci in turn.

2.1. Primary and secondary functions of pointing

One focus of research in gesture studies has been on the variety of functions pointing serves in communication. By definition, pointing always serves the function of drawing attention somewhere. But, under this broad umbrella, pointing has certain uses that are widely considered “primary” (Enfield, Kita, and de Ruiter 2007), “prototypical” (Langacker 2008), or “canonical” (Cooperrider 2014), and other uses that are usually considered “secondary”¹. The primary use of pointing, on these treatments, involves indicating something in the real world—such as a star in the sky, a mountain on the horizon, a fish in an aquarium—and, in doing so, inviting a listener to look at that something. There are several contexts in which such points occur, including ostention-based language learning (e.g., Clark and Estigarribia 2011), direction-giving (e.g., Kita 2003b), sight-seeing (e.g., Kendon 2004), and a variety of other joint activities (e.g., Bangerter 2004). By definition, primary points not only invite listeners to re-orient their gaze, they also convey crucial information about where something is, or which of several is meant (Enfield, Kita, and de Ruiter 2007). Without the information conveyed by such gestures, the communicative message would be incomplete.

But pointing is also used in a number of other ways that are usually considered “secondary,” even within the category of “real-world” points to entities or places (see Figure 1).

¹ “Primary” and “secondary” are, of course, theoretically loaded terms, inviting the question: Primary in what sense? One idea is that primary points are more frequent—as far as we know, there is no work suggesting this. Another idea is that they loom larger in folk theories of pointing—this has been claimed, but without any direct evidence. A third idea is they are learned first. This seems likely to be the case, but, again, we are not aware of direct evidence.

One example is when people point to something or somewhere, but without necessarily intending to redirect listener gaze and without relying on the point to communicate message-critical information. Enfield, Kita, and de Ruiter (2007) describe pointing in such cases as a kind of pragmatic safety net; it is used when the speaker thinks the listener knows the referent but is not entirely sure. Relatedly, speakers point in cases where the listener is already attending to the pointed-to target and where the referent is perfectly clear. A good example is seen in points to the self (Cooperrider 2014). When speakers point to their own bodies along with pronouns like ‘I’, ‘my’, or ‘mine’, they are drawing attention but not necessarily reorienting listener gaze—according to the norms of conversation, listeners should already be looking at the speaker, and the referent of ‘I’ is rarely ambiguous. Similarly, when pointing to the listener with ‘you’ or ‘yours,’ listeners know where they are and the referent is usually not ambiguous. In these cases, pointing serves to reorient discourse attention but not visual attention per se; it adds emphasis but does not contribute message-critical information.

Another type of “secondary” pointing occurs when people point to one thing to refer to another. In the above examples, what the speaker points to—the *target*—is recognizably the same as what is referred to in speech—the *referent*. This is sometimes called “direct pointing” (Le Guen 2011). But, at other times, the pointed-to target is associated with the referent but not identical to it (e.g., Borg 2002; Clark 2003; Le Guen 2011). This phenomenon has gone by different labels, including “metonymic pointing,” “deferred ostention,” and “indexical chaining.” A classic example involves pointing to a speedometer to refer to a car’s speed (Quine 1960); other examples include pointing to the chest to refer to a ‘we’ (Cooperrider 2014), or pointing to a house to refer to one of its occupants (Levinson 2006).



Figure 1. Examples of points to real-world entities in gesture (top row) and sign (bottom row). (A) An English speaker points to an array of novel creatures, while carrying out a referential communication task. (B) A Yupno (Papua New Guinea) man, far right, asks a “where” question, and his three interlocutors point as part of their answers: a nose point (far left), an index finger point (man behind, face occluded), and another nose point (middle). (C) A deaf signer of San Juan Quiahije Chatino Sign Language (Mexico) points to a plant while he explains its various uses. (D) A deaf signer of Israeli Sign Language points while carrying out a referential communication task (image courtesy of Sign Language Research Lab, University of Haifa).

People also point to things that, strictly speaking, are not there. This phenomenon is commonly known as *deixis am phantasma* (Buhler 1990 [orig. 1934]) or *abstract deixis* (Stukenbrock 2014) and it takes a number of different forms. In some cases, people point metaphorically, such as to a temporal landmark like ‘tomorrow’, which has no physical location in space (Cooperrider, Sweetser, and Núñez 2014). In other cases, people point to empty locations to invest them with meaning (see Haviland 2000 on “baptismal” pointing), a behavior that has been studied in storytelling situations (McNeill 1992) and in joint activities (Bavelas and Gerwing 2011). This general technique of assigning referents to empty locations in space has

been the subject of direct comparisons between speakers and signers, as discussed later. Finally, people also point to to apparently empty space when they are gesturing “under transposition.” During storytelling, for instance, people may point as if from some imagined there-then rather than from the actual location here-now of the speech event (Haviland 1993, 2003).

All of the uses of pointing considered so far serve *referential* functions, but speakers also point for *interactive* functions. Several of these uses involve pointing to present people. For instance, speakers taking over a turn will sometimes point to the last speaker as a way of showing agreement with what was just said (Healy 2012). In multiparty conversations such as meetings, people point as a way of tacitly citing others present (Bavelas et al. 1992). Pointing to the addressee is also used, not to show agreement, but to mock (Sherzer 1973) or scold (Andrén 2014). Pointing at objects can serve an interactive function, too, as when the speaker uses the point alone, or the point combined with speech, to request the object (Bates 1976; Brinck 2004). Generally, such interactive uses of pointing have not been as widely examined as the more prototypical referential uses. Note, of course, that these interactive functions still involve the same overarching function of orienting attention to a region of space—in the case the person being agreed with, cited, mocked, or scolded, or the object being requested—but take on a richer meaning in context.

2.2. Co-production with speech

Another focus for gesture researchers has been how pointing is organized in relation to spoken language. Importantly, pointing does occur on its own, without accompanying speech—early in development but also in adult communication. Generally, like depicting gestures, points can occur on their own, in sequence with speech, or overlapping with speech (Clark 2016). When

pointing does overlap with speech, it is most prototypically associated with a distinctive class of words known as demonstratives—including, in English, *this*, *that*, *these*, *those*, *here*, and *there* (Diessel 2006). Indeed, demonstratives have sometimes been dubbed “pointing words” (Diessel 2012). This is partly because demonstratives commonly co-occur with pointing—indeed, some describe pointing as obligatory when demonstratives are used (e.g., Levelt, Richardson, and Heij 1998)—and partly because both serve to indicate something in the world. Going further, Cooperrider (2016) has emphasized that demonstratives and pointing are designed in relation to each other. In particular, the choice of whether to point to an entity is entwined with the choice of whether to use a demonstrative and, if so, whether to use *this* or *that*, *here* or *there*.

Pointing also commonly co-occurs with spoken language beyond demonstratives, of course. Because points are often used for conveying “where” or “which” information, pointing is regularly used along with location or feature descriptions. In fact, the range of spoken referents that pointing can partner with is essentially unbounded. By making use of metonymy, metaphor, and imagination, speakers can talk about a wide world of possible referents—non-present, invisible, non-physical—while simultaneously directing attention to regions of space in the here and now (Cooperrider 2014).

2.3. Variation in pointing across contexts

Gesture researchers have also examined how points vary in form from use to use and context to context. Such variation is usually not assumed to be arbitrary, but rather to reflect fine-grained differences in function. Some aspects of this variation stem from culture-specific conventions, as discussed later, but others may reflect general principles. For example, Kendon (2004) describes how different pointing handshapes are tailored to different discourse purposes.

He notes that when British and Italian speakers indicate something for the purposes of presenting it as if for “inspection” (p. 224) they tend to point with the palm open and facing up. In other cases, variation in pointing handshape reflects the incorporation of iconic features, and thus fuse indicating and depicting elements (Cooperrider 2014; Kendon 2004; Goodwin 2007). Recently, Talmy (2018) has analyzed in detail such deviations from the prototypical case of index finger pointing, creating a typology of how different ways of pointing evoke targets that are static or moving, 2d or 3d, punctate or extended (see also Hassemer, 2016).

Beyond incorporating iconic features, pointing gestures also vary from use to use in how much effort the speaker puts into them. Drawing on interviews with Lao speakers, Enfield, Kita, and de Ruiter (2007) observed that points serving the primary function of conveying location information involved greater arm extension and were more likely to involve speaker gaze to the target; the secondary points they observed, in contrast, were “smaller” in form. Relatedly, Bangerter and Chevalley (2007) observed that “communicative points”—produced when speaker and listener were visible to each other—were more likely to involve arm extension than “non-communicative points”—produced when a barrier separated the participants. These and other findings suggest that pointing gestures embody varying degrees of effort. They also suggest a candidate general principle that merits further investigation: the more central a pointing gesture is to the message at hand, the more effort the speaker will put into it.

2.4. Variation in pointing across cultures

A final focus has been on how pointing varies from one culture to the next. Pointing, by all accounts, is a human universal (e.g., Cooperrider, Slotta, and Núñez 2018), but it also varies in several ways across communities. Some of this variation is due to particular conventions of pointing form. Speakers of Arrernte, an Australian Aboriginal language, have several pointing handshapes that are codified for particular purposes—for instance, an open hand with palm facing to the side is used when indicating the direction of an absolutely oriented path (Wilkins 2003). Some communities have a conventional practice of raising the height of the pointing arm to reflect the distance of the target—the higher the arm, the farther away the target (Eco 1976). People in Mesoamerica show an especially exaggerated version of this “far is up” principle, sometimes using a near-vertical point to indicate distant referents (Levinson 2003; Mesh 2017). Different communities also have different conventions for pointing non-manually, with the head and face. Some form of pointing with the head—such as tossing, thrusting, tilting—appears to be universal (e.g., McClave 2007). In some cultures, however, there are also conventional facial pointing actions. These include *lip-pointing*, which consists of protruding the lips (Enfield 2001; Sherzer 1973), and *nose-pointing*, which consists of scrunching the nose (Cooperrider & Núñez 2012). Ethnographers have frequently claimed that such facial gestures are a major—or even preferred—form of pointing in the communities where they are used (e.g., Sherzer 1983). In one case, this claim has been borne out quantitatively. Using a referential communication task, Cooperrider, Slotta, and Núñez (2018) found that people in the Yupno valley of Papua New Guinea, where nose-pointing is used, were just as likely to point non-manually as manually.

Pointing also varies across cultures by virtue of being bound up with broader communicative practices and cognitive patterns. For example, Blythe and colleagues (2016) have

described how pointing becomes an especially critical communicative resource in Murrinhpatha conversation because of cultural taboos on naming certain people and the places associated with those people. Elsewhere, pointing is recruited into a conventional practices for referring to the time of day. The best-studied case is found in the Brazilian Amazon (Floyd 2016). Nheenghatú speakers will point to an accurately oriented arc of the sun, running east to west, in order to refer to particular times (e.g., noon, by pointing directly overhead) or to more extended intervals (e.g., all afternoon, by sweeping a hand over a segment of the arc). Similar practices are found much more widely in speaking communities (see also Le Guen and Pool Balam 2012), as well as in some village sign languages (de Vos 2014). Finally, it is reported that people in some indigenous communities remain absolutely oriented and maintain accurate cognitive maps as they move through the world (Levinson 2003). There is thus a cultural expectation in such groups that people will point accurately, even to distant, unseen locations (Haviland 1993; Le Guen 2011). In Western cultural groups, there appears to be no such expectation (e.g., Schegloff 1984); Americans, for instance, sometimes point with comic inaccuracy, even to familiar locations.

A final source of variation across cultures is taboos that regulate how you can point or what you can point to. In Ghana, for instance, pointing with the left hand is considered impolite, and this prohibition has consequences for direction-giving (Kita and Essegbey 2001). In Aboriginal Australia, where avoidance registers are used during certain social interactions, speakers will often point in a more “constrained” fashion by using a fist or the elbow (Green and Wilkins 2014). Elsewhere, taboos govern what you can point to. Famously, in some cultures, it is unacceptable to point to rainbows (Lee and Fraser 2001); in many Western cultures, it is considered rude to point to people, though this norm is unevenly observed and commonly violated (see, e.g., Jarmolowicz-Nowikow 2015).

3. Pointing signs

Signers, like speakers, point prodigiously. Every sign language documented thus far—whether used by a single deaf homesigner, a group of deaf people in an urban or village setting, or even by hearing people as an alternative to speech—relies heavily on pointing to serve multiple functions. Despite this fact, research on sign languages has historically focused on only a small subset of the many functions of pointing signs. When sign linguistics arose as a field of study in the 1960s, its practitioners were intent on demonstrating that sign languages are not merely elaborate gestural systems, but instead exhibit the same structures found in spoken language (see, e.g., Klima and Bellugi 1979). As a result, early research on pointing signs focused on those features that could be directly compared with speech, and sidelined pointing features with analogues in gesture. Only relatively recently has a welcome sea-change begun in the discipline: more and more, sign linguists are attending to the full set of features of pointing signs, taking interest in the many features that are shared with pointing gestures. The major foci of research on pointing signs include: similarities between pointing signs and spoken pronouns, demonstratives, and locative expressions; uses of pointing signs to establish and maintain reference; other uses of pointing, some analogous to “secondary” pointing gestures; and finally, cross-linguistic comparisons of pointing signs. We now discuss each in turn.

3.1 Pronouns, demonstratives, and locatives: analogues to pointing signs?

Signers, of course, point toward the objects, spaces, and people around them: pointing is as fundamental to their communication as it is for speakers. The push to compare sign with speech led sign language linguists to focus on just one type of real-world pointing, points toward present people. These were compared systematically with pronouns, the most basic resource for referring to persons in speech. There was a rich set of comparisons to be made, first in terms of function: both pointing signs and pronouns refer, that is, they identify speech act participants and track reference to those participants throughout the discourse (e.g., Pettito 1987; Meier 1990; Engberg-Pedersen 1993; Liddell 1996; Lillo-Martin and Klima, 1990; Senghas and Coppola 2001; van Hoek 1996; Perniss and Ozyurek 2015). In addition, signed points to persons can take different forms based on whether the target is the signer, addressee, or third, present person—and whether it is singular or plural—a fact that many sign linguists take as evidence for the grammatical person- and number-marking that is found on pronouns (e.g., Meier and Lillo-Martin 2013). Moreover, person-referring pointing signs are subject to the same principles that determine the placement of pronouns in spoken languages, including the so-called binding conditions on anaphora (for a discussion, see Meier and Lillo-Martin, 2010). Faced with this evidence, sign linguists have disagreed, sometimes quite contentiously, about whether person-referring pointing signs are true pronouns, or can even be called *linguistic*. At the heart of the argument is the question of whether a language's lexicon needs to contain a finite, listable set of forms. Some authors claim that because some features of pointing are gradient—in particular, the direction of the point, which may be modified in indefinitely many ways—signed points should be understood as *gestural* components of the language (meaning, formed at least partly from gradient features) rather than *linguistic* (meaning, organized around a finite set of categorical

oppositions) (e.g., Liddell and Metzger 1998; Liddell 2000; Liddell 2003). Other authors argue that pointing signs are organized in a way that makes them linguistic, but the types of distinctions they encode are limited and are thus closer to a simplified demonstrative system than to a pronominal one (Ahlgren 1990; McBurney 2002; Koulidobrova and Lillo-Martin 2016). Still others argue that the person- and number-marking features seen in some sign language's person-referring points justifies treating them not only as linguistic, but as clear pronouns (see discussion in Cormier, Schembri, and Woll 2013). A growing trend in the discipline is to side-step the debate altogether, worrying less about broad categorization of pointing signs as linguistic or gestural, and focusing instead on identifying similarities and differences between pointing signs and pronouns or demonstratives on the one hand, and pointing signs and pointing gestures on the other (See discussions in Cormier, Schembri, and Woll 2013; Johnston 2013a, 2013b).

Of course, signers point not only toward people in the world around them, but also toward objects and locations. Pointing signs targeting objects have been described as demonstrative expressions (McBurney 2004; Koulidobrova and Lillo-Martin 2016), while pointing signs targeting locations have been called 'locatives' (e.g., Padden 1983; Shepard-Kegl 1985; de Vos 2013). Notably, signers appear to distinguish points towards locations from points toward people by modifying the formational feature of palm orientation: points toward locations are typically formed with the palm facing downwards, whereas points toward people are more often formed with the palm facing to the side. This observation has been made for a number of the world's sign languages (for a review, see Pfau 2011), including in quantitative analyses of American Sign Language and British Sign Language (Bayley, Lucas, and Rose 2002; Fenlon et al. 2013). Notably, in these two quantitative studies signers were found to be more consistent in

their use of palm orientation and handshape for points towards locations, and to tolerate more variation for points towards people. Fenlon and colleagues (2013) suggest that this result is due to different patterns of co-articulation with the surrounding signs—a possibility that underscores how closely pointing signs are prosodically integrated with the signs surrounding them.

3.2. Pointing signs to establish and maintain reference (425 words)

Some of the most interesting features of pointing in sign language arise when the point is directed towards nothing at all. Signers frequently ‘anchor’ a referent in space by first naming the referent, and then pointing to a location in the empty space in front of them (Barberà and Zwets 2013). An ASL signer recounting a story about her pet, for example, could introduce the animal with the lexical sign DOG, preceded or followed by a point. The noun-accompanying point appears to share the function of spoken language determiners, and its presence and ordering relative to the noun provides information about whether the reference is definite (*the* dog) or indefinite (*a* dog) (MacLaughlin 1997; Zimmer and Patschke 1990). Crucially, this type of point towards empty space—with or without an accompanying noun—has a second function: it associates the referent with the selected empty space (called a *referential locus*, or *R-locus*, in the sign language literature), making it possible to point back towards this same space later to refer back to the same referent. The ASL signer from our example points alongside the sign DOG, and in so doing, associates the notion of the dog with a specific location in the space in front of her. It is thus possible for her to continue to point to this same location throughout her narrative, referring again and again to the dog as she narrates his adventures (see discussion in Perniss and Ozyurek 2015, Cormier, Schembri, and Woll 2013). Once a signer has associated a referent to a given R-locus, they can use a variety of deictic mechanisms beyond the point to

refer back to the referent. Many sign languages contain a specialized set of main verbs that are produced using movements to or from R-loci, conveying that the subject or object of the verb is the referent associated with that space (e.g., Padden 1983; see also discussion in Hou and Meier, *in press*). In our ASL example, the signer might modulate the location and movement of the verb BITE, making the starting-place of the moving hand the dog's R-locus (and thus identifying the dog as the biter) or moving the hand towards the dog's R-locus (identifying the dog as the unfortunate bitee). 'Spatial agreement' of the kind exemplified by the movement of the verb BITE in this example is dependent on the existence of R-loci, and these loci in turn are established by an initial pointing act. In this way, a peculiar function of points—to establish reference to non-present entities—becomes foundational for verb agreement processes in many sign languages.

3.3. Other pointing phenomena in sign languages

Across signing communities, points are also regularly used metonymically—that is, points toward real-world spaces are used for referents that are not in those spaces, but are conceptually related to them (see Table 1). This, of course, is analogous to the metonymic pointing gestures described earlier. In Yolngu Sign Language and Kata Kolok, languages used in small-scale communities where the location of everyone's home is common knowledge, a signed point towards a particular home refers to the person who lives in it (de Vos 2013; Bauer 2014). Among not only speakers of Yucatec Maya, but also signers of Yucatec Maya Sign Language, a point to the sky refers to the time of day when the sun is at that location (Le Guen and Pool Balam 2012; see also de Vos 2013). In young sign languages and more established ones alike, points to the hair, teeth and lips are regularly used to refer to the colors black, white, and red

(Woodward 1989; Nonaka 2004; de Vos 2011; Zeshan and Sagara 2016). The human propensity toward developing metonymic reference is so great that even when homesigners get little exposure to metonymic pointing in gesture, they nevertheless develop it. Using this strategy substantially expands the communicative potential of the point (Butcher, Mylander, and Goldin-Meadow 1991).

Sign languages also incorporate pointing into fully lexical signs. For example, in ASL and other sign languages, body parts terms are most often formed by a pointing movement toward the body part. Often these are not simply prototypical points with an index-finger extended, but involve different handshapes (e.g., open hand) or motion (e.g., reduplication) (Pyers, 2006). Indeed, many lexical signs, while not obviously “pointy,” are articulated in relation to parts of the body—such as the head, face, or abdomen—and thus motivated, in part, by metonymic indexicality (Kendon 1980; Cooperrider 2014). For instance, words related to cognition are often articulated near the head (Kendon 1980; Evans and Wilkins 2000); in contrast, words related to hunger may be articulated near the stomach, and words related to eating may be articulated near the mouth (Ostling et al. 2018).

Table 1. Uses of pointing in gesture and sign

	Gesture	Sign
<u>Direct points to real-world entities</u>		
Objects	e.g., Bangerter 2004; Cooperrider 2016	e.g., McBurney 2004; Koulidobrova and Lillo-Martin 2016
Locations	e.g., Enfield, Kita, and de Ruiter 2007; Mesh 2017; Wilkins 2003	e.g., Padden 1983; Shepard- Kegl 1985; de Vos 2013

Persons	e.g., Cooperrider, 2014	e.g., Meier and Lillo-Martin, 2010, 2013; Cormier, Schembri, and Woll 2013
<u>Metonymic points</u>		
Locations for Person reference	e.g., Levinson, 2006	e.g., Butcher, Mylander, and Goldin-Meadow 1991; de Vos 2013; Bauer 2014
Locations for Temporal reference	e.g., Floyd 2016; Le Guen & Pool Balam 2012	e.g., Le Guen 2012; de Vos 2013
Body parts for Experiential concepts	e.g., Cooperrider 2014	e.g., Kendon 1980; Evans and Wilkins 2000; Ostling et al. 2018
Body parts for Colors	<i>not attested</i>	e.g., Woodward 1989; de Vos 2011; Zeshan and Sagara 2016
<u>Points to empty space</u>		
Referential Loci	McNeill 1992; Perniss and Ozyurek 2015	e.g., Engberg-Pedersen 1993; Liddell 2003; Cormier, Schembri, and Woll 2013
Metaphorical	e.g., Cooperrider, Núñez, and Sweetser, 2014	e.g., Yano and Matsuoka, 2018
Transposed targets	e.g., Haviland 1993	e.g., Liddell, 2003
<u>Interactive functions of pointing</u>	e.g., Bavelas et al. 1992; Healy 2013	<i>not attested</i>

3.4. Pointing signs in crosslinguistic comparison

When discussing the variety of functions for pointing signs, it can be easy to forget that the sign languages in which pointing is found are themselves remarkably diverse. There is no one context for “pointing in sign language:” rather, pointing signs are found in sign languages young and old, in urban and rural environments, with high or low numbers of users in a variety of

different social configurations. What is common to the pointing signs found in all of these environments is that they are frequent and indispensable. For homesigners still in the process of conventionalizing vocabularies, pointing is a reliable mechanism for identifying not only present objects but also the properties that they embody (Coppola and So 2006; Torigoe and Takai 2002). For signers of more established sign languages, pointing takes on additional functions (Pfau and Steinbach 2006) and in at least some contexts it is used even more frequently than in homesign (Senghas and Coppola 2010). There are certainly aspects of variation in pointing across sign languages. For example, pointing signs draw attention to the physical environment in ways that reflect the different topographies and direction-giving traditions where sign languages emerge (de Vos 2013; Mesh 2017; Nonaka 2015), and they direct attention beyond the here-and-now in ways particular to the narrative practices of specific cultures (Green and Wilkins 2014). Just how uniformly pointing is integrated into different sign languages, and how much diversity there may be in sign language pointing practices, are promising areas for further study.

4. Comparing gesture and sign

Much of the work on pointing gestures has been done without drawing any comparisons to pointing signs; and, vice-versa. Fortunately, this mutual disinterest is starting to change. Increasingly, for instance, sign linguists are comparing phenomena in sign both to analogous phenomena in spoken language and to analogous phenomena in co-speech gesture (e.g., Johnston 2013a; Cormier, Schembri, and Woll 2013; Lillo-Martin and Meier 2013; Pfau 2011). A number of insightful observations have come out of such theoretical comparisons, and a range of similarities and differences between pointing gestures and pointing signs have been proposed. One limitation of such theoretical treatments, however, is that they often rely on an “armchair”

understanding of pointing, rather than an empirically informed one. Moreover, because gesture researchers and sign researchers have so often gravitated to different aspects of pointing, it is tempting to assume that gesturers don't really do *this*, or signers don't do much of *that*, when, in reality, we simply lack studies spanning the full range of pointing behaviors in gesture and sign. To overcome this limitation, direct comparisons are critical (as several in the field have noted, e.g., Cormier, Schembri, and Woll 2013). In this vein, several studies have, for instance, compared how signers and gesturers use pointing (and other indexically anchored behaviors) during reference-tracking (Barberà and Zwets 2013; Perniss and Ozyurek 2015). Here, we consider two recent lines of our own work; both efforts compare pointing in gesture and sign using similar datasets and similar analytic criteria, and both take a quantitative approach.

4.1. Comparing pointing in Chatino gesture and sign

A first study to systematically compare pointing by signers and gesturers in the same community, taking a quantitative approach to a sizable dataset, was performed by Mesh (2017) in a Chatino community of Mexico. This study compared points to “landscape-scale” referents—including schools, churches, and trade locations in the surrounding mountainous topography—produced by gesturers and signers as they gave route directions.

The Chatino people traditionally inhabit a region at the base of the southern Sierra Madre mountain range in Mexican state of Oaxaca. While Chatinos are in no way socially isolated, there are social barriers to sending children to residential schools in mestizo (non-indigenous) cities. As a result, deaf Chatinos have minimal exposure to the national sign language transmitted in residential deaf schools. In the Chatino community of San Juan Quiahije, 11 of the approximately 3,600 community members are deaf, and these 11 people, along with their hearing

family members, are developing an interrelated set of family sign languages: San Juan Quiahije Chatino Sign Language (SJQCSL). Signers of SJQCSL draw on the rich gestural practices found in the surrounding community. An interesting question that arises in this context is thus how much signers alter these practices as they incorporate them into a fully visual-manual language. Mesh (2017) approached this question by focusing on pointing practices in particular.

In a series of semi-structured interviews, deaf and hearing citizens of San Juan Quiahije were asked how to reach local and regional landmarks on footpaths and via the roads that have more recently been built for travel by truck to distant locations. 31 people were interviewed: 29 hearing speakers of San Juan Quiahije Chatino (providing 6 hours, 37 minutes footage containing 873 points to identifiable locations) and two deaf signers of SJQCSL (providing 31 minutes of footage containing 232 points to identifiable locations). Since pointing in Mesoamerica has been described as obeying the “far is up” principle (Le Guen 2006), and as using different handshapes to indicate nearby, visible objects versus distant directions (e.g., Haviland 2003), all points were coded for the distance of the target (measured in meters) and for two formational features of the point: elbow height and handshape. A later extension of the study took a third formational feature into account: arm extension (Mesh *submitted*).

Chatino speakers showed a strong pattern of marking referent distance in their gestures, using all three coded features: nearby targets were frequently indicated using points with a low elbow, partial extension of the arm, and an extended index finger (see example, Figure 2a). By contrast, distant targets were significantly more likely to be indicated using points with a high elbow, full extension of the arm, and an open handshape (see example, Figure 2b). Remarkably, deaf SJQCSL signers mirrored the hearing speaker-gesturers’ pointing system in only one respect: like gesturers, signers used elbow height to mark distance, but unlike gesturers, the

signers frequently used a fully extended arm and an extended index finger to indicate targets regardless of their distance (Figures 3a and 3b).



Figure 2. Examples of points to objects and locations produced by a speaker of San Juan Quiahije Chatino during an interview about local landmarks. The speaker points to a nearby street (left) and to a distant city (right).

How can this result shed light on what is shared, and what is distinct, in pointing signs and pointing gestures? The area of similarity between gesturers and signers provides an important first clue: the use of elbow height to mark referent distance has been argued to be a universal feature of human pointing (see, e.g., Eco 1976), but the instantiation of the far-is-up system varies across communities. In particular, the use of near-vertical pointing to mark distant referents has been described as particular to the Mesoamerican context (e.g., Levinson 2003). The pointing feature shared by signers and gesturers in San Juan Quiahije, then, is community-particular, and was evidently acquired in a process of cultural transmission that has both deaf and hearing recipients.



Figure 3. Examples of points to objects and locations produced by a signer of San Juan Quiahije Chatino Sign Language during an interview about local landmarks. The signer points to a nearby building (left) and to a distant city (right).

The differences between gesturers and signers in this study are equally important for our understanding of how pointing enters sign languages. Evidently, signers of emerging languages do not adopt the pointing practices around them wholesale. Rather, they differentially integrate features of pointing practices into their emerging linguistic systems, in ways that are likely sensitive to the contrasts already developing in their language's phonology and morphology. If differences are to be found between pointing gestures and pointing signs in communities with older, more established sign languages, these differences may well be due to language-specific constraints imposed on the adoption and adaptation of gestures during the early stages of the sign languages' emergence.

4.2. Pointing in BSL, ASL, and spoken English

Fenlon, Cooperrider, and colleagues recently compared pointing signs and pointing gestures using existing corpora, in a first study (Fenlon et al. *in press*), and controlled elicitation, in a second (Cooperrider et al. 2017). The first study examined points to the self, addressee, and other entities (thus corresponding to first, second, and third person pronouns) (Fenlon et al. *in press*). The data came from two existing corpora of dyadic conversation; it included 27 English speakers from the Tavis Smiley Corpus (Cooperrider 2014), who contributed a total of 543 pointing gestures, and 24 signers from the conversational component of the British Sign Language Corpus (Fenlon et al. 2014), who contributed a total of 574 pointing signs. A number of prior researchers had suggested that pointing signs differ in their function from pointing gestures (e.g., Meier and Lillo-Martin 2013; Barberá and Zwets 2013). Fenlon and colleagues took a different tack, examining whether pointing signs might differ in their *form* from pointing gestures, by virtue of being more “linguistic” in nature. If so, the authors reasoned, the pointing signs should show a heightened degree of *conventionalization*, *reduction*, and *prosodic integration*, since these three characteristics are considered to be formational hallmarks of linguistic status.

By examining a range of features—such as handshape, hand use, duration, and others—the authors found that pointing signs did indeed differ from pointing gestures on these three dimensions. First, pointing signs appeared to be more conventionalized than pointing gestures. Specifically, the signers were: more consistent in their handshape preference, strongly favoring points with index finger extension; more consistent in their use of one hand instead of two; and more consistent in their use of their dominant hand. Second, pointing signs were much more reduced than pointing gestures, especially in terms of duration, lasting 245 msec on average,

compared with 865 msec on average for the pointing gestures. Third, the pointing signs were integrated into utterance-level prosody in a way that pointing gestures were not. Specifically, utterance-final pointing signs were longer than non-final pointing signs—a pattern of lengthening that has been widely observed for other types of signs (e.g., Wilbur 1999). Pointing gestures, in contrast, did not show this pattern.

These findings about form are thus consistent with the proposal that pointing signs are more linguistic than pointing gestures. However, the authors also noted an alternative possibility. Several of the observed differences might be explained instead by a another crucial difference between sign and gesture: pointing signs are produced within the same articulatory channel as the rest of the referential content, i.e. the hands, whereas pointing gestures are produced in a different articulatory channel from the rest of the referential content. This “primary channel constraint” offers an intuitive explanation for the shorter duration of pointing signs, as they have to be wedged into a stream of other signs. The constraint could also have more subtle effects. For instance, it could add a pressure to conserve effort when signing, leading signers to strongly favor one hand; it could also lead to pointing signs becoming more tightly integrated into broader prosodic structures because those structures are produced with the same articulators. In sum, it remains an open question whether the differences observed by Fenlon et al. are primarily driven by the linguistic status of pointing signs per se, or whether at least some might be driven by a “primary channel constraint” that exerts certain pressures on pointing signs.

A second study by the same researchers sought to further investigate commonalities and differences in pointing in gesture and sign, this time using a controlled elicitation in the lab. The participants were twelve English speakers and twelve ASL signers (Cooperrider et al. 2017). Whereas the corpus study focused on pronoun-like points (to self, addressee, and other entities),

the elicitation study focused on points to visible locations and objects. Of particular interest were two issues. A first was whether both pointing gestures and pointing signs would exhibit that pattern observed by Enfield, Kita, and de Ruiter (2007) for Lao speakers, in which “location-focused” points—that is, points carrying message-critical information about “which” or “where”—were bigger in form. To examine this, Cooperrider et al. designed a paradigm to elicit location-focused utterances in response to “which” or “where” questions (e.g., “That chair.”), as well as explanatory utterances involving more than “which” or “where” information (e.g., “She walked to the chair in the back.”) (Figure 4). The expected pattern was that points embedded in location-focused utterances would be bigger in form than points embedded in explanatory utterances. Indeed, this pattern was found, but with an important additional wrinkle. The researchers further distinguished two types of points occurring within location-focused utterances: “load-bearing points” in which the point exclusively carried the locative information (e.g., “That chair”); and “load-sharing points” in which the point co-expressed the locative information alongside other locative words (e.g., “That chair on the right”). In both gesturers and signers, only the load-bearing points were larger in form; the load-sharing points were no bigger than the points embedded in explanatory utterances.

A second issue was how the “same channel constraint” described above might affect the integration of pointing signs with other signs (and, conversely how the *absence* of this constraint might affect the integration of pointing gestures with spoken language). In line with the findings of Fenlon et al., pointing signs were markedly shorter in duration than pointing gestures. Further, the duration of both types of points was shaped by the utterances in which they were integrated, but in different ways. When produced as part of location-focused utterances, which were usually brief, pointing signs and pointing gestures were comparable in duration. But, in other contexts,

they diverged. Pointing gestures produced as part of explanatory utterances, which were typically longer than other utterances, tended to stretch out to “span over” the utterance. In fact, the longer the utterance, the longer the pointing gestures. In contrast, pointing signs produced as part of such explanatory utterances were uniformly short regardless of utterance length, as they had to “slot in” with other linguistic material.

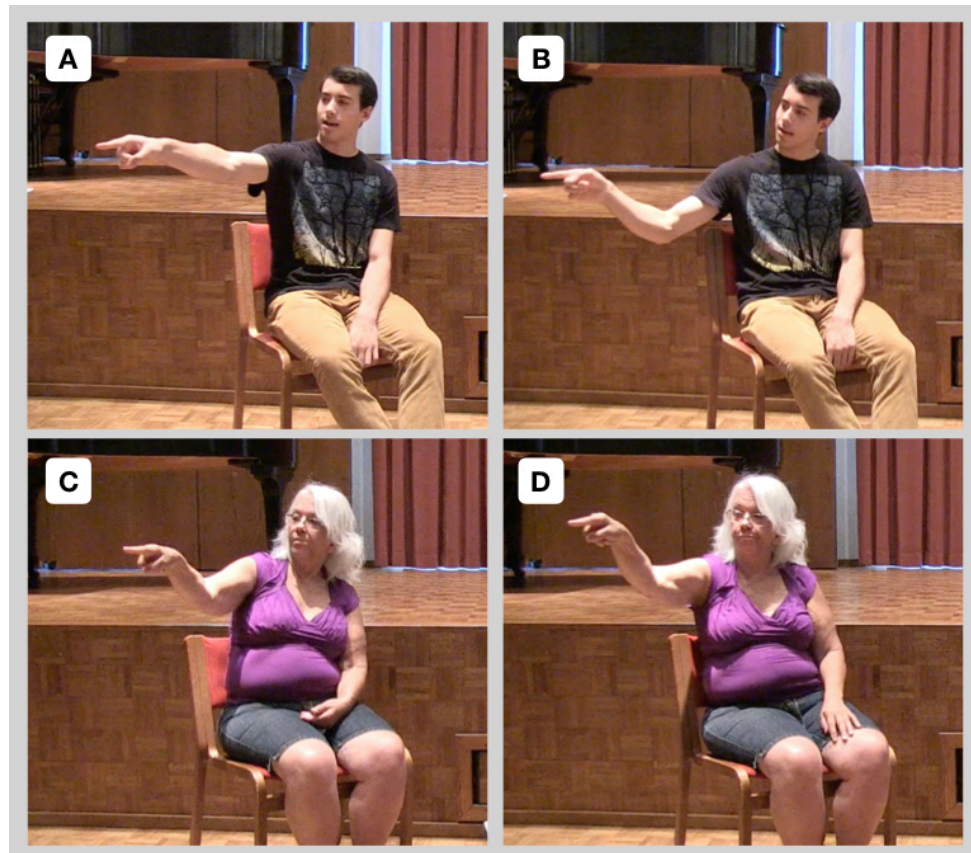


Figure 4. Examples of points to objects and locations produced by an English speaker (top row) and an ASL signer (bottom row). Points were produced as part of a referential communication task (Cooperrider et al., 2017), and were embedded in short location-focused utterances (left panels, A and C) or in longer explanatory utterances (right panels, B and D).

Taking both studies together, several generalizations emerge. On the one hand, pointing gestures and pointing signs show a number of broad similarities. Both are used in similar ways, such as to point to present persons, non-present others, visible locations and objects. Both are

sometimes used along with other lexical material, and other times on their own. Both are responsive to similar functional pressures, such as obeying the pressure to use more effort when the point carries more central information. On the other hand, a number of broad differences were evident. Pointing signs are more consistent in form and tend to be more reduced, both in duration and in the bodily effort expended to produce them. This marked difference in reduction may stem from a “same channel constraint” that operates in sign but not in gesture. Of course, to corroborate these generalizations, more work is needed with different speaking and signing communities.

5. Conclusions

Everyone points—children and adults, signers and speakers, urbanites and rural farmers. By any criterion we might choose—frequency of use, cross-cultural universality, developmental priority, semiotic simplicity—pointing is a basic communicative act. As such, pointing is sometimes treated as a monolith. But, in fact, pointing takes different forms and does different things; it varies from moment to moment and community to community; it has an over-arching function of directing attention, and a host of more fine-grained functions, too. It also exhibits different properties when produced in gesture or in sign. This does not imply that pointing gestures and pointing signs are fundamentally, irreconcilably different, however. As we have shown, many of the uses of pointing found in gesture—points to real-world people, objects, and places; metonymic points; points to empty space; and more—are also found in sign. There also appear to be a handful of general principles observed by signers and speakers, such as the principle that more effort should be put into a point if it makes a critical contribution to the message. Though we have sketched in broad strokes the similarities and differences between

pointing gestures and pointing signs, it bears emphasis that there is much work left to do—and, in particular, there is much promise in further systematic, direct comparisons that will sharpen our understanding of these similarities and differences.

The formal and functional diversity of pointing invites an obvious question for developmentally minded researchers: How does pointing get this way? How do young children—whether speakers or signers—go from producing the basic pointing behavior that has so far been the focus of most developmental studies, to the kaleidoscopic adult behavior that has been the focus of our chapter? A number of specific, tractable questions can be formulated. Several of these have been touched on already, but, we would argue, are ripe for more sustained inquiry. In the case of pointing gestures, we might ask questions like:

- 1) Do children produce so-called “primary” points earlier than secondary points? If so, which types of secondary pointing emerge first? How does the emergence of certain types of secondary pointing (e.g., metonymic) hinge on the emergence of certain cognitive abilities?*
- 2) Do children begin to show the formational distinction between “primary” points and secondary points from the beginning of their pointing lives, or does it only develop later?*
- 3) Are pointing gestures and spoken demonstratives “co-organized” from the get-go, are is this tight relationship late to emerge? If late to emerge, how are pointing and demonstratives related at first? (See Rodrigo et al. 2004, for a first study.)*
- 4) Do children’s pointing gestures show evidence of culture-specific practices—e.g., the far-is-up principle, or the prohibition on left-handed pointing—from the very beginning, or is this cultural “layer” only added later, after a more universal form of the gesture is in place? (See Haviland 2003 for a first study.)*
- 5) Do children in cultures that make heavy use of facial pointing use these gestures from the start, or do they show an early preference for manual forms?*

In the case of pointing signs, we might ask questions such as:

- 6) Do children acquiring sign languages produce so-called “primary” and “secondary” points in the same timeframe as children acquiring speech?*

7) When children learn lexical distinctions in pointing signs (e.g., handshape distinctions expressing person and number) or lexical signs involving pointing (e.g. body-part terms) do they reliably produce both the indexicality and the conventional features?

8) Does indexicality help in children's sign learning (e.g. for words related to cognition) or is it irrelevant? (For analogous debates about whether iconicity helps, see Ortega 2017).

9) When do children begin to understand and produce signs used to establish—and refer back to—referential loci?

10) What culture-specific features of pointing are retained when points are integrated into new sign languages? Since the primary creators of new sign languages are typically deaf children, does the process of language development have an effect on what pointing features are retained?

These questions, of course, are just a start. Further developmental issues will inevitably arise as we gain a better understanding of regularities in pointing gestures, regularities in pointing signs, and in where these two uses of pointing diverge. Once we switch mindsets—from thinking of pointing as a simple, uniform behavior to thinking of it as a sometimes complex, multiform one—it becomes clear just how many questions remain unanswered and how much work is left to do.

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