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Nose-pointing: Notes on a facial gesture of Papua New Guinea

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Abstract:

This article describes a previously undocumented deictic facial gesture of Papua New Guinea, which we call *nose-pointing*. Based on a video corpus of examples produced by speakers of Yupno, an indigenous language of Papua New Guinea's Finisterre Range, we characterize the gesture's morphology— which involves an effortful scrunching together of the face, or *S-action*, in combination with a deictic head movement— and illustrate its use in different interactive contexts. Yupno speakers produce the nose-pointing gesture in alternation with more familiar pointing morphologies, such as index finger and head-pointing, suggesting that the gesture carries a distinctive meaning. Interestingly, the facial morphological component of nose-pointing— the S-action— is also widely used *non*-deictically by Yupno speakers, and we propose that such uses provide crucial clues to the meaning of nose-pointing. We conclude by highlighting questions for further research, including precisely how nose-pointing relates to non-deictic uses of the S-action and what cultural and communicative pressures might have shaped the gesture.

Keywords: pointing gestures; nose-pointing; facial expression; Yupno; Papua New Guinea

1. Introduction

Pointing is a hallmark of our species. A number of different observations lend support to the characterization of the pointing gesture as a "basic building block" of human communication (Kita, 2003). It emerges early in ontogeny, before speech (Bates & Dick, 2002); it is ubiquitous in everyday face-to-face interaction; and when spoken communication falters, pointing assumes a central role (Goodwin, 2006; Goldin-Meadow & Mylander, 1984). These facts, taken together with the finding that even our closest cousins, the chimpanzees, do not point for each other in the wild or understand human pointing in the laboratory (Povinelli, Bering, & Giambrone, 2003), have clinched pointing's status as a distinctively human communicative primitive (Tomasello, 2008). Unfortunately, however, the gesture's primordial mystique is out of proportion to the sum of empirical work on how humans around the world actually point (but see important contributions by Enfield, 2001; Wilkins, 2003; Kendon & Versante, 2003; Kendon, 2004: 199-224). Among the most pressing questions that remain unexplored is the extent to which pointing varies morphologically and functionally across cultures, as well as the factors that give rise to such variation.

This paper engages such questions by presenting a preliminary report of a previously undocumented form of deictic gesture— *nose-pointing*— used by the Yupno, an indigenous group of Papua New Guinea. Throughout this paper we draw an important distinction between a "form" and a "gesture". In our terminology a "form" is an etic, function-free characterization of morphology, in this case a particular facial action; a "gesture" implies a bodily action pairing form and function, here a *deictic* gesture. The distinction proves crucial to the present case because, as we describe below, the same facial

form that Yupno speakers produce as part of the nose-pointing *gesture* is also used more widely and in functionally distinct ways. Moreover, though the facial form involved in nose-pointing is not unique to the Yupno, its incorporation into a commonplace deictic gesture is. The nose-pointing gesture involves: (a) a deictic reorientation of the head and gaze, in coordination with (b) a distinctive facial action— the *S-action*— to be described in detail in §4.2. Condition (a) without (b) we label *head-pointing,* and it is hardly unique to the Yupno; condition (b) without (a) appears to be widely used by the Yupno, but the range of its uses and their precise relationship to nose-pointing remain unclear. The S-action primarily involves contracting the *levator labii* muscles, in concert with muscles of the brow, such that visible creases form around the nose and lower forehead. To our knowledge, use of the nose-pointing gesture in Papua New Guinea has not been previously described in any detail, if at all. Kendon (1980) makes passing mention of what may be a similar gesture used by the Enga, a cultural group from the nearby highlands of Papua New Guinea[1]. It is important to underscore from the outset that, though Yupno nose-pointing co-exists with more familiar pointing morphologies— such as manual pointing and head-pointing— it would be a mistake to consider it "just another" pointing tool among equivalents in the Yupno repertoire (c.f. Wilkins, 2003).

In the Western world, pointing is strongly identified with a specific prototypical form: the combination of extended arm and extended index finger. A handful of recent studies have shown that, in many cultures however, index finger pointing is but one morphology among several. Deictic use of the head has been attested in several

[1] Kendon's (1980) mention, in its entirety, reads: "The Enga make use of the nose as an instrument of pointing, which is done by orienting the face in the direction of the point, tossing the head back slightly and at the same time lifting the nose by contracting the nasiolabial muscles" (pg. 106).

industrialized cultures, including among English speakers in the United States (McClave et al., 2007). Variants of manual pointing have also been described in several cultures. Wilkins (2003), for example, discusses a set of conventional handshapes used by speakers of Arrernte, an aboriginal Australian group, for particular communicative situations (e.g. a flat hand point for indicating cardinal directions). Wilkins further argues that among the Arrernte the index-finger extended handshape lacks the privileged status it appears to enjoy elsewhere and claims it is best characterized as one of several "allomorphs" in a broader class of "one-finger pointing", all of which serve the same function of individuating single objects. Along related lines, Kendon (2004: 199-224) has described morphological variation in manual pointing among Italian and British speakers, with different handshapes and palm orientations reflecting subtly distinct discourse functions.

The best-described form of *non*-manual pointing gesture is lip-pointing. Lip-pointing involves protruding one or both lips, sometimes with and sometimes without the lips parted, in concert with a tilting or "tossing" of the head. It was first considered in detail by Sherzer (1972), as used by the San Blas Cuna of Panama, and has been taken up more recently by Enfield (2001), as used by speakers of Lao. Lip-pointing is now attested to be extremely widespread geographically, with numerous— though, unfortunately, largely anecdotal— reports of its use in South America, Papua New Guinea, aboriginal Australia, Africa, and the Caribbean, among other places (for discussion of the distribution of lip-pointing, see Wilkins, 2003, pg. 174-178). Other forms of non-manual pointing have received scant attention in the literature, and the specific morphology under consideration in the present paper has not been previously investigated in any detail.

These observations about the wider world of pointing varieties, though confined to a handful of studies, raise questions of considerable theoretical interest. What cultural or communicative pressures shape the use of one form or another, both within and across cultures? To what extent do these formal varieties reflect distinct functional varieties? Definitive answers to these questions are far beyond the scope of a single case study, of course, but we hope that the present observations might contribute a valuable piece to the broader puzzle. In what follows, we briefly describe the Yupno cultural context before moving to discussion of details of the S-action used in the nose-pointing gesture and how it is layered on top of head-pointing. We then illustrate examples of nose-pointing and discuss aspects of its variation from one use to the next. In order to gain possible insight into the meaning of nose-pointing— that is, how it might contrast functionally with finger- and head-pointing— we examine non-deictic uses of the same distinctive S-action.

2. The Yupno

The Yupno occupy more than twenty villages scattered throughout the Upper and Lower Yupno Valleys of Papua New Guinea's Finisterre Range, near the border between Madang and Morobe provinces. The current population is approximately 8000 (Slotta, 2012). At present, no roads reach the valley from the coastal urban centers; the only approach to the Yupno territory is by multiday walk from the coast, or else by single-engine aircraft to the regional airstrip at the village of Teptep. Due in large part to the remoteness and ruggedness of the Yupno territory, the group's exposure to Western cultural practices has been limited and irregular. Only a trickling influx of media, consumer products, and emissaries reaches the valley from the industrial world, and tourism is essentially non-

existent. Foreign missionaries and researchers, however, have sporadically visited the territory since the middle of the 20th century, and it is not uncommon for Yupno adults to have traveled once or a few times to Madang or Lae, the two closest coastal cities.

Yupno is a non-Austronesian language that has been only patchily described, most notably in a series of anthropological publications by Jürg Wassmann and Verena Keck (see Wassmann (1998) and Keck (2005)). More thoroughgoing linguistic description is underway, but is incomplete (see Slotta, 2012 for a first report). The Yupno language is still learned as a first language throughout the Yupno territory. Children enrolled in local schools receive instruction in a combination of Yupno, Tok Pisin (the largely English-based creole of Papua New Guinea), and, to a much lesser extent, English.

3. Data and analysis

Data for the present study consist of high-definition video recordings[2] of ethnographic interviews conducted in late August and early September of 2009. The recordings were made by the present authors in collaboration with Jürg Wassmann, an anthropologist who has carried out research with the Yupno for more than 25 years. The interviews were of two types, structured and unstructured: the structured interviews were conducted as part of a project on spatial construals of time in Yupno (published as Núñez, Cooperrider, Doan, & Wassmann, 2012); unstructured interviews were made in order to build a corpus of Yupno multimodal interaction, and ranged over diverse topics, from Yupno customs and geography to the participants' personal histories. Multilingual research

[2] The use of high-definition video proved critical in that it allowed for a much more detailed characterization of the facial form than would have been possible otherwise. It also allowed for the analysis of less intense cases of nose-pointing that may have gone unnoticed.

assistants— with proficiency in English and Tok Pisin as well as native command of Yupno— were present during all interviews. The Yupno adults who participated in the interviews were unaware of our interest in co-speech gesture, and thus also of our particular interest in the nose-pointing gesture. In fact, through most of data collection, we were only dimly aware of nose-pointing, and were certainly unaware of just how pervasive it is in Yupno interaction. Interviews were carried out mostly in the village of Gua, with additional video material obtained during day trips to the neighboring villages of Uskokop and Gangalut and with Yupno speakers in Madang. The total video corpus contains more than 15 hours of conversation from which we identified over 80 examples— produced by 13 different speakers— of the facial S-action for further analysis. In the majority of these examples, the S-action is used as part of nose-pointing. The nose-pointing gesture is sometimes produced without speech; other times in the corpus it is co-produced with Yupno, Tok Pisin, or English. Each example of nose-pointing was analyzed for its context of use and for the fine-grained morphological details of its production, including its degree of intensity and its co-ordination with other gestural articulators.

4. Head-pointing, S-action, and the nose-pointing gesture

The Yupno nose-pointing gesture is produced when a deictic head movement— *head-pointing*— and the S-action are performed concurrently. Importantly, these two components of the gesture are dissociable, and we now describe them in turn before discussing their coordinated production in cases of nose-pointing.

4.1. Head-pointing

Deictic use of the head is found in abundance in Yupno interaction, as it appears to be across cultures (McClave et al., 2007). In head-pointing[3] the head makes an accelerated movement in a direction, reaches an apex where it may be held briefly, and then is returned to a rest position. The movement has the same excursionary character common to all gestures, and is marked by a clear effort peak (Kendon, 2004). This effort peak is crucial in distinguishing a *deictic* reorientation of the head from incidental reorientation of the head. The direction of the head movement can be directly forward, off to one side, or in any direction in three-dimensional space that the head can move through a combination of rotating, raising, and tilting. Of course, the head is subject to biomechanical constraints that determine exactly what parts of space can be indicated and how easily, but a full exploration of such constraints will require further research. Importantly, the movement in head-pointing, as in other types of pointing, is roughly linear— a "movement toward" a region of space (as discussed by Kendon, 2004, pg. 200).

Figure 1 shows a Yupno speaker producing two head-points to different referents

[3] We thank Adam Kendon for discussion of how to best characterize head-pointing.

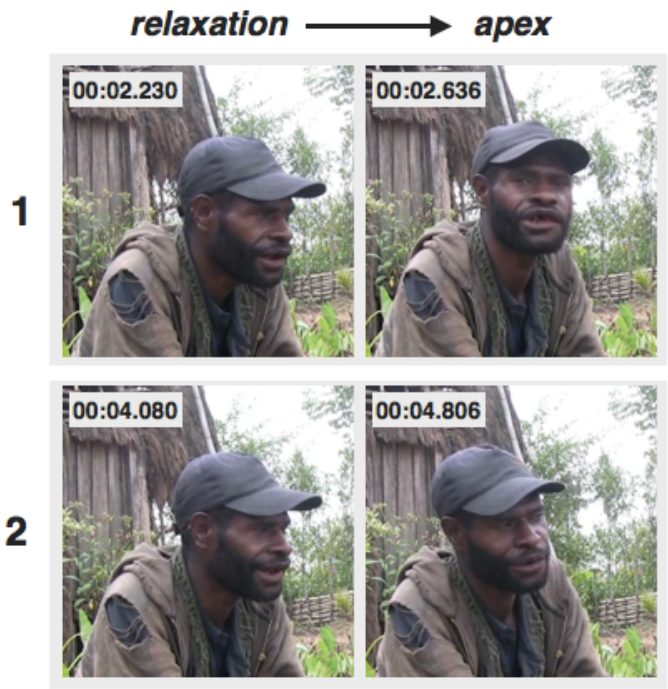

Figure 1. Two examples of head-pointing produced by a Yupno speaker. In contrast to examples of nose-pointing discussed below, these head movements are not accompanied by any distinctive facial action. Frames on the left depict the speaker before initiating the stroke of the head movement; frames on the right depict the apex of the movement. Time codes are given in the top left of each frame.

in a short stretch of discourse. In the first the speaker produces a head-point to his right, by rotating and raising his head. In the second the speaker does not rotate the head but tilts it to his right along with his entire upper body, while maintaining gaze on the interlocutor. For the present purposes it is crucial to note that neither of the head-points in Figure 1 is co-produced with an effortful facial action, such as we describe next.

4.2. The S-action: Basic facial morphology and dynamics

The kernel of the nose-pointing gesture is a distinctive facial form that is produced by a contraction of the *levator labii superioris* muscles located bilaterally on both sides of

the nose, which raise the upper lip and slightly broaden the wings of the nose[4]. Contracting these muscles brings about a constellation of changes in the human face (see Ekman et al., 2002 for fuller description, especially the description of Action Unit 9). Most saliently, it results in horizontal folds appearing along the root of the nose and glabella, as well as in a raising and slight deepening of the nasiolabial furrow, which extends bilaterally from the base of the nose downward to corners of the mouth (see Figure 2). Brow muscles are invariably involved as well, in particular the *procerus* muscle, which both brings together and lowers the brow toward the nose, further intensifying the mesh of wrinkles. Finally, producing the form often results in a narrowing of the eye aperture and a slight opening of the mouth. Informally, the combined effect of pulling the nose upward and pulling the brow downward and inward may be characterized as an effortful *scrunching together* of the face (see Figure 2 for the anatomy of the S-action; see Figure 3, for examples of the form produced by three Yupno speakers as part of a full nose-pointing gesture). For this reason, we refer to the facial action in isolation as the *S-action*. English speakers will sometimes label similar actions "nose-wrinkling", though the exact extension of this phrase is unclear and often carries a negative valence. Indeed, of special interest is the

[4] In our data the action always appears to be executed symmetrically— that is, with muscles contracting on both sides of the face— but note that it is anatomically possible to independently contract the *levator labii* muscles.

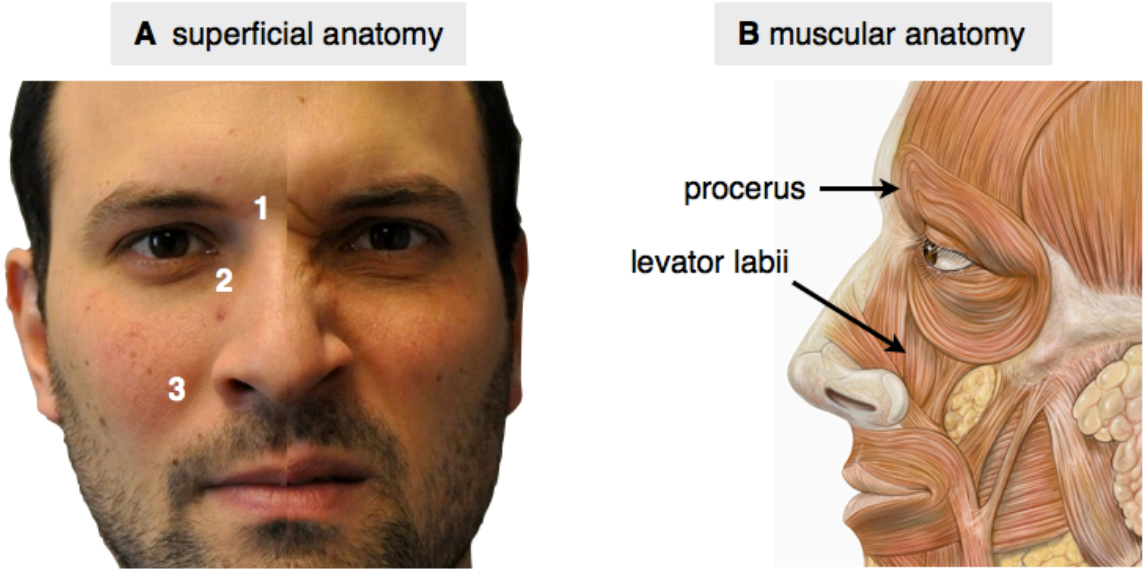

Figure 2. The anatomy of the S-action. (A) The superficial anatomy of the form, seen in a composite image juxtaposing the same face in relaxation (left) and apex (right). Producing the S-action causes creases to emerge in the region between the eyebrows (1) and along the flanks of the nose and under the eye (2). The nasiolabial furrow (3) is raised and somewhat deepened. (B) The muscular anatomy of the S-action, which is produced by contracting the levator labii and procerus (Illustration credit: Patrick J. Lynch).

fact that the S-action is commonly associated with the expression of disgust in the Western world (see, for example, Chapman, Kim, Susskind and Anderson, 2009), which we return to below. When produced *a*symmetrically, the action may also be termed a "snarl" (e.g. Darwin, 1998 [orig. 1872]: 245-248). Yet, as it is used by the Yupno, we have no evidence to suggest that the S-action entails the slightest negative affect.

Participation of additional muscle groups varies somewhat idiosyncratically from speaker to speaker. One clear idiosyncratic variable in the present data is that the eyes are sometimes squeezed shut, and other times narrowed but left open (for illustration, compare Figures 5 and 6, discussed later). Eye-shutting appears to vary across speakers and across different contexts

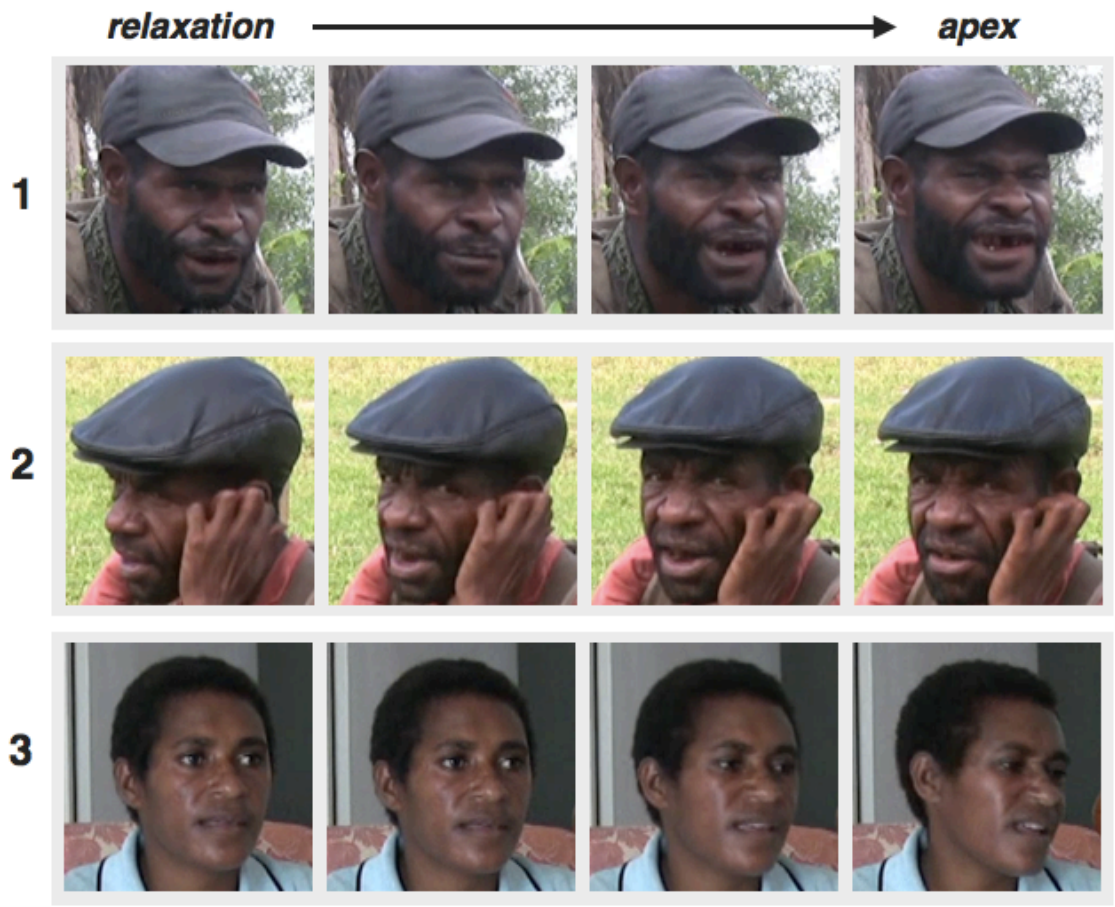

Figure 3. Examples of the nose-pointing gesture produced by three different Yupno speakers. The frames show the unfolding of the form from relaxation to apex, proceeding in ~100 millisecond time steps. The facial form exhibits an effortful *scrunching together* of the face, which we call the "S-action". Series 1 represents a high-intensity version of the S-action, series 2 an intermediate-intensity version, and series 3 a low-intensity version.

of use, but is not associated with one function of the facial form or another (e.g. deictic or non-deictic), though this claim remains to be verified in a larger corpus. A final noteworthy dimension of the S-action is that producing it results in a slightly different constellation of facial changes depending on the physiognomy of the speaker: in one speaker an intense

nose-point may result in salient diagonal lines running down the flanks of the nose; in another speaker, the form may produce deep horizontal creases under the eyes.

4.3. Nose-pointing

The full-fledged Yupno nose-pointing gesture is marked by the coordination of head-pointing with production of the S-action. Note that neither of these morphological components of nose-pointing is in itself unique to the Yupno, as discussed above. What is special in the Yupno case is the combination of these components into a conventional and commonplace gesture that, as we explore later, serves a particular function. Figure 3 gives examples of the nose-pointing gesture produced by different speakers.

A few further comments on the morphology of the nose-pointing gesture are worth highlighting. A first is that nose-pointing gestures exhibit a clear hallmark of pointing gestures in that they can be produced with differing degrees of intensity (c.f. Enfield et al., 2007). Intensity evident in pointing is a manifestation of communicative effort, and there is evidence to suggest that speakers modulate pointing intensity to meet the demands of the discourse (Enfield et al., 2007). Interestingly, such an intensity gradient is also considered a criterial feature of facial actions (Ekman et al., 2002). In the case of nose-pointing, at least two different parameters of the gesture indicate the degree of intensity with which it is produced. The first is the degree of contraction of the muscles in the S-action. Forceful contraction results in more— and more *conspicuous*— changes to the face. The different examples in Figure 3 exhibit different degrees of contraction, with series 1 being the most intense and series 3 being the least intense. The second parameter is the length of time the form is held in its *apical*, or most intense, form and the head held in its re-oriented

position[5]. Sometimes the S-action manifests as no more than a fleeting flash over the face while in other cases it can be held in place for more than a second.

Another important point concerns the coordination of head-pointing and S-action. Again, precisely what makes it evident that the nose-pointing gesture functions deictically is that the speaker's head is *re*-oriented during the preparation phase to establish a line of sight in a particular direction. Examples of this re-orientation can be seen in series 2 and 3 of Figure 3 (in series 1 the speaker is already fixating the referent when he initiates the S-action). Conversely, what leads us to identify other uses of the S-action as fundamentally *non*-deictic is the fact that there is no effortful re-orientation of the head and gaze. Deictic cases involve a break of mutual gaze with the audience in order to establish a line of sight by rotating the head in the desired direction (but see example 4 below for an exception to this tendency). In most cases, there is also a subtle movement of the *height* of the head— that is, either a lifting or lowering of the chin. This component of the movement is not a ballistic "toss" of the head— as has sometimes been described for lip-pointing and as Kendon characterizes the possible Enga version of nose-pointing — but a smooth repositioning that serves to subtly reinforce the sense that the speaker is *re-orienting* to some location in space. In a handful of examples in the corpus, the nose-pointing gesture also involves an effortful forward head thrust, but such head-thrusting is limited to cases in which the target is located directly in front of the speaker. Movements of the head also signal the offset of the nose-point: as the form vanishes from the face, tension in the head

[5] The factors affecting the duration of an apical hold in adult pointing gestures have not been studied previously to our knowledge. While we suggest apical holds embody communicative effort, they very well may serve other functions as well, such as to maintain reference over a broader stretch of speech.

and neck is relaxed and the eyes and head re-orient to the return gaze to the listener or elsewhere.

5. Examples of nose-pointing

In our corpus of video data the majority of cases in which the S-action occurs are cases of nose-pointing. In other words, the action is produced along with other actions which, together with the co-produced speech, signal the speaker's intent to reorient the audience to a region of space. Whether the deictic use of the form is in fact considered to be its most protoypical use by speakers of Yupno is unclear, but we consider it first because of the relative preponderance of deictic over non-deictic uses in our corpus.

5.1. Example 1— Multiple available pointing strategies

The first example illustrates the use of the nose-pointing gesture in a basic pointing context: in direct response to a question about location (c.f. Enfield, 2001). A group of six adult Yupno men are sitting outdoors during an ethnographic interview in the village of Uskokop. Four of the men are residents of the village; the other two men are research assistants from Gua who have joined the researchers for a day of interviews in neighboring villages. During a brief break in the interview, one of the assistants directs a question to the local men about the location of something in the village. Three of the local men respond immediately by pointing, but their pointing gestures differ. A first responds by lowering his head slightly, fixing his gaze, and producing a low-intensity S-action. During the gesture his arms remain crossed over his knees, and though he is clearly speaking concurrently his words are unintelligible. At the same time as the first man's response, a second local man

sitting to his right points by lifting his left arm and extending his index finger in the same direction. Finally, a third man also responds a fraction of a second after the first two. He re-orients his head away from the question-asker, raises it slightly, and produces the S-action. He is holding a young child in his lap at the time of the gesture, and produces the nose-point without spoken accompaniment. The example compactly illustrates a range of pointing gestures available to Yupno speakers, as well as some aspects of their variation. First, the example shows that, in response to the same question, both index finger pointing and nose-pointing are acceptable. Second, it illustrates contrasting head movements as part of nose-pointing: one man coordinates the facial action with a subtle *downward* movement of the head, the other with an *upward* movement. And, third, the example shows that nose-pointing can be produced with or without accompanying speech.

5.2. Example 2— Nose-pointing and hand-pointing in coordination

The second example comes from an informal conversation between the researchers and two adult Gua men about aspects of the men's personal biographies. Both men are proficient in Tok Pisin, as well as English to a much lesser degree. In the example, one of the men is explaining where in the village his son was born, in a cluster of houses just outside the main settlement area of Gua. He begins his explanation by pointing off camera with his left hand, index finger extended, explaining in English that the birth occurred in a house that was "down there" (see Fig. 4, panel A). One of the interviewers comments that the location of the house means that it must have made for quite a far walk to the local health center, which lies at some walking distance from Gua in the opposite direction. The man immediately corrects an apparent misunderstanding of the distance of the house in

question, saying “Ah, not very far… just…”. As he says “just” he breaks gaze with the questioner and points again to the same location with his left hand (Fig. 4, panel B). As his left arm reaches full extension, he leans forward, tilts his head slightly downward, and produces the S-action. He relaxes the facial action and returns his gaze to the questioner but follows up by producing a few more index-finger extended pointing strokes in the same direction. The interviewer asks for clarification. The man again breaks gaze and fixes the nose-point in place, resumes the index-finger point to the same location, and says “down there” (Fig. 4, panel C). Discussion quickly follows about whether the researchers have, in the course of touring the village, visited the cluster of houses in question, with the two Yupno men insisting that they have. One researcher asks whether the cluster is considered part of Gua and both men nod in assent. The same speaker from before says “Just… below there”. Co-timed with “just”— which is protracted and spoken with notably high pitch— he produces yet a third iteration of the combined nose- and hand-point, almost identical morphologically to the first two. Moreover, the arm extension, body lean, and S-action are tightly coordinated to reach apex at the same time (Fig. 4, panel D). He retracts the gesture and returns gaze while finishing with “below there”. As the first man begins his retraction, the second Yupno man, quiet until this point in the sequence, now offers a nose-point, thrusting his head forward and downward slightly while saying “down there”.

The example demonstrates clearly that there is no prohibition on— or unwelcome redundancy in— producing manual and facial pointing gestures together. This fact perhaps provides an important clue that the hand-point and nose-point may serve different yet complementary roles. Especially interesting to note is that the speaker initially locates the house with an index-finger point only (panel A), and it is only after the failure of this first

Figure 4: Four pointing gestures discussed in example 2. The gestures, depicted in panels A-D, form an ordered sequence, each separated by a period of relaxation. (A) An initial manual point to a house beyond view, produced *without* accompanying facial action. (B) A second iteration of the manual point now accompanied by the nose-point and co-produced with the word "just". (C) A third iteration co-produced with "down there". (D) A fourth and final iteration co-produced with "just… below there". Time codes are given in the bottom right of each panel.

referential bid that the man supplements the hand gestures with nose-points (panels B-D). Very few of the examples in the corpus involve such a series of mixed-articulator points to the same referent. However, the present example alone would seem to undermine what at first may seem a reasonable interpretation: namely that nose-pointing— by dint of its

smaller amplitude and lesser expenditure of bodily effort— primarily signals lower communicative effort than hand-pointing (see Enfield, 2001, pg. 198-202, for discussion of sequences of hand-pointing and lip-pointing). In other words, this sequence seems to challenge the naïve intuition that nose-pointing is just a less effortful alternative to hand-pointing.

5.3. Example 3— Variation in form across speakers

In the next example, the researchers (including a collaborating anthropologist, Jürg Wassmann) are having an informal conversation and a group of four Yupno men about geography and culture in the village of Gua. The anthropologist is seeking a translation of the Tok Pisin word *daunbilo* (meaning 'downwards') into Yupno. A first man responds by reorienting his head in the direction of the macro-scale slope of the valley down toward the sea, slightly lifting his chin, and saying "omoden" (a Yupno spatial adverb meaning roughly 'downhill') while producing the S-action. A second, older man responds immediately afterward (though he does not appear to have seen the first man's gesture) by also supplying the Yupno word "omoden". He also produces a nose-pointing gesture, coordinating a slight chin lift with the S-action. Interestingly, in contrast to the first, the second speaker's version of the S-action involves noticeable eye-shutting. One of the interviewers asks for a clarification of the Yupno word, and immediately both men, one after the other, reproduce the word "omoden" along with nose-pointing gestures. As in the first iterations of the gesture, the second man's version of the facial form involves conspicuous eye-shutting while the first man's version does not.

5.4. Example 4— Nose-pointing to the abstract

Example 4 comes from the same conversation as example 2, a discussion about the birth of a Yupno man's son. One of the interviewers asks whether his son's birth was "kalip si ngan" (a Yupno expression meaning 'in the distant past'). The question is posed playfully, as the boy is known by all participants in the interaction to be no more than a toddler. The man responds by rejecting the characterization with a smile, saying "It's not…" (i.e., the boy was certainly not born in the distant past). He trails off and then, after a brief pause, continues in a mixture of English and Yupno (italics): "It's *apmasoq*. Or, it's some times— some years only going back. I can remember it". Tightly co-timed with the production of the Yupno word *apmasoq* the man produces the S-action while pointing with his head downward and slightly to his left, in the direction of the declivity of the valley down toward the sea (see Fig. 5, A series of panels). Curiously, this appears to be the lone example in the corpus in which a speaker maintains mutual gaze with the interlocutor while nose-pointing elsewhere. A possible explanation is the metalinguistic nature of the utterance, as the speaker is nominating a particular word while monitoring closely its uptake. The Yupno word *apmasoq* is formed by joining the word for yesterday (*apma*) with the diminutive (-*soq*) and in this context may be loosely rendered into English as "just yesterday". The example shows quite clearly that nose-pointing can be used to point out the abstract— such as, in this case, temporal entities— just as it can concrete entities, places, and directions. The speaker also appears to reproduce the facial form— this time without deictic reorientation of the head— soon after this initial production. After saying "apmasoq" his face relaxes and remains relaxed through a brief pause. But he then reproduces the S-action in less intense form as he says in English "some", while

Figure 5: Two examples of the unfolding of the facial form from relaxation to apex, produced by the same speaker at different points in an interview. Frames are separated by ~200 millisecond time steps. (A) In a case of abstract nose-pointing, the speaker produces the S-action in the course of head-pointing to his left while saying the Yupno word *apmasoq* (yesterday + DIMINUTIVE) (example 4 in text). (B) The speaker produces the S-action *without* pointing. The facial action is co-timed with "just" and occurs in the context of an apparent pragmatic hedge (example 8 in text).

maintaining gaze on the interviewer. We now move to consider such apparently *non*-deictic uses of the S-action.

6. Other uses of the S-action

A question that naturally arises from the previous examples is that of the meaning of nose-pointing. How, if at all, is nose-pointing functionally distinct from other forms of Yupno pointing, such as head-pointing and index-finger pointing? As already discussed, the two morphological components of nose-pointing— head-pointing and S-action— are dissociable. Much as important clues to the meaning of nose-pointing are found by comparing cases of head-

pointing (which lack S-action) with cases of nose-pointing (which include S-action), further clues may be provided by cases in which the S-action is produced without pointing. In the foregoing examples, the fact that the speaker is producing the face as part of a pointing action is evident in the effortful *re-orientation* of the head and gaze to some part of the environment. It is based largely on this re-orientation that we labeled such uses *deictic*, and have thus described them as nose-pointing gestures. But in the examples considered next, no such reorientation is in evidence, and the accompanying speech further reinforces the reading that no pointing is intended. Examples of the S-action without pointing seem to be invariably co-produced with speech.

6.1. Example 5— with Yupno word meaning short

In this example, the facial form is produced three times in short succession, each time with a different degree of intensity and each time with the same word. A young man is attempting to explain the meaning of the Yupno phrase *sigak pasipmasoq* (a phrase meaning 'a very short season'). His explanation occurs as part of a structured interview in which Yupno speakers were asked to explain the meaning of various time-related Yupno expressions (results of this study are discussed elsewhere (Núñez, Cooperrider, Doan, and Wassmann, 2012)). The man repeats the phrase several times to himself before launching into an explanation. He produces the face a first time tightly co-timed with the word "pasipmasoq", with notable eye-shutting and no evident head reorientation. When the interviewer repeats the word for confirmation, the man repeats the base part of form— "pasipma"— this time more slowly and with greater intensity in the facial action. He concludes the sequence by repeating "pasipmasoq" twice more, adding a subtle version of the facial gesture (but now without concurrent eye-

shutting) to the final version. The Yupno word *pasipmasoq* is composed of the word *pasipma* (meaning 'short') + *-soq* (diminutive) and can be glossed as 'very short'. It is used of objects with concrete spatial extent, as well as of objects with temporal extent such as, in the present case, a season. Words indicating relative smallness or tiny referents appear to be strongly associated with the S-action, as the examples below further demonstrate.

6.2. Example 6— with Tok Pisin word meaning small

The next example occurs as part of an informal conversation with two Yupno men about the village of Gua and its history. During the conversation, conducted in Tok Pisin, one of the men relates a story from his childhood. He describes how everyone in Gua was pleased with the arrival of an anthropologist— everyone including "ol timbuna, liklik man, bikpela lapun man". The list can be glossed in English as "the ancestors, boys, and big old men". Each item in his three-term list is co-produced with a gesture. As he says "ol timbuna" he twists his body to his left, with his right arm outstretched (see Fig. 6, panel A); as he continues with "liklik man" he now twists his body to his right and produces a high-intensity version of the S-action, his eyes completely closed and his mouth slightly open (panel B); as he finishes with "bikpela lapun man" his face changes rapidly— the eyes now open wide and the brow lifts— and he raises his right hand high above his head (panel C). The timing of the facial contraction with *liklik* is precise in both onset and offset, lending weight to the inference that the facial action in this example is narrowly associated with that particular modifier and not with, for instance, the full list.[6]

[6] Note that in this example, as with several others in the corpus, it is not possible to judge definitively whether the actions are best considered deictic or non-deictic. After all, an alternative interpretation of this example, suggested by the reorientation of the head, is that it is another case of abstract nose-pointing in which a fictive referent— a

Figure 6: A Yupno speaker relating a story in Tok Pisin. He produces a sequence of three gestures, each tightly linked to part of a three-term spoken list. (A) The speaker produces a manual gesture and associated head movement with "ol timbuna" ('the ancestors'). (B) The speaker twists his torso slightly to his right and produces the S-action while saying "liklik man"

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boy— is located in space. However, the fact that the S-action is precisely co-timed with the diminutive modifier— *liklik*— leads us to favor a non-deictic interpretation.

(‘boys’). (C) The speaker raises his torso and right hand, and expands the face and brow while saying “bikpela lapun man” (‘big old men’).

6.3. *Example 7— with English word* little

In another example a Yupno speaker provides explicit, unsolicited meta-linguistic commentary on the Yupno morpheme *–joq*, an allomorph of the diminutive form *–soq* given above. The example occurs in the context of one of the structured interviews mentioned previously, in which the researchers are asking questions about the Yupno understanding of time. A group of men have been asked to explain the Yupno phrase *abjuk duma donjoq* meaning ‘not now but a bit later’. The word *donjoq* is made up of *don* (meaning ‘later’) and *-joq* (diminutive). Without prompting one of the men, a field assistant who has been translating parts of the conversation for us, offers the following explanation in English: “Our word *joq*. A little. Not beyond… a little bit”. As he first says “a little” he produces a low intensity version of the S-action; co-timed with “beyond” he produces an upward tilt of the head, brow raised; finally, as he says “a little bit” seconds later he reproduces the S-action, upgrading the intensity and now coordinating it with a subtle forward head thrust. In both cases the facial action is produced without reorienting the head and while maintaining gaze on the interviewer. Again, the coupling between the speech and facial action is precise in both onset and offset, reinforcing the interpretation of a narrow lexical-level meaning for the S-action rather than a phrasal- or message-level meaning.

6.4. Example 8— with English word just

All of the above examples of non-deictic uses of the S-action involve reference either to the property of smallness or to small referents. However, in rarer instances in the corpus speakers

produce the facial action in close concert with words that do *not* explicitly convey size information. These examples are of special interest as they raise the intriguing possibility of a wider network of meanings surrounding the form. In the following example, the speaker— also the speaker in examples 2 and 4— produces the S-action while responding to a question, again, about his biography: "When I was- when I was at Teptep doing just a labor of M-A-F— M-A-F company...". Tightly co-timed with "just" the speaker produces the S-action along with a small amplitude headshake, all while maintaining gaze on the questioner (see Fig. 5, B series of panels). Together the use of the headshake and the word *just* are suggestive of hedging (see Kendon [2002], pg.177-179 on headshakes as expressions of speaker uncertainty). The reason for the hedge is not entirely clear, but one possibility is that the speaker is downplaying the importance of this particular stint of work in the context of his personal history. Importantly, note that the facial form itself is morphologically indistinguishable from other versions of the S-action produced by the same speaker in both pointing and non-pointing contexts (compare Fig. 5, series A [pointing] and series B [non-pointing]).

7. Discussion

7.1. Nose-pointing: The puzzle of meaning

Does nose-pointing contrast functionally with other Yupno ways of pointing? From one perspective, nose-pointing contrasts minimally with head-pointing. That is, the S-action is produced as an occasional— but by no means obligatory— adjunct to head-pointing, suggesting the possibility that it overlays some distinctive semantic ingredient or "inflection". From another perspective, nose-pointing contrasts minimally with non-deictic uses of the S-action. The fact

that the identical form is also produced without pointing suggests the possibility that the form has some stable meaning that might be characterized independent of its deictic function.

We distinguish several possible explanations of nose-pointing's meaning. A first possibility is that nose-pointing occurs in free variation with head-pointing; the two are functional equivalents. While this represents a "null hypothesis" of a sort, it is at odds with an important principle of human communication, Clark's (1996, pg. 261) "principle of choice". According to Clark's principle, whenever speakers make a choice among a set of possible signals they mean something by their choice. Note that on such a free variation account the deictic and non-deictic uses of the S-action would be mere gestural "homonyms" (c.f. Sherzer, 1972, pg. 118): functionally distinct gestures with no semantic commonality binding them, which just happen to both involve the S-action. A second possibility is that nose-pointing primarily contrasts with hand-pointing in that it involves a lesser expenditure of bodily effort and thus signals a lesser degree of *referential* effort; at the same time, nose-pointing involves an incrementally greater degree of effort than head-pointing. Nose-pointing thus falls at an intermediate point on a continuum of referential effort between head-pointing on the low end and hand-pointing on the high end. Such an account warrants further investigation, but has a few limitations. For one, it is not clear how useful and pragmatically motivated a marker of intermediate referential effort actually would be, particularly given that both head-pointing and hand-pointing can be modulated to reflect different degrees of referential effort. Another limitation of the effort account is that it provides no motivation for the form of the S-action itself. Indeed, both the free variation possibility and the intermediate effort possibility treat the S-action as an essentially arbitrary form and take the deictic and non-deictic uses of the S-action to be homonyms.

A more compelling possibility, which we term the *precision hypothesis*, treats as crucial the observation that the S-action is used non-deictically. The precision hypothesis posits that the relationship between nose-pointing and non-deictic uses of the S-action is one of gestural "polysemy"[7]: a shared semantic theme runs through the superficially disjoint contexts of use (c.f. Kendon, 2004). These inter-related contexts of use include the examples of nose-pointing proper (examples 1-4), the examples of the S-action used as a kind of gestural diminutive (examples 5-7), and the rare but intriguing other uses of the S-action (example 8). According to the precision hypothesis, nose-pointing embodies a speaker's construal of referential exactness and it is connected to other uses of the S-action by a well-attested route of semantic extension. In what follows we outline this account in some detail and bring together a number of different observations that lend support to it.

Given its frequent co-occurrence— and fine-grained temporal co-production— with words denoting small size, a clear semantic theme of the S-action in its non-deictic uses is *diminutiveness*. In the above examples, co-produced smallness-related speech includes the English phrase *a little bit* (example 7); the Tok Pisin phrase *liklik man*, or boy (example 6); and the Yupno word *pasipmasoq*, comprising the word for short and the diminutive affix (example 5). Additionally, in other examples in the corpus not discussed above, the form is produced with semantically related terms such as Tok Pisin *manki* or 'boy', English *some* in the sense of few, Yupno *aminjoq*, made up of the word for man (*amin*) plus the diminutive (*-joq*), English *small*, *near,* and *little*, and at least one additional instance of co-production with the Yupno word

[7] Consider as an example of gestural polysemy among speakers of English three gestures that are nearly identical in form: the 'just a minute' gesture, made by holding the index finger up for inspection; the 'nomination deictic' (Kendon, 2004, pg. 142), a discourse-related gesture that marks what is being said as of singular importance; and the gesture for 'one'— as in "I'll take one of those"— again involving the same form. A notion of 'oneness' or 'singularity' undergirds these three uses, certainly, though the link may not be consciously accessible to most speakers.

pasipmasoq (produced by a different speaker from example 5). From this profusion it seems beyond doubt that use of the S-action in isolation very often carries diminutive meaning. But the interesting further question is whether a diminutive semantic core might somehow also account for the many cases in which the form is used as part of nose-pointing, as well as for the non-deictic cases (e.g. example 8) in which smallness is not directly referred to in speech.

Evaluating this possibility requires consideration of the semantics of the diminutive. Diminutives take on a wide range of meanings cross-linguistically. Based on a large sample of languages, Jurafsky (1996) presented an analysis of the diminutive as a radial category defined by a semantic core of CHILD/ SMALL and characterized by a number of widely attested extensions from this core, each driven by different mechanisms of semantic change. Among the most common extensions are the senses of *endearment*, *approximation*, *intensity/exactness*, *imitation*, and *femaleness*. Not every language that has a morphological or lexical diminutive instantiates all of these attested extensions, of course; most will instantiate only a handful. Of potential interest to the Yupno nose-pointing case are the *intensity/ exactness* extensions of the diminutive because, as discussed by Jurafsky, these extensions appear to be strongly associated with deixis. That is, languages around the world use the diminutive with deictic adverbs (e.g. *here, there*) that imply spatial extent in order to denote a narrowing of that extent. He writes: "Deictic physical location is viewed as a region in a line or a plane; diminutivization of this region converts it to a point" (pg. 550). He adds that, via the cross-linguistically pervasive metaphor of TIME is SPACE, words expressing *temporal* deictic extent, such as *now* can likewise be diminutivized.

These semantic facts suggest the possibility that the Yupno S-action, when "layered" on top of head-pointing to produce nose-pointing, contributes a shading of intensity/ exactness to the pointing act. In English an analogous intensifying/ exactifying function is fulfilled lexically

by adding the word *right* ("right here", "right now"), or somewhat more restrictedly by adding *just* ("just now", "just then") to deictic and other spatial words (e.g. *next*, *inside, below*). In the English case, it would appear that the use of intensifying lexical material is as much a matter of pragmatics as semantics. *Right* and *just* do not necessarily encode precision in an objective spatial sense, but rather a construal of precision against the backdrop of a presumed attentional field. Put another way, the supplementation of deictic words with intensifying material seems to imply, whether preemptively or correctively, that the audience's attention is focused too broadly. If English is any guide in this respect, the Yupno nose-pointing gesture may plausibly enact a speaker's construal of a referring act as *precise* against the backdrop of a presumed attentional field that is *diffuse*. On this account, a nose-pointing gesture would thus constitute a more intense/ exact version of a head-point produced without accompanying S-action.

Lending support to the above account is the fact the Yupno language uses the diminutive as a marker of deictic intensity/ exactness in precisely the way Jurafsky describes for other languages[8]. The Yupno diminutive is realized as a morphological suffix, with three allomorphs: -*soq* after a vowel, -*joq* after a bilabial/ coronal, and -*goq* after a velar. Examples of the exactness use of the morphological diminutive include *abjukgoq* (now + DIMINUTIVE: "right now") and *odonjoq* (here + DIMINUTIVE: "right here"). Though no detailed study has been carried out, the Yupno diminutive appears to be relatively productive and has extensions at least to endearment in addition to intensity/ exactness. How does the semantic/ pragmatic range of the Yupno morphological diminutive relate to the semantic/ pragmatic range of the S-action in Yupno? This is a question of special interest, but we are currently far from answering it. Note, though, that there appears to be a clear association between the S-action and— not only words related to

[8] Linguistic facts about the Yupno diminutive presented in this section are based on field observations made by James Slotta and generously shared with the authors (James Slotta, *personal communication*, October 18, 2010).

smallness generally— but to the morphological diminutive in particular, both in deictic (see example 4) *and* non-deictic contexts (see example 7). Curiously, in other examples, the facial form is produced in association with the English pseudo-diminutive "just" (see examples 2 and 8), and in only one of these cases (example 2) is the context spatial.

The crucial question for the precision hypothesis, of course, is whether there is any evidence in the corpus to suggest that the nose-pointing gesture entails a sense of exactness that head-pointing does not. Possible supportive evidence is found in several of the examples above. In example 2 the speaker first produces a pointing gesture with no accompanying facial action and then, only upon failing to be understood, supplements the manual pointing gesture with a nose-point. The fact that the facial action appears only *after* the manual form alone has failed suggests that it here functions to upgrade referential specificity (see Enfield, 2001, pg. 198-202 for discussion of the notion of "upgrading"). Similarly intriguing is example 4, in which the S-action is co-produced with a word marked by the morphological diminutive— *apmasoq*— and is used in the sense of 'only yesterday'. In this example, the speaker seems to produce the nose-point *correctively*, after an interlocutor has suggested a much broader attentional field, spanning from the present to the distant past.

Is the pairing between the S-action and its diminutive meaning (and, by hypothesis, in the cases of nose-pointing its intensity/exactness meaning) an arbitrary convention, or is it motivated? And, if motivated, what might be its iconic roots? First, the form could be rooted in a stylization of looking at something that is difficult to see because it is small— i.e. a form of exaggerated squinting[9]. Second, the form could have roots in the kinesthetic sensation of clenching or scrunching together the face so as to make it smaller. Regardless of which of these

[9] Interestingly, Wilkins (2003) mentions Arrernte speakers' use of a stylized squint along with lip-pointing "when large relative distance is being indicated, and when an object is particularly close and available" (pg. 187).

possibilities is correct, an important factor in the cultural "selection" of this form appears to be its *gradability*. As discussed above, the S-action— like other facial actions— can be produced on a gradient of intensity; at the same time, smallness is clearly a gradient feature as well. Thus the degree of intensity of the S-action can be varied to analogically reflect the degree of smallness (or exactness) one wants to communicate, in the same way that the intensity of a smile can be varied to analogically reflect the degree of happiness that is desired. The point is subtle but important: the use of a gradable gestural form to mark a categorical meaning (e.g. the use of a gradable facial gesture like the S-action to mark gender) or the use of a categorical gestural form to mark a gradable meaning (e.g. the use of a categorical handshape to mark smallness) would not work as efficiently.

7.2. Comparison to lip-pointing

Nose-pointing differs in key respects from lip-pointing, the currently best-documented form of non-manual pointing, and these differences go beyond their superficial morphological dissimilarity. Lip-pointing is broadly distributed geographically, suggesting independent cultural invention in different parts of the world (Wilkins, 2003). To the best of our current knowledge, nose-pointing is much more limited in distribution. Kendon's earlier report of a similar form in use by the Enga, also of Papua New Guinea, raises the intriguing possibility that the gesture is used areally and is not restricted to the Yupno Valley. Indeed, a secondary aim of the present report is to stimulate interest in facial actions among linguists and anthropologists working in the area, on the possibility that the phenomenon we have documented is not so isolated after all. Nonetheless, despite the possibility of micro-areal diffusion we know of no reports to suggest the form is in use outside of Papua New Guinea. In the context of the world's cultures, then, nose-

pointing thus appears to be a less "obvious" or "available" morphology to humans than lip-pointing.

Another conspicuous difference between nose-pointing and lip-pointing is that, in lip-pointing, the speech articulators are obviously affected, whereas in nose-pointing they are much less so, if at all. Enfield (2001, pg. 200) does make reference to lip-pointing while speaking, but the action almost certainly changes the acoustic qualities of the co-produced speech. The S-action, on the other hand, is free to operate as a truly *co-speech* gesture, as it does in many of the examples in the corpus. If the gestural polysemy we have proposed proves correct, another difference is that the facial action that is criterial of nose-pointing can also be produced independently of pointing. No examples of the lip-pointing facial action have been presented which do not also involve pointing, though in certain cases the deictic function is admittedly less transparent (see Sherzer, 1972 for discussion).

Enfield (2001) hypothesizes that the formation of the lip-point serves to "switch on" the real deictic vector of the action: gaze[10]. In support of this interpretation he offers the observation that the lips and gaze are always aligned in lip-pointing. Lip-pointing is thus cast as an elegant solution to a basic problem of face-to-face interaction, the problem of marking the difference between *incidental* gaze and *deictic* gaze. The logic is compelling, and it would seem at first blush that nose-pointing may also be fruitfully conceived of as a sort of gaze switch. However, such an interpretation does not fit well with several of our observations. In at least one example in the corpus (example 4), the nose-point is done with clear disalignment between the head/nose

[10] Note, however, that in lip-pointing there is also a projection of a body part in space— that is, a movement toward the intended referent, which Kendon, following Eco (1976), has maintained as a criterial feature of pointing (Kendon, 2004, pg. 200). In nose-pointing, by contrast, the facial action involved is more or less orthogonal to any vector that is projected toward the intended referent by the head motion. In other words, the nose is not actually doing the pointing— it is not "moving toward" the referent. Rather the S-action supplies a kind of "inflection" on the head-pointing act.

and the gaze. In at least one other case— not discussed above— the S-action is produced in the course of head-pointing to a referent behind the speaker.

7.3. Nose-pointing and the study of facial action

How does the phenomenon of nose-pointing and the S-action more generally fit within our understanding of the role of the face in human communication? Previous work on facial movements has cleaved tightly to the framework first initiated by Darwin— and later elaborated by Ekman and colleagues— on the face as a canvas for the expression of emotions. It is striking to note, in connection to this framework, that the facial action described above is identical to the putatively universal expression of disgust (for discussion of the facial dynamics of disgust, see Chapman, Kim, Susskind, and Anderson, 2009). Disgust is very commonly included among the five or six basic emotions (e.g. Fridlund, 1994), and it has even been proposed that recognition of the expression is supported by a dedicated brain area (Phillips et al., 1997). What is more, the form of the disgust expression itself has been argued to be not arbitrary but *adaptive*, with functional roots in sensory rejection (Susskind, Lee, Cusi, Feiman, Grabski, & Anderson, 2008). We did not study the Yupno expression or recognition of disgust, but the existence of a commonplace facial action that recruits the same form as the putatively universal and evolutionarily adaptive form raises questions about how disgust is expressed by speakers of Yupno.

As demonstrated above, the S-action is very often produced as a *co-speech* gesture, exhibiting clear links to spoken language in both timing and meaning. The present study thus contributes to an embryonic but promising line of investigation into co-speech facial action. Several commentators have noted the special interest of such research (e.g. Fridlund, 1994), but

only a handful of studies have sought to rigorously characterize kinds of communicative facial actions that go beyond the expression of the basic emotions (see, e.g., Ekman, 1979 and Chovil, 1991/2). This empirical gap may be due in large part to the fact that studying facial actions poses analytic and methodological challenges: facial actions are small in overall amplitude, they vary greatly in intensity, and they form and fade very rapidly. Much remains to be learned about the type and strength of relations that may hold between facial action and speech, how systematic these relations are, and also about any cross-cultural variation in these relations. Hints in the literature suggest that certain cultures may operate with a specialized repertoire of co-speech facial actions (e.g. Levinson, 2010 on Yélî Dnye).

8. Conclusion

The present study has described a deictic gesture— nose-pointing— used by the Yupno of Papua New Guinea's Finisterre Range, which is marked by the coordination of head-pointing with a distinctive facial action— the S-action. The action consists of an effortful scrunching together of the face; it varies in the intensity with which it is produced and— when used as part of nose-pointing— how it is coordinated with other gestural articulators and whether or not it is co-produced with speech. In the video data analyzed, the S-action appears to be used both as a supplement to head-pointing (i.e. forming the nose-pointing gesture) as well as in isolation when making reference to small things or to the property of smallness. While at this stage it remains possible that these deictic and non-deictic uses are gestural homonyms— similar forms recruited for unrelated functions— we have outlined the evidence in favor of a compelling alternative, that a semantic theme of *diminutiveness* underlies all uses of the form. According to this proposal, when used non-deictically, the S-action functions like a gestural diminutive, adding an analogue

complement to verbal characterizations of size; when used as part of the nose-pointing gesture, the same facial action contributes an ingredient of *deictic intensity* or *exactness*. On this account, the deictic intensity/ exactness sense of nose-pointing arises by processes analogous to the semantic extension of the diminutive from its core meaning of SMALL, a path of semantic extension also attested in the Yupno language.

While the above observations have highlighted several descriptively and theoretically interesting facets of nose-pointing and the facial action at its core, much remains to be investigated about the gesture and its distribution. Of particular interest is the question of just how systematic and overlapping the links are between the Yupno morphological diminutive and the S-action. Is the distribution of the form precisely co-extensive with the distribution of the linguistic marker? Also of interest are aspects of Yupno metacommunicative theories about the gesture and its meanings, such as whether any link is noted between nose-pointing and non-deictic uses of the S-action and, if so, which use is considered prototypical.

The interest of nose-pointing goes well beyond its place in the cabinet of cross-cultural gestural curiosities. Current evidence strongly suggests that humans everywhere point, but this does not mean that pointing is the same everywhere. It may well prove true that index-finger morphology represents a universal developmental default, as suggested recently by (Liszkowski, Brown, Callaghan, Takada, de Vos, 2012). But the existence of such a default only makes deviations from it all the more intriguing, inviting questions about the biomechanical, cultural, and linguistic factors that motivate morphological and functional variation in pointing (see Cooperrider, 2011 for discussion). Indeed, notwithstanding its primordial mystique, pointing appears to be subject to cultural pressures. It is unsurprising that a human communicative tool, however basic, is subject to innovation and elaboration in the way that all human tools are;

perhaps it is because of pointing's universal utility— not in spite of it— that we should expect dimensions to its variation that remain undescribed. Further research on pointing may not undermine its putative primordiality, but it just might disclose another no less interesting side of the story: how pointing gestures constitute a site of cultural innovation.

References

Bates, Elizabeth, & Dick, Frederic (2002). Language, gesture, and the developing brain. *Developmental Psychobiology*, *40*(3), 293-310. doi:10.1002/dev.10034

Chapman, Hanah A, Kim, D. A., Susskind, Joshua M., & Anderson, Adam K. (2009). In bad taste: evidence for the oral origins of moral disgust. *Science*, *323*(5918), 1222-6.

Chovil, Nicole. (1991/2). Discourse-oriented facial displays in conversation. *Research on Language and Social Interaction*, *25*, 163-194.

Clark, H. H. (1996). *Using language*. Cambridge: Cambridge University Press.

Cooperrider, Kensy (2011). *Reference in action: Links between pointing and language*. Doctoral dissertation, University of California, San Diego.

Darwin, Charles. (1998 [orig. 1872]). *The Expression of the Emotions in Man and Animals*. Oxford: Oxford University Press.

Eco, Umberto (1976). *A theory of semiotics*. Bloomington, IA: Indiana University Press.

Ekman, Paul (1979). About brows: emotional and conversational signals. In M. von Cranach, K. Foppa, W. Lepenies, & D. Ploog (Eds.), *Human ethology: Claims and limits of a new discipline* (pp. 169-249). New York: Cambridge University Press.

Ekman, Paul, Friesen, Wallace V., & Hager, Justin C. (2002). *Facial Action Coding System*. Salt Lake City, UT: Research Nexus.

Enfield, Nicholas J. (2001). "Lip-pointing": A discussion of form and function with reference to data from Laos. *Gesture*, *1*(2), 185-211.

Enfield, Nicholas J., Kita, Sotaro, & De Ruiter, Jan Peter (2007). Primary and secondary pragmatic functions of pointing gestures. *Journal of Pragmatics*, *39*(10), 1722-1741.

Fridlund, Alan J. (1994). *Human facial expression: An evolutionary view*. San Diego, CA: Academic Press.

Jurafsky, Daniel (1996). Universal Tendencies in the Semantics of the Diminutive. *Language*, *72*(3), 533-578.

Goldin-Meadow, Susan, & Mylander, Cynthia. (1984). Gestural communication in deaf children: The effects and noneffects of parental put on early language development. *Monographs of the Society for Research in Child Development*, *49*(3-4), 1-151.

Goodwin, Charles. (2006). Human Sociality as Mutual Orientation in a Rich Interactive Environment: Multimodal Utterances and Pointing in Aphasia. In N. J. Enfield & S. C. Levinson (Eds.), *Roots of human sociality: Culture, cognition and interaction* (pp. 97-125). New York: Berg.

Keck, Verena (2005). *Social discord and bodily disorders: Healing among the Yupno of Papua New Guinea*. Durham, NC: Carolina Academic Press.

Kendon, Adam (1980). A description of a deaf-mute sign language from the Enga Province of Papua New Guinea with some comparative discussion. Part II: The semiotic functioning of Enga signs. *Semiotica*, *32*(1/2), 81-117.

Kendon, Adam (2002). Some uses of the head shake. *Gesture*, *2*, 147-182.

Kendon, Adam (2004). *Gesture: Visible action as utterance*. Cambridge: Cambridge University Press.

Kendon, Adam & Versante, Laura (2003). Pointing by hand in Neapolitan. In S. Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 109-137). Mahwah, NJ: Lawrence Erlbaum.

Kita, Sotaro (2003). Pointing: A foundational building block of human communication. In S. Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 1-8). Mahwah, NJ: Lawrence Erlbaum.

Levinson, Stephen C. (2010). Questions and responses in Yélî Dnye, the Papuan language of Rossel Island. *Journal of Pragmatics*, *42*(10), 2741-2755.

Levy, Elena T., & Fowler, Carol A. (2000). The role of gestures and other graded language forms in the grounding of reference in perception. In D. McNeill (Ed.), *Language and Gesture* (pp. 215-234). Cambridge: Cambridge University Press.

Liszkowski, Ulf, Brown, Penny, Callaghan, Tara, Takada, Akira, & de Vos, Connie (2012). A Prelinguistic Gestural Universal of Human Communication. *Cognitive Science*. doi:10.1111/j.1551-6709.2011.01228.x

McClave, Evelyn (2000). Linguistic functions of head movements in the context of speech. *Journal of Pragmatics*, *32*(7), 855-878.

McClave, Evelyn, Kim, Helen, Tamer, Rita, & Mileff, Milo (2007). Head movements in the context of speech in Arabic, Bulgarian, Korean, and African-American Vernacular English. *Gesture*, *7*(3), 343-390.

McNeill, David (1992). *Hand and Mind: What Gestures Reveal about Thought*. Chicago: Chicago University Press.

Núñez, Rafael, Cooperrider, Kensy, Doan, D, and Wassmann, Jürg (2012). Contours of time: Topographic construals of past, present, and future in the Yupno Valley of Papua New Guinea. *Cognition*, 124 (1), 25-35.

Phillips, Mary L., Young, Andy W., Senior, Carl, Brammer, Michael, Andrew, C., Calder, a J., et al. (1997). A specific neural substrate for perceiving facial expressions of disgust. *Nature*, *389*(6650), 495-8.

Povinelli, D. J., Bering, J. M., & Giambrone, S. (2003). Chimpanzees' "Pointing": Another Error of the Argument by Analogy? In S. Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 35-68). Mahwah, NJ: Laurence Erlbaum.

Sherzer, Joel (1972). Verbal and nonverbal deixis: The pointed lip gesture among the San Blas Cuna. *Language in Society*, *2*, 117-131.

Slotta, James (2012). Dialect, trope, and enregisterment in a Melanesian speech community. *Language & Communication*, *32*(1), 1-13. doi:10.1016/j.langcom.2011.11.003

Susskind, Joshua M., Lee, Daniel H., Cusi, Andrée, Feiman, Roman, Grabski, Wojtek, & Anderson, Adam K. (2008). Expressing fear enhances sensory acquisition. *Nature Neuroscience*, *11*(7), 843-50.

Tomasello, Michael (2008). *Origins of human communication*. Cambridge, MA: MIT Press.

Wassmann, Jürg (1993). *Das Ideal des leicht gebeugten Menschen: Eine ethno-kognitive Analyse der Yupno in Papua New Guinea [The ideal of the slightly bent human: An ethno-cognitive analysis of the Yupno in Papua New guinea]*. Berlin: Dietrich Reimer.

Wilkins, David (2003). Why pointing with the index finger is not a universal (in sociocultural and semiotic terms). In S. Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 171-215). Mahwah, NJ: Laurence Erlbaum.