Mitchell, Alice. 2025. Pointing for time-of-day reference in Datooga. In Eric Norman Dzwiza-Ohlsen (ed.), Deixis – Zeigen – Pointing. Interdisziplinäre Perspektiven, 217–242. Darmstadt: WBG.

Pointing for Time-of-Day Reference in Datooga

Alice Mitchell

Abstract: This paper describes how Datooga speakers use both their voices and bodies to refer to the time of day. In Datooga, a Nilotic language spoken in Tanzania, time-of-day reference is often communicated by using a flattened hand to point to the position of the sun at reference time (e. g., to indicate midday, one would point directly upwards). This gesture is usually accompanied by gaze in the same direction as well as a verbal expression that links the pointing gesture with the linguistic utterance. Based on audio-video recordings of everyday interaction, the chapter examines the "contextual configurations" (Goodwin 2000) in which these references occur, i. e., how people rely on different semiotic fields (gesture, gaze, language, material objects, space) to talk about the time of day. The paper also discusses the embodied and spatially embedded quality of these everyday communicative practices, since pointing for time-of-day reference serves as a good example of the multimodal and situated nature of human communication.

Keywords: Datooga, temporal reference, pointing, multimodality, Tanzania

1 Introduction

When talking about events in the past, future, or habitual present, speakers of a Tanzanian language called Datooga frequently use pointing gestures to refer to the time of day. Using an outstretched arm or forearm

and flattened hand, speakers point to the position of the sun at reference time, usually at the same time that they say 'the sun like this' or an equivalent verbal expression. Figure 1 provides an illustration to help the reader easily visualize how this works: here, the speaker points directly upwards at a 90° angle while saying 'the sun like this' to indicate 12 p.m. The paper first aims to describe this highly conventionalized system of pointing for time-of-day reference in detail, based on analysis of examples taken from video recordings of everyday, spontaneous interaction in Datooga-speaking communities. Second, the paper aims to explore how these pointing gestures create meaning through symbolically complex, embodied, and intersubjective orientations to a "culturally formulated space" (Goodwin 2003, 218). It also argues that these pointing gestures invoke a notion of time that is embedded in people's sensory experience of their physical environment. I rely on the empirical, micro-level methods and theoretical concepts of linguistics and linguistic anthropology to study the role of pointing in attending to a particular aspect of the world, namely, the sun's trajectory through the sky and the significance of this visual phenomenon for structuring everyday life. In this introductory section, I outline the main conceptual areas of interest to be discussed in relation to pointing for time-of-day reference.

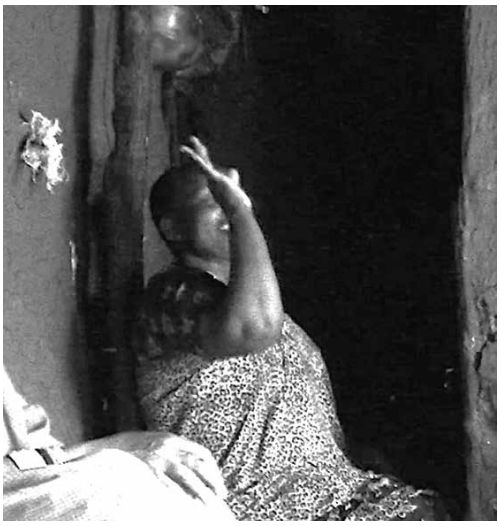

Figure 1: Pointing at noon

Kita (2003, 1) defines pointing as "a communicative body movement that projects a vector from a body part", where the vector indicates "a certain direction, location, or object". Here we are concerned with a conventionalized pointing practice that indicates the location of a particular object: specifically, the position of the sun on an arc that extends from the eastern to the western horizon. What is communicated by means of this pointing gesture is not the spatial location itself but a temporal reference to a particular time of day. Several scholars (e. g., Hanks 1990; Haviland 2003) have discussed the way in which pointing gestures, as well as other forms of deixis, have the appearance of concreteness, directness, and simplicity, but are in fact conceptually and formally complex acts of meaning-making. As we will see, time-of-day pointing practices in Datooga rely on precise coordination of speech and gesture, as well as cultural background knowledge, in order to be interpreted as time-of-day references. Pointing to the sun's position in the sky to tell the time may seem like a concrete, physically grounded form of temporal reference, whereby the 'lived' body creates a kind of geometric contiguity with the 'celestial' body associated with the temporal cycle of day and night. On closer inspection, it is clear that these gestures in fact involve abstracted and displaced meaning. People do not point at the sun in the here-and-now of the immediate visual field of the co-present interlocutors; rather, they point to a structured location in space that is associated with a portion of the day.[1] In other words, these pointing gestures are highly conventionalized form-meaning pairings whose usage is independent of the immediate physical presence of the sun. Nonetheless, perceptual experience of the physical environment and collective spatial frameworks are important for understanding how these gestures work, as I will discuss. Like all pointing practices, these time-of-day references also clearly

1 To point at the sun directly, particularly with an outstretched finger, is in fact taboo in some Datooga communities.

exemplify the embodied nature of language and human communication, where an individual's body serves both as the medium for, and an object of, communication.

In addition to unpacking the multimodal configurations (i. e., the integrated use of different types of semiotic resources) within which these pointing gestures are construed as meaningful, I will also briefly consider what such time-of-day references might tell us about conceptual representations of time among Datooga speakers. By way of these gestures, individuals reproduce a system of dividing up daylight hours according to the position of the sun in the sky. Speakers also frequently use verbal resources to refer to aspects of the sun's appearance, from which times of day can then be inferred (e. g., "the sun was turning red"). The movements of celestial bodies – the sun, moon, and stars – are of course central to time reckoning systems throughout human history. The oldest methods of daily time reckoning are based on measuring the length of shadows cast by the sun, and the modern twenty-four hour clock can be traced back to the Babylonian system of dividing the period between sunrise and sunset into twelve units (Dohrn-van Rossum 1996). The number of divisions made by the present-day Datooga pointing system appears to align with the twelve-hour numerical system that co-exists with pointing (see below for more details), though gesture allows for a more gradient representation of time than the categorical units of the linguistic numerical system. Cultural systems for dividing the day up into parts are often thought to be motivated by the "rhythms of social life", i. e., the habitual activities that are associated with different parts of the day (Munn 1992, 95). Below I sketch out the way that the position of the sun guides daily activities, particularly those relating to cattle herding, among rural Datooga. Precise time-of-day references allow speakers to locate past or future events within the daily flow of activities and thus draw on cultural associations with particular times of day, as well as to indicate duration. The representation of time through gesture necessarily gives these temporal references a spatial quality and reminds us of the entangled nature

of space and time in human experience of the world (cf. Munn 1992). Many linguists have investigated the ways in which time is conceptualized in terms of space (e. g., Brown 2012; Moore 2014)prompting one to wonder whether cultural specificity in spatial language and cognition is reflected in thinking about time. In the Mayan language Tzeltal, spatial language relies heavily on an absolute frame of reference utilizing the overall slope of the land, distinguishing an uphill / downhill axis and an orthogonal 'crossways' axis on the basis of which objects at all scales are located. Does this absolute system for calculating spatial relations carry over into construals of temporal relations? This question was explored in a study where Tzeltal consultants produced temporal expressions and performed two different nonlinguistic temporal ordering tasks. The results show that at least five distinct schemata for conceptualizing time underlie Tzeltal linguistic expressions: (i, and pointing practices specifically have been used to study how different communities conceptualize the past, present, and future, e. g., by pointing in front of or behind the body (Núñez & Sweetser 2006). In our case, time-of-day reference does not involve metaphorical processes that map time onto space but rather draws on people's concrete perceptual experience of the sun's daily motion across the sky. The penultimate section of the paper considers this embedding of time concepts in the physical environment.

The pointing practices for time-of-day reference discussed in this paper are not unique to Datooga but quite widespread in communities located in tropical regions where the day length does not vary a great deal. Floyd (2016) offers the most extensive case study of what he calls "celestial pointing" among speakers of an indigenous Brazilian language called Nheengatú. Like Datooga, Nheengatú speakers use a "visual bodily practice" (Floyd 2016, 32) for time-of-day reference, whereby pointing gestures occur together with speech. Floyd uses both naturalistic corpus data as well as experimental approaches to demonstrate the highly conventionalized nature of celestial pointing. His main theoretical interest in the paper is multimodality and the implications of these convention-

alized 'hybrid' practices for our theory of language. Here I will be more concerned with the meaning-making processes and cultural frameworks that undergird these pointing practices, but I note that Floyd's study provided the inspiration for this one. Floyd (2016, 38) gives a list of many other languages with similar time-of-day reference systems, all of which are located in the tropics. He mentions several other African languages, though as far as I know this phenomenon has not been investigated in detail for any African language until now. One 'linguaculture' not referenced by Floyd but especially relevant for Datooga is Nuer, another traditionally pastoralist ethnic group who also speak a Nilotic language. In his 1939 paper on Nuer time concepts, Evans-Pritchard (1939, 205) briefly mentions solar pointing practices, describing them as follows: "A common way of indicating the time of day of future or past events is by pointing with an outstretched arm to the place where the sun then occupied, or will occupy, in the heavens and by saying 'Thus the sun' (*cang enono*)." This description closely resembles the composite time-of-day references that we will see in Datooga. In general, it is worth bearing in mind that my analysis of Datooga time-telling practices may be loosely applicable to other communities. Though the ability to interpret time-of-day pointing is not specific to Datooga people, the fine-grained details of how this pointing system works are community- and language-specific and thus merit in-depth study.

In what follows, I consider the cultural significance of dividing up the day among rural Datooga and describe different strategies of time-of-day reference, paying detailed attention to pointing practices. The subsequent sections take up discussion of the spatial and temporal frameworks that both underlie, and are reproduced by, this gestural system of telling the time.

2 The cultural significance of time-of-day reference among rural Datooga

To first provide some brief ethnographic and methodological context for this study, the name 'Datooga' is an endogenous ethnonym referring to a traditionally pastoralist people of northern and central Tanzania who are estimated to number around 160,000 (Muzale & Rugemalira 2008). This term subsumes various subgroups which are associated with different regions of the country and distinguished on the basis of slightly divergent socioeconomic and cultural practices. The largest and best-known subgroup is Barabaiga. The subgroups speak different dialects of a language also referred to as Datooga, genetically classified as Southern Nilotic (Rottland 1982). The data presented in this paper is taken from a video corpus of everyday domestic interaction that I recorded in a couple of rural households located in Mbulu District in northern Tanzania. The primary language spoken in all the households was Datooga, and specifically, the Barabaiga and Gisamjanga dialects (which are highly mutually intelligible). Other languages sometimes heard in these households were Swahili, the national language and language of wider communication in Tanzania, and Iraqw, a local Cushitic language. All households were multigenerational, with the oldest generation of adults living with their sons and daughters-in-law and grandchildren. All households looked after herds of cattle and small agricultural plots where they grew maize and beans. At the time of the fieldwork (2014–2017), none of the households had electricity and women fetched water and firewood from nearby. While I visited all the households fairly regularly, I lived in one of the households for extended periods and refer to this below as my 'host household'.

In these rural Datooga-speaking communities of Tanzania, two systems of daily time-keeping operate: the numerical clock system and the solar time system based on the daily progression of the sun through the sky. The two systems are of course historically related and one can easily

be translated into the other. We will see examples of both systems in use in the following section. In East Africa, the twelve-hour clock begins at dawn, such that midday is six o'clock and 6 p.m. is twelve o'clock. Clock time regulates administrative and institutional activities, such as the beginning of the school day, church services, political meetings, and (at least in principle) departures of public transport. For example, a Land-Cruiser leaves one village for a nearby town twice a week at 9am (though actual departure time depends on various factors including number of passengers). Given the scarcity of physical clocks in rural Datooga households, I assume that many people calculate numerical time based on solar time (and perhaps associated phenomena, such as the length of shadows). In the last decade or so, however, mobile phones have become ubiquitous in rural Tanzania and as a consequence some people have easy access to numerical clock time (phones are often configured to the twenty-four-hour clock that begins at midnight, thus introducing a variant numerical system). Some young Datooga people also wear digital watches, though these often seem to function as status symbols as much as time-telling devices. Though clock time is not irrelevant to human activity in rural Datooga communities, daily routines, including waking, sleeping, cooking and milking, are still largely regulated by the rhythms of the sun, and time-of-day reference often invokes solar time, as we will see.

For pastoralists, keeping track of the time of day is perhaps most important for cattle herding. Writing about Nuer pastoralists of East Africa, Evans-Pritchard (1939, 207) observed that "[t]he daily timepiece is the cattle-clock". The so-called 'cattle-clock' is also a relevant concept for rural Datooga: daily activities are planned not only with reference to solar time but also according to the needs of the cattle. For example, at times of year when herds do not need to travel far to reach water and pasture, people wake up around dawn and women start milking and preparing the morning meal. Late into the dry season, however, women may need to start milking before sunrise so that the cattle can leave the compound

early enough to reach more distant pastures. By midday, young calves that have been grazing close to the compound must be brought back inside to protect them from the heat of the sun. Once the sun is low in the sky, cattle are herded back home. The importance of keeping track of the time of day for organizing herding duties is something children have to learn, as an incident that took place in my host household illustrates. It was early August, in the middle of the dry season, and a thirteen-year-old girl brought her herd back so late in the day that a hyena followed her part of the way home. That evening, she was rebuked for this incident by one of her uncles. As part of a fairly long rebuke directed at the girl, he explicitly referenced the time of day:

(1) *dúgâagù íi rákt áséeta qwányíit saa kumi na moja qáná saa kumi gwásín náa dúg àbà [xxx]*

dúg-âagù		íi=ráktá		áséeta		q-wá-nyíit	
cattle-2SG.POSS.PL		COND-go.WEST.CF.IS		sun		AFF-3-fill	
saa	kumi	na	moja	qáná	saa	kumi	g-wá-sín
clock	ten	CONJ	one	or	clock	ten	AFF-3-do
náa	dúgá	àbà					
what	cattle	PREP					

'Your cattle, if the sun is going down, if it gets to 5 p.m., or 4 p.m., what are the cows doing at [unclear]?'[2]

2 Linguistic examples in this paper follow transcription conventions in linguistics: the first line presents an utterance written in a slightly adapted version of the Datooga orthography; the second line presents the same utterance with the words broken up into smaller units of meaning; the third line is aligned with the second line and provides glosses of each linguistic unit; and the fourth line provides a translation. The glosses in the third line make use of linguistic abbreviations for grammatical categories as follows: 2 'second person'; 3 'third person'; AFF 'affirmative'; AM 'associated motion'; ANAPH 'anaphoric'; CF 'centrifugal'; COND 'conditional'; CONJ 'conjunction'; COP 'copula'; CP 'centripetal'; INCP 'inceptive';

Here, the time of day is used as a point of reference as to where the cattle should be located. The uncle questions why his niece's herd was not already closer to home by 4 p.m. or 5 p.m. Time of day is thus used as a guide for the movement of the cattle towards and away from the compound, with a very real danger (in the form of hyenas) motivating the herder's attention to time. Linguistically, the girl's uncle uses both sun position ('if the sun is going down') and numerical time in Swahili ('5 p.m., or 4 p.m.') to refer to the time of day, though the girl herself had no time-keeping devices other than her own perceptual abilities (the uncle did not use a pointing gesture in (1), perhaps because it was fairly dark inside the house). This example highlights one important way in which the time of day regulates activities in rural Datooga life, while also reminding us of the major dangers of not attending to time of day in this environment.

To summarise, many Datooga operate with four different (though related) systems of telling the time: 24-hour clock time; 12-hour clock time; sun position; and the 'cattle clock'. We now turn to look at how Datooga speakers typically communicate concepts relating to these systems, with a special focus on pointing practices.

3 Strategies for time-of-day reference in Datooga

Time-of-day reference in the Datooga language takes a variety of different forms, including exclusively verbal reference, combined verbal and manual reference, and potentially also exclusively manual reference, though this last form is not well attested. Using only the verbal channel, speakers can denote intervals of the day with time adverbials such as

IS 'inflectional suffix'; NEG 'negative'; PL 'plural'; POSS 'possessive'; PREP 'preposition'; PRF 'perfect'; PRO 'pronoun'; PSN 'personal name'; SG 'singular'.

sàktéayda 'morning', *áskwéarda* 'afternoon', or *shìng'áda* 'evening'. Time-of-day reference is also achieved through verbal depiction of the course of the sun in the sky, using verbal predicates such as *gámúchú* 'it dawns' and *gámíktá* '[the sun] sets', as well as of the relative brightness of the day, like in Example (2), where the speaker locates the end point of an activity with reference to first light:

(2) *gàdéemgá másármán éa gàwéeshìit*

gàdéemgá	*m-á-sármán*	éa	g-à-wéesh-ìit
woman	NEG-3-sing	CONJ	AFF-3-white-INCP

'Didn't the women sing until – until it got light?'

Another purely verbal means to refer to the time of day is to use the numerical twelve-hour clock system. Datooga speakers sometimes use Swahili to refer to clock time and sometimes the Datooga equivalent, as seen in Examples (3) and (4), both uttered by the same speaker (Swahili forms are indicated in bold):

(3) *jèedá qwâan síittá gáwá* ***saa kumi***

jèedá	qwâan	síid-ídá	g-á-wá	saa	kumi
stomach.POSS	father	person-DEM.DIST	AFF-3-go	hour	ten

'I swear, that person left at 4 p.m.'

(4) *gàgúl àséetá báa îispà néa gèetín*

g-à-gúl	àséetá	báa	îispà	néa	g-èe-tín
AFF-3-strike	hour	ASSOC	seven	CONJ	AFF-IMPS-open

'It got to 1 p.m. and they opened it'

The choice of Swahili rather than Datooga when using numerical time reference is possibly influenced by topic, or, more specifically, the type of

event being located in time. Speakers frequently use Swahili forms when referring to transportation such as motorbikes and busses, the departure and arrival of which are loosely organized according to clock time.[3] Most interactions rural Datooga people have with drivers and conductors of communal transport are likely to take place in Swahili, which presumably affects their choice of language when talking about transportation in Datooga.

My interest in this paper is in time-of-day references which are achieved through a combination of verbal and gestural means. In addition to pointing gestures, which are the central focus here, speakers sometimes also use numerical gestures when referring to time using the twelve-hour clock system. For example, in Figure 2, the woman pictured was talking about the time the bus leaves from her village to the nearest small town.

Figure 2: Holding up three fingers while saying "what time" [3 o'clock = 9 a.m.]

3 It is notable that it was transportation, and in particular the railway, that created a need for a standardised system of clock time across locales in the first place – see Zerubavel (1982) for an account of these historical developments.

She comments that if you arrive at the stop at 9 a.m., the bus may already be full. To refer to the time of day (9 a.m.), she uses the expression *àséetá báa háad* 'what time' (literally 'hour of how many') and specifies the precise numerical time by holding up three fingers (the choice to use the twelve-hour clock system rather than the sun position system again appears to be related to the topic of public transport, though she uses Datooga here rather than Swahili). In this example we see how the iconic numerical gesture completes the meaning of the verbal expression. In the verbal utterance, the noun *àséetá* 'hour' specifies the unit of time, while the interrogative quantifier *háad* 'how many' asks for the number of units. The gesture 'answers' this question by specifying the quantity 'three' (through an iconic indication of three fingers). The hand gesture and the verbal expression are thus part of a single act of reference and an example of what Clark (1996) has called "composite signals". This interlocking of verbal and gestural signs also characterises pointing gestures in time-of-day reference, to which we now turn. Pointing gestures appear to be more common than numerical gestures for telling the time.

Time-of-day pointing involves pointing with the forearm or arm and a flattened hand to the position of the sun at reference time. Like numerical time-telling gestures, celestial pointing in Datooga is almost always an element of a composite signal in combination with a verbal expression that refers to the sun. I first describe a single example of celestial pointing in detail and then make some general observations about these pointing gestures and how they combine with verbal expressions in composite utterances. My chosen example, represented by the transcribed utterance in (5) and the video stills in Figure 3, is taken from a recording of a conversation between three middle-aged women. Muudaan, the woman pictured in the video stills in Figure 3, was sitting on a stool next to a doorway, while the other two women were sat about a meter away from her to her right (and have been cropped from the images). The women were discussing some recent events in the village. In the utterance in (5),

Muudaan makes reference to the time of day at which a previously mentioned woman arrived at someone's house:

(5) *shìng'ád àséetá súnú qwàhídú dêa wás gátmòoda*

shìng'áda	àséetá	sún-ú	q-wà-híd-ú
evening	hour	be.like-CP	AFF-3-arrive.CP
déa	wás	gátmòoda	
ANAPH.PRO	be	wife	

'In the evening at around 5 p.m. (lit. the sun like this) the woman arrived'

Figure 3: Gesture accompanying utterance in Example (5)

Muudaan uses the noun *shìng'áda* 'evening' to first specify the general part of the day and directly follows this with a more precise reference to the hour of the day. When she begins speaking, her gaze is directed downwards and her hands are in her lap, as seen in the first frame of Figure 3. As she completes the word 'evening', she starts to turn her head (frame 2) and begins uttering the phrase *àséetá súnú* 'at this hour' (literally 'the sun like this'). As she says *àséetá* 'sun', her gaze is already pointing towards the position of the sun and she begins to move her arm upwards (frame 3). By the time she utters *súnú* 'like this', her arm is pointing at approximately 30° westwards, indicating the position of the sun in

the sky at around 5 p.m. (frame 4). From beginning to turn her head to returning her hand to its resting position, the whole bodily movement takes just over one second, and the stationary gesture (or gesture "hold") is extremely brief – less than 100 milliseconds. As she continues the utterance, she returns her gaze and hands downwards (frame 5).

With respect to formal aspects of the point, the gesture in Figure 3 is a conventional example, where a straight line is created from the elbow to the tip of the fingers by holding the hand in a flattened position with all fingers outstretched. Sun position points involving single outstretched fingers are not attested. Unlike in some parts of Africa where pointing with the left hand is considered taboo (Kita & Essegbey 2001), Datooga speakers can indicate time-of-day reference using either hand (earlier in the conversation, the same woman made another time-of-day reference by pointing with her left hand rather than her right hand). People can also use material objects to point with, using these objects as extensions of the body:

Figure 4: Woman uses broom to point (5 p.m.)

Figure 4 is taken from a video of a woman pegging out a cowhide to dry in the sun. Once she had finished pegging, she began sweeping up around the hide using a small broom. I asked her whether the cowhide would be dry by tomorrow and she responded by saying *gàygwásúnú áséetá nêa níjàam* 'The sun will be like this and it will have dried'. As she uttered the word 'sun', she very rapidly moved the broom into the position shown in Figure 4, so that it pointed at an approximately 30° angle, which my Datooga-speaking research assistant later translated as 5 p.m. In this case, the pointing vector is created purely by means of the broom, and not with the arm, though in other cases it would be possible for an object to function as an extension of a straight line created with the arm. While a speaker's gaze direction also usually indicates the rough position of the sun at reference time, in this case gaze is not used, perhaps because the gesture was so swift and the woman immediately carried on with her sweeping activity. Another formal aspect of celestial pointing identified in Floyd's (2016) study of Nheengatú was a sweeping movement of the gesture to indicate an interval of time. For instance, someone could point at a 30° angle westwards and then move the arm downwards towards the horizon to indicate the last hours of daylight. In Datooga, I have only observed gestures indicating fixed time points, though this kind of phasal time-of-day reference is presumably possible.

When considered in the abstract, pointing gestures can communicate many different kinds of information. A point such as the one in frame 4 of Figure 3 could indicate (i) a direction; (ii) a person, animal, or object currently located somewhere in the indicated direction; or (iii) someone or something typically associated with that direction (e.g., a neighbour who lives to the west of where the speaker is currently sitting), as well as an expressive stance towards any of these entities (as in pointing with excitement). Signs are of course never interpreted in isolation but within their immediate "contextual configurations" (Goodwin 2000) as well as their histories of use. Under what conditions, then, are pointing gestures interpreted as time-of-day references? As already mentioned, time-of-

day points are almost always accompanied by verbal material that frames the point as relating to time. In the utterance in (5), the gesture coincides with the noun phrase *àséetá súnú*, which involves the noun *àséetá* 'sun' and the verbal modifier *súnú*, which is a manner deictic, meaning 'be like this'.[4] This form *súnú* can be described as a deictic because it relies on some aspect of the immediate speech context for its interpretation, usually a bodily display of how some activity or state was performed or configured. In (5), we observe a chain of deictic reference, or series of intertextual signs, where the form *súnú* directs attention to the current configuration of the speaker's arm, which in turn directs attention to a particular location in space. In combination with the linguistic reference to *àséetá* 'sun', this spatial location is then interpreted as a reference to a specific position of the sun in the sky, and the sun position is then interpreted as a time-of-day reference. Thus we see how this seemingly simple, usually extremely brief pointing gesture involves quite complex chains of signification.

Most of the examples I have collected of time-of-day references using pointing are accompanied by linguistic reference to the sun (*àséetá*), modified by a manner deictic – usually *súnú*, as we have seen, or *úrjínú* 'be like this'. There is some flexibility in the linguistic form of these composite signals, with variations in ordering and phrasing. It is also possible to leave out explicit reference to the sun and to combine the pointing gesture with the verb *gwásúnú* 'it is like this', with an implied solar subject. In some cases, however, gestural time-of-day reference accompanies linguistic time-of-day reference without a deictic form connecting the linguistic expression to the gestural representation. In these cases, we can no longer speak of a 'composite signal', because the gesture is not crucial to the meaning of the utterance, but rather embellishes what is

4 The verb root is *sun* 'be like', which bears the 'centripetal' suffix *-u* which indicates motion towards the deictic centre, i. e. the speaker and addressee.

communicated linguistically. For instance, speakers may use a specific numerical time-of-day reference (see (4) for an example) while indicating the same information by pointing to the position of the sun. Alternatively, speakers may refer to a specific position of the sun via verbal means while providing the same information in the visual modality (i. e. by pointing). In (6), for example, a girl specifies the time of day verbally by referring to the visual quality and motion of the sun at sunset. The grammatical category indicated as AM in the gloss is 'associated motion', a category which allows speakers to indicate that some argument of the verb is moving, either towards or away from the deictic centre (cf. Kießling & Bruckhaus 2017). Here the sun is the implied subject that is both turning red and moving away (indicated by the *-t* suffix) towards the horizon. As the speaker refers to the time of day in this way, she also indicates the position of the sun on the western horizon (an approximately 0° angle) with the standard flattened arm gesture (in this case not accompanied by gaze), depicted in Figure 5.

(6) *Chíkón qám míi nílíl êa gwáarêaríidàat*

Úchíkón	qámná	míi	n-í-líli
PSN	NOW	NEG.COP	PRF-3-sleep.IS
êa	g-wá-árêar-íid-àa-t		
CONJ	AFF-3-be.red.INCP-AM-CF		

'Uchikon, now didn't she sleep until it turned red and went down (i. e. sunset)?'

Though this latest example contrasts with the one in (5) because it is not a composite signal (i. e., the pointing gesture does not complete the verbal utterance), the interpretation of the gesture as a time-of-day reference still depends on the linguistic context. Like in the composite examples, the gesture hold seen in Figure 5 is sequentially aligned with the verbal form *gwáarêaríidàat* 'it turned red and went down', the part of

Figure 5: Girl indicates sunset

the utterance that refers to the time of day. In all cases discussed so far, the production of pointing signs is anchored in, and precisely calibrated to, the immediate linguistic context. I have only found one example in my video corpus in which a time-of-day pointing reference is produced without accompanying speech. In this example, a woman says "the woman was here until" and then silently indicates the position of the sun at 3 p.m. Synchronically (i. e. at the precise moment of the gesture), the pointing gesture is the sole means of reference to the time of day. However, the interpretation of the gesture is still linguistically determined because it occurs immediately after the word 'until', which sets up a context in which a time reference is anticipated. Thus, these pointing gestures always form part of "locally relevant multimodal packages" (also referred to as "contextual configurations") (Goodwin 2003, 225), where meaning is determined through both verbal and visual cues. Meaning also depends on an existing cultural framework mapping sun position to time of day, as I now discuss.

4 Sun position and the cultural organization of space

The previous section investigated formal aspects of time-of-day pointing gestures and their precise coordination with verbal material. An adequate analysis of these pointing practices must also consider the way in which these gestures make particular features of the environment relevant at the moment of communication. Datooga time-of-day pointing practices are examples of what Goodwin (2017, 237) calls "environmentally coupled gestures", gestures that "use pointing to tie language to specific phenomena in the environment". Goodwin argues that research on gesture should not concentrate solely on the action of the hand but also "take into account the object in the world being grasped" (228), because this object becomes a significant part of the contextual configuration in which meaning is created. The relevant object in the world in our case is of course the sun, which is often simultaneously indicated by the word *àséeta* 'sun', as we saw above. The pointing gesture orients to a particular aspect of this object, namely, its location on an east-west axis. To retrieve the meaning of the gesture, individuals must then abstract from this indicated location in space to a position in a temporal sequence, i. e., the time of day at which the described state of affairs occurs. From one perspective, this mental abstraction – from pointing gesture, to sun position, to time of day – seems entirely straightforward: people who spend a great deal of time outdoors have experienced the daily trajectory of the sun through the sky thousands of times by middle childhood and can readily indicate where the sun rises and sets and its path in between. As such, Datooga people's ability to point out the sun's location at any given time of day may appear 'natural', arising from individual perceptual engagement with a permanent feature of the physical environment. Yet this engagement with the sun's position and this method of time-telling is of course deeply cultural: time-of-day pointing gestures are formally conventionalized, as we saw above, and they must be learned. Such learning

likely occurs through the shared orientations to the sun that occur in everyday communicative practice.

Time-of-day pointing gestures rely on, and reproduce, communal ways of organizing and understanding space and environment. First, in terms of their orientation in space, time-of-day pointing gestures make use of an absolute frame of reference system (Levinson 2003) in that they are always produced along an east-west axis. In Figure 6, the girl produces a gesture pointing directly west to indicate sunset: even when sitting indoors, body movements are anchored to absolute points of reference in the environment. This property of pointing gestures makes use of a more general cognitive framework, since Datooga speakers use absolute (rather than egocentric or 'relative') frames of reference in many other kinds of activities involving spatial reference (relative spatial words like 'left' and 'right' can be translated but are seldom used). Second, and much more specific to the activity of time-telling, time-of-day pointing gestures carve up the sun's trajectory on the east-west axis, associating particular positions on this axis with temporal meanings. Though the sun is a highly salient feature of the environment in all human communities, Datooga speakers (and members of other rural communities with similar practices) orient to this celestial body in a locally specific way by producing embodied representations of its relative position in the sky and using these representations to locate events in time.

In Goodwin's (2017) work on environmentally coupled gestures, he focuses on professional communities of practice who orient to structure in the environment to achieve certain goals, e. g., archaeologists using pointing gestures and language to cooperatively interpret different colours in layers of soil. The ways in which objects are scrutinized (e. g., the way an archaeologist learns to 'see' soil) allow people to engage in particular kinds of activities and produce particular kinds of knowledge. Special ways of seeing the physical environment do not emerge only in professional spheres of life, however. The everyday act of referring to the time-of-day via pointing in Datooga communities also involves vi-

sualizing structure in space: specifically, carving up distinct points on an East-West axis. Importantly, in time-of-day reference speakers orient not to the here-and-now, immediate phenomenon of the sun in the sky but to a conceptual representation, namely, the imagined position of the sun at some point in the past or future. As discussed in the introduction, this aspect of time-of-day pointing involves 'displacement' (one of Hockett's (1960) design features of language that allows us to talk about things we do not have immediate perceptual access to). That is, time-of-day references make use of an abstract spatial model rather than producing meaning by indicating features of the immediate environment. Further, this spatial model does not necessarily need to be invoked by visual means. Though pointing gestures are common, purely verbal references to the position of the sun are also possible as temporal references (as they are in English, e. g., "the sun went down"). Though conceptually 'displaced', pointing for time-of-day reference is still deeply embedded in people's habitual experience of their physical environment and reflects a lifestyle that is governed by the rhythms of the natural world.

5 Pointing and conceptualisations of time

The concept of "rhythm", and related notions of cycles and cyclical activity, has been central to scholarship on the anthropology of time and temporality (Munn 1992). In his work on Nuer, Evans-Pritchard (1939) puts forward the notion of "oecological time", an understanding of time that derives from one's experience of the physical environment (as opposed to "structural time", which has to do with relations between social categories, such as generations). Evans-Pritchard (1939, 192) discusses how cyclical changes in the natural environment (from rainfall patterns, to botanical processes, to the appearance of migratory animals) shape "social rhythm", upon which he claims Nuer concepts of time are primarily based. Humans operate with many different concepts of time and the pointing practices that are the subject of this chapter relate only to con-

cepts of time at the small scale of the day. Nonetheless, the structuring of daytime among rural Datooga is a good illustration of ecological time. I have already discussed how certain activities, particularly those relating to cattle-herding, are organized around the daily cycle delimited by sunrise and sunset. The communicative practices that make relevant the sun's motion through the sky when talking about the sequence or duration of events and activities reveal how ecological rhythms shape not just activities themselves but also the conceptual representation of those activities. Time-of-day concepts – at least those that rely on the sun's position and not the twelve-hour clock – are thus intimately connected to the natural world (rather than the symbolic hands of a plastic clock, the beeping alarm, the end-of-school bell, etc.). Indeed, unlike the numeral clock system, pointing for time-of-day reference is restricted to daylight hours, with concepts for parts of the night expressed only verbally. Pointing to the position of the sun as a way of conceptualizing time is also fundamentally spatial and emphasises Munn's (1992, 94) point that "in a lived world, spatial and temporal dimensions cannot be disentangled". The way in which space structures time in this particular context is not merely a property of the mind, but of the body: time-of-day pointing practices constitute a kind of embodied temporality (cf. Goodwin 2002), where daily time reckoning is achieved through coordinating the body with language and environment.

6 Concluding remarks

Pointing serves many different functions in human communication. Time reference – the focus of this chapter – is perhaps one of the more unusual. As we have seen, pointing is one of a number of different strategies for time-of-day reference among Datooga speakers, though I would speculate that the sun-based pointing system is older than the numerical system, the latter presumably introduced through contact with Swahili and perhaps also European colonizers. In terms of Peirce's theory of se-

miosis, as discussed in Enfield (2013), we can identify the pointing gesture in time-of-day reference as a sign whose object is a time of day, and whose interpretant is typically the mental locating of an event in time and making any relevant inferences. The relationship between the sign and the object is indexical: the pointing gesture is spatially contiguous with the position of the sun at the referred-to time of day. Importantly, the relationship between the sign and the object relies on a particular contextual configuration, discussed in detail above, in which linguistic elements, gaze, and an existing understanding of local spatial frameworks all work together to associate the pointing gesture with a time of day (as opposed to a location in space, or an object in the indicated direction). At first glance, pointing for time-of-day reference may appear to be a mundane, straightforward way of indicating time, but this paper has demonstrated how these pointing practices involve complex processes of meaning-making that rely on the precise coordination of the body, language, and conceptual representations of space. These pointing practices also remind us that our perceptual orientations to the environment are influenced by the cultural worlds we inhabit. In rural Datooga communities, people attend closely to the position of the sun in the sky in order to organize their daily lives. This attention to the sun's position is made especially evident in these communicative practices, in which people produce visible, embodied representations of the sun's position. Pointing for time-of-day reference is a clear example of a type of embodied cognition, where the speaker's arm and hand is fleetingly employed as a cognitive tool for telling the time.

One question that remains about time-of-day reference is the specific number of divisions these pointing gestures distinguish. I have assumed that they roughly align with the twelve-hour clock but would ideally investigate this more systematically than was possible using only my video data corpus. Assuming these pointing practices reflect a largely outdoor lifestyle attuned to the dynamics of the physical environment, a second, broader question is the extent to which these pointing practic-

es are maintained or abandoned among urban, literate Datooga whose lives are more strongly regulated by clock time. The form of knowledge explored in this chapter is rooted in particular ways of experiencing and communicating about time and space and as such seems likely to change, or even disappear, in the context of the rapid socioeconomic transformations currently taking place in Datooga communities.

Bibliography

Brown, P. (2012). Time and Space in Tzeltal: Is the Future Uphill? *Frontiers in Psychology* 3, 212.

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

Dohrn-van Rossum, G. (1996). *History of the Hour: Clocks and Modern Temporal Orders*. Chicago, IL: University of Chicago Press.

Enfield, N. J. (2013). *Relationship Thinking: Agency, Enchrony, and Human Sociality*. Oxford: Oxford University Press.

Evans-Pritchard, E. E. (1939). Nuer Time-Reckoning. *Africa* 12(2), 189–216.

Floyd, S. (2016). Modally Hybrid Grammar?: Celestial Pointing for Time-of-Day Reference in Nheengatú. *Language* 92, 31–64.

Goodwin, C. (2000). Action and Embodiment Within Situated Human Interaction. *Journal of Pragmatics* 32, 1489–1522.

Goodwin, C. (2002). Time in Action. *Current Anthropology* 43, S19–S35.

Goodwin, C. (2003). Pointing as Situated Practice. In: S. Kita (Ed.), *Pointing: Where Language, Culture, and Cognition Meet*. Mahwah, N.J: L. Erlbaum Associates, 217–242.

Goodwin, C. (2017). *Co-operative Action*. Cambridge: Cambridge University Press.

Hanks, W. F. (1990). *Referential Practice: Language and Lived Space among the Maya*. Chicago: University of Chicago Press.

Haviland, J. B. (2003). How to Point in Zinacantán. In: S. Kita (Ed.), *Pointing: Where Language, Culture, and Cognition Meet*. Mahwah, N.J: L. Erlbaum Associates, 139–170.

Hockett, C. F. (1960). The Problem of Universals in Language. In: J. H. Greenberg (Ed.), *Universals of Language*. Cambridge, MA: MIT Press, 1–22.

Kießling, R., & Bruckhaus, S. (2017). Associated Locomotion in Datooga (Southern Nilotic). In: S. Kaji (Ed.), *Proceedings of the 8th World Congress on African Linguistics*. Tokyo: Tokyo University of Foreign Studies, 243–258.

Kita, S. (2003). Pointing: A Foundational Building Block of Human Communication. In: S. Kita (Ed.), *Pointing: Where Language, Culture, and Cognition Meet*. Mahwah, N.J: L. Erlbaum Associates, 1–8.

Kita, S., & Essegbey, J. (2001). Pointing Left in Ghana: How a Taboo on the Use of the Left Hand Influences Gestural Practice. *Gesture* 1, 73–95.

Levinson, S. C. (2003). *Space in Language and Cognition: Explorations in Cognitive Diversity*. Cambridge: Cambridge University Press.

Moore, K. E. (2014). *The Spatial Language of Time: Metaphor, Metonymy, and Frames of Reference*. Amsterdam: John Benjamins Publishing Company.

Munn, N. D. (1992). The Cultural Anthropology of Time: A Critical Essay. *Annual Review of Anthropology* 21, 93–123.

Muzale, H. R. T., & Rugemalira, J. M. (2008). Researching and Documenting the Languages of Tanzania. *Language Documentation & Conservation* 2, 68–108.

Núñez, R. E., & Sweetser, E. (2006). With the Future Behind Them: Convergent Evidence from Aymara Language and Gesture in the Crosslinguistic Comparison of Spatial Construals of Time. *Cognitive Science* 30, 401–450.

Rottland, F. (1982). *Die südnilotischen Sprachen: Beschreibung, Vergleichung und Rekonstruktion*. Berlin: D. Reimer.

Zerubavel, E. (1982). The Standardization of Time: A Sociohistorical Perspective. *American Journal of Sociology* 88, 1–23