

# The Protean Pointing Gesture: Variation in a Building Block of Human Communication

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## Abstract

Pointing is a foundational building block of human communication, but does it take the same form from one culture to the next? Index finger pointing is often assumed to be universally privileged. Use of non-manual pointing morphologies has been attested around the world but it has never been clear how central these variants are in the communities in which they occur. Using a novel referential communication task, we investigated pointing preferences in two cultures: in the Yupno of Papua New Guinea and in the US. Our task prompted similar rates of pointing in both groups, but the Yupno participants produced more non-manual pointing (nose- and head-pointing) than manual pointing, while the US participants stuck unwaveringly to index finger pointing. The motivation for these starkly contrasting patterns requires further investigation, but it is clear they constitute fundamentally different ways of carrying out one of our most distinctively human communicative acts.

**Keywords:** pointing; reference; communicative universals; human diversity; embodiment; Papua New Guinea

## Introduction

Humans have been influentially described as the “symbolic species” but might just as well be described as the “deictic species.” Evidence of animal pointing in the wild is scarce and contested, but human infants everywhere, sometime before they can speak, start to point for their caretakers. This prelinguistic gesture, an early bodily expression of the drive to orient and share the attention of others, remains a basic communicative tool throughout the lifespan and is deployed in all kinds of everyday activities (Clark, 1996). Such observations have led some researchers to posit a special role for pointing at the dawn of human language (e.g. Tomasello, 2008). Primordial or not, there is little question that pointing constitutes, in the words of one researcher, a “foundational building block of human communication” (Kita, 2003).

What form does this building block take and is it the same form from one culture to the next? Despite decades of philosophical and cognitive scientific interest in pointing, there has been surprisingly little systematic empirical work

on these questions. In the folk theories of the English-speaking world and other so-called WEIRD (Western Educated Industrialized Rich Democratic) societies, there is a strong association between pointing and extension of the forefinger, an association enshrined in the English colloquial terms “index” or “pointer” finger. This forefinger-pointing association is not just a matter of terminology. A recent study of infant gestures in seven far-flung speech communities found in each one a preference for index finger pointing over other kinds of manual or non-manual pointing (Liszkowski et al., 2012). Use of the index finger as a kind of developmental pointing default may in fact have its roots in the anatomy of the human hand. When the hand is at rest, the index finger protrudes relative to the other fingers in human children and adults but *not* in chimpanzees (Povinelli et al., 1994). And, indeed, notwithstanding impressionistic claims made about remote cultures, use of the index finger for pointing has been found in every community in which it has been sought. These facts taken together suggest that index finger pointing may be a strong candidate for a human universal.

Countering this swelling tide of evidence for the extended index finger as a species-wide privileged form of the gesture, however, are a handful of reports of substantive cultural differences in how humans point. In several groups, variations in pointing handshape, such as the flat or horned hand, carry conventional meanings (Wilkins, 2003; Kendon & Versante, 2003). Other studies have described conventionalized ways of pointing non-manually, such as by protruding the lips (Sherzer, 1972; Enfield, 2001) or by scrunching the nose (Cooperrider & Nunez, 2012) while directing one’s gaze to a region of space. Though largely absent from WEIRD communities, such non-manual pointing practices may not be so rare. Lip-pointing in one variant or another appears to be widely distributed, with reports of its use in Southeast Asia, Australia, the Caribbean, Africa, and South America.

Should such differences of form be considered surface-level cultural quirks, or do they imply that this foundational building block is more protean than often assumed? Existing

evidence leaves this question largely open. Previous studies have provided existence proofs of alternatives to index finger pointing but have not demonstrated a central role for them. Provocative claims about the primacy of non-manual pointing in some groups have occasionally been put forward. About the Cuna of Panama, for example, Sherzer (1983) observes that lip-pointing, relative to manual pointing, is “more common by far” (pg. 169, quoted in Enfield, 2001). But the reliance on lip-pointing or other non-manual forms relative to manual forms has never to our knowledge been quantified. Moreover, even in WEIRD groups, the extent of the preference for index finger pointing relative to other types of pointing, either manual or non-manual, has been taken for granted and never studied systematically. Head-pointing has also been attested in a number of such groups (McClave et al., 2007), leaving open the possibility that it plays a larger role than casual impressions might suggest. Given the current body of evidence, a skeptical observer might understandably presume patterns in pointing gestures across cultures to be universal until proven otherwise.

In the present study we used a novel referential communication task to investigate preferences for different forms of pointing in two cultural groups: a first group consisting of adult members of the Yupno community of Papua New Guinea and a second group consisting of adult speakers of English in the United States. In addition to index finger pointing, the Yupno make use of both head-pointing and nose-pointing, a conventional form of non-manual pointing that consists of ‘S-action’ — that is, contractions of the muscles surrounding the nose along with muscles of the brow — while re-orienting the head toward a region of space (Cooperrider & Núñez, 2012). Our own previous impressions were that non-manual pointing, and in particular nose-pointing, played a central role in Yupno communication. The US population has previously been shown to use both index finger pointing and head-pointing but not any conventional facial gesture such as lip- or nose-pointing. Our referential communication task was designed to elicit pointing gestures and demonstratives (not analyzed further here), and to be appropriate for use across cultures and age groups. The task affords an important opportunity to make, for the first time, a systematic comparison across groups in what bodily resources are used to accomplish one of our most basic and distinctively human communicative tasks.

## Methods

### Participants

The Yupno portion of the study was conducted in the upper Yupno valley of Papua New Guinea’s Finisterre Range, in the village of Gua. 16 Yupno adults (8 men, 8 women) participated in pairs in exchange for a small gift. All participants were local residents and native speakers of Yupno, most with limited experience in urban areas. All

sessions were conducted within the main settlement area of Gua village, half in an enclosed garden area and the other half in a single-room schoolhouse.

The US portion of the study was conducted at the University of California, San Diego. 18 adults participated in exchange for course credit. All were undergraduate students and fluent speakers of English. One pair was eliminated because of excessive leaning on or sitting on the hands, as well as a comment implying that pointing was not allowed during the task. 16 participants (12 men, 4 women) were included in the final analysis. All sessions with US participants were conducted indoors.

### The ‘Stacks and Squares’ task

‘Stacks and Squares’ is a novel referential communication task in which a director tells a matcher how to arrange objects (‘stacks’) on a fixed array of locations (‘squares’). Unlike many classic referential communication games, the participants work in full view of each other, inviting gesture as a useful strategy. The director is seated before an array of five square cloths laid out on the ground, with a stack of objects off to one side of the array. The director is shown a photo of the objects arranged in a particular way on the cloth squares, and is told that the goal is to get the matcher, who cannot see the photo, to arrange the objects just like they are in the photo. Each photo depicts eight of the eleven total objects arranged on the cloths, with every square occupied and sometimes with more than one object per square.

The five cloth squares (one 16 by 16 in. red square, two 8 by 8 in. red squares, and two 8 by 8 in. blue squares,) are arranged on the ground in a symmetrical array (see Figure 1 for a schematic depiction). To one side of the array is a small rectangular platform on the ground that serves as a “staging area” for the objects. Eleven objects are stacked on the staging area: a small white cylindrical top, a large white cylindrical top, a small cardboard cylinder, a large cardboard cylinder, three colored beanbags (red, green, blue), and four yellow foam cubes. All objects start on the staging area at the beginning of a trial and return to it after the trial is over.

After consenting to participate, one member of the pair was seated on one side of the array in cross-legged fashion with the arms in front of the body and thus available for gesture. Other sitting positions, such as leaning back on the hands, were corrected by the experimenter. The participant seated first served as the first director. He or she first completed one practice trial involving only 5 objects and then two additional trials involving full 8-object arrays. The director and matcher then switched roles and the now-director completed two trials. After four total trials, the roles were switched again and the director’s seating position was moved to the opposite side of the array. All other aspects of the array remained fixed. There were then two more trials, another role switch, and two final trials. In all, each

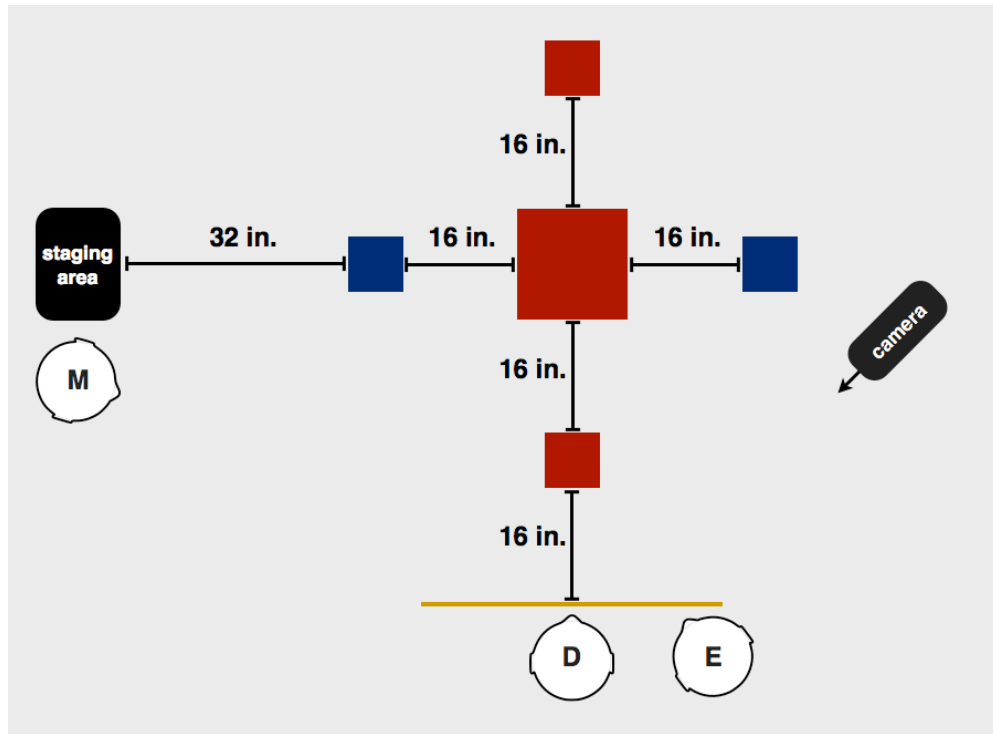


Figure 1: The layout of the ‘Stacks and Squares’ task. The colored squares represent square cloths laid out on the ground in front of the director. The director’s task is to tell the matcher how to arrange objects (retrieved from the staging area) on the squares (D= director, M= matcher, and E= experimenter).

participant served as director for four trials, two from each side of the array. Throughout the study the experimenter sat to one side of the participant, holding a laptop with a full-screen photograph of each target array. The director was video-recorded from a single camera, filming the participant from roughly a 45 degree angle off to one side. The same order of trials was used for all participants, and which side of the array the participants started on was counterbalanced across pairs.

### Analysis

All videos were analyzed using ELAN annotation software for the presence of pointing and iconic gestures (not discussed in the present report) produced by the director. Note that while it was not mandated that matchers remain silent, they spoke much less than directors and their verbal and gestural productions were not analyzed. Pointing gestures were defined as effortful movements toward a region of the task area (e.g. the staging area) produced with the intention of directing attention toward that region, and exhibiting an effort peak— or “stroke” (Kendon, 2004). In the case of manual pointing, the finger or arm serves to define a vector in space projecting from the speaker toward the target region. In the case of non-manual pointing, the eyes primarily serve to define the vector and other head and face movements, by virtue of their marked nature, serve to call attention to the speaker’s gaze (Enfield, 2001). These movements may include lifting, lowering, tossing, tilting, or

thrusting of the head, or in rarer cases an accelerated full torso movement with the head and neck fixed. In nose-pointing, one of the above types of head movement is also co-produced with the distinctive S-action. For each pointing gesture, the form of the gesture was classified into one of the following mutually exclusive categories: (a) index finger extended handshake, (b) other handshake, (c) a head-pointing movement without S-action, (d) a head-pointing movement with S-action, (e) S-action without a head-pointing movement, (f) other combination of these forms. Because S-action has conventional uses in Yupno that do not involve pointing (see Cooperrider & Núñez, 2012 for discussion), cases of S-action without head-pointing were not considered pointing gestures. Finally, Yupno participants occasionally produced a manual pointing gesture and a nose-pointing gesture simultaneously. Such cases were counted as separate manual and non-manual pointing gestures.

### Results

The task successfully elicited high rates of pointing in both groups: 496 were produced by the US participants (mean=31, median= 33.5); 598 were produced by the Yupno participants (mean= 37.4, median= 31.5). The mean number of pointing gestures— collapsing across articulators— did not differ between the two groups ( $t = .92$ , 30 df, two-tailed  $p = .36$ ).

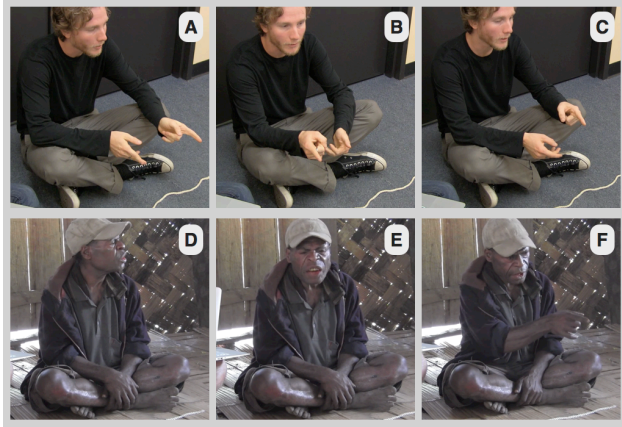


Figure 2: Examples of pointing gestures produced in the ‘Stacks and Squares’ task. US participants produced almost exclusively index finger pointing gestures (panel A, B, C), while Yupno participants produced a balance of non-manual (D, E) and manual (F) pointing gestures.

We next examined the pattern of articulator use in each of the groups (see Figure 2 for examples). Of the 496 pointing gestures produced by the US participants, 450 [.91] were produced with the index finger extended, 35 [.07] were produced with some other handshape, and 11 [.02] were produced with the head. 16/16 of the US participants produced manual pointing gestures, but only 2/16 produced non-manual pointing gestures. The mean proportion of hand-pointing morphologies for the US participants was .95 (median= 1.00,  $SD$ = .19). Overall, 15 of 16 US participants showed a preference for manual pointing.

Of the 598 pointing gestures produced by the Yupno participants, 234 [.39] were produced with the index finger extended, 8 [.01] were produced with some other handshape, 252 [.42] were cases of nose-pointing, and 104 [.17] were produced with the head only. 14/16 of the Yupno participants produced manual pointing gestures, and 16/16 produced non-manual pointing gestures. The mean proportion of hand-pointing morphologies for the Yupno participants was .34 (median= .32,  $SD$ = .24) (see Figure 3). Overall, 11 of 16 Yupno participants showed a preference for non-manual pointing.

We next tested for the significance of these observed patterns. First, we tested whether the presence or absence of manual or non-manual pointing differed across the groups. Overall, the proportions of participants using manual pointing did not differ by group (two-tailed Fisher’s exact test  $p$ = .48), but the proportions of participants using non-manual pointing did (two-tailed Fisher’s exact test  $p$ < .0001). Second, we tested whether the proportions of pointing gestures that were produced manually differed between the groups. A Mann-Whitney U-test confirmed that the proportions in the groups did indeed differ ( $U$ = 10,  $n_1$ = $n_2$ = 16,  $p$ <.0001).

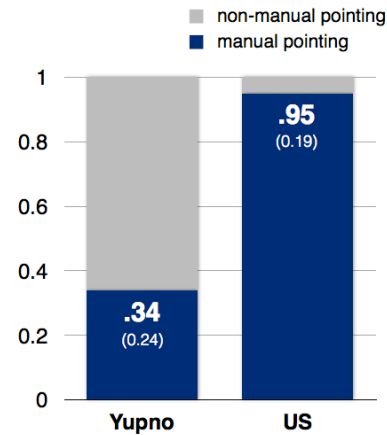


Figure 3: Mean proportions of manual pointing forms in Yupno and US participants. Standard deviations are given in parentheses.

## Discussion

The present study used a novel referential communication task to compare the use of different pointing forms in two cultural communities. Perhaps unsurprisingly, the US speakers in our sample showed a strong preference for index finger pointing over other kinds of manual pointing and only trace amounts of non-manual pointing. In this pattern of articulator preferences they differed dramatically from the Yupno speakers in our sample, who commanded a much more balanced repertoire of pointing forms. Most strikingly, the Yupno speakers produced more non-manual pointing gestures than manual ones. The groups did not differ overall in the rate at which they produced pointing gestures in the task, and when pointing manually both strongly preferred the extended index finger over other handshapes. Our results thus lend support to the primacy of the pointing gesture as a basic building block of human communication, while at the same time suggesting that this building block may be more protean than previously appreciated.

Our results lead naturally to the question of why the Yupno point non-manually at much higher rates than do US speakers. A straightforward, if somewhat unsatisfying, explanation is that non-manual pointing is a “technique of the body” (Mauss, 1934)— that is, a form of unreflective bodily practice that differs from one group to the next. There may be nothing incorrect about this answer as far as it goes, but it only pushes back the question of why the Yupno have developed this particular technique of the body while other cultures have developed other techniques. Deeper answers may perhaps be found in how the Yupno pointing system is interwoven with other features of the cultural context, such as communicative sensibilities prevailing in Papua New Guinea, Yupno understandings of proper comportment, and the Yupno language itself.

Throughout New Guinea there is an emphasis on controlling the broadcasting of communications. Secrecy is a religious and political imperative that makes controlling the “cast” of communication a matter of serious

concern. The stakes of controlling who hears what are high: in one popular Yupno story all but one of the men in a village are ritually killed after a young boy inadvertently reveals a secret of the men's house to his mother. From institutionalized practices of revelation and concealment in men's cults (e.g., Barth, 1975; Herdt, 2003) to "secret languages" used to disguise the true meaning of speech from outsiders (Schieffelin, 2008), communicative practices reflect this concern to direct communications to some while masking them from others. Among the Yupno, extensive whispering and ingressive speech are used, apparently to limit the prospect that people will overhear one's speech and to narrow the cast of communication to those being addressed. In much the same vein, after the completing the task reported in this paper, a few participants commented that nose- and head-pointing were ways of masking what one is talking about from potential overhearers. Non-manual gesture may thus be part of a repertoire of techniques that reduce the broadcasting of communicative signals. If this account is correct, high rates of non-manual pointing may be found throughout Papua New Guinea or at least in those regions where this communicative sensibility prevails.

Another possibility is that the less "active" bodily demeanor involved in non-manual gesture may accord with a Yupno ideal of the "easy-going" person (*yawori*)—one who is not overactive and aggressive, but calm and contained (Wassmann, 1994; Wassmann & Dasen, 1994). If this account is correct, the high rates of non-manual pointing we observed may not be observed in other communities in the same region that differ in their models of proper comportment. Importantly, note that, whatever the possible roles of such communicative sensibilities or cultural models, they do not constitute rigid taboos against manual pointing, a fact that is clear in our data: manual pointing still made up 40% of all Yupno pointing gestures produced, was used by 14/16 Yupno participants, and was preferred over non-manual pointing by five Yupno participants.

Structural features of the Yupno language might also have implications for the group's pointing practices. The possibility of a connection between gestural practices and linguistic features was once suggested in passing by Charles S. Peirce. Peirce (1998) comments that many languages supply spatial information in gesture and that "[o]nly the Eskimo are so wrapped up in their bearskins that they have demonstratives distinguishing landward, seaward, north, south, east, and west" (pg.16, fn). Peirce's fanciful idea that limitations on gesture production prompted linguistic changes could just as well be turned on its head: speakers of languages that habitually provide increased spatial precision in their core grammar might have less of a need for precise gestures. The Yupno language boasts a highly elaborated demonstrative system, with entity-referring demonstratives (like "this" and "that" in English) and place-referring demonstratives (like "here" and "there" in English) that are enriched with uphill-downhill marking (Wassmann, 1994).

These enriched demonstratives were used pervasively by Yupno speakers in our task, while US speakers only had the comparatively impoverished English demonstratives to work with. The possibility that language structure might covary with pointing practices could go some way in explaining the puzzling fact that non-manual pointing conventions and elaborated demonstratives systems are apparently not uncommon in small-scale linguistic communities but are both entirely absent from WEIRD communities.

Our study also invites the more fine-grained question of what determines, from one moment to the next, what articulator a speaker will use for pointing. One clear factor is which articulators are currently available. If the hands are, for whatever reason, not available for gesture, the head may prove a useful substitute, a phenomenon that has been observed in English speakers. We controlled for this factor in the present study by having participants adopt a common sitting position with the hands available. Note, though, that the availability issue may have implications for variation in pointing practices over longer time scales. In cultures or subcultures where the hands may be regularly occupied during communication, non-manual gesture may flourish and over time become established as a viable pointing alternative even when the hands are free.

Another likely factor in selecting one pointing form over another in the moment is its affordances. A common and probably not unwarranted assumption is that manual pointing is more spatially precise than non-manual pointing, and, indeed, some have mentioned this "diminished precision" of non-manual pointing as its *raison d'être* (e.g. Hewes, 1981, pg. 265). Importantly, along with exhibiting diminished precision, non-manual pointing forms may require less effort to produce than manual pointing. If required precision and required effort go hand in hand in pointing, it could be that Yupno speakers tailor their pointing form according to the "principle of least effort" (Zipf, 1949; Clark, 1996), in general using a non-manual morphology unless the increased precision of a manual morphology is required. Further analysis of the moment-by-moment structure of Yupno pointing will be required to address this issue. Additionally, future studies using the Stacks and Squares task might manipulate the degree of precision required, for instance by creating more complex arrays of "squares" that consist of both high- and low-precision targets. If, indeed, Yupno speakers observe a principle of least effort when pointing, then the question becomes— not why do Yupno speakers "suppress" manual pointing (c.f. Hewes, 1981)— but why do English speakers over-extend themselves.

Pointing is a behavior that humans everywhere, across the world's cultures and starting from a young age, produce routinely and unreflectively throughout their everyday social interactions. Various strands of evidence have previously supported the possibility that there is a species-wide privileged form that the human pointing gesture takes. Our data challenge this universality and open up new

questions for further investigation. Do the Yupno show a preference for non-manual pointing already in infancy? Do other cultures with conventions for non-manual pointing, such as lip-pointing, exhibit a similar pattern of articulator preferences? Why, given the alternatives that the human *bauplan* makes available, do US speakers stick unwaveringly to the index finger? Most generally but also most importantly of all: if this foundational building block of human communication is not rigid but malleable, what forces determine its shape?

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