

Fifteen ways of looking at a pointing gesture

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Abstract:

The human pointing gesture may be viewed from many angles. On a neutral description, it is an intentional movement, often of the hand, by which one person tries to direct another's attention—it is, in short, a bodily command to look. But this bland definition is only a start. Pointing may also be seen as a semiotic primitive, a philosophical puzzle, a communicative workhorse, a protean universal, a social tool, a widespread taboo, a partner of language, a part of language, a fixture of art, a graphical icon, a cognitive prop, a developmental milestone, a diagnostic window, a cross-species litmus test, and an evolutionary stepping-stone. These fifteen ways of looking highlight the diverse dimensions of one our most unassuming, ubiquitous behaviors. Pointing appears so widely, and in so many guises, because of what it embodies: a distinctively human preoccupation with attention.

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1. Introduction

Leonardo da Vinci had a number of obsessions: water, trees, shadows, optics, anatomy, geometry, and, according to a recent biographer, the human pointing gesture (Isaacson, 2017). In several of his paintings and sketches, figures aim their index fingers upward or outward, usually out of frame. In *The Last Supper* (1495-96), the apostle Thomas points heavenward; in the Paris version of the *Virgin of the Rocks* (1483-86), a winged angel points to the left; in *A Woman in a Landscape* (1518-19), sometimes known as the “pointing lady” sketch, a solitary subject points rightward; in *Saint John the Baptist* (1513-16), the figure directs a beguiling smile at the viewer and a swooping finger at the sky (Fig. 1). The upward pointing gesture, considered an allusion to the divine, was a particular signature of Leonardo’s. When the painter Raphael paid homage to Leonardo in his *School of Athens* (1509-11) fresco, he portrayed Plato in Leonardo’s likeness and depicted him pointing up (Isaacson, 2017, p. 449).

Why would a mind that compassed and canvassed so much become fixated on such an apparently unremarkable gesture? We can only guess. Perhaps his interest in pointing grew out of his fascination with the postures of the hand. No doubt he understood its role in social interaction, its central place among the forms of bodily communication he studied throughout his life. Likely he recognized the gesture’s capacity to wrench attention—a capacity that a painter could appreciate and exploit. Speculatively, he may have registered in pointing something enigmatically human.



Fig. 1. A selection of pointing gestures in the art of Leonardo da Vinci. *Top left:* Detail of *The Last Supper* (1495-96) mural in which the apostle Thomas points upward (Image: public domain). *Top right:* Detail of the *Virgin of the Rocks* (1483-86) painting (Paris version), depicting an angel pointing to baby Jesus (Image: public domain). *Bottom left:* Detail of a sketch known as a *Woman in a Landscape* (1518-19) (Image: Royal Collection Trust / © Her Majesty Queen Elizabeth II 2019). *Bottom right:* Detail of the painting *Saint John the Baptist* (1513-16) (Image: public domain).

Leonardo is not the only one to see something special in pointing. Philosophers, anthropologists, rhetoricians, artists, linguists, psychologists, semioticians, educators, primatologists, neurologists, and others have all keyed on the gesture at one time or another. Pointing enters into discussions about cross-cultural etiquette, about sign languages, about neurological disorders, about the nature of meaning, about what separates man from brute; it features in diagnostic manuals, philosophical treatises, animal training handbooks, and travelers' accounts. These diverse treatments show that, for such a seemingly simple behavior, pointing proves to be remarkably multilayered. Here I separate out these layers, examining in turn the major ways that pointing has been—and can be—viewed. In so doing, I aim to present the fullest portrait yet of a humble gesture that some have nonetheless found mesmerizing.

But what is this humble gesture? How might we define it? On a bland description, a pointing gesture is a movement one person makes to direct the attention of another (e.g., Clark, 2003; Cooperrider, Slotta, & Núñez, 2018; Eco, 1976; Kendon, 2004). It's a gestural jutting out—a “movement toward” (Eco, 1976, p. 119)—that embodies a command to look in a particular direction. In many cultures, this movement prototypically takes the form of an extended arm and index finger. Some describe it as “projecting” an imaginary line toward its target (e.g., Talmy, 2017). The gesture's effect is almost jarring: it commands and redirects a viewer's attention as soon as it is registered (Langton & Bruce, 2000).

With a working definition in hand, we can now consider the different ways the gesture has been—and may be—understood. We will consider fifteen in all, beginning with how pointing is understood in semiotics and philosophy; then we move to how it is seen in multimodal interaction research and anthropology; next to how it is understood in linguistics;

then to how it figures in visual culture; and, finally, to how it is seen across various subfields of cognitive science.

2. A semiotic primitive

Pointing has often been singled out as one of the most basic ways a person can convey something to another. Wilhelm Wundt considered pointing “not only the simplest, but also the most primary gesture in the effort to communicate” (Wundt, 1973, p. 74). Ludwig Wittgenstein wrote: “If I want to show a person the way I point my finger in the direction he is to follow, and not the opposite one... It is in human nature to understand pointing a finger *in this way*. And thus the human language of gestures is in a psychological sense primary” (Wittgenstein, 2005, p. 46, original emphasis). Collinson (1937) summarizes the idea of pointing as a semiotic primitive plainly: “The simplest and most universal form communication is gesture and the simplest kind of gesture is the act of pointing” (p. 17). Remarks like these belong to a long tradition in which pointing has been considered “ontologically primeval” (Haviland, 1993, p. 12).

Some pronouncements about the primitive nature of pointing have had practical motivations. In 1800 Joseph-Marie Dégerando, a French philosopher and proto-anthropologist, published a guidebook for European travelers who wished to observe “savage peoples” in distant lands (Dégerando, 1969). When encountering natives, he advised, it is best to rely on the “language of action”—that is, gestures. He noted that indicating gestures are the ones whose “effect is most sure, and least subject to ambiguity.” He continued: “We must think to describe only when we can not *point out*” (p. 71; original emphasis). Many participants in “first contact” scenarios seem to have intuited Dégerando’s advice (Hewes, 1974; see also Bonvillian, Ingram, & McCleary, 2009). Martin Frobisher, traveling in the Arctic in the 1500s, described how a

native interlocutor conveyed that his party would return in three days by “making signes with three fingers, and pointing to the Sunne” (Hewes, 1974, p. 10). Commodore Byron, describing an encounter with the indigenous inhabitants of Patagonia in 1764, recorded: “During our pantomimical conference, an old man often laid his head down... and afterwards pointed first to his mouth, and then to the hills, meaning, as I imagined it, that if I would stay with them till morning they would furnish me with some provisions” (Hewes, 1974, p. 20). In situations like these, with no shared communicative conventions in place, pointing proves preeminently handy.

Other pronouncements about the primitive nature of pointing have had theoretical motivations. Pointing has often figured centrally in broad treatments of how humans mean for each other. For Charles S. Peirce, progenitor of semiotics, pointing exemplified one of three fundamental sign types (Peirce, 1940; see Goudge, 1965 for discussion). In his framework, these types differ in how they evoke their objects: *icons* bring to mind their objects because they resemble them; *symbols* bring to mind their objects because of a learned association; and *indices* like pointing “direct attention to their objects by blind compulsion” (Peirce, 1940, p. 180). An index—whether in the form of a pointing gesture, a thunderclap, a weathervane, or a rap at the door—“exercises a real physiological force over the attention” (Goudge, 1965, p. 56). This trichotomy has since been taken up and refined. Following Peirce, Clark (2003, 2016) distinguishes three basic methods of human communication—depicting (that is, using icons), describing (that is, using symbols), and indicating (that is, using indices) (see also Ferrara & Hodge, 2018). One can indicate in a variety of ways—by brandishing, touching, or presenting an object—but pointing is the exemplar.

A related tradition treats pointing as a paradigm case of joint attention, the condition in which two or more people are attending to something together (Kockelman, 2005; Tomasello,

2008). In turn, such accounts view joint attention as an “exemplar of semiosis” and a “condition of possibility for language socialization and cultural socialization more generally” (Kockelman, 2005, p. 237). Seen this way, as a symbol of our species’ capacity for joint attention, the pointing gesture becomes implicated in the very foundations of meaning making.

3. A philosophical puzzle

Simple as it may seem, others have stressed that pointing is less than straightforward. Consider the act of trying to teach someone the meaning of a word by pointing out what it refers to. This is known as *ostensive definition*, and it has long been a philosophical fixation. In his *Confessions*, written around 400 CE, St. Augustine described it as central to language learning: “When they [my elders] named some object, and accordingly moved towards something, I saw this and I grasped what the thing was called by the sound they uttered when they meant to point it out” (Augustine, 1996, I.8). Wittgenstein quoted this passage at the outset of his *Philosophical Investigations*, and then proceeds to question whether one could really learn language in this way. How, he wondered, could one convey something’s properties simply by pointing to it? “Point to a piece of paper.—And now point to its shape—now to its colour... How do you do it?” (Wittgenstein 1953, section 33). The target of the point is always the same, after all; only its intended meaning changes.

Quine shared such worries. He invited readers to imagine themselves in the company of a speaker of an unfamiliar language. As a rabbit hops past, your companion cries “Gavagai!” Can you assume that *gavagai* means ‘rabbit’? And can you confirm that it means ‘rabbit’ by pointing to other hoppers-by and asking: “Gavagai?” Unfortunately not, wrote Quine, as the meaning of the word, despite the gesture, is hopelessly underdetermined: “Point to a rabbit and you have

pointed to a stage of a rabbit, to an integral part of a rabbit, to the rabbit fusion, and to where rabbithood is manifested” (1960, p. 52-53). Anecdotes abound about how pointing gestures in Gavagai-like circumstances have been misconstrued. Reportedly, the indri lemur of Madagascar got its name when a French naturalist, Sonnerat, recorded a native guide shouting “Indri!” while pointing to one of the animals. But *indri* in the native language, Malagasy, simply means ‘Look there!’ (discussed in Clark & Sengul, 1978). The truth of this anecdote remains debated. Hacking (1981) claimed to debunk the story, and questioned whether there has ever been such a “malostension.” But the veracity of such stories is beside the point: what is crucial is the observation that a pointing gesture does not single-handedly identify a referent. All it says is “look in this direction, and infer what I’m getting at” (see Tomasello, Carpenter, & Liszkowski, 2007).

Pointing is puzzling enough when it picks out something right there for all to see—what Quine (1968) refers to as *direct ostension*. The puzzles multiply when someone points to something present as a way of referring to something that is not—what he dubs *deferred ostension* (Borg, 2002; Nunberg, 1993). Quine’s examples of the latter involve someone pointing to a car’s gas gauge to refer to the gasoline, or pointing to grass to refer to the abstract property of green-ness. Elsewhere, deferred ostension has been called “metonymic pointing” (Cooperrider, 2014; Le Guen, 2011). The idea is that what is actually pointed to—the target—serves as a metonymic portal to what is meant—the referent. A commonplace example occurs when a person points to their own chest when referring to “we” (Cooperrider, 2014)¹. The fact that people point metonymically makes the meaning of “Gavagai!” all the more inscrutable. It

¹ Even a point to the chest with “I” arguably involves a metonymy, as a conventional location stands for the abstract concept of self. Such an interpretation becomes more compelling when we consider that, in some places, one can refer to the self by pointing to a different conventional location: the nose (e.g., Davis, 2010).

could mean ‘brown,’ ‘furry,’ ‘rodent,’ ‘non-human,’ ‘animal,’ ‘lunch,’ among countless other associated concepts (Tallis, 2010). The transparency of pointing is—at least sometimes—an illusion.

4. A communicative workhorse

Primitive perhaps, puzzling sometimes—but one thing that is inarguable about pointing is that it is pervasive. The gesture is a workhorse of everyday communication, prominent in contexts such as direction-giving (Kita, 2003; Kita & Essegbey, 2001), doctor-patient interactions (Gerwing & Li, 2019), work meetings (Mondada, 2007), guided tours (Kendon, 2004), museum visits (Winghager, Atzwanger, Bookstein, & Schaefer, 2011), archaeological digs (Goodwin, 2003), talk show interviews (Cooperrider, 2014), mathematics lectures (Alibali, Nathan, & Fujimori, 2011; Knoblauch, 2008)—and no doubt countless other contexts that await close study. In naturalistic settings like these, pointing may in fact be the most commonly used gesture type of all, more common than depictive gestures or conventional emblems like the “thumbs up.” One group of researchers filmed 25 Aka men in the Central African Republic who were gathered to cook and socialize, and found that pointing accounted for more than 60% of their gestures (Robira et al., 2018). Similarly, Alibali et al. (2011) examined math lectures in the United States and Japan and found that attention-directing movements—chiefly pointing, but also other forms of indicating—accounted for more than 60% of gestures.

Why is pointing so pervasive? The answer likely lies in its several virtues. One is immediacy: The gesture captures and steers attention with a forcefulness that speech cannot match, as suggested by Peirce (1940). Another is efficiency: Pointing can sometimes offer a degree of spatial precision that is difficult to verbalize (Bangerter, 2004), helping single out a

specific star in spangled sky or particular fish in a bustling aquarium. A third virtue is flexibility: Joined with a bit of imagination, pointing is remarkably far-reaching, hardly limited to what is visible and concrete. People readily point through walls (Bühler, 1990); they point as if from somewhere other than where they are standing (Haviland, 1993); they point to temporal landmarks (Cooperrider, Núñez, & Sweetser, 2014), and to other entities that exist only the imagination (McNeill, Cassell, & Levy, 1993; Stukenbrock, 2014); they point to now-empty locations to refer to what was previously there, beginning at a very young age (e.g., Bohn, Call, & Tomasello, 2015); and they point to metonymic portals, as previously discussed—to the gas gauge to refer to gas but also to a person’s house to refer to the person (Levinson, 2007) or to a spot on the sun’s arc to refer to a time of day (Floyd, 2016).

Pointing is widely used, but is widely understood? In short, yes. Children begin to extract meaning from pointing gestures at a young age (Thompson & Massaro, 1986), and they rely on pointing more than words when the two are in conflict (Grassmann & Tomasello, 2010). So effective is pointing in reorienting children’s attention that mothers in the village of Gapun, in Papua New Guinea, try to quiet fussy infants by pointing into the jungle at non-existent pigs (Kulick, 2019). In adults, pointing is processed automatically (Langton & Bruce, 2000), and with a remarkable degree of precision (Bangerter & Oppenheimer, 2006; Cooney, Brady, & McKinney, 2018). It speeds communication, helping listeners arrive more quickly at an intended referent (Louwrese & Bangerter, 2010). Listeners take pointing gestures into account when interpreting what a vague utterance means: They will read a comment that “the flies are out” as an indirect request if it is accompanied by a point to an open screen door (Kelly, Barr, Church, & Lynch, 1999). Listeners even process points to empty space: If a speaker regularly points to the left when talking about Shakespeare and the right when talking about Goethe, a later change in

spatial assignment will screw them up (Gunter & Weinbrenner, 2017; see also Gunter, Weinbrenner, & Holle, 2015). Similar effects have been found in children as young as 7-8 years old (Smith & Hudson Kam, 2015). Listeners also appreciate metonymic pointing. Floyd (2016) showed that Nheengatú speakers extracted the time of day from points to the sun's arc; they also tended repeat the pointing gesture when asked what a speaker "said" and to quietly correct it when it was inaccurate.

Pointing also serves as a communicative workhorse when spoken communication is not possible. It pervades cultural contact scenarios, as mentioned (Hewes, 1974). Goodwin (2003) described the case of Chil, a severely aphasic man who managed complex utterances and narratives with the help of a few words ("yes," "no," "and") and a lot of points. Pointing is a fixture of the sign systems used in work environments where speech is difficult, such as the sawmill languages of British Columbia (Meissner, Philpott, & Philpott, 1975). It is also a cornerstone of "homesign"—the gestural systems of communication that profoundly deaf individuals create when they cannot access spoken language and are not exposed to a conventional sign language like American Sign Language (ASL) (Goldin-Meadow & Mylander, 1984; see also Kendon, 1980a, 1980b, 1980c). Points remain prominent as sign languages grow and become increasingly codified. A corpus analysis of Kata Kolok, a village sign language in Bali, found that 16% of signs were pointing signs (de Vos, 2014). Comparable percentages have been reported in Auslan (Johnston, 2013) and ASL (Morford & McFarlane, 2003). The most frequent sign in several sign language corpora is the first person pronoun, consisting of an index finger point to the chest (e.g., Fenlon et al., 2014). Invariably, across settings and cultures, in both spoken and signed communication, pointing proves indispensable.

5. A protean universal

Wherever you go, people point; the gesture is, by all accounts, a human universal (Cooperrider et al., 2018; Eibl-Eibesfeldt, 1989). And wherever you go, people point at least sometimes with the extended forefinger². This is the canonical form of pointing in many places, and, accordingly, speakers of many languages refer to the forefinger as the “index finger” or “pointer finger.” (The word *index*—along with *indicate*, *deixis*, and *deictic*—traces to a Proto-Indo-European root meaning ‘to show’ [“index,” n.d.]) Such labels are found not only in English and European languages but also in Iranian (Filippone, 2010), Turkic (Yong-Song, 2016), and Amerindian languages (Trumbull, 1874)—and possibly universally³. Why is the index finger used for this purpose, as opposed to some other digit? Some researchers have noted that when the human arm is held vertical and the hand is allowed to dangle, the index finger sticks up relative to the other digits (Povinelli & Davis, 1994). (In some languages, the forefinger is also known as the “one who stands erect,” perhaps alluding to this biomechanical fact [Filippone, 2010].) Others have noted that index finger extension is the bodily antithesis of a precision grip posture, in which a small object is gripped between forefinger and thumb (Butterworth, 2003). Whatever the reason, it is clear that when humans need to extend a single finger, it is the forefinger that they prefer. A survey of ten sign languages found that signs that involve extending a single finger overwhelmingly involve extending the index finger; the pinky is a distant second (Woodward, 1982).

² There is at least one informal report of a group, in Papua New Guinea, that never points with the index finger (Wilkins 2003, p. 176). Absence is notoriously difficult to demonstrate, however—and impossible to demonstrate with informal reports.

³ The association between pointing and the forefinger is so strong that many label *any* gesture that involves forefinger extension “pointing.” An example is the rhetorical gesture that involves poking the digit upwards while raising an important point or new insight. Kendon (2004, p. 142) dubs this the “nomination deictic”; I prefer to refer to it as a variety of “pseudo-pointing” to make it clear that it is not, in fact, deictic.

Prototypes aside, pointing is remarkably protean. The core function of pointing, again, is to direct a listener's attention, and this can be done using a number of body parts, in different configurations. The whole hand is an obvious choice. Children use this form of pointing frequently (e.g., Cochet & Vauclair, 2010), as do adults in certain contexts (Flack, Naylor, & Leavens, 2018). When English speakers point to themselves, they usually use the whole hand, sometimes pressing it against their chest⁴ (Cooperrider, 2014). Blind speakers favor pointing with the whole hand, as do sighted people when blindfolded (Iverson & Goldin-Meadow, 2001). Even when extending digits, other configurations are possible. When pointing to something at one's back, the thumb serves well (Kendon, 2004, p. 218-22). At Disney resorts, employees are trained to point with the index and middle finger joined together, putatively in imitation of Walt Disney's signature cigarette-in-hand pointing technique (Luu, 2017). Genie, a child who was tragically unexposed to language or communication from a very young age, favored pointing with her middle finger (Looney & Meier, 2014).

Several have argued that the form of one's pointing gesture is not an arbitrary choice but reflects what one is doing in discourse (Kendon, 2004), or how one is construing what one is pointing to (Cooperrider, 2011). On these accounts, the index finger is well suited to singling out a focal object (Kendon, 2004), while full-hand sweep may be better suited for indicating a broader area, such as a mural, mountain range, or group of people (Cooperrider, 2011). (In his Gavagai musings, Quine [1968, p. 189] suggested in passing that one might "indicate the whole rabbit with a sweeping gesture.") Several scholars have proposed rich taxonomies of pointing form; these show how, through a combination of handshape and motion pattern, people indicate referents of astounding variety (Hassemer & McCleary, 2018; Talmy, 2017). Pointing gestures

⁴ Not to be confused with the "hand to heart" gesture that Hilary Clinton adopted during her 2016 presidential campaign (Stanley, 2016), which is identical in form but different in meaning.

also vary in size: when people point to something central to their message, they extend their arms more fully (Enfield, Kita, & de Ruiter, 2007).

When we look across communities, variations in pointing form multiply. There are no reports of a culture that favors pointing with some finger *other* than the index—but this digit may not be equally privileged everywhere. In Arrente, an Australian Aboriginal group, some pointing handshapes have dedicated purposes: the “horned hand” is used when indicating the general direction in which a place lies, rather than the path being used to get there (Wilkins, 2003). Khoisan hunters use different handshapes to point out different things, for instance using a thumb pressed into the index finger to indicate animal tracks (Hindley, 2014). In the Casamance region of West Africa, people sometimes emphasize a point by accompanying it with a finger snap (Krajcik, 2017). In many parts of the world, people point to more distant targets with the arm pitched sharply upward. This convention—reported in Australia (Wilkins, 2003), Madagascar (Sibree, 1884), and Mesoamerica (Mesh, 2017), among many other places—likely stems from the fact that further locations appear to be higher up in the visual field. The gesture greatly exaggerates this apparent height, however, sometimes aiming almost vertically (Mesh, 2017).

Hands and arms are not the whole story, either. Another natural choice for pointing is the head. Particularly when the hands are occupied, Westerners point by nodding, tossing, or jutting their heads toward targets (McClave, 2000; Emmorey & Casey, 2001), a behavior that has been proposed as a candidate human universal (McClave et al., 2007). Other cultures accompany their head points with conventional facial actions. The most widespread of these is lip-pointing, which involves pursing, protruding, or funneling the lips while looking toward a target of interest; the gesture is globally distributed, with scholarly studies of its use in Panama (Sherzer,

1973), Laos (Enfield, 2001), Peru (Mihas, 2017), Australia (Wilkins, 2003), Nigeria (Orie, 2009), and China (Li & Cao, 2019), among many other in-passing mentions and informal discussions. Another form of conventional facial gesture is nose-pointing, found in parts of Papua New Guinea (Cooperrider & Núñez, 2012; Kendon, 1980b). It involves scrunching the face together while aiming the gaze toward a target (Fig. 2).



Fig. 2. Two forms of pointing common in the Yupno valley of Papua New Guinea. *Top:* A Yupno man points with an extended index finger to a depiction on the ground (Image: author). *Bottom:* A Yupno man (left) nose-points toward an object by directing his gaze and scrunching his face together, a conventional form of pointing in some parts of Papua New Guinea (Image: author).

Ethnographers have sometimes reported that non-manual pointing is not only present in a given community, but is preferred over manual pointing (e.g., Bailey, 1942; Everett, 2005; Sherzer, 1986; Sibree, 1884). But only recently have preferences for manual versus non-manual pointing been directly assessed (Cooperrider et al., 2019; Li & Cao, 2019). Using a referential

communication task, Cooperrider et al. (2018) quantified pointing preferences in the Yupno, a group that uses nose-pointing; in contrast to Americans, who strongly favored the index finger, the Yupno were equally like to point non-manually and manually. Beyond fingers, hands, and heads, there are still other options for pointing—a laser pointer, in modern lecture halls⁵, or a machete in the Brazilian hinterland (Floyd, 2016). Pointing is universal and ubiquitous, but also remarkably protean.

6. A social tool

Beyond its basic function of orienting attention, pointing often adds shadings of social meaning. These shadings are sometimes negative. One of the very first observers of gesture, the classical rhetorician Quintillian, noted that pointing is used not only in indication but also in “denunciation” (Quintillian, 1922, Book XI). Eibl-Eibsfeldt (1989, p. 485) discussed a series of photos depicting a “pointing duel” between two !Kung boys. The threatening tone of pointing has sometimes become the stuff of spectacle, as during the 1959 “Kitchen Debate” when Nixon and Khrushchev exchanged pointing jabs (Larner, 1986) (Fig. 3). In some places, pointing figures in “aggressive magic” (Roheim, 1925). The gesture is also used in the course of reprimand. André (2010, p. 222) discusses the example of a young boy scolding a toy, presumably in imitation of having been scolded this way himself (see also Calbris, 1990, p. 118-9). Sherzer (1973) describes how the Kuna of Panama use lip-pointing in the course of mockery. In ASL, the sign for MOCK involves two hands pointing with the index finger, as do other signs that involve negative interactions between people (Roush, 2011). In both English and Chinese, idioms use “finger pointing” as an image for accusing and blaming (Yu, 2000).

⁵ Pointing in lectures is commonly done with laser pointers and other “prosthetics”—that is, tools that extend the reach of the pointing arm (Tallis, 2010).



Fig. 3. An interaction between Richard Nixon, then Vice President of the United States, and Nikita Khrushchev, then Soviet First Secretary, during the so-called “Kitchen Debate” of 1959. At several moments during the episode—as Nixon would later recall—the men pointed to each other in an aggressive manner.

Pointing can also contribute positive shadings of social meaning. A speaker may point to the previous speaker as a way of showing agreement with what was just said (Healy, 2012)—a kind of bodily “Definitely!” In group conversations, people will point to a present party when referring to something that party said previously, a form of nonverbal “citation” (Bavelas, Chovil, Lawrie, & Wade, 1992). At least to some observers, pointing conveys authoritativeness: Children find people who point more credible than those who do not (Palmquist & Jaswal, 2012). Pointing is also deployed in greeting, as a jokey way of saying, “Hey there!” or “I see you!” (Sherzer, 1973). In the US at least, jocular greeting points are sometimes accompanied by a wink, produced with two hands, or are made to look like shooting a gun; they are also common fodder for GIFs (Fig. 4).



Fig. 4. Stills from GIFs in which pointing functions as part of a jocular greeting or acknowledgment. Such points may be produced with two hands, accompanied by winks, or embellished in other ways.

Pointing does subtler social work, too. A speaker may produce a casual, small point as a way of making sure a listener knows what they are talking about—while also not rudely implying the listener does *not* know, as a larger point might (Enfield et al., 2007). Mondada (2007) describes how, during collaborative works sessions involving shared artifacts, pointing gestures serve as a signal that one wants to hold the floor. As with any communicative signal, pointing has a basic meaning that is enriched in context, taking on new shadings depending on who is pointing, when, and how.

7. A widespread taboo

As useful and ubiquitous as pointing is, it is also often subject to prohibitions. This may be because of the negative shadings of aggression, reprimand, or mockery that it sometimes

carries⁶, or because it draws unwanted attention. Pointing has been described as a way of “doing focused looking” (Kendon, 2009, p. 359) and a representation of gaze (Cappuccio, Chu, & Kita, 2013), and is thus akin to staring. Travel guides to various parts of the world often assert that pointing to people in particular should be avoided (e.g., Rodgers, 2019). Some have wondered whether a taboo on pointing to people might be universal (Dupoux, 2011)—or might have once been universal, as it is far from clear that such a taboo is still observed. Several studies have examined points to persons in Western communities (e.g., Fenlon et al., 2019; Healey, 2012), suggesting it is not particularly scarce. At the same time, there is evidence that speakers in such groups point differently when indicating people, favoring less “pointy” handshapes (Jarmołowicz-Nowikow, 2014; see Fenlon et al., 2019 for a similar pattern). The idea that less “pointy” forms are less likely to carry negative meanings may be why politicians sometimes avoid using an extended index finger in their rhetorical gestures—giving rise, for example, to Bill Clinton’s signature gesture, known as the “Clinton thumb” (Shwarz, 2015). It may also be the deeper reason behind the two-fingered “Disney point,” stories about Walt’s pointing proclivities notwithstanding.

Beyond Anglo-European communities, taboos on pointing are sometimes taken more seriously. In parts of Africa, pointing with the left hand is considered taboo, as the left side is associated with toileting and other profane functions. Kita & Essegbey (2001) studied this in Ghana by stopping people in the city of Keta, and asking for directions to nearby locations. The left-hand taboo had clear consequences: People would sometimes strain to point across their bodies with their right hand, or conspicuously tuck their left hand behind their backs, and or join

⁶ Why it carries these connotations is an open question. The aggressive flavor may arise from pointing’s resemblance to stabbing (see Roheim, 1925, p. 90-92) or, more generally, from the notion that pointing is conceived as projecting an arrow-like—and thus potentially puncturing—force.

both hands together before pointing. Sometimes, while the right hand extended out to point, the left hand, though limp at the person's side, would quietly extend its index finger—a behavior the authors describe as “semi-pointing” (though “pseudo-pointing” might be more appropriate). In Malaysia, people sometimes use a “forward thumb” handshape to point, to avoid the transgressive edge of the index finger (Mechraoui & Noor, 2017, p. 69). In Aboriginal Australia, interactions between certain kin relations require special circumspection; sometimes in these contexts people will thus point with an elbow, knee, or fist (Green, 2019). What all these varieties share is the apparent drive to defang finger pointing by using a blunter morphology—a phenomenon that Blust (2019) has described as “avoidance deixis.”

Many cultures also observe strict taboos about pointing to entities other than people. Among the Zulu, pointing toward objects associated with the ancestors is forbidden; pointing to crops will make them die, and the pointer's arm may become diseased (Raum, 1973, p. 437). In Madagascar it is prohibited to point to whales, sharks, or large octopuses with the extended index finger (Astuti, 1995). Among the Kedang of Indonesia, one should not point to Ursa Major, or to still-growing pumpkins (Barnes, 1973, p. 621). A particularly puzzling case is the widespread taboo on pointing to rainbows (Blust, 2019). This taboo is also observed by the Kedang, who believe that by pointing to a rainbow “one runs the risk of having one's fingers permanently bent” (Barnes, 1973, p. 621). Similarly, in the Navajo tradition, if you point to a rainbow it will “cut off or break” your finger (Bulows, n.d.); in Hungary, it is said the offending finger will wither away (Lee & Fraser, 2001). Many further variants of this taboo could be adduced; Blust (2019) reports cases of it from every continent.

Taboos on “pointing” with other body parts are also attested. In Laos, there is a general prohibition on pointing with the feet. Wilkins, Kita, & Enfield (2007) write that, whereas the

taboo on pointing to people is treated somewhat casually, pointing with the feet is “quickly and forcefully sanctioned” (p. 94). In December of 2008, a sculpture of Santa in only his undergarments caused a stir in Palermo, Italy because his crotch was aimed in the direction of a local church (Lorello, 2008). Such examples highlight another reason that pointing may become taboo: it implies some congress between the pointer and the pointed to, and this congress may be seen as untoward. Fanciful and diverse as pointing prohibitions are, all stem from a seemingly universal recognition that the gesture is powerful and must be used with care.

8. A partner of language

Pointing is sometimes complete on its own—a wordless command, request, greeting, or tip. But more often points come partnered with words and often those words are *demonstratives* (e.g., Bühler, 1934; Dixon, 2003; Diessel, 1999; Peeters & Özyürek, 2016). This class of words—which includes *this*, *that*, *here*, *there*, *these*, and *those* in English—in many cases require a pointing gesture or other visual demonstration to make sense, hence the term. “I’ll have this one,” said pointing to a full pastry case, is incomplete without a gesture that specifies *which*. Some researchers have thus characterized gesture as an “obligatory” partner to demonstratives (Wilkins & de Ruiter, 1998; Levelt, Richardson, & La Heij, 1985; see discussion in Lücking, Pfeifer, & Rieser, 2015). This over-states the case, however: *This* and *that* can be used without a pointing gesture as long as the referent is salient enough for other reasons (Clark, Shreuder, & Buttrick, 1983; Talmy, 2017). For example, when a man walks into a bar in a head-turning costume, one can refer to him as “that guy,” with no point needed. Nonetheless, it is broadly agreed that those demonstratives supported by pointing—sometimes termed “gestural” uses of demonstratives (e.g., Fillmore, 1982)—are primary.

When demonstratives and pointing gestures join forces, they form a special type of utterance (Cooperrider, 2016). Speakers only produce a co-demonstrative point when they are confident their gesture can single out the intended target. Thus when speakers are farther from a target, they continue to point but stop supplementing those points with demonstratives (Bangerter, 2004); and when people have a laser pointer—enabling them to single out a target at any distance—they supplement their points with demonstratives all the more (Cooperrider, 2016). There is also evidence that speakers produce co-demonstrative points with a greater degree of arm extension, as though they recognize the gesture bears more of the communicative load (Cooperrider, Fenlon, Keane, Brentari, & Goldin-Meadow, 2020).

The association between pointing and demonstratives is all the more interesting in light of certain properties of demonstratives. Demonstratives, after all, are interesting company to keep. For one, this word class appears to be found in every human language (Diessel, 1999; Himmelman, 1996). (This may not sound impressive, but consider that not all languages have adverbs and or even adjectives [Evans & Levinson, 2009]). Demonstratives are also among children’s first words (Clark & Sengul, 1978; Diessel, 2006). And, most remarkably, demonstratives appear to be especially ancient. This can be inferred from the fact that they cannot be traced to earlier words; their etymologies simply cannot be reconstructed (Diessel, 2006)⁷. No other word class boasts this property—indeed, even the most workaday function words usually have discernible roots. For example, *the* can be traced back to an earlier form—the demonstrative *that*, in fact. This un-traceability suggests that demonstratives may have been

⁷ The claim that demonstratives cannot be traced to earlier words has not gone unchallenged. Copeland (2000), for example, proposes that the Tarahumara demonstrative includes a root for ‘hand,’ and, accordingly, he describes the form as “a lexicalized manual gesture.”

present at the very first stirrings of human language; and, if they were, it was likely along with their steadfast partner, pointing.

9. A part of language

Outside of discussions of demonstratives, there is not much mention of pointing in linguistics textbooks. The gesture rarely attracts attention in descriptive grammars or dictionaries. Spoken language linguists view pointing—like other gestures, facial signals, and vocal modulations—as essentially outside of language, as so-called paralinguistics. With sign languages, however, the situation is different: Pointing pervades signed communication, and serves many of the functions served in spoken languages by pronouns, demonstratives, locatives, and other basic word classes. Personal pronouns—words like *I*, *you*, *they*—have attracted particular attention; in sign languages, these are produced as points to the speaker’s own chest, to the listener, or to a third person (e.g., Friedman, 1975). Debate persists about whether these should be treated as analogous to spoken language pronouns or rather as “just” pointing gestures (e.g., Cormier, Schembri, & Woll, 2013; Johnston, 2013; Meier & Lillo-Martin, 2013; Pizzuto & Capobianco, 2008). On the one hand, speakers also gesture toward themselves, their addressees, and to others when referring to *I*, *you*, and *they*; on the other, signers’ points are more rigidly conventionalized than gesturers’ points and thus appear to be more word-like (e.g., Fenlon et al., 2019). There are several other arguments for the pronoun-like status of person points (Meier & Lillo-Martin, 2013). One influential but controversial line of evidence comes from child development: Young signers occasionally show pointing reversals—indicating the addressee when they mean “I,” or themselves when they mean “you”—much as young speakers sometimes confuse these pronouns (Petitto, 1987; but see, e.g., Morgenstern, Caët, & Limousin, 2016).

Beyond points to persons, pointing signs are used in a range of other ways. One related use is to anchor reference to non-present third parties (e.g., Barberà & Zwets, 2013). If one wants to tell a story about two characters, one might start by pointing to empty space on the left and then right to assign a character to each location; later, one can refer back to those characters by pointing to their assigned locations (e.g., Perniss & Ozyurek, 2015), or use the locations to show actions that are directed toward those characters (e.g., Schembri, Cormier, & Fenlon, 2018). Sign languages also use points for locative (e.g., Fenlon, Schembri, Rentelis, & Cormier, 2013) and demonstrative functions (e.g., McBurney, 2002). Importantly, such points differ from spoken language locatives and demonstratives in at least one respect. Spoken languages make categorical distinctions in their locatives (*near, far*) and demonstratives (*this, that*). But when signers point, there are no such distinctions—they point to a continuous range of locations.



Fig. 5. Stills from a sampling of lexical signs in American Sign Language (ASL; top) and British Sign Language (BSL; bottom) that involve pointing. Body-part terms such as EYE and CHIN commonly involve a point, sometimes with the motion reduplicated. Verbs that are conceptually related to a body part—such as KNOW or DREAM—are often anchored to that part, though they may also involve iconic handshapes or motion patterns (All images: www.spreadthesign.com.)

Pointing also enters abundantly into sign language lexicons. Peruse a sign language dictionary and you'll find a number of signs of all word classes—nouns, verbs, adjectives—that involve pointing in some way (Fig. 5). Body-part terms are a clear case. In ASL, signs including EYE, NOSE, and CHIN are made by index-finger pointing to these features; terms for larger anatomical regions, such as LEG, BACK, and ARM, are produced by pointing with the whole hand (Pyers, 2006). These lexical items are often distinguished from more ad hoc pointing gestures by iterating the point. Further, signs for concepts related to body parts are often anchored to that part by pointing (Cooperrider, 2014; Kendon, 1980c). For instance, signs for 'dream' or 'forget' in several sign languages involves anchoring movement in the vicinity of the head. Speakers produce similar gestures (Cooperrider, 2014). Despite the superficial similarities

in how speakers and signers point, in many cases pointing signs have become more codified than their counterparts in gesture, and have thus become part and parcel of language.

10. A subject of art

Leonardo was by no means the first artist to depict pointing. For centuries before he painted the gesture on his canvases and drew it in his sketchbooks, people had been carving it into stone and weaving it into cloth (Fig. 6). An Egyptian house altar from 1350 BCE portrays a royal couple with three children clambering over them; one, a little girl, points with her index finger while looking back toward her mother. An ancient Zapotec cornerstone shows a figure pointing as a speech bubble rises from his mouth. The Bayeux tapestry, created in England during the 11th century, is rife with extended index fingers; a particularly vivid scene involves a group of men watching—and pointing to—what we now know as Haley’s comet (discussed in Cooperrider, 2011).



Fig. 6. Representations of pointing from the ancient world. *Left:* Detail of a limestone house altar from Egypt (c. 1350 BCE) depicting Nefertiti, with one of her daughters on her lap. The daughter is pointing toward her father, the Pharaoh Akhenaten, and looking back toward her mother (Image: Flickr user kairoinfo4u). *Right:* A Zapotec cornerstone (c. 200 CE) depicting a figure pointing, as a speech bubble arises from the mouth (Image: author).

This brief catalogue barely scratches the surface; pointing has been a fixture of representational art for centuries⁸. Several tropes and traditions can be identified. One vein, of which the Bayeux tapestry is an example, depicts people pointing to celestial phenomena. An especially pointing-rich example is a 1577 woodcut by Georg Mack depicting a comet over

⁸ Perhaps the most famous pointing gesture in all of art is not actually a pointing gesture. In Michelangelo's *The Creation of Adam* (c. 1512), a scene on the ceiling of the Sistine Chapel, God strains toward Adam with his index finger outstretched; Adam's own index finger appears to be just starting to extend, as if to receive it. God is not pointing at Adam, however, but rather appears poised to channel divine force into him, through the finger. This is thus another example of "pseudo-pointing."

Nuremberg. In Renaissance art, pointing gestures were legion, especially points directed upward in reference to the divine (Sherman, 2010). (A Spanish saying with a meaning comparable to “when pigs fly” translates as “when Saint John points downward,” in reference to John the Baptist.) For centuries, statues have shown a penchant for pointing. Examples include statues of Christopher Columbus in Barcelona, St. Elijah at St. Peters, Moses in New Orleans, and several status of Lenin pointing to the future (Fig. 7). Alberto Giacometti’s celebrated *Man pointing* (1947) was sold for more than 140 million USD in 2015, the most expensive sculpture ever. Pointing also figures in the postmodern playfulness of more recent decades. *Pointing arm* (1990), by Kevin Wolff, depicts an arm reaching around a mirror and pointing to itself. Michelangelo Pistoletto’s *Donna che indica* (1982) shows a woman pointing, her back turned toward the viewer; she is set in a large stainless steel panel—the effect is that she points to whatever or whoever is around her.



Fig. 7. Examples of statues pointing. *Left:* The *Monumento a Colón* in Barcelona, Spain. The statue depicts Christopher Columbus pointing east, perhaps toward his birth city of Genoa, Italy (Image: Flickr user David Berkowitz). *Right:* A statue of Moses in the New Orleans botanical gardens. The figure clutches a tablet in one hand and, with the other, points toward the divine (Image: Jordan Davison).

Why is pointing so common in art? Even allowing that it is one of our most commonly used gestures, it seems unexpectedly pervasive. One reason may be that it is one of few gestures that can be readily recognized in static form. Gombrich (1966, p. 395) wrote that “because art arrests movement... [it is] restricted in the gestures it can show unambiguously.” He added: “You cannot paint even the shaking of the head we use in the West for ‘no’.” But you can paint a point with no problem: In contrast to other gestures, it is usually held in place, the arm rising, fixing the target, and pausing at its apex. Another reason for the popularity of pointing is that it can suggest power relations—in Gombrich’s (1966, p. 394) words, it is “a sign of dominance universally understood.” In discussing the puzzling prevalence of pointing in Mesoamerican

codices, Olko (2014) also keys on its connotations of command and dominance. In the case of statues, pointing is also a natural choice because it places a figure in conversation with a broader setting. By pointing to a building or monument, or in a certain direction, a statue can command a grander stage than it otherwise would. But perhaps the primary reason pointing abounds in art is the same reason it abounds in life: It is an unmatched tool for orienting attention. Much of what artists do—or aim to do—is coerce and orchestrate attention. A pointing gesture is a potent, if unassuming, tool for doing precisely that.

11. A graphical icon

Beyond its use in particular works of art, pointing has long figured in visual culture as a stylized graphical device. In such uses, pointing is often carried out by disembodied hands—more or less detailed—that float on paper, stone, or screen. For centuries in Europe, beginning at least as early as the 12th century, pointing pervaded manuscripts in the form of the *manicule*—a term from the Latin word for “little hand” (Sherman, 2010). Manicules were small drawings of hands, usually in the margins, with their index fingers extending into the text to mark noteworthy passages (Fig. 8).

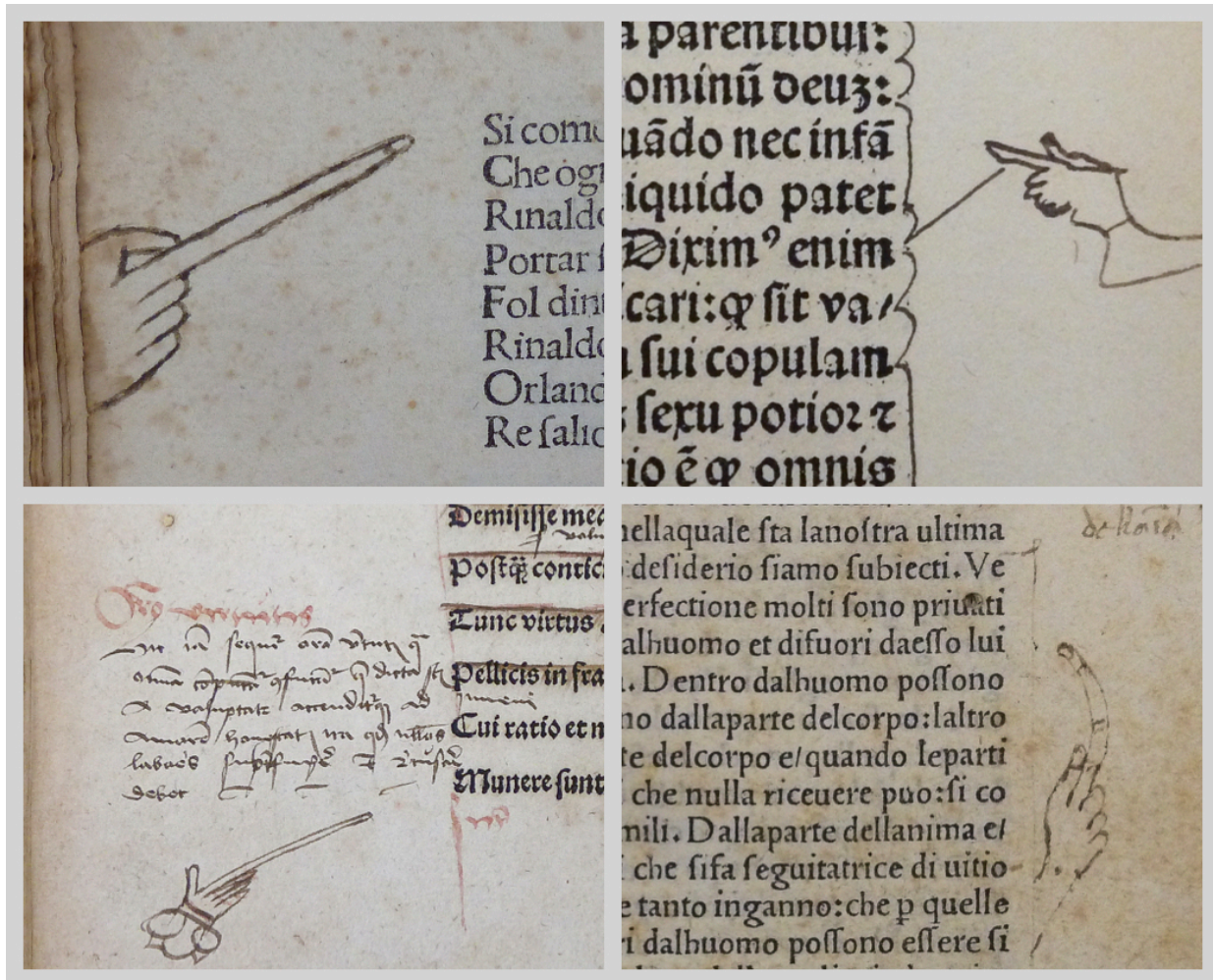


Fig. 8. Examples of manicules—small pointing hands—drawn in the margins of books (All images: Flickr user POP [Provenance Online Project]). Manicules were among the most common forms of marginalia for several centuries in Europe; they were often anatomically improbable and sometimes ornate.

These drawings were often fanciful, bordering on nightmarish: Some had creepily long index fingers, too many fingers, or fingers twisting in anatomically impossible ways. Others took the form of hands emerging from the bodies of beasts; some were not hands at all, but other human or non-human appendages (Houston, 2013; Sherman, 2010). Beginning in the late 1400's, stylized hands also served as printers' marks (Sherman, 2010). These were not merely an occasional adornment: Sherman (2010) writes that between the 12 and 18th centuries, manicules

“may have been the most common symbol produced both by and for readers in the margins of manuscripts and printed books” (p. 29).

Manicules—in the more general sense of disembodied hands—have also long been used in signage and print (McPharlin, 1942). (At some point, they appear to have been overtaken by the graphically simpler arrow. However, they can still be seen wherever old-timey style is visually referenced.) One context where such disembodied hands are sometimes seen is on fingerposts—those multi-armed road and trail signs that signal the direction and distance of various landmarks. Another is grave markers, which show hands pointing up or, much more rarely, down. By some accounts, the upward-pointing version represents “the hope of heaven,” whereas the downward-pointing version represents “God reaching down for the soul” and is associated with untimely death (Powell, 2018). Whether in books, signs, or grave-markers, manicules are now rarely used in earnest. Some claim they became so widespread that the public grew weary of them (Houston, 2013).

People today are perhaps most likely to encounter disembodied pointing hands on their screens. Early versions of the desktop cursor depicted a pixelated pointing gesture, instead of an arrow (Sherman, 2010). (Cursors are also called “pointers,” and in some interfaces the cursor converts to a gloved, index-finger pointing hand when hovering over a clickable object.) Currently, the pre-eminent use of pointing icons may be emoji, which are widely used in text messaging and social media. Pointing emoji have been around since 1991 and are available in four directions—pointing up, down, left, and right (Gawne & McCulloch, 2019). According to Gawne & McCulloch (2019), a common use of them is along with the demonstrative *this*, when trying to direct attention to a post above or below. Given the pervasiveness of pointing icons to

date, it's a safe bet that—whatever graphical environments come next—they will also feature disembodied, pointing hands in some form.

12. A cognitive prop

Pointing is a powerful tool for directing attention—including the pointer's own attention. In Japan, when a train enters a station, an employee may hop out and begin a crisp routine of *shisa kanko* (“point and call”) (Richarz, 2017). With no particular audience in mind, the worker proceeds through a series of safety checks, pointing to different targets in the process. Similar pointing-for-no-one behaviors can be observed in very young children. One study conducted a hide-and-peek task with 18-24 month old children (DeLoache, Cassidy, & Brown, 1985). The experimenter hid a toy (e.g., Big Bird) while the child watched; a timer was set, and the child was asked to wait. During the four-minute interval before they could retrieve the toy, the children talked about the to-be-remembered location, looked at it, and pointed to it. Similar “mnemonic” uses of pointing have been observed in 2-4 year old children (Delgado, Gómez, Sarriá, 2011). Informal observations of this type of “private pointing” go back decades, and have been used to argue that, when pointing first emerges in children, it emerges as a self-orienting behavior rather than as a social one (e.g., Lempert & Kinsbourne, 1985).

A domain in which private pointing is especially pronounced is counting. One study had adults look at photos of haphazardly strewn change—quarters, dimes, and nickels—and count it as quickly as possible. On half the trials, subjects were allowed use their hands to point to the photo and on the other half were not. When they could point, subjects counted faster and made fewer errors (Kirsh, 1995). Spontaneous pointing behaviors can also be observed in simpler counting tasks, beginning at a young age (Saxe & Kaplan, 1981; Gordon, Chernyak, & Cordes,

2019). And this pointing has benefits: Four-year olds were better at counting arrays of chips when they could touch or point to them—or, interestingly, when a pig puppet touched or pointed to the chips on their behalf (Alibali & DiRusso, 1999). Adults also point spontaneously in simple array-counting tasks and benefit from doing so; and, if prohibited from pointing, they turn to nodding instead (Carlson, Avraamides, Cary, & Strasberg, 2007). Even chimps spontaneously point when engaging in counting-like behavior, suggesting that the urge to use the hands to orient one's own attention in such tasks is deep-seated (Boysen, Berntson, Shreyer, & Hannan, 1995).



Fig. 9. Detail of *Temperance* (c. 1559-60), a print by Philips Galle, after Pieter Bruegel the Elder. A group of men are huddled together, absorbed in books. Several are pointing to their texts with writing implements or fingers, in an apparently self-directed manner.

Pointing-for-self may also be observed during reading. Small children often use their index fingers to point to or trace words as they sound them out. Apparently it's not only small people who do this. The print *Temperance* (1559-1560), after Pieter Bruegel the Elder, depicts a group of figures, hunched over inscriptions, using fingers or tools to follow the words (Fig. 9). (When reading Braille, blind people most often use their index fingers to scan text [Van Boven, Hamilton, Kauffman, Keenan, Pascual-Leone, 2000]). In the Jewish tradition, readers of the Torah use ritual pointers called *yads*, which often have a tiny pointing hand at their tip; originally at least, these served to keep greasy fingers off of fragile manuscripts.

Possible benefits of pointing-for-self during reading are unknown, but seeing others point appears to be helpful. Many educators emphasize the importance of various “print referencing”

strategies, including pointing, in getting children to attend to text (Justice & Ezell, 2004), and the benefits of these practices have been observed in a randomized-controlled trial (Piasta, Justice, McGinty, Kaderavek, 2012). Tracing graphical materials with one's own index finger appears to boost learning, as shown recently in studies involving learning about temperature graphs (Agostinho et al., 2015), geometry (Hu, Ginns, & Bobis, 2015), the water cycle (Tang, Ginns, & Jacobson, 2019), and the human heart (Korbach, Ginns, Brünken, & Park, 2020). One study of people with stroke-induced alexia—the inability to read—found that instructing them to trace letters improved their text-copying and reading ability (Seki, Yajima, & Sugishita, 1995). A study of people with aphasia—the inability to speak—found that pointing improved their ability to name common objects (Hanlon, Brown, & Gerstman, 1990). Across ages, contexts, and subpopulations, pointing proves to be a handy, helpful, and even rehabilitating cognitive prop.

13. A developmental milestone

Babies usually begin to point as they near the end of their first year (e.g., Moore, Dailey, Garrison, Amatuni, & Bergelson, 2019). The gesture is one of their earliest communicative acts—usually preceding their first words by some weeks (Carpenter, Nagell, Tomasello, & Moore, 1998)—and marks a major milestone in their social development. One study reported roughly this same timeline in seven very different cultural settings, with children first pointing with their whole hand and then, a bit later, replacing that with index finger pointing (Liszkowski et al., 2012). What are children doing when they first begin to point? What exactly is it they are trying to communicate? Early studies divided children's first points into those that had an imperative function (a nonverbal “I want that!”) and those that had a declarative function (a nonverbal “Isn't that cool!”) (Bates, Camaioni, & Volterra, 1975). Not only do these two types

of points have different functions, they also have different forms. Imperative points tend to be produced with the whole hand, whereas declarative points tend to be produced with an extended index finger (Cochet & Vauclair, 2010; Grunloh & Liszkowski, 2015). Many researchers favor a “cognitively rich” interpretation in which these early declarative points reflect the infant’s desire to influence others’ attention, thoughts, and feelings (Tomasello et al., 2007; but see Leavens, 2011 for critical discussion). Some further suggest children may have an information-gathering aim, as pointing often results in a caregiver providing additional information about whatever is pointed to (Southgate, van Maanen, & Csibra, 2007; Begus & Southgate, 2012).

The basic timeline surrounding the emergence of pointing may now be established, but the deeper origins of this milestone remain mysterious. A variety of accounts have been proposed. One idea is that pointing is “ritualized” from reaching (Vygotsky, 1981; see also Wundt, 1973). On this account, babies will sometimes try to grab objects that are out of reach; over time, they realize that adults often supply the out-of-reach object anyway; in this way, they learn to outstretch their arms toward a desired object—that is, to point. Recent work offers some support for this view by showing that 8-month old children are more likely to reach toward unreachable objects when adults are present than when they are not (Ramenzoni & Liszkowski, 2016). Another common proposal is that pointing is learned by imitating adults. A recent training study cast doubt on this possibility, however, showing that exposing pre-pointing infants to a veritable pointing bonanza did not change when they acquired the gesture (Matthews, Behne, Lieven, & Tomasello, 2012). A third idea is that pointing begins as a spontaneous orienting behavior, a way of guiding one’s own attention, and is only later co-opted for communication (e.g., Carpendale & Carpendale, 2010; Lempert & Kinsbourne, 1985). A fourth proposal, compatible with others, is that pointing originates in touch (e.g., Kettner & Carpendale, 2018).

Long before pointing in communicative situations, infants extend their index fingers (Lock, Young, Service, & Chandler, 1994; Masataka, 2003), often in the context of exploring objects with their fingertips. Lock et al. (1994) describe this behavior as points “slipping out”; in the terminology used here, it is another form of “pseudo-pointing.” A recent set of studies found evidence that pointing has the character of simulated touch even in adults (O’Madagain, Kachel, & Strickland, 2019). When pointing to a sticker on the vertical face of a three-dimensional box, for example, people rotate their wrists as though trying touch the sticker and rather than merely indicate its direction.

Whatever its origins, the onset of pointing offers a glimpse of what is coming next. It is possible to predict the words that will soon enter a child’s vocabulary by looking at the objects they are pointing to (Iverson & Goldin-Meadow, 2005). Moreover, the age when children first point to an entity while simultaneously offering a spoken label for it (e.g., a point at a dog with “dog”) predicts the age at which they will produce noun-plus-determiner combinations in speech (e.g., “the dog”) (Cartmill, Hunsicker, & Goldin-Meadow, 2014). A meta-analysis of 25 studies on pointing and child development corroborated such tight links between pointing proclivities and linguistic abilities (Colonnesi, Stams, Koster, & Noom, 2010). Interestingly, these correlations held only for declarative pointing, not imperative. One interpretation of such links is that pointing savvy reflects general communication savvy, such that kids who are good at pointing also tend to be good at talking. But it’s also possible that pointing guides language learning in a more direct way (Goldin-Meadow, Goodrich, Sauer, & Iverson, 2007). Caregivers often respond to their children’s points by offering labels or explanations (Lucca & Wilbourn, 2018), and evidence suggests that “fact-finding” may be part of what motivates children to point in the first place (Lucca & Wilbourn, 2019). Put together, such observations support the

conclusion that pointing is not merely a milestone but—as one researcher put it—“the royal road to language” (Butterworth, 2003).

14. A diagnostic window

Because pointing is such a basic communicative act, it often serves as a diagnostic window. It’s an outward sign of what is going on inside the mind and body—an index to abilities, proclivities, or deficits we might not otherwise be able to see. Since pointing emerges within a relatively narrow window in typically developing infants—usually between 10 and 14 months—its absence or delay can signal trouble ahead. One study found that children that only point with the whole hand, not the index finger, by 12 months are at greater risk for primary language delay at two years (Lüke, Rohlfing, Grimminger, Liszkowski, & Ritterfeld, 2017). Another found that children with primary language delay point less at one year of age and *more* at two years of age, compared to their typically developing peers (Lüke, Ritterfeld, Grimminger, Liszkowski, & Rohlfing, 2017). (Typically developing children point less by age two, as speech overtakes gesture [e.g., Lock et al., 1994]). Among infants with early brain damage, pointing behavior at 18 months predicts whether a child’s vocabulary will fall within normal ranges in the second year of life (Sauer, Levine, & Goldin-Meadow, 2010).

Pointing can also serve as a diagnostic of more general cognitive profiles beyond communicative competence. Several studies have found that children with autistic spectrum disorder fail to understand or produce declarative points (Baron-Cohen, 1989; Goodhart & Baron-Cohen, 1993; see Sparaci, 2013 for a review). These differences persist long after the typical window for language acquisition. Children with Williams syndrome also show deficits in producing and understanding points, despite boasting superior vocabulary (Laing et al., 2002). In

fact, in an inversion of the typical developmental sequence, children with Williams syndrome usually talk *before* they point, by an average of six months (Mervis & Becerra, 2007).

Pointing is also used as a diagnostic window in adults. It offers a basic form of experimental response in a variety of psychological paradigms; and, as a basic coordination task, it offers a window into motor control (Jones & Lederman, 2006) and a variety of neurological issues (e.g., Berti & Frasinetti, 2000)⁹. In the 1920s neurologists uncovered a class of deficits—sometimes called “pointing disorders”—that reflect issues with the neural machinery of body knowledge. Pick identified a pair of patients who were able to name parts of their own body when asked, but, mysteriously, were unable to point to them—a disorder that would be classed as “autotopagnosia” (Felician, Ceccaldi, Didic, Thinus-Blanc, & Poncet, 2003). It was later found that this inability may also extend to the bodies of others (“heterotopagnosia”), and that the inability to point to others’ body parts can occur despite intact ability to point to one’s own (Degos, Bachoud-Levi, Ergis, Petrissans, & Cesaro, 1997). The presentation of this disorder is puzzlingly specific. One patient, a 41-year old man, scored almost perfectly in his ability to name and point to his own body parts; he also had no trouble naming the same body parts of the examiner, and he was even able to grasp the examiner’s body parts if asked. Yet he was completely unable to point to them (Degos et al., 1997). (A common behavior during examinations of heterotopagnosic patients is “self-referencing,” in which patients respond to requests to point to an examiner by pointing instead to themselves, sometimes with a comment like “your nose... is here... behind my nose” [Cleret de Langavant, Trinkler, Cesaro, & Bachoud-Leví, 2009, p. 1749]). Subsequent studies have found that heterotopagnosics can often point to more abstract bodies: They are slightly better at pointing to photographs than actual

⁹ “Pseudo-pointing” may also serve as a diagnostic window. Vives-Rodriquez & Louis (2018) found an increased prevalence of index finger extension while walking in patients with dystonia.

people, better still at pointing to dolls, and near perfect at pointing to line drawings (Cleret de Langavant et al., 2009). A possible explanation for this deficit—though far from a settled one—is that it stems from an inability to see another’s body as both subject and object (Langavant et al., 2012; see also Tallis, 2010).

Because pointing is basic way of indicating direction, it is widely used as an index of spatial awareness (e.g., Nazareth, Huang, Voyer, & Newcombe, 2019). Lewis (1976), for instance, used a simple pointing task to explore dead-reckoning ability in aboriginal Australians. He had five aboriginal men point to distant landmarks or cardinal directions while he stood behind them and checked their accuracy with a compass. The average deviation across 34 targets tested was a mere 14 degrees. A later cross-cultural comparison revealed that the accuracy of Europeans’ points pales in comparison, to an almost comical degree (Levinson, 2003). A more recent study found that, when asked to point to cardinal directions, all fourteen members of an Australian Aboriginal community were correct to within 10 degrees; of the fourteen Stanford University affiliates tested for comparison, only a third were correct to within 30 (Boroditsky & Gaby, 2010). Even during storytelling, it appears that when Australian Aboriginals point somewhere, they point accurately (Haviland, 1993). Impressionistically, this contrasts with how many Anglo-Europeans point in conversation. As Schegloff (1984) observed, when American English speakers point to non-visible locations, they are not necessarily pointing accurately, as when “two people referring to the same place... point in different directions” (p. 280). Throughout the lifespan, whether one points—as well as when, how, and where—offers vital clues to what is going on in one’s mind and brain.

15. A cross-species litmus test

Pointing is frequently trumpeted as a uniquely human communicative behavior, one that does not come naturally even to our closest primate cousins (Povinelli, Bering, & Giambrone, 2003; Tallis, 2010; Tomasello, 2006). This uniqueness claim has not gone unchallenged, however. One study reported the following field observations of bonobos in Zaire:

“Noises are heard coming from the vegetation. A young male swings from a branch and leaps into a tree... He emits sharp calls, which are answered by other individuals who are not visible. He points – with his right arm stretched out and his hand half closed except for his index and ring fingers – to the position of the two groups of camouflaged observers who are in the undergrowth.”
(Vea & Sabater-Pi, 1998, p. 289)

For years this was the only account of pointing by a primate in the wild. Other possible cases have since come to light, produced by chimpanzees in the context of reaching for desired objects (Hobaiter, Byrnes, & Leavens, 2014). The researchers reporting these more recent observations admit, however, that chimpanzee pointing in the wild appears to be “vanishingly rare” (Hobaiter et al., 2014, p. 84) and that the interpretation of these few documented cases remains fraught.

Whether chimps point in the wild remains debatable, but the fact that they point in captivity is well established. Such pointing has nonetheless usually been thought marginal—imperative rather than declarative, produced only for humans and never for other apes, and often involving the full hand (except where cage mesh induces finger extension) (for a critical review, see Leavens, 2012). A counterpoint to these claims, as Leavens (2012) notes, is that apes trained to use a natural human language do point declaratively and with the index finger (see Gardner & Gardner, 1969; Lyn, Greenfield, Savage-Rumbaugh, Gillespie-Lynch, & Hopkins, 2011). Recent results also suggest that captive chimps use pointing as flexible signal, raising their arms higher to point to further targets (Gonseth, Kawakami, Ichino, & Tomonaga, 2017; Roberts, Vick, Roberts, & Menzel, 2014)—much as humans do (e.g., Mesh, 2017)—and adapting their gestures

in other ways to fit the communicative context (Tauzin, Bohn, Gergely, & Call, 2020). In short, apes do point—flexibly and even declaratively—provided sufficient human scaffolding and interaction, but pointing can hardly be said to be a natural proclivity.

As debates about chimps continue, research on animal pointing has broadened out considerably. Recent studies have examined putative pointing in gorillas, mangabeys, dogs, horses, dolphins, and magpies, among others (Krause, Udell, Leavens, & Skopos, 2018). Such behaviors do not look like canonical index finger pointing, of course—many of these animals do not have fingers. Rather, they are other bodily acts that seem intended to direct attention, such as poking a rostrum (in dolphins; Xitco, Gory, & Kuczaj, 2001), projecting a beak (in magpies; Kaplan, 2011), or proffering food (in ravens; Pika & Bugynar, 2011). A familiar example of such “pointing-like” behavior is seen in hunting dogs, sometimes called “pointers.” Upon seeing quarry of interest, these dogs adopt a stereotyped stance: head forward and aligned with body, paw raised, as if indicating to the hunter the direction of the game. This appears to be an ingrained response, however, rather than a flexible effort to direct attention. Skeptics are thus quick to dismiss this—and other pointing-like behaviors in animals—as “merely instrumental” (see Kaplan, 2011 for discussion).

A parallel branch of research focuses, not on whether animals naturally point for each other, but on whether they understand human pointing (Krause et al., 2018). The question is more experimentally tractable, permitting tidy designs and clever manipulations; it thus provides a litmus test that can be applied across diverse taxa. Most studies on this question use a variant of the “object choice paradigm” (e.g., Hare, Call, & Tomasello, 1998). In this set-up, an experimenter tries to cue an animal to the presence of food in one of two locations (e.g., buckets on right and left) by pointing. If the animal takes the cue rather than guesses randomly, this

suggests an understanding of the gesture's function. An important early finding using this method was that domestic dogs take the cue, but chimps do not (Hare & Tomasello, 2005). This suggested that dogs may have evolved to understand pointing over their millennia-long partnership with *Homo sapiens*. Work since has shown, however, that it is interactions over an animal's lifespan that are critical, not its genetic inheritance: Wolves who have interacted regularly with humans understand pointing, while domestic dogs who have not interacted with humans do not (Udell, Dorey, & Wynne, 2008).

Beyond primates and dogs, the issue has now been examined in capuchins, sea lions, elephants, bats, pigs, goats, cats and other species, with many studies reporting some degree of understanding (Krause et al., 2018). Importantly, even species that succeed on this task do not necessarily succeed at human-like levels. The much-trumpeted success of African Elephants is success less than 80% of the time (Smet & Byrne, 2013). From this still-expanding and sometimes conflicting literature on animal pointing, a few generalizations emerge. For one, interaction with humans over the lifespan correlates with better understanding of human pointing (Krause et al., 2018). Further, animals from diverse habitats and taxa, and with widely different body-plans, behave in ways that steer the attention of their conspecifics; the thorny question is what is going on in these animals' minds when they do this. In sum, the refrain that "animals don't point" is too coarse. But there is little question that there is something human about pointing—characteristically human if not uniquely so.

16. An evolutionary stepping-stone

Several scholars have sometimes cast pointing in a starring role in the emergence of language. This casting decision makes sense in light of some of the ways of looking at pointing

already considered. If pointing is a semiotic primitive, the “simplest of the simplest” way of meaning something, probably it was present right at the beginning. If the words most closely associated with pointing—demonstratives—are impossible to trace to earlier words, perhaps both pointing and demonstratives belong to the oldest bedrock of human language (e.g., Diessel, 2006). If pointing is among the first forms of communication used as a child develops, maybe it was among the first forms of communication used as humankind developed (e.g., Meguerditchian, Cochet, & Vauclair, 2011). If our closest cousins only sort of point—that is, under the right circumstances, but mostly with brutish motives—perhaps it was the development of full-blown declarative pointing that marked the separation of man from beast (e.g., Tomasello, 2008). Semiotically simple, apparently ancient, developmentally privileged, distinctively human—why not then, suppose pointing is also primordial?

The idea that pointing served as an evolutionary stepping-stone is tied up with the more general notion that language began in the hands. This “gesture first” idea has deep roots (e.g., Hewes, 1973; for discussion, see Kendon, 2017) and remains popular today (Arbib, Liebel, & Pika, 2008; Corballis, 2008; Tomasello, 2008), though it has hardly gone unchallenged (e.g., Levelt, 2004). Beyond the intuitive “gesture is primitive” rationale supporting such accounts, a widely bruited argument is that great apes, our closest cousins, use gestures more flexibly than vocalizations (e.g., Pollick & de Waal, 2007). An emerging alternative to gesture first theories is what might be called “multimodal-all-along” views (e.g., Frölich et al., 2019; Kendon, 2017). Some in this latter camp deny a privileged role for gesture over speech, but nonetheless give pointing pride of place among the earliest “strata” of multimodal language (e.g., Levinson & Holler, 2014).

Among gesture first accounts, the role of pointing varies. Some do not specify which

particular types of gestures came first (e.g., Corballis, 2008). Others stress the importance of pantomime—that is, imitations of actions produced without speech (Arbib et al., 2008; Mallery, 1882). A few scholars, however, have granted pointing special primordial status (for discussion, see Hewes, 1981). Tran Duc Thao proposed that pointing evolved in the context of hunting on the open savannahs of Africa, and that language followed from it (Thao, 1973; discussed in Hewes, 1981). More recently, Tomasello (2008) has argued that pointing was “the primordial form of uniquely human communication” (p. 3). For Tomasello, what is most distinctive about our species is a cooperative mode, and he sees pointing as a basic tool of cooperative communication. Others have outlined detailed accounts of the steady elaboration of human communicative competence, extending from pointing to full-blown grammar (Bejarano, 2011; Rolfe, 1996). Such “pointing first” proposals have occasionally met with skepticism. Bühler (1990) commented, with derisive tone, on the “myth of the deictic origin of language” (p. 100; for discussion, see Diessel, 2012). By this he meant the idea, popular in his day, that “what is specifically human... begins with the genuine deictic gesture, and the rest inexorably emerges from it” (p. 101). The idea admittedly seems far-fetched. But as Bühler noted a beat later: “Myths need not be false.”

17. Conclusion

The cognitive scientist Elizabeth Bates—who, among other contributions, pioneered the study of infant pointing—observed that when you look at something for long enough, it is easy to see it as having “cosmic importance” (Bates, 1979, p. 33). To paraphrase William Blake, you start to see the world in a grain of sand. I’m not the first to see a world in pointing. Bates herself perhaps did; so did Tallis (2010), who comments toward the end of his book: “How small the

index finger and how great its effect” (p. 143). Pointing may not contain the world, but there is little question it contains multitudes. In it we find a declaration, a command, a question, a reproach, a jibe, a citation, a transgression; we have a highlighter, a crystal ball, a spy-hole, and a spring-board; we have a gesture that salutes, instructs, offends, and aggresses; we have an act that is proscribed, portrayed, stylized, and grammaticalized. And though the gesture has been the subject of scrutiny and scholarship for centuries, there remain a number of unsettled questions about how and why it is used (Table 1).

Table 1

Unsettled questions for further research

Why is pointing so pervasive?

Why is index finger favored for pointing?

Why is non-manual pointing (e.g., lip-pointing) more common outside of WEIRD settings?

Why is pointing considered aggressive?

Why is pointing so widely considered taboo?

How do pointing signs and pointing gestures differ?

Why is pointing so commonly represented art?

Why do children point initially?

What is the nature of the underlying deficit in autotopagnosia and heterotopagnosia?

If chimps are able point in the captivity, why do they not point in the wild?

What mental states are involved when diverse animal species produce pointing-like behaviors or see human pointing?

What was the role of pointing in the evolution of language?

Another thinker who saw a lot in pointing was Leonardo. The puzzle of what drew him to the gesture is unresolved and probably unresolvable. Perhaps he was not interested in pointing per se. I would venture instead that he was interested in *attention*, and that his interest in pointing may have been just a natural extension of this broader and deeper fixation. He was fascinated with the nature, dynamics, and mysteries of human looking, particularly its anatomy (e.g., the workings of the human eye) and geometry (e.g., issues of perspective) (Isaacson, 2017). As a painter, he understood his task was to capture and guide the attention of his audience. He must have recognized that, in art as in life, the pointing gesture is an unmatched means of doing just that. No wonder he was “mesmerized” (Isaacson, 2017, p. 474).

This suggestion about Leonardo may also shed light on the larger puzzle of why generations of scholars, artists, and scientists have been mesmerized by pointing—and by so many different aspects of it. In short, we are creatures of attention. Today, attention is increasingly described as a major currency of social and cognitive life—an idea reflected in phrases like the “attention economy” and books with titles like *The Attention Merchants*. But while this framing may be new, the truth behind it is old. At the dawn of academic psychology, William James wrote that “*My experience is what I agree to attend to. Only those items which I notice shape my mind*” (James, 1890, p. 402, original emphasis). Our species’ preoccupation with attention—with monitoring it, steering it, controlling it—is long-standing, deep-seated, and perfectly embodied in the pointing gesture. It’s a preoccupation—and a gesture—that emerges in the first year of life and is likely as ancient as language itself.

Ultimately, then, the human pointing gesture is like the finger pointing to the moon in the well-known Zen koan. What is most interesting about pointing is not the gesture itself but what it

points to: a distinctively human preoccupation with attention. The human pointing gesture—in whatever guise it appears—is a proxy for this broader fixation, a token of it but not the totality. In trying to understand the gesture’s ubiquity and multidimensionality, we would be wise to heed the words of Bruce Lee, who popularized the “pointing to the moon” koan in the film *Enter the Dragon* (1973): “Don’t concentrate on the finger, or you will miss all that heavenly glory.”

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