Demonstratives and visibility: Data from Ticuna and implications for theories of deixis

Abstract

In many Indigenous languages of the Americas, demonstratives are said to encode whether the referent is visible. But little evidence has appeared for these claims, leading some scholars to argue that all apparent visibility meanings in demonstratives are epiphenomenal on spatial content, epistemic modal content, or evidential content relating to senses other than vision. Drawing on elicitation, experiments, and corpus data collected in recent fieldwork, I argue that three of the exophoric demonstratives of Ticuna (isolate; Brazil, Colombia, Peru) do encode information about the visibility of the referent. Contrary to other proposals, this information concerns the literal sense of vision – not epistemic modality, general direct evidentiality, or the location of the referent in space. My findings provide the first substantive evidence that visibility can be encoded in demonstratives.

Keywords: Demonstratives; Deixis; Evidentiality; International Year of Indigenous Languages

Word count (excludes abstract and references): 14,976
1 Introduction

Demonstratives are an exceptional word class. Present in every language (Diessel 1999: 2), they are among the most frequent words in corpora (Diessel 2006: 482) and the earliest function words in children’s language development (Clark 2013: 100-101). They play a starring role in the management of joint attention (Tomasello 2008: 232); diachronically, they represent the only closed class that is the source, but not the target, of grammaticalization (Diessel 1999: ch. 6). Most of these properties are specific to uses of demonstratives in exophoric reference – where they index referents in the surround of the speech act – rather than in anaphora.

Despite the many exceptional properties of exophoric demonstratives, traditional analyses of their meaning are simple. They claim that demonstratives’ deictic content – the information which they convey about the relation between the referent and the discourse participants – concerns only the referent’s distance from the speaker (Fillmore 1973: 65-67; Diessel 1999: 36; Anderson & Keenan 1985: 281). More recent work has avoided the term ‘distance,’ but retained the view that the deictic content always concerns space (Enfield 2003; Peeters et al. 2015; Grenoble et al. 2019). As a consequence, exclusively spatial analyses of demonstratives remain widely accepted in linguistics, in fields from formal semantics (e.g., Wolter 2006) to acquisition (e.g., Chu & Minai 2018) to psycholinguistics (e.g., Stevens & Zhang 2013).

In this article, I challenge exclusively spatial analyses by demonstrating that the deictic content of demonstratives can encode perceptual as well as spatial information. More specifically, I argue that three of the six demonstratives of Ticuna (isolate; Brazil, Colombia, Peru) encode information about the visibility of the referent as part of their deictic content. From elicited, experimental, and observational data, I argue that these demonstratives convey whether the speaker sees the referent at the moment of speech. The demonstratives’ visibility meanings arise from encoded perceptual deictic content; contrary to the predictions of exclusively spatial analyses, they are not due to inference from the items’ spatial deictic content. Moreover, the perceptual clearly concern the sense of vision – not any more general evidential meaning, nor any more abstract epistemic modal one.

I intend these arguments to support a broader view of the meaning of demonstratives and other functional items as embodied: grounded, in part, in the sensory and perceptual capacities of the human body. Linguists often think about how perceptual capacities influence language in the domain of sound. We know, for example, that properties of the human auditory system limit the set of possible phonological contrasts. My goal in this paper is to provoke readers to consider how perception matters in the domain of meaning, too – to ask how non-linguistic properties of perception and cognition, like the prominence of vision over other senses, influence the functional lexicon.

The organization of the paper is as follows. §2 reviews previous arguments for and against the existence of visibility contrasts in demonstratives. §3 provides general background information on the Ticuna language and its speakers, and §4 describes the language’s demonstrative system. §§5-6 are the core of the paper, arguing for the existence of visibility contrasts using data from semantic elicitation (§5) and a controlled production task (§6). In §7, I demonstrate that the visibility requirements arise from encoded deictic content rather than inference; in §8,
I validate the analysis against observational data. Then, in §9, I conclude with implications for theories of demonstratives and evidentiality.

2 The visibility debate

In many Indigenous languages of the Americas, the deictic content of demonstratives and other deictics is said to convey information about the visibility of the referent, as well as about its location.

Boas (1911: 528) was likely the first to make a visibility claim, writing that three of the deictic determiners of Kwak’wala (Wakashan; Canada) required that the referent was visible to the speaker, and three that it was invisible. In the century since the publication of this claim, at least 22 other Indigenous American languages, and 12 non-American languages, have been described as displaying visibility contrasts in demonstratives. Hanks (2011) provides a long list of visibility claims in 20th-century works; for more recent claims, see Romero-Méndez (2009: 216) on Ayutla Mixe (Mixe-Zoque; Mexico), Schupbach (2013: 69-73) on Blackfoot (Algonquian; USA/Canada), or Brandão (2014: 96-98) on Paresi-Haliti (Arawak; Brazil).

Visibility claims are incompatible with an exclusively spatial analysis of demonstratives, because visibility is not a function of location. A referent can be invisible to a perceiver and be maximally close to them – for example, on the back of their head – or maximally far from them, too distant to see. As such, if the encoded deictic content of demonstratives ever includes visibility, exclusively spatial analyses are false.

Because of these high stakes, authors interested in demonstratives as spatial language have repeatedly argued that they never encode visibility information (Enfield 2003, 2018; Levinson 2004, 2018a). Instead, these authors claim, apparent visibility contrasts arise from other components of demonstrative meaning, such as spatial deictic content; epistemic modal content; or evidential content relating to senses other than vision.

Enfield (2003, 2018) emphasizes the possibility that apparent visibility requirements may be epiphenomenal on spatial deictic content. He analyzes Lao (Tai-Kadai; Laos) as displaying one ‘non-proximal’ demonstrative, which encodes that the referent is ‘not here’ from the speaker’s perspective, and one neutral demonstrative. In this system, Enfield (2003: 96) argues, visibility is a factor influencing the use of demonstratives, but is not part of their encoded meaning. He suggests that visibility may impact demonstrative use in Lao, writing that lack of ‘physical and/or perceptual access’ encourages the use of the non-proximal demonstrative (Enfield 2003: 97-102). But visibility does not determine the acceptability of either demonstrative, since both demonstratives can be used to index either visible or invisible referents (Enfield 2018: 78).

Summarizing this analysis, Enfield urges analysts to ‘show caution’ before claiming that visibility is ever encoded in demonstratives. Visibility, he suggests, may be more often a ‘contextual factor’ in demonstrative use than an encoded part of deictic content (Enfield 2003: 96). These claims – both of which Enfield presents as cross-linguistic generalizations – appear to be based exclusively on the Lao system.
More recently, Levinson (2004, 2018a: 30-31) has suggested that apparent visibility requirements are epiphenomenal on epistemic modal meanings. His primary evidence for this claim comes from the demonstrative system of Yelí Dnye (isolate; Papua New Guinea). Henderson (1995) argues that the Yelí Dnye demonstrative wu encodes that the referent is invisible. Levinson (2018b) demonstrates that wu can be used for some visible referents. He therefore proposes that it encodes that the speaker is uncertain of the identity of the referent – an epistemic modal meaning – rather than that the referent is invisible.

Levinson (2018a) also argues that some apparent visibility requirements are epiphenomenal on evidential meanings concerning the sense of hearing. His evidence for this argument comes from Tiriýó (Carib; Brazil). Meira (1999) describes the Tiriýó demonstrative mē(ni) as encoding that the referent is invisible. In later work, however, Meira (2018: 236) discovered that mē(ni) requires not only that the referent is invisible, but also that the speaker directly perceives it via hearing. Thus, mē(ni) can be used to ask What’s that? about a sound, but not about an object that is present in the surround but hidden (i.e., not perceptible via any sense).

In the Tiriýó case, Levinson suggests, the visibility requirement of mē(ni) is epiphenomenal on its auditory evidential requirement. He generalizes from this case and the Yelí Dnye example to argue – in a list of demonstrative universals – that all apparent visibility requirements arise from epistemic modal meanings, as in Yelí Dnye, or evidential meanings concerning the sense of hearing, as in Tiriýó. On the basis of these two examples, he argues that apparent invisible demonstratives ‘are more likely to have an evidential basis, being reserved for audible referents, or referents indirectly ascertained’ (Levinson 2018a: 37).

Despite the many claims of visibility contrasts in the literature, Enfield’s (2003) and Levinson’s (2018a, 2018b) skepticism about the reality of these contrasts is justified. Very few authors who make visibility claims provide any data – in the form of either judgments or observations of use – to support them. Moreover, among the few sources that provide evidence for visibility contrasts, none provide evidence that they relate to the sense of vision, rather than to more general epistemic modal or non-visual evidential meanings.

Consider, for example, Gillon’s (2009) careful examination of deixis in Skwxwú7mesh (also known as Squamish; Salish; Canada). Gillon claims that two of the five demonstratives of Skwxwú7mesh encode that the referent is invisible. However, all of Gillon’s (2009: 18-19) examples of these demonstratives involve a referent that the speaker directly perceives via hearing. This leaves open the possibility that the ‘invisible’ demonstratives encode not that the referent is invisible, but rather – in line with Levinson (2018a) – that the speaker perceives the referent via hearing. Similarly, Hanks’ (1990) influential study of deixis in Yucatec Maya (Mayan; Mexico) claims that the presentative demonstrative hé?el oʔ encodes that the referent is visible. Yet one of Hanks’ (1990: 256) examples shows a speaker using this demonstrative to index a referent that is invisible, enclosed in a bag. This suggests – again in line with Levinson (2018a) – that the ‘perceptual’ content of hé?el oʔ may concern the identifiability or perceptual accessibility of the referent, rather than the literal sense of vision.

In sum, even the works that provide the most detailed evidence for visibility contrasts have yet to show that those contrasts are about vision. Gillon (2009) fails to eliminate the possibility that the ‘invisible’ demonstratives of Skwxwú7mesh actually convey access via hearing, rather
than lack of access via vision; Hanks’ (1990) examples show that the ‘visible’ demonstrative of Yucatec can be used to index a referent that is in fact invisible. Against this background, my goal in the remainder of this article is to demonstrate that the demonstrative system of Ticuna does encode information about visibility, and to show that this information specifically concerns the sense of vision.

3 The Ticuna language

Ticuna is a language isolate spoken along the western course of the Amazon River in Brazil, Colombia, and Peru. Estimates of the speaker population range from 38,680 (Lewis et al. 2014) to 69,000 (Instituto Socio-Ambiental 2017). Despite threats from national languages, children continue to acquire Ticuna as a first language in most areas where it is spoken.

3.1 Participants

Data presented in this paper comes from my fieldwork with speakers of Ticuna in the indigenous community of Cushillococha, Peru, over 13 months between 2015 and 2019. As of September 2019, Cushillococha was home to between 4,000 and 5,000 people, the great majority of whom identified as Ticuna and spoke Ticuna as their dominant language. I conduct all of my research with Ticuna speakers using both Spanish and Ticuna as metalanguages. Approximately 150 people, aged 12 months to 75 years, have participated in my fieldwork on deixis in Ticuna. Of these people, approximately 45 participated in the collection of the video corpus described in §8, and 105 participated in an ongoing project on young children’s acquisition of demonstratives (not reported on here).

Five people participated in the elicitation task reported in §5, and ten in the experimental task in §6. I describe the participants for each task in the corresponding section.

3.2 Language background

Several grammatical properties of Ticuna are relevant to the analysis below: (a) the contrast between demonstratives and third-person pronouns, (b) noun class, and (c) evidentiality.

First, some languages – for example, Turkish (Azar et al. 2019: 557-558) – lack a clear distinction between demonstratives and third-person pronouns. In Ticuna, however, demonstratives clearly contrast with third-person pronouns. Ticuna third-person pronouns are prosodically dependent; display stem suppletion conditioned by case markers; and pattern apart from nouns in differential object marking. Demonstratives, by contrast, are independent prosodic words; do not display case suppletion; and pattern exactly like nouns in differential object marking. Consequently, I view pronouns and demonstratives as separate systems, and do not further consider pronouns in this paper.

Second, the language displays noun class, with five classes. The class assignment of nouns is based primarily on semantic factors, such as animacy. All noun phrase constituents, including
demonstratives, agree for noun class with the head of the phrase. I cite demonstratives using the form for noun class IV, as it is the morphologically default noun class.

Third, outside of the demonstrative meanings investigated in this paper, Ticuna has few morphemes marking evidentiality or epistemic modality. The only propositional evidential is the (optional) reportative =ā. Epistemic modality is conveyed by the epistemic modal predicates beʔmaʔnaʔ and kyʔaʔs ‘it could be that…’. These predicates introduce a complement clause: kyʔaʔ requires focus inside the complement, while beʔmaʔnaʔ does not. Neither epistemic modal has an evidential meaning component; both are compatible with a range of direct and indirect evidence sources for the complement proposition. Since none of the epistemic or evidential markers convey perceptual information, I do not investigate their interactions with the perceptual meanings of demonstratives.

4 The demonstrative system of Ticuna

In this section, I present the demonstrative inventory of Ticuna, as background to the analysis of visibility requirements below. For readers interested in the formal properties of the demonstratives, [redacted for anonymous review] offers more detail on the items.

Ticuna has six nominal demonstratives, shown in Table 1. Nominal demonstratives are the items equivalent to this and that in English. They can be used either adnominally or pronominally. Locative demonstratives – the items equivalent to here and there in English – are distinct from nominal ones, as are demonstrative adverbs of manner (like this, like that). In this paper, I do not consider either locative demonstratives or demonstrative manner adverbs. Therefore, I refer to the nominal demonstratives simply as ‘demonstratives.’

Table 1 shows that the demonstrative paradigm displays significant morphological regularities, both within and across noun classes. For example, all forms of the regional, multifunctional, and remote past anaphoric demonstratives end in the segments [ma]. Despite these regularities, it is not possible to analyze the demonstratives as morphologically complex, for two reasons: (a) in certain morphological contexts, the final syllable of demonstratives can be deleted without semantic effect, and (b) the sets of demonstratives that appear to be morphologically related have no consistent semantic relationship.

<Table 1 on next page>
In the analysis of visibility requirements that follows, I am concerned only with the productive exophoric demonstratives – speaker-proximal pa’a², dyad-proximal ne’a², speaker-distal je’a², and multifunctional ne’ma². I pass over regional po’m’a⁴ and the remote past anaphor je’m’a⁴, as their unproductivity (for po’m’a⁴) and unacceptability in exophoric use (for je’m’a⁴) make them impossible to compare with the exophoric items.

1 The spatial deictic content of ne’a² encodes that the referent is located inside the space of the discourse participants’ joint activity – typically, that the referent is between the speaker and the addressee(s). I therefore label it ‘dyad-proximal.’

2 Recognational reference (Himmelman 1996) is demonstrative reference to entities known primarily from the discourse participants’ shared world knowledge (i.e., sources of common ground other than the discourse and the physical surround of interaction).
All of the exophoric demonstratives can bear derivational enclitics which modify their deictic content. For example, the enclitic =ʔɪʔʃiʔ ‘really’ intensifies the spatial deictic content of demonstratives, conveying that the referent is especially close to the speaker or addressee (for the proximals) or especially far (for the distal).

One derivational enclitic, =â⁴ma⁴, appears to modify the perceptual deictic content of demonstratives, altering their visibility requirements. Thus, in §§5-6 I discuss only root forms of demonstratives, not those with =â⁴ma⁴ or other derivational enclitics. I discuss demonstratives with =â⁴ma⁴ in §7.

5 Visibility requirements: Evidence from semantic elicitation

Two of the exophoric demonstratives introduced in §4 – dyad-proximal ne³a² and speaker-distal je³a² – can index only visible referents. They require that the speaker sees the demonstrative referent at the moment of speech.

I claim that multifunctional ne³ma² represents three distinct lexical items: a non-exophoric item, an addressee-proximal exophoric item, and an invisible item. Invisible ne³ma², I argue, can index any referent that the speaker does not see at the moment of speech.

As a first source of evidence for my claims about the visibility requirements of ne³a² and je³a², in this section I consider contexts where the speaker directly perceives the referent via a sense other than vision, such as hearing, smell, or touch.

I show that ne³a² and je³a² are unacceptable in all contexts of access via senses other than vision. Thus, these items specifically require that the speaker sees the referent, rather than imposing a more general requirement that they perceive it via some sense. I also demonstrate that invisible ne³ma² can index a referent perceived via any non-vision sense, whether hearing, smell, or touch. This indicates that – contrary to Levinson’s (2018a: 37) claims about apparent invisible demonstratives – the perceptual deictic content of invisible ne³ma² concerns vision, not epistemic modality or access via a specific non-vision sense, such as hearing.

Examples in this section were collected using context-based semantic elicitation (Matthewson 2004). Five language consultants participated in the elicitation. All five were born in the Cushillococha area, spoke Ticuna as their sole first language, and had previously participated in semantic elicitation with me on a range of topics for at least two months. Two of the five consultants were women and three were men. Their ages ranged from 36 to ~70 years.

Additionally, all five elicitation consultants were sequential bilinguals. They had acquired Spanish at ages ranging from five to 15 years. Three consultants reported speaking Ticuna more often than Spanish, and two reported speaking Spanish more often than Ticuna (both speak Spanish at work and Ticuna at home).

5.1 Referents perceived via non-vision senses
This section discusses demonstrative reference to entities known via hearing, smell, and touch, in that order. Each consultant was presented with at least six contexts involving this kind of reference (some consultants were presented with one to three additional contexts). Here, I discuss three contexts of direct, non-vision perception of a demonstrative referent – one for each of hearing, smell, and touch.³

First, dyad-proximal \( ne^3a^2 \) and speaker-distal \( ge^3a^2 \) are not acceptable ways to index a referent that the speaker perceives via **hearing**. In speaking of a referent known only by hearing, consultants uniformly rejected \( ne^3a^2 \) and \( ge^3a^2 \) in favor of \( ne^3ma^2 \). Some consultants also volunteered or accepted speaker-proximal \( pa^4a^2 \).

(1) provides the data from one participant for a context involving reference to an entity known by hearing. The table below (1) shows the combined responses of all five consultants presented with this context. The ‘participants volunteering’ column shows the count of participants who volunteered each demonstrative as their first response when presented with the context. The ‘participants accepting’ column shows the count of participants who accepted, **but did not volunteer**, each demonstrative in the context of (1). The ‘participants rejecting’ column shows the count of participants who rejected each item.

<Example (1) on next page>

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³ I do not discuss the sense of taste because taste cannot be isolated from smell outside a laboratory context.
(1) Context: We hear a recorded song playing at the neighbor’s place. We cannot see the radio that is playing the song. You tell me you like the song.\(^4\)

\(\text{✓ŋe}^3\text{ma}^2 / \text{✓ŋa}^4\text{a}^2 / \#\text{ŋe}^3\text{a}^2 / \#\text{je}^3\text{a}^2\) wi\(^3\)ja’e\(^3\) i\(^4\) ŋe\(^5\)ma\(^2\) ni\(^3\)²t\(³\) t\(³\)ja\(³\)² ni\(²\)³t\(³\) ri\(³\) t\(⁴\)o\(³\)ri\(³\) me\(⁴\)³ ni\(⁴\)³ t\(⁴\)

\(\text{✓ŋe}^3\text{ma}^2 / \text{✓ŋa}^4\text{a}^2 / \text{✓ŋe}^3\text{a}^2 / \text{ŋe}^3\text{a}^2\) wi\(^3\)ja’e\(^3\)

\(\text{✓DEM:}\text{MULTI(IV)} / \text{✓DEM:}\text{PROX(IV)} / \#DEM:}\text{DYAD(IV)} / \#DEM:}\text{DIST(IV)} song(IV)

\(\text{i}^4\ ŋe\(^5\)ma\(^2\) ni\(^3\)³ =t\(³\) t\(³\)ja\(³\)² i\(³\)ni\(²\) =t\(³\) t\(³\)o\(³\)ri\(³\) me\(⁴\)³ ni\(⁴\)³ t\(⁴\)

\(\text{LNK(IV)} \text{DEM:}\text{LOC} 3 =\text{ACC} \text{1SG.SC=} \text{hear} =\text{NMLZ(IV)} \text{1SG.AL.POSS} \text{good} \text{3S=} \text{COP}

‘That (\(\text{✓ŋe}^3\text{ma}^2 / \text{✓ŋa}^4\text{a}^2 / \#\text{ŋe}^3\text{a}^2 / \#\text{je}^3\text{a}^2\) song that I hear there, I like it.’

(LWG 2017.2.86)

Responses to context in (1):

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Participants Volunteering</th>
<th>Participants Accepting</th>
<th>Participants Rejecting</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ŋe(^3)ma(^2)</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td>ŋa(^3)a(^2)</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>?</td>
</tr>
<tr>
<td>ŋe(^3)a(^2)</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>#</td>
</tr>
<tr>
<td>je(^3)a(^2)</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>#</td>
</tr>
</tbody>
</table>

The unacceptability of ŋe\(^3\)a\(^2\) and je\(^3\)a\(^2\) in (1) cannot be due to spatial deictic content, epistemic modal content, or a general direct/indirect evidential contrast. The anomaly is not spatial because the referent in (1) is outside the speaker’s reaching space, and therefore meets the spatial deictic requirements of (at least) je\(^3\)a\(^2\). Likewise, the anomaly is not epistemic modal, because the speaker clearly perceives and identifies the referent. And it cannot arise from a general contrast between direct and indirect evidentiality, since the speaker directly accesses the referent via hearing – and that is in fact the only way that the referent of (1), being a sound, could be accessed.

In the same way, dyad-proximal ŋe\(^3\)a\(^2\) and speaker-distal je\(^3\)a\(^2\) are also not acceptable ways to index a referent that the speaker perceives only via smell. In speaking of referents known by smell, consultants reject the visible demonstratives and volunteer only ŋe\(^3\)ma\(^2\) (2). As for referents known via hearing, some consultants accept ŋa\(^3\)a\(^2\) in addition to ŋe\(^3\)ma\(^2\).

<Example (2) on next page>

\(^4\) Glosses use Leipzig abbreviations and the following additional abbreviations: AL.POSS = alienable possessor, : ALT = alternative (disjunction/polar question), A'\text{MA} = contrastive/visibility-neutral enclitic (§7.2.2), CNTF = counterfactual, CONN = connective ‘if/when,’ COP = copula, DFLT.POSS = default possessor, IBEN = beneficiary/maleficiary of intransitive verb, LNK = linker, SC = subordinate clause inflection, MULTI = multifunctional, SP = Spanish word.

\(^5\) Parenthetical citations below example sentences identify the consultant who produced the sentence (via a three-letter code) and the page of my field notes where the sentence appears (by year, notebook number, and page number). My field notes are publicly available in [Archive name removed for anonymous review].
(2) Context: You notice that I am wearing some perfume. You cannot see any perfume or anything associated with the perfume, such as the bottle. You tell me the perfume smells good.

\[
\sqrt{\text{ye}^3\text{ma}^2} / \sqrt{\text{pa}^4\text{a}^2} / \sqrt{\text{ye}^3\text{a}^2} / \sqrt{\text{je}^3\text{a}^2} \text{ pu}^3\text{ma}^4\text{ra}^1 \text{i}^1 \text{i}^2 \text{ti}^2 \text{ti}^4 \text{ri}^1 \text{na}^4 \text{me}^4 \sqrt{\text{ye}^3\text{ti}^2}.
\]

\[
\sqrt{\text{ye}^3\text{ma}^2} \quad / \sqrt{\text{pa}^4\text{a}^2} \quad / \sqrt{\text{ye}^3\text{a}^2} \quad / \sqrt{\text{je}^3\text{a}^2} \quad \text{ pu}^3\text{ma}^4\text{ra}^1
\]

\[
\sqrt{\text{DEM:} \text{MULTI}} \quad / \sqrt{\text{DEM:} \text{PROX}} \quad / \sqrt{\text{DEM:} \text{DYAD}} \quad / \sqrt{\text{DEM:} \text{DIST}} \quad \sqrt{\text{perfume} \text{(IV)}}
\]

\[
i^1 = \text{ji}^2 \quad =?\text{i}^2 \text{ti}^2 \quad =?\text{i}^4 \quad \text{ri}^1 \quad \text{na}^4 \quad \text{me}^4 \quad =?\text{i}^2 \text{ti}^2
\]

\[
\text{3S.SC} = \text{issue.good.smell} = \text{really} \quad \text{=NMLZ(IV)} \quad \text{TOP} \quad \text{3S} = \text{good} \quad =\text{really}
\]

‘That (\sqrt{\text{ye}^3\text{ma}^2} / \sqrt{\text{pa}^4\text{a}^2} / \sqrt{\text{ye}^3\text{a}^2} / \sqrt{\text{je}^3\text{a}^2}) perfume that is fragrant, it smells good.’

(DGG 2017.2.82)

Responses to context in (2):

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Participants Volunteering</th>
<th>Participants Accepting</th>
<th>Participants Rejecting</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>\text{ye}^3\text{ma}^2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td>\text{pa}^4\text{a}^2</td>
<td>0</td>
<td>4 (1 marginal)</td>
<td>1</td>
<td>?</td>
</tr>
<tr>
<td>\text{ye}^3\text{a}^2</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>#</td>
</tr>
<tr>
<td>\text{je}^3\text{a}^2</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>#</td>
</tr>
</tbody>
</table>

As for (1), the unacceptability of \text{ye}^3\text{a}^2 and \text{je}^3\text{a}^2 in (2) cannot arise from the items’ spatial deictic content, epistemic modal content, or non-vision evidential content. The anomaly cannot be spatial, since the referent is located on the addressee’s body, and visible referents in this location can be indexed with both \text{ye}^3\text{a}^2 and \text{je}^3\text{a}^2. The anomaly cannot be epistemic modal, because the speaker clearly identifies the referent. Likewise, the anomaly cannot arise from a general direct/indirect evidential contrast, since the speaker directly perceives the referent via the sense of smell.

Third, referents known via the senses of touch and proprioception (awareness of one’s own body) can be indexed with either \text{ye}^3\text{ma}^2 or \text{pa}^4\text{a}^2. In speaking of such referents, consultants always volunteered \text{pa}^4\text{a}^2, but always accepted \text{ye}^3\text{ma}^2. They rejected \text{ye}^3\text{a}^2 and \text{je}^3\text{a}^2.

For example, in the context shown in (3), the speaker points to one of their own teeth. They have perceptual access to the tooth by proprioception, and potentially also by touch (if their point involves touching the referent). This context was presented to 10 participants as part of a controlled production task (discussed in §6). All 10 participants in the task volunteered speaker-proximal \text{pa}^4\text{a}^2 in (3), but all nine who provided judgments also accepted \text{ye}^3\text{ma}^2. By contrast, participants consistently rejected \text{ye}^3\text{a}^2 and \text{je}^3\text{a}^2.

<Example (3) on next page>
(3) Context: You point to one of your own front teeth. You tell me the tooth hurts.

\[\sqrt{\text{\textipa{\textipa{da}³\textipa{a}¹}/\textipa{\textipa{ji}³\textipa{ma}²}/\textipa{\textipa{ji}³\textipa{a}²}/\textipa{\textipa{gu}³\textipa{a}²}\textipa{tʃo'pi'\textipa{\textipa{ta}¹}}\textipa{na⁴\textipa{\textipa{ʌ}}}¹},\]

\[\sqrt{\text{\textipa{\textipa{da}³\textipa{a}¹}}/\sqrt{\text{\textipa{\textipa{ji}³\textipa{ma}²}}}/\sqrt{\text{\textipa{\textipa{ji}³\textipa{a}²}}}/\sqrt{\text{\textipa{\textipa{gu}³\textipa{a}²}}}\]

\[\sqrt{\text{\textipa{\textipa{DEM}³\textipa{PROX}⁷\textipa{III}}}/\sqrt{\text{\textipa{\textipa{DEM}³\textipa{MULTI}⁷\textipa{III}}}/\sqrt{\text{\textipa{\textipa{DEM}³\textipa{DYAD}⁷\textipa{III}}}/\sqrt{\text{\textipa{\textipa{DEM}³\textipa{DIST}⁷\textipa{III}}}}\textipa{tʃau¹} =\textipa{pʃi'\textipa{\textipa{ta}¹}}\textipa{na⁴} = \textipa{\textipa{ʌ\textipa{\textipa{ɪ}}}¹}\]

1SG =tooth(III) 3S= hurt

'This (\textipa{\textipa{\textipa{na}³\textipa{\textipa{a}²}}}/\sqrt{\text{\textipa{\textipa{ne}³\textipa{ma}²}}}/\sqrt{\text{\textipa{\textipa{ne}³\textipa{a}²}}}/\sqrt{\text{\textipa{\textipa{je}³\textipa{a}²})}} tooth of mine hurts.'

(LWG: 2017.1.171)

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Participants Volunteering</th>
<th>Participants Accepting</th>
<th>Participants Rejecting</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textipa{\textipa{ne}³\textipa{ma}²}</td>
<td>0</td>
<td>9 (1: ND)</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td>\textipa{\textipa{na}³\textipa{\textipa{a}²}</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td>\textipa{\textipa{ne}³\textipa{a}²}</td>
<td>0</td>
<td>2 (1: ND)</td>
<td>7</td>
<td>#</td>
</tr>
<tr>
<td>\textipa{\textipa{je}³\textipa{a}²}</td>
<td>0</td>
<td>0 (1: ND)</td>
<td>9</td>
<td>#</td>
</tr>
</tbody>
</table>

Speakers’ judgments in favor of \textipa{\textipa{ne}³\textipa{ma}²} in (3) indicate that \textipa{\textipa{ne}³\textipa{ma}²} is acceptable in speaking of referents perceived through the more proximal non-vision senses of touch and proprioception, as well as the more distal senses of hearing (1) and smell (2). These judgments also indicate that \textipa{\textipa{ne}³\textipa{ma}²} is not sensitive to the location of its (invisible) referent. The referent of invisible \textipa{\textipa{ne}³\textipa{ma}²} can be part of the speaker’s own body, as in (3), or relatively far from them, as in (1).

Participants’ judgments against \textipa{\textipa{ne}³\textipa{a}²} and \textipa{\textipa{je}³\textipa{a}²} in (3), on the other hand, do not provide information about the items’ perceptual deictic content. \textipa{\textipa{ne}³\textipa{a}²} and \textipa{\textipa{je}³\textipa{a}²} cannot index the speaker’s own body parts, even if they are visible. Therefore, the rejections in (3) – unlike those in (1) and (2) – could reflect either spatial or perceptual requirements of \textipa{\textipa{ne}³\textipa{a}²} and \textipa{\textipa{je}³\textipa{a}²}.

5.2 Temporal and modal properties of the visibility requirement

Knowing that \textipa{\textipa{ne}³\textipa{a}²} and \textipa{\textipa{je}³\textipa{a}²} require that the speaker sees the referent, we next ask about the temporal and modal properties of that requirement. Do these items require only that the speaker has seen the referent at some time, or could see it under some circumstances? Or, do they require that the speaker actually sees the referent at the moment of speech?

We find that \textipa{\textipa{ne}³\textipa{a}²} and \textipa{\textipa{je}³\textipa{a}²} require that the speaker **actually sees the referent at the moment of speech.** That is, the visibility requirement applies to the moment of speech in the actual world. It cannot be satisfied by the speaker seeing the referent at other times or in other possible worlds.

This property distinguishes the visibility requirement from all other noun phrase implications in Ticuna (e.g., the property implication of argument noun phrases and the possession implication of possessive noun phrases). Besides the deictic content of demonstratives, all other noun phrase implications in Ticuna have free temporal and modal interpretation. They can be interpreted either at the moment of speech, or at other contextually given times, and either in the actual world, or in other contextually given possible worlds – just as in English. For
example, if I am discussing what will happen if someone gets married, I can refer to her potential husband as na³-te³ (3=husband) 'her husband,' even if the referent does not meet that description in the actual world.

If the visibility requirement of ƞe²a² and je²a² displayed free temporal interpretation, then speakers would be able to use visible demonstratives to index a referent that they had seen in the past, even if they did not see it at the moment of speech. (4) demonstrates that this prediction is false for je²a²; ƞe²a² behaves the same. (There is no table below 4 because it was presented to only two consultants; their judgments were identical.)

(4) Context (my actual actions in elicitation): You and I are side-by-side at a table. I show you a bag of marbles. You see the marbles in the bag; then I close the bag and place it on the other side of the table. You say,

\[
\begin{align*}
\check{\text{ji}^{31}\text{e}^{2}\text{ma}^{4}} & / \#\text{gu}^{31}\text{e}^{2}\text{pe}^{ti'ka^{1}} \text{Bi}'tu'a'ri^{3} ti^{47}i^{4}. \\
\check{\text{ji}^{31}\text{e}^{2}\text{ma}^{4}} & / \#\text{gu}^{31}\text{e}^{2} \text{pe}^{ti'ka^{1}} \text{Bi}'t\text{u}^{5} =a'ri^{3} ti^{47} = i^{4} \\
\check{\text{DEM:} \text{MULTI(I)}} & / \#\text{DEM:} \text{DIST(I)} \text{marble(I)} \text{Victoria} =\text{AL.POSS} 3(I)S= \text{COP}
\end{align*}
\]

'Those (\check{\text{je}^{2}ma^{2}}/ \#\text{je}^{2}a^{2}) marbles are Victoria's.'

(DGG: 2017.3.177; LWG: 2017.3.166)

The speaker in (4) sees the referent just before the moment of speech. Thus, if je²a² required only that the speaker saw the referent some time before the demonstrative reference, it would be acceptable in (4). But it is unacceptable, indicating that the visibility requirement concerns only vision at the moment of speech. Conversely, the acceptability of ƞe²ma² in (4) shows that it requires only that the referent is invisible to the speaker at the moment of speech, not for any longer period.

Similarly, suppose that the visibility requirement had free modal interpretation. If so, speakers would be able to use visible demonstratives to index a referent which they saw at the moment of speech in an alternative possible world – even if they did not see it in the actual world. (5) indicates that this prediction is false for both ƞe²a² and je²a².

(5) Context (my actual actions in elicitation): You and I are side-by-side at a table. On the other side of the table from us, there is a box containing some marbles. You cannot see them, because the box is closed. You say,

\[
\begin{align*}
\eta^{e}gu^{2}\text{ma}^{3} caja tfi^{4} wa'\text{na}'gu^{2}, ri^{1} \check{\text{ji}^{31}\text{e}^{2}\text{ma}^{4}}/ \#\text{ji}^{31}\text{e}^{2} / \#\text{gu}^{31}\text{e}^{2} \text{pe}^{ti'ka^{1}}'ti^{3} tfa'\text{dau}^{2}
\end{align*}
\]

\[
\begin{align*}
\eta^{e}gu^{2}\text{ma}^{3} caja tfi^{4} 0= wa'\text{na}' =gu^{2} ri^{1} \check{\text{ji}^{31}\text{e}^{2}\text{ma}^{4}} / \\
\text{CONN} \quad \text{Sp:box} \quad \text{CNTF} \quad 3S.SC= \text{open} \quad =\text{SUB} \quad \text{TOP} \quad \check{\text{DEM:} \text{MULTI(I)}} / \\
\check{\text{ji}^{31}\text{e}^{2}} / \#\text{gu}^{31}\text{e}^{2} \text{pe}^{ti'ka^{1}} =ti^{3} tfa^{3}= \text{dau}^{2} \\
\check{\text{DEM:} \text{DYAD(I)}} / \#\text{DEM:} \text{DIST(I)} \text{marble(I)} =\text{ACC} \quad 1\text{SGS}= \text{see}
\end{align*}
\]

‘If the box were open, I would see those (\check{\text{je}^{2}ma^{2}}/ \#\text{je}^{2}a^{2}/ \#\text{je}^{2}a^{2}) marbles.’

(LWG: 2017.3.154)

Responses to context in (5):
A counterpart to (4), (5) shows that potential visual access to a referent is insufficient to make \( \eta e^3a^2 \) and \( je^3a^2 \) acceptable. Only actual vision at the moment of speech allows these demonstratives and excludes \( \eta e^3ma^2 \).

### 5.3 Interim summary: Only vision matters

The previous two sections have shown that \( \eta e^3a^2 \) and \( je^3a^2 \) cannot be used for referents that the speaker directly perceives via senses other than vision (1-3); that the speaker sees only prior to the moment of speech (4); or that the speaker sees only in possible worlds other than the actual world (5). By contrast to \( \eta e^3a^2 \) and \( je^3a^2 \), all of these contexts allow multifunctional \( \eta e^3ma^2 \). Some also allow speaker-proximal \( pa^3a^2 \).

Table 2 summarizes this evidence for the perceptual requirements of \( \eta e^3a^2 \), \( je^3a^2 \), and \( \eta e^3ma^2 \) in tabular form.

<table>
<thead>
<tr>
<th>Perceptual context</th>
<th>( \eta e^3a^2 ), ( je^3a^2 )</th>
<th>( \eta e^3ma^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker (only) hears referent</td>
<td># (1)</td>
<td>✓ (1)</td>
</tr>
<tr>
<td>Speaker (only) smells referent</td>
<td># (2)</td>
<td>✓ (2)</td>
</tr>
<tr>
<td>Speaker (only) perceives referent via touch / proprioception</td>
<td># (3)</td>
<td>✓ (3)</td>
</tr>
<tr>
<td>Speaker sees referent (only) before moment of speech</td>
<td># (4)</td>
<td>✓ (4)</td>
</tr>
<tr>
<td>Speaker sees referent (only) in counterfactual world</td>
<td># (5)</td>
<td>✓ (5)</td>
</tr>
</tbody>
</table>

I have provided this level of detail about the perceptual contexts where \( \eta e^3a^2 \), \( je^3a^2 \), and \( \eta e^3ma^2 \) are acceptable in order to show that their perceptual deictic content relates to the sense of vision, not general direct evidentiality or epistemic modality (Levinson 2018a), location in space (Enfield 2003), or access via specific non-vision senses (Levinson 2018b).

### 6 Visibility requirements: Experimental evidence

All of the contexts in (1-3) involved referents which the speaker directly perceived via a sense other than vision, such as hearing, smell, or touch. The judgments against \( \eta e^3a^2 \) and \( je^3a^2 \) in these contexts, and in favor of \( \eta e^3ma^2 \), therefore do not provide any evidence about referents which the speaker does not perceive via any sense.
Additionally, in each of (1-3), the non-vision sense involved is the only sense by which the referent can be perceived. For example, absent technology such as spectrograms, songs can only be perceived by hearing (1). The judgments reported on (1-3), then, provide evidence only about entities that are invisible because of their intrinsic perceptual properties. They tell us nothing about entities that are invisible because of contingent properties, such as location.

Therefore, to explore demonstrative reference to entities that are invisible because of contingent properties – as well as reference to entities the speaker does not perceive via any sense – I conducted an experiment using the Demonstrative Questionnaire, an instrument designed by Wilkins (1999).

In this section, I begin by describing the Demonstrative Questionnaire (§6.1) and discussing the distribution of results for the task as a whole (§6.2). I then report results from portions of the task designed to test for visibility requirements (§6.3). In §6.4, I discuss the results, showing that they support the same analysis of the visibility requirements proposed in §5. In §6.5, I summarize the section.

6.1 Method

6.1.1 Materials

The Demonstrative Questionnaire is a controlled production task which consists of 25 'scenes.' It includes both a forced-choice component and an acceptability judgment component.

In each scene of the Demonstrative Questionnaire, the researcher sets up a specific spatial configuration of the participant, an addressee, and an inanimate object, such as a ball. Once the participant, addressee, and object are in the required configuration for the scene, the researcher asks the participant to produce a frame sentence with demonstrative reference to the object, such as 'Is DEM ball yours?' The frame sentences are designed to be syntactically acceptable if and only if they contain exactly one demonstrative. Therefore, this portion of the Demonstrative Questionnaire represents a forced-choice task.

After participants volunteered one demonstrative in each scene, I asked them to judge the acceptability of each of the other exophoric demonstratives. Participants provided acceptability judgments on complete frame sentences minimally different from their volunteered frames, not on isolated words. This component of the Demonstrative Questionnaire represents an acceptability judgment task.

6.1.2 Participants

6 To prompt participants to produce the frame sentences, I produced imperatives like ‘Ask me if the ball is mine.’
7 This design was successful. Of the 250 forced-choice trials (25 scenes x 10 participants), there was 1 trial where the participant did not volunteer a demonstrative, and 11 trials where participants volunteered two demonstratives (produced the frame sentence twice with different demonstratives). In the descriptive statistics below, only participants’ first volunteered response is treated as a response to the forced-choice task. The second response is treated as a positive acceptability judgment.
Ten people participated in the Demonstrative Questionnaire task. They were the five participants from the elicitation task, and five additional participants. All of the five additional participants had experience with linguistic fieldwork, either with me or with SIL missionaries.

All ten participants spoke Ticuna as a first language and were born and raised in the Cushillococha area. Six participants were women and four were men. They ranged in age from 20 to ~70 years. Eight of ten participants were sequential bilinguals. They had acquired Spanish at ages from five to 15 years. The other two participants were simultaneous bilinguals. Seven participants reported that they spoke Ticuna more often than Spanish; three reported that they spoke Spanish more often.

One participant, participant 10, had more exposure to Spanish than the other participants. She was a simultaneous bilingual. At the time of the research, she had returned – a few weeks earlier – from four years (ages 16-20) living in Lima, where she spoke almost exclusively Spanish. Other participants either had never lived outside the Cushillococha area (n = 4) or had lived there continuously for at least 10 years at the time of research (n = 5).

Participant 10’s responses in the forced-choice component of Demonstrative Questionnaire varied substantially from other participants, suggesting contact effects of Spanish on her representation of the Ticuna demonstratives. In the interest of transparency, she is included in the results below. However, where her responses departed from all other participants, they are flagged with the code *P10*. She did not participate in the task in §5.

### 6.2 Distribution of results

#### 6.2.1 Forced-choice results

I take responses to the forced-choice component of the Demonstrative Questionnaire as indicating which demonstrative is most natural in a given scene.

In data from the forced-choice task, I describe participants as showing ‘high agreement’ that a demonstrative is most natural in a given scene if at least eight of 10 participants volunteered that demonstrative in the scene. I describe participants as showing ‘moderate agreement’ that a demonstrative is most natural in a given scene if at least six of 10 volunteered the item.

These standards are based on the probability of obtaining the same result under the null hypothesis, which I take to be that all demonstratives are equally natural and participants select one randomly. Under the null hypothesis, the probability that six of 10 participants would choose the same demonstrative, out of four possible exophoric demonstratives, is ~0.051 (approaching an alpha of 0.05). The probability that eight of 10 would choose the same demonstrative is ~0.00069 (less than an alpha of 0.001 for high significance).

By these criteria, participants displayed high agreement on the same demonstrative in 13 of 25 scenes, and moderate agreement in six.

Participants volunteered morphologically complex forms – consisting of a demonstrative root and a derivational enclitic such as *=á’tma* (§4) – in 13 of 250 trials. Because derivational
enclitics modify demonstratives’ deictic content, complex forms are tabulated separately from root forms in results for the forced-choice task. Complex forms were not offered for acceptability judgments.

6.2.2 Acceptability judgment results

I use responses to the acceptability judgment task to evaluate which demonstratives are acceptable in a given scene. I discuss the distinction between ‘acceptability’ and ‘naturalness’ in §6.2.3.

In interpreting the acceptability judgment data, it is crucial to know that participants in the experiment were overall more likely to issue positive than negative judgments. This was true both across participants and across scene-demonstrative combinations. Across participants, the average participant issued 60.0% positive judgments (SD = 13.5%, range = 44.7% - 78.4% positive), and only three participants issued <50% positive judgments. Likewise, across the 90 scene-demonstrative combinations with >1 judgment, the average scene-demonstrative combination elicited 62.6% positive judgments (SD = 24.0%, range = 0% - 100% positive). Only 24 of the 90 scene-demonstrative combinations (26.7%) received <50% positive judgments, and only six combinations (6.7%) received <25% positive judgments.

The overall high rate of positive judgments, in combination with the large variance among participants in the rate of positive judgments, suggests that (some) participants displayed a yes-response bias – that is, sometimes accepted sentences which they actually found anomalous. The presence of such a yes-response bias is consistent with field methods literature suggesting that language consultants sometimes accept anomalous forms for reasons of social desirability (e.g., Meakins et al. 2018: 152). It is also consistent with research showing that, in acceptability judgments of demonstratives, participants may display response biases linked to prescriptive rules (Hanks 2009; Stevens & Zhang 2013).

The Demonstrative Questionnaire does not include trials designed to identify yes-response bias, and none of the participants displayed an outlier rate of positive judgments. Therefore, there is no principled way to identify yes-biased participants for exclusion from the acceptability judgment data.

Instead, I correct for the yes-bias by reporting the raw judgments for each scene-demonstrative combination together with the z-score of the proportion of judgments as acceptable (calculated over the data for all combinations with >1 judgment). The acceptability z-score (range: -2.61 – 1.55) represents the acceptability of each scene-demonstrative combination relative to the other combinations in the experiment. Combinations with lower z-scores are less acceptable.

6.2.3 Acceptability heuristics

---

8 Fieldwork literature also suggests that participants may develop yes-bias over a session due to fatigue (Majid 2011: 56). But fatigue does not explain the yes-bias in this experiment: results of a Pearson correlation between trial number and proportion of positive judgments indicated no significant relationship (r(88) = -0.19, p = 0.067).
In the following section, I use both forced-choice and acceptability judgment data to adjudicate whether a given scene-demonstrative combination is acceptable.

Per §6.2.1, I take forced-choice data as evidence about what demonstrative is most natural in each scene. I assume that naturalness entails acceptability. Therefore, if participants display moderate or high agreement on a demonstrative in forced-choice results, I conclude that the demonstrative is acceptable.

Per §6.2.2, I take acceptability judgment data as (additional) evidence about what demonstratives are acceptable in each scene. Acceptability judgments were divided (not unanimous) in 78 of 90 scene-demonstrative combinations with >1 judgment. Consequently, rather than concluding that a demonstrative is acceptable or unacceptable only if it has unanimous judgments, I assign acceptability labels based on the acceptability z-scores.

For demonstratives that were not volunteered by >5 participants in the forced-choice task, I use the following standards for acceptability. A demonstrative is ‘clearly acceptable’ in a scene if it has an acceptability z-score > 1 (>86.7% positive judgments). A demonstrative is ‘clearly unacceptable’ in a scene if it has an acceptability z-score < -1 (<38.6% positive judgments) and was volunteered by no more than one participant in the forced-choice task. A demonstrative’s acceptability is ‘unclear’ in a scene if it has an acceptability z-score between -1 and 1 (38.6 – 86.7% positive judgments), or if it has an acceptability z-score <-1 but was volunteered by two or more participants in forced-choice. These thresholds and floors for acceptability are, to be sure, numerically high; this is intended to account for the yes-response bias discussed in §6.2.2.

6.3 Results

Results of the Demonstrative Questionnaire show that, in referring to invisible objects located beyond the speaker’s reaching space, participants always found ṇe’m̩a² to be the most natural demonstrative. By contrast, participants did not find dyad-proximal ṇe’a² and speaker-distal je’a² to be natural, and did not clearly judge them acceptable, for any invisible referent.

The Demonstrative Questionnaire contains three scenes – scenes 15, 18, and 25 – where the referent is both (a) not visible to the speaker and (b) located outside the speaker’s reaching space.⁹ The spatial deictic content of je’a² requires only that the referent is beyond the speaker’s reach. Therefore, an exclusively spatial analysis predicts that je’a² will be natural and acceptable in all three scenes. Likewise, given the spatial deictic content of ṇe’a², it should – on an exclusively spatial analysis – be natural and acceptable in at least scenes 15 and 18.

Both of these predictions are false. Speakers’ responses in the forced-choice component of the Demonstrative Questionnaire indicate that dyad-proximal ṇe’a² and speaker-distal je’a² are not natural in any of scenes 15, 18, or 25. Rather, the only demonstrative which speakers consistently find natural in these scenes is invisible ṇe’m̩a². Similarly, in acceptability judgments, speakers do not find ṇe’a² or je’a² clearly acceptable in any of these scenes. Instead, their judgments of the visible demonstratives range from equivocal to strongly negative.

---

⁹ For the seven participants with recordings of the experiment, inspection of the recordings confirmed that the referents were invisible in these scenes.
To illustrate these generalizations, I discuss each of the three invisible scenes in turn.

### 6.3.1 Scene 15

In scene 15, shown in (6), the speaker and addressee are at one end of a cleared space and the referent is at the other end. The referent is blocked from vision for both speaker and addressee.

The example sentence in (6) is one participant’s volunteered response to Scene 15. The table following (6) shows all participants’ responses to the scene in the forced-choice task (far left column) and the acceptability judgment task (three middle columns). The far-right column of the table summarizes the results based on the heuristics given in §6.2.3 Acceptability heuristics.

(6) Demonstrative Questionnaire Scene 15

![Diagram of Scene 15](image)

**neˈma² na⁴ʔpaʰʔi³ ri¹, ku³³ri³ ni⁴⁴ʔi⁴?**

DEM: MULTI(IV) DFLT.Poss =bucket(IV) TOP 2SG.AL.Poss 3S= COP ‘That (neˈma) bucket, is it yours?’

(SSG: 2017.1.186)

### Responses to (6)/Scene 15

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Forced-Choice: Participants Volunteering</th>
<th>Acceptability Judgments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Participants Accepting¹¹</td>
<td>Participants Rejecting</td>
</tr>
<tr>
<td>naˈa²</td>
<td>0</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>yeˈ a²</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>jeˈ a²</td>
<td>1 (P10)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>neˈma²</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Other responses:**

**Complex forms**

2 (both: yeˈ a²=aˈma⁴)

**No demonstrative**

1

---

¹⁰ Images of Demonstrative Questionnaire scenes are taken from Wilkins (2018).

¹¹ Only participants who did not volunteer a given demonstrative were asked to judge its acceptability. Therefore, rows add to 10 across all 3 columns, not across only the acceptability judgment columns.
\( \eta \text{e}^{'\text{ma}} \) is clearly the most natural demonstrative in scene 15, volunteered by six of ten participants in the forced-choice task. \( \eta \text{a}^{'\text{a}} \) is clearly unacceptable; it was never volunteered, and its acceptability z-score is less than -1.

\( \eta \text{a}^{'\text{a}} \) and \( \eta \text{e}^{'\text{a}} \) receive ambiguous results in the scene. \( \eta \text{a}^{'\text{a}} \) was never volunteered in scene 15. Acceptability judgments on it were equivocal; it received less than the mean proportion of positive judgments, but its difference from the mean was small (< 1 standard deviation). \( \eta \text{e}^{'\text{a}} \) was volunteered once in the scene, by participant 10 (cf. §6.1.2). As with \( \eta \text{e}^{'\text{a}} \), acceptability judgments on \( \eta \text{e}^{'\text{a}} \) were equivocal; its acceptability z-score was negative but had absolute value <1.

In order to preserve an exclusively spatial analysis of \( \eta \text{e}^{'\text{a}} \) and \( \eta \text{a}^{'\text{a}} \), one could argue that the response pattern in (6) is due to the location of the referent in space. This argument fails because of the data from scene 13 of the Demonstrative Questionnaire, shown in (7). In this scene, the speaker, addressee, and referent are all in exactly the same location as in Scene 15. However, the referent is visible.

(7) Demonstrative Questionnaire Scene 13

```
ku\textsuperscript{3}ri\textsuperscript{3} ni\textsuperscript{i}\textsuperscript{t}\textsuperscript{i} \textsuperscript{i} i\textsuperscript{4} je\textsuperscript{3}a\textsuperscript{2} pe\textsuperscript{4}?tfi\textsuperscript{i}?
ku\textsuperscript{3}ri\textsuperscript{3} ni\textsuperscript{i}\textsuperscript{1}i = i\textsuperscript{4} i\textsuperscript{4} je\textsuperscript{3}a\textsuperscript{2} pe\textsuperscript{4}?tfi\textsuperscript{i}
2SG.AL.POSS 3S= COP LNK(IV) DEM:DIST(IV) basket(IV)
'Is that \( \textit{je}^{3}\text{a}^{2} \) basket yours?'
(ECP: 2017.1.183)
```

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Forced-Choice: Participants Volunteering</th>
<th>Acceptability Judgments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \eta \text{a}^{'\text{a}} )</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>( \eta \text{e}^{'\text{a}} )</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>( \text{je}^{'\text{a}} )</td>
<td>5</td>
<td>4 (ND: 1)</td>
<td>0</td>
</tr>
<tr>
<td>( \eta \text{e}^{'\text{ma}} )</td>
<td>0</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

Other responses:

Complex forms 3 (all: \( \textit{je}^{3}\text{a}^{2}=\text{a}^{'}\text{ma}^{3} \)
While no demonstrative receives moderate or high agreement in visible Scene 13 (7), the demonstrative most often volunteered is je’a². Additionally, every participant who did not volunteer je’a² accepted it, showing that the item is clearly acceptable in this configuration when the referent is visible. No other demonstrative, including ne’mava², was clearly acceptable in Scene 13.

The sole difference between Scene 15 (6) and Scene 13 (7) is that the referent is visible. The referent has the same absolute location, and the same location relative to the discourse participants, in both scenes. As such, under an exclusively spatial analysis, the data for the two scenes should be identical. This prediction is wrong: in visible scene 13, the most natural demonstrative is je’a²; in invisible scene 15, it is ne’mava².

6.3.2 Scene 18

In scene 18, shown in (8), the speaker is at one end of a cleared space and the addressee is at the other, facing away from the speaker. The referent is in front of the addressee, making it visible to the addressee but invisible to the speaker.

(8) Demonstrative Questionnaire Scene 18

Responses to (8)/Scene 18

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Forced-Choice: Participants Volunteering</th>
<th>Acceptability Judgments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participants Accepting</td>
<td>Participants Rejecting</td>
<td>Acceptability Z-Score</td>
</tr>
<tr>
<td>na’a²</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>ne’a²</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>je’a²</td>
<td>1 (P10)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>ne’mava²</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

In scene 18, as in scene 15, ne’mava² is clearly the most natural demonstrative. It was volunteered by eight of 10 participants in the forced-choice task.
The other demonstratives all displayed ambiguous results for scene 18 in the forced-choice task. \( pa^a^2 \) was volunteered once, \( \eta e^a^2 \) was never volunteered, and \( je^a^2 \) was volunteered once. The token of \( je^a^2 \) was volunteered by participant 10 (§6.1.2) – the same participant who volunteered \( je^a^2 \) in scene 15.

Acceptability judgment results were also equivocal for scene 18. \( pa^a^2 \) and \( \eta e^a^2 \) displayed slightly negative acceptability z-scores, and \( je^a^2 \) displayed a slightly positive z-score. However, no item other than \( \eta e^m^a^2 \) had an acceptability z-score with absolute value >1, again making \( \eta e^m^a^2 \) the only clearly acceptable item.

Like Scene 15, Scene 18 has a counterpart visible scene – Scene 16. In Scene 16, the speaker, addressee, and referent are all in the same locations as in Scene 18, but the referent is visible. Visible Scene 16, shown in (9), received extremely similar responses to invisible Scene 18, reflecting that \( \eta e^m^a^4 \) can also function as an addressee-centered demonstrative.

(9) Demonstrative Questionnaire Scene 16

\[
\begin{align*}
ku^3ri^3 & \ ji^?i^? \ a^4 \ ji^2ma^4 \ bu^a^e^a^3 \ re^4 \\
2SG.AL.POSS & \ COP.SC \ =\SC \ LNK(II) \ DEM:RODUCTION(II) \ pot(II)
\end{align*}
\]

'Is \( (ji^2ma^4) \) cooking pot yours?'

(ABS: 2017.2.32)

Responses to (9)/Scene 16

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Forced-Choice: Participants Volunteering</th>
<th>Acceptability Judgments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>( na^a^2 )</td>
<td>0</td>
<td>4( \quad 6 )</td>
<td>( -0.941 )</td>
</tr>
<tr>
<td>( \eta e^a^2 )</td>
<td>0</td>
<td>6( \quad 4 )</td>
<td>( -0.109 )</td>
</tr>
<tr>
<td>( je^a^2 )</td>
<td>1 (P10)</td>
<td>6( \quad 3 )</td>
<td>0.168</td>
</tr>
<tr>
<td>( \eta e^m^a^2 )</td>
<td>9</td>
<td>1( \quad 0 )</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Comparing (8) and (9) shows that participants’ responses to Scenes 16 and 18, in both forced-choice and acceptability judgment tasks, were indistinguishable. Therefore, in scene 18 participants’ preference for \( \eta e^m^a^2 \) (and dispreference for \( \eta e^a^2 \) and \( je^a^2 \)) could be due either to the referent’s invisibility or the referent’s location near the addressee.
6.3.3 Scene 25

In scene 25, shown in (10), the speaker and addressee are standing together at a lookout point. The speaker points at an invisible referent located beyond the horizon, more than 1km away.

(10) Demonstrative Questionnaire Scene 25

\[ \text{ma}^3\text{ri}^3 \text{ni}^3\text{?u}^4 \text{ku}'\text{dau}^2\text{?u}^4 \text{ja}^1 \text{ji}^3\text{ma}^2 \text{i}^3\text{a}^1 \text{ne}^1 \text{ja}^1 \text{Galilea?} \]

\[ \text{ma}^3\text{ri}^3 \text{ni}^3=\text{?u}^3 \text{ku}'= \text{dau}^3 =\text{?u}^4 \text{ja}^1 \text{ji}^3\text{ma}^2 \]

\[ \text{PERF 3} =\text{ACC 2SG.S SC = see =SUB LNK(III) DEM: MULTI(III)} \]

\[ \text{i}^3\text{a}^1 \text{ne}^1 \text{ja}^1 \text{Galilea} \]

\[ \text{town(III) LNK(III) Galilea} \]

‘Have you been to that (\text{je}^3\text{ma}) town, Galilea?’

(ABS: 2017.2.32)

Responses to (10)/Scene 25

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Forced-Choice: Participants Volunteering</th>
<th>Acceptability Judgments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{ja}^4\text{a}^2 )</td>
<td>0</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>( \text{je}^4\text{a}^2 )</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>( \text{je}^4\text{a}^2 )</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>( \text{je}^4\text{ma}^2 )</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Other responses:

Complex forms 1 (\( \text{je}^4\text{a}^2=\text{?i}\text{5tfi}\) (P10)

In scene 25, \( \text{je}^4\text{ma}^2 \) is again the most natural demonstrative, volunteered by eight of ten participants. No other demonstrative is natural. In the forced-choice task, \( \text{ja}^4\text{a}^2 \) and \( \text{je}^4\text{a}^2 \) were never volunteered, and root \( \text{je}^4\text{a}^2 \) was volunteered only once (by participant 4).

In the acceptability judgment task, all demonstratives besides \( \text{je}^4\text{ma}^2 \) were clearly unacceptable, with acceptability z-scores less than -1. Additionally, during the acceptability judgment trials, three participants independently volunteered comments that they found speaker-distal \( \text{je}^4\text{a}^2 \) unacceptable because they could not see the referent.
As for the previous two scenes, Scene 25 has a counterpart scene in which the referent is visible. This is Scene 24, shown in (11). The speaker and addressee are standing together at a lookout point, and the speaker points at a visible landmark at least 100 meters away.

Since the referents in Scenes 24 and 25 are different, they are not in exactly the same location. However, as distant landmarks, the referents do belong to the same category of location relative to the discourse participants. An exclusively spatial analysis therefore predicts that the data for Scene 24 should be exactly the same as for Scene 25. In fact, it is not, as shown in (11).

(11) Demonstrative Questionnaire Scene 24

\[
\begin{array}{c}
\text{\textit{wi}³\textit{ri'pi'ki'na'} ri' \textit{je}³\textit{a}² nai³\textit{gu}² tfa³\textit{ri'na'gi}³} \\
\text{\textit{wi}³\textit{ri'} \textit{je}³\textit{a}² nai³} =\textit{gu}² tfa³= \textit{i'na'gi}³
\end{array}
\]

one =times TOP DEM:DIST(IV) tree(IV) =LOC 1SGS= climb

‘Once, I climbed that (\textit{je}³\textit{a}²) tree.’

(KSC: 2018.1.45)

Responses to (11)/Scene 24

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Forced-Choice: Participants Volunteering</th>
<th>Acceptability Judgments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participants Accepting</td>
<td>Participants Rejecting</td>
<td>Acceptability Z-Score</td>
</tr>
<tr>
<td>\textit{na}³\textit{a}²</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>\textit{ne}³\textit{a}²</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>\textit{je}³\textit{a}²</td>
<td>8</td>
<td>1</td>
<td>0 (ND: 1)</td>
</tr>
<tr>
<td>\textit{ne}³\textit{ma}²</td>
<td>0</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

The data from scene 24 indicates that in speaking of a \textbf{visible} landmark, \textit{je}³\textit{a}² is the most natural demonstrative. It was volunteered by eight of ten participants in this scene. \textit{na}³\textit{a}² and \textit{ne}³\textit{a}² were volunteered by one participant each. In stark contrast to scene 25, \textit{ne}³\textit{ma}² was never volunteered.

Scene 24 and 25 (11, 10) therefore display exactly the same pattern seen in Scene 13 and 15 (7, 6). In arrays where the referent is beyond the space of the interaction (i.e., not in reach for either speaker or addressee) and is \textbf{visible}, participants find \textit{je}³\textit{a}² most natural (7, 11). But if the referent is \textbf{invisible}, then \textit{ne}³\textit{ma}² becomes most natural, even if the referent’s location is unchanged (6, 10). Similar patterns hold for \textit{ne}³\textit{a}².
These minimal visibility contrasts make an exclusively spatial analysis of \( \eta^e\'a^z \) and \( \eta^e\'a^z \) infeasible. Instead, to account for the Demonstrative Questionnaire results, we must propose that \( \eta^e\'a^z \) and \( \eta^e\'a^z \) require that the speaker sees the referent.

6.4 Discussion

All three invisible scenes – 15 (6), 18 (8), and 24 (10) – display similar results in the forced-choice data. Participants displayed high or moderate agreement that \( \eta^e\'ma^z \) is most natural in all of these scenes. Root \( \eta^e\'a^z \) was never volunteered in any of the scenes. Root \( \eta^e\'a^z \) was volunteered only three times across the three scenes; two of the three tokens came from Participant 10, who is also an outlier in language background (§6.1.2).

Participants’ preference for \( \eta^e\'ma^z \) as the most natural demonstrative in the invisible scenes cannot be explained by an exclusively spatial analysis. Each of the invisible scenes corresponds to another scene that is spatially similar or identical, but has a visible referent. In the minimally different visible scenes corresponding to scenes 15 (6, 7) and 25 (10, 11), participants found \( \eta^e\'a^z \) and \( \eta^e\'ma^z \) to be the most natural demonstrative. This indicates that the preference for \( \eta^e\'ma^z \) in invisible scenes 15 and 25 is due to the referent’s perceptual status, not its location in space. Location in space influenced participants’ use of \( \eta^e\'ma^z \) only in contexts where the referent was within reach for the addressee, such as scenes 16 (9) and 18 (8).

Invisible scenes did vary somewhat in acceptability judgments of \( \eta^e\'a^z \) and \( \eta^e\'a^z \). In scenes 15 (6) and 18 (8), participants’ acceptability judgments of \( \eta^e\'a^z \) and \( \eta^e\'a^z \) were equivocal. They were roughly equally likely to accept or reject each of the items, and the proportion of positive judgments always fell within one standard deviation of the mean for all scene-demonstrative combinations. By contrast, in scene 25 (10), participants found all demonstratives other than \( \eta^e\'ma^z \) clearly unacceptable. They were much more likely to reject the items, with the proportion of positive judgments falling well below the mean.\(^{12}\)

6.5 Interim Summary: \( \eta^e\'ma^z \) Most Natural, \( \eta^e\'a^z \) and \( \eta^e\'a^z \) Dispreferred, in All Invisible Scenes

This section has shown that, in the Demonstrative Questionnaire task, participants strongly preferred \( \eta^e\'ma^z \) as the most natural demonstrative in all scenes where the referent is invisible and located beyond the speaker’s reaching space (scenes 15, 18, and 25; 6, 8, 10).

By contrast, participants found \( \eta^e\'a^z \) and \( \eta^e\'a^z \) less natural and acceptable in all invisible scenes. In the forced-choice component of the task, participants never volunteered root \( \eta^e\'a^z \) and only very rarely volunteered root \( \eta^e\'a^z \). Likewise, in the acceptability judgment component, participants never clearly judged \( \eta^e\'a^z \) and \( \eta^e\'a^z \) as acceptable in these scenes.

\(^{12}\) It is not clear to me why more participants judged \( \eta^e\'a^z \) and \( \eta^e\'a^z \) unacceptable in scene 25 than in scenes 15 and 18. One possible explanation is that the landmark in scene 25 is invisible because of its permanent location, while the objects in scenes 15 and 18 are invisible because of their transient locations (unlike the landmark, they can be moved). Invisibility due to permanent properties, as in (1-3) and scene 25, may provoke stronger judgments against \( \eta^e\'a^z \) and \( \eta^e\'a^z \) than invisibility due to transient properties, as in scenes 15 and 18. Permanent vs. transient invisibility, however, did not lead to substantial differences in forced-choice data.
This response pattern is not due to the spatial deictic content of the demonstratives. Referents in the same location relative to the participants consistently elicited \(\eta^e a^2\) when visible (scenes 13 and 24; 7, 11) but \(\eta^e ma^2\) when invisible (scenes 15 and 25; 6, 10). Only when the referent was near the addressee – prompting the addressee-proximal use of \(\eta^e ma^2\) – did location impact participants’ responses.

Table 3 summarizes the results of the invisible scenes for \(\eta^e a^2\), \(\eta^e a^2\), and \(\eta^e ma^2\). Table 4 summarizes the results of the minimally different visible scenes.

**Table 3: Results for \(\eta^e a^2\), \(\eta^e a^2\), and \(\eta^e ma^2\) in invisible scenes of the Demonstrative Questionnaire**

<table>
<thead>
<tr>
<th>Scene</th>
<th>Description</th>
<th>(\eta^e a^2) and (\eta^e ma^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Speaker and addressee together at one end of large cleared space. Referent at other end, invisible to both.</td>
<td>? (6)  (\eta^e a^2)  (\eta^e ma^2),  (\eta^e ma^2)  (\eta^e ma^2)</td>
</tr>
<tr>
<td>18</td>
<td>Speaker and addressee at opposite ends of large cleared space. Referent with addressee; it is visible to addressee, but not to speaker.</td>
<td>? (8)  (\eta^e ma^2)</td>
</tr>
<tr>
<td>25</td>
<td>Speaker and addressee together at lookout point. Referent is distant landmark invisible to both.</td>
<td># (10)  (\eta^e ma^2)</td>
</tr>
</tbody>
</table>

**Table 4: Results for \(\eta^e a^2\), \(\eta^e a^2\), and \(\eta^e ma^2\) in visible scenes of the Demonstrative Questionnaire which are minimally different from scenes in Table 3**

<table>
<thead>
<tr>
<th>Scene</th>
<th>Description</th>
<th>(\eta^e a^2) and (\eta^e ma^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Same as Scene 15, but referent is visible to both.</td>
<td>(\eta^e a^2)  (\eta^e ma^2)  (\eta^e ma^2)  (\eta^e ma^2)</td>
</tr>
<tr>
<td>16</td>
<td>Same as Scene 18, but referent is visible to both.</td>
<td>? (9)  (\eta^e ma^2) (Addr-centered)</td>
</tr>
<tr>
<td>24</td>
<td>Same as Scene 25, but referent is visible to both.</td>
<td>(\eta^e a^2) (11)  (\eta^e ma^2)  (\eta^e ma^2)</td>
</tr>
</tbody>
</table>

In sum, then, the Demonstrative Questionnaire results are consistent with the elicitation results felicitation presented in §5. They show that, in speaking of referents they cannot see, speakers strongly prefer \(\eta^e ma^2\) over all other root demonstratives, and disprefer or reject \(\eta^e a^2\) and \(\eta^e a^2\). This pattern holds whether the speaker perceives the referent via a sense other than vision (§5) or fails to perceive it via any sense (§6). The results are also robust to method of data collection, holding both in semantic elicitation (§5) and in experimental data (§6).

### 7 The visibility requirements are encoded

In the preceding sections, I have argued that all of \(\eta^e a^2\), \(\eta^e a^2\), and \(\eta^e ma^2\) have visibility requirements. Dyad-proximal \(\eta^e a^2\) and speaker-distal \(\eta^e a^2\) are acceptable only if the speaker sees the demonstrative referent. Conversely, exophoric \(\eta^e ma^2\) (outside its addressee-centered use) is acceptable if and only if the speaker does not see the referent. Speaker-proximal \(pa^e a^2\) is
the sole demonstrative without visibility requirements. It is acceptable both for referents that
the speaker sees, and for those they perceive through other senses (§5).

In this section, I show that the visibility requirements are encoded, not merely inferred, in all
three of \(\text{ŋe}^2\text{a}^2\), \(\text{je}^2\text{a}^2\), and \(\text{ŋe}'\text{ma}^2\). For the purposes of exposition in this section, I assume that
invisible and addressee-centered \(\text{ŋe}'\text{ma}^2\) represent different lexical items and ignore addressee-
centered \(\text{ŋe}'\text{ma}^2\).

### 7.1 Three logically possible analyses of the perceptual requirements

There are three logically possible ways to analyze the perceptual requirements documented for
\(\text{ŋe}^2\text{a}^2\), \(\text{je}^2\text{a}^2\), and invisible \(\text{ŋe}'\text{ma}^2\) in the preceding subsections. Two of these analyses involve
deriving some of the perceptual requirements via inference, while the other does not.

The first possible analysis – which I adopt and defend below – does not rely on inference. It
treats visibility as a binary feature. Under this analysis, \(\text{ŋe}^2\text{a}^2\) and \(\text{je}^2\text{a}^2\) encode the positive
value of the visibility feature, [+visible], and invisible \(\text{ŋe}'\text{ma}^2\) encodes the negative value, [-
visible]. Speaker-proximal \(\text{ŋa}^2\text{a}^2\), which empirically is not sensitive to visibility, is
underspecified for the feature. I refer to this as the encoding analysis of the perceptual
requirements. It is shown graphically in (12).

(12) Encoding analysis of perceptual requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Spatial Deictic Content</th>
<th>Encoded Perceptual Deictic Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\text{ŋa}^2\text{a}^2)</td>
<td>Spkr-proximal</td>
<td>(∅)</td>
</tr>
<tr>
<td>(\text{ŋe}^2\text{a}^2)</td>
<td>Dyad-proximal</td>
<td>[+visible]</td>
</tr>
<tr>
<td>(\text{je}^2\text{a}^2)</td>
<td>Spkr-distal</td>
<td>[+visible]</td>
</tr>
<tr>
<td>(\text{ŋe}'\text{ma}^2) - ‘Invisible’</td>
<td>(∅)</td>
<td>[-visible]</td>
</tr>
</tbody>
</table>

Moving to the inference-based analyses, the first possible inference-based analysis locates the
visibility meanings in \(\text{ŋe}^2\text{a}^2\) and \(\text{je}^2\text{a}^2\) only. According to this analysis, \(\text{ŋe}^2\text{a}^2\) and \(\text{je}^2\text{a}^2\) encode a
privative feature [visible]. Apparent invisible \(\text{ŋe}'\text{ma}^2\) does not encode any perceptual deictic
content. It picks up its perceptual value through inference alone, due to paradigmatic contrast
with \(\text{ŋe}^2\text{a}^2\) and \(\text{je}^2\text{a}^2\). This analysis is shown graphically in (13).

(13) First inference-based analysis of perceptual requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Spatial Deictic Content</th>
<th>Perceptual Deictic Content</th>
<th>Encoded</th>
<th>Inferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\text{ŋa}^2\text{a}^2)</td>
<td>Spkr-proximal</td>
<td>∅</td>
<td>(no inferences)</td>
<td>(no inferences)</td>
</tr>
<tr>
<td>(\text{ŋe}^2\text{a}^2)</td>
<td>Dyad-proximal</td>
<td>[visible]</td>
<td>(no inferences)</td>
<td>(no inferences)</td>
</tr>
<tr>
<td>(\text{je}^2\text{a}^2)</td>
<td>Spkr-distal</td>
<td>[visible]</td>
<td>(no inferences)</td>
<td>[invisible]</td>
</tr>
<tr>
<td>(\text{ŋe}'\text{ma}^2)</td>
<td>(∅)</td>
<td>[visible]</td>
<td>(no inferences)</td>
<td>(no inferences)</td>
</tr>
</tbody>
</table>

The second possible inference-based analysis of the visibility requirements pins the visibility
meaning on invisible \(\text{ŋe}'\text{ma}^2\). Under this analysis, \(\text{ŋe}'\text{ma}^2\) encodes a privative feature [invisible].
By contrast, \(\text{ŋe}^2\text{a}^2\) and \(\text{je}^2\text{a}^2\) do not encode any perceptual deictic content. Their visibility
requirement arises exclusively through inference, due to paradigmatic contrast with invisible
\(\text{ŋe}'\text{ma}^2\). This inference-based analysis is depicted graphically in (14).
(14) Second inference-based analysis of perceptual requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Spatial Deictic Content</th>
<th>Perceptual Deictic Content</th>
<th>Encoded</th>
<th>Inferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>ja’a⁷</td>
<td>Spkr-proximal</td>
<td></td>
<td></td>
<td>(no inferences)</td>
</tr>
<tr>
<td>ne’a⁷</td>
<td>Dyad-proximal</td>
<td></td>
<td></td>
<td>visible</td>
</tr>
<tr>
<td>je’a⁷</td>
<td>Spkr-distal</td>
<td></td>
<td></td>
<td>visible</td>
</tr>
<tr>
<td>ne’ma⁷ - 'Invisible'</td>
<td>Ø</td>
<td></td>
<td></td>
<td>(no inferences)</td>
</tr>
</tbody>
</table>

In order to assess these possible analyses, it is crucial to know that the perceptual requirements of ne’a⁷ and je’a⁷ are projective (Tonhauser et al. 2013). That is, the requirements persist when the items are embedded in the family of sentences. (15) demonstrates that the visibility requirement of je’a⁷ is projective; ne’a⁷ behaves the same.

(15) Context: Across the table from you and me, there is a box containing some marbles. You know the marbles are there, but you can’t see them.

a. Atomic Sentence

#gu³?je² pe’ti’ka¹ Bi’tu’a’ri³ ti’i⁴.
#gu³?je² pe’ti’ka¹ Bi’tu⁵ =a’ri³ ti⁴ =i⁴
DEM:DIST(I) marble(I) Victoria =AL.POSS 3Sbj(I)= COP
Attempted reading: (That (je’a⁷) marble is Victoria’s.)

b. Negation

#ta’ma⁷ Bi’tu’a’ri³ ti’i⁴ ja⁴ gu³?je² pe’ti’ka¹.
#ta’ma⁷ Bi’tu⁵ =a’ri³ ti⁴ =i⁴ =ja⁴ gu³?je² pe’ti’ka¹
NEG Victoria =AL.POSS 3Sbj(I)= COP LNK(I) DEM:DIST(I) marble(I)
Attempted reading: (That (je’a⁷) marble is not Victoria’s.)

c. Polar Question

#e’?na⁵ Bi’tu’a’ri³ ti’i⁴ ja⁴ gu³?je² pe’ti’ka¹.
 e’?na⁵ Bi’tu⁵ =a’ri³ ti⁴ =i⁴ =ja⁴ gu³?je² pe’ti’ka¹
ALT Victoria =AL.POSS 3Sbj(I).SC= COP =SUB LNK(I) DEM:DIST(I) marble(I)
Attempted reading: (Is that (je’a⁷) marble Victoria’s?)

d. Epistemic Modal

#be’?ma’na⁴ Bi’tu’a’ri³ ti’i⁴ ja⁴ gu³?je² pe’ti’ka¹.
 be’?ma’na⁴ Bi’tu⁵ =a’ri³ ti⁴ =i⁴ =ja⁴ gu³?je² pe’ti’ka¹
EPISTEMIC:POSSIBILITY Victoria =AL.POSS 3Sbj(I)= COP LNK(I) DEM:DIST(I) marble(I)
Attempted reading: (It’s possible that that (je’a⁷) marble is Victoria’s.)

e. Conditional Antecedent

#e’?ga⁴ Bi’tu’a’ri³ ti’i⁴ gu² ja⁴ gu³?je² pe’ti’ka¹, ti’³?na⁴ ti’³?i³ na’³a³.
 e’?ga⁴ Bi’tu⁵ =a’ri³ ti⁴ =i⁴ =gu² ja⁴ gu³?je² pe’ti’ka¹
COND Victoria =AL.POSS 3Sbj(I).SC= COP =COND LNK(I) DEM:DIST(I) marble(I)
ti³⁴ =na³ ti³⁴ =i³⁴ na³ =ā³
3(I) =DAT 3(I) =ACC IMP= give:InamSgO
The perceptual requirements’ projection behavior indicates that they are not entailments, since entailments fail to project from the family of sentences (including the Ticuna-specific family of sentences given in 15). Likewise, the projection shows that the requirements are not conversational implicatures – conversational implicatures, being calculated from entailments, also fail to project. Thus, if the visibility requirements are encoded, it is as not-at-issue content: presuppositions or conventional implicatures. Conversely, if the requirements arise from inference, they must, given the projection, be inferred from not-at-issue content.

This means that we cannot choose between the encoding analysis in (12) and the inference-based analyses in (13) and (14) using standard tests for entailment vs. conversational implicature. Instead, we must look to the language-specific predictions of each analysis.

I therefore argue that the inference-based analyses in (13) and (14) fail for two reasons: (a) they do not account for the Demonstrative Questionnaire data, and (b) they make incorrect predictions about how the visibility requirements interact with morphology. The encoding analysis in (12), on the other hand, accounts for both the Demonstrative Questionnaire and the morphological data.

7.2 Inference analyses of the perceptual requirements fail

Each of the two inference-based analyses of the perceptual requirements has a different empirical flaw. In both cases, the flaw is sufficient to reject the analysis.

7.2.1 Inference-based analysis in (13)

First, consider the inference-based analysis of the visibility requirements in (13). This analysis states that the deictic content of $\text{je}^3a^z$ and $\text{je}^e_a^z$ encodes both (a) that the referent is visible and (b) information about the referent’s location in space.

By contrast, under this analysis, apparent invisible $\text{je}^3ma^z$ encodes nothing about either the referent’s visibility or its location. It is a maximally general demonstrative, underspecified for both spatial and perceptual deictic content. This is very similar to Enfield’s (2003) analysis of the Lao demonstrative $\text{ni}i\text{4}$, and to some analyses of the English demonstrative that (e.g. Wolter 2006; Doran & Ward 2017).

An underspecified analysis of $\text{je}^3ma^z$ would be attractively parsimonious. However, I reject it, as it overpredicts the acceptability of $\text{je}^3ma^z$ in the Demonstrative Questionnaire. If $\text{je}^3ma^z$ has no deictic content, it should be broadly acceptable for any referent, no matter its location in space or perceptual accessibility. Consequently, in the Demonstrative Questionnaire, $\text{je}^3ma^z$ should be judged acceptable more often than other demonstratives.

This prediction is false: $\text{je}^3ma^z$ was not judged acceptable significantly more often than $\text{je}^3a^z$ or $\text{je}^e_a^z$. In scenes with $>1$ judgment, on average $\text{je}^3ma^z$ was judged acceptable by 67.8% of participants (SD = 23.9%), while $\text{je}^3a^z$ was judged acceptable by 64.4% of participants (SD =
18.6%) and $je^\text{a}^i$ was judged acceptable by 62.2% (SD = 27.1%). Wilcoxon rank sum tests indicated no significant difference in proportions of yes-judgments for $\eta e^\text{ma}\text{a}^i$ vs. $\eta e^\text{a}^i$ ($W = 262.5$, $p = 0.612$) or for $\eta e^\text{ma}\text{a}^i$ vs. $je^\text{a}^i$ ($W = 250$, $p = 0.585$).

### 7.2.2 Inference-based analysis in (14)

Second, look to the inference-based analysis in (14). This analysis treats $\eta e^\text{ma}\text{a}^i$ as encoding invisibility, while $je^\text{a}^i$ and $je^\text{a}^i$ lack any encoded perceptual deictic content.

Because this analysis assigns perceptual deictic content to invisible $\eta e^\text{ma}\text{a}^i$, it does not share the flaws of the analysis in (13). However, it makes a different set of incorrect predictions. These concern interactions between $je^\text{a}^i$ and $je^\text{a}^i$ on the one hand, and the enclitic =â′ma⁴, a polysemous element that occurs on a range of spatial expressions, on the other.

According to the inference-based analysis in (14), the visibility requirement of $je^\text{a}^i$ and $je^\text{a}^i$ is not part of the items’ encoded meaning. If we assume that morphology only affects encoded content, not content that is derived via inference, the analysis in (14) predicts that morphology should not be able to modify the visibility requirement of $je^\text{a}^i$ and $je^\text{a}^i$. That is false: when $je^\text{a}^i$ and $je^\text{a}^i$ combine with the enclitic =â′ma⁴, their visibility requirement changes.

To understand interactions between =â′ma⁴ and visibility requirements, background on =â′ma⁴ is necessary. =â′ma⁴, previously introduced in §4, is an enclitic which appears on quantifiers, predicates, spatial adjuncts, and the demonstratives $pa^\text{a}^i$, $je^\text{a}^i$, and $je^\text{a}^i$. (16) outlines the reading(s) of =â′ma⁴ on each of these constituent types other than demonstratives.

<table>
<thead>
<tr>
<th>Host Constituent</th>
<th>Reading of =â′ma⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantifier</td>
<td>Takes quantificational verb, derives NP quantifier</td>
</tr>
<tr>
<td>Predicate</td>
<td>Concessive similar to still or anyway (e.g. 'I told them not to work but they’re working=â′ma⁴', Anderson &amp; Anderson 2017: 7)</td>
</tr>
<tr>
<td>Spatial adjunct</td>
<td>Takes adjunct expressing location, derives adjunct expressing bearing (e.g. 'it’s at the port' &gt; 'it’s toward the port')</td>
</tr>
<tr>
<td>Spatial adjunct</td>
<td>Takes adjunct expressing motion goal, derives adjunct expressing direction (e.g. 'I walked to town' &gt; 'I walked toward town')</td>
</tr>
</tbody>
</table>

The readings shown in (16) are extremely diverse. I view them as evidence that the surface morpheme =â′ma⁴ corresponds to several homophonous lexical entries. Under this view, it is not surprising that =â′ma⁴ also has two apparently disjunctive readings on demonstratives.

One of the two readings of =â′ma⁴ on demonstratives involves contrast. When a speaker refers to two objects which have the same spatial deictic value relative to them, they often index the first-mentioned referent with an unmodified demonstrative, and the second-mentioned referent with the same demonstrative bearing =â′ma⁴. For example, in (17), the speaker uses

---

13 =â′ma⁴ cannot appear on $je^\text{ma}\text{a}^i$, but can appear on the related locative demonstrative $je^\text{ma}\text{a}^i$. Therefore, I take the restriction against combinations of $je^\text{ma}\text{a}^i$ and =â′ma⁴ to be lexical (rather than morphological, i.e. it does not indicate that $je^\text{ma}\text{a}^i$ is synchronically composed of another morph and =â′ma⁴).
root speaker-proximal *pa’a* to index one of her own hands (line a), then *pa’a* with =â’ma* to index the other (b).

(17)  
a. *da*³ᵃ¹ tfau’³me’ tfo³⁄⁻^i⁵ na’ʌu¹.  
\[da³ᵃ¹ tfau¹ =me¹ \text{ tfo}³³ \text{} =?i⁵ na⁴ = ʌu¹\]  
DEM:PROX(III) 1SG =hand(III) 1SG =IBEN 3= hurt  
'This (pa’a) my hand hurts.'

b. *da*³ᵃ¹â’ma⁴ ri¹, ta’ma³ tfo³⁄⁻^i⁵ na’ʌu¹.  
\[da³ᵃ¹ =â’ma⁴ ri¹ ta’ma³ \text{ tfo}³³ =?i⁵ na⁴ = ʌu¹\]  
DEM:PROX(III) =Â’MA⁴ TOP NEG 1SG =IBEN 3S= hurt  
'This other one (*na’a=â’ma*), it doesn't hurt.'  
(KSC: 2018.1.43)

The second reading of =â’ma* on demonstratives is perceptual. When *qe’a* and *je’a* bear =â’ma*, their spatial deictic content stays constant, but their perceptual content changes. They gain the capacity to index (some) referents that are invisible to the speaker.

For example, Participant 3 volunteered first *qe’a=â’ma*, then *je’a=â’ma*, in scene 15 of the Demonstrative Questionnaire, where the referent is invisible (18). This use of =â’ma* does not require contrast – there is only one possible referent in (18), not two identical ones, as in (17). In conversation, about 40% of demonstrative tokens with =â’ma* index invisible referents (§8).

(18) Demonstrative Questionnaire Scene 15 (shown above as 6)

---

(17)  
a. *ji*³ᵃ⁴â’ma⁴ pe⁴tʃi¹ ri¹ ku³ri³ ni⁴i⁻^i⁴?  
\[ji³ᵃ⁴ =â’ma⁴ pe⁴tʃi¹ ri¹ ku³ri³ ni⁴i = i⁴\]  
DEM:DYAD(II) =Â’MA⁴ basket(II) TOP 2SG.AL.POSS 3S= COP  
'That (*qe’a=â’ma*) basket, is it yours?' (volunteered)

b. *gu*³ᵃ⁴â’ma⁴ pe⁴tʃi¹ ri¹ ku³ri³ ni⁴i⁻^i⁴?  
\[gu³ᵃ⁴ =â’ma⁴ pe⁴tʃi¹ ri¹ ku³ri³ ni⁴i = i⁴\]  
DEM:DIST(II) =Â’MA⁴ basket(II) TOP 2SG.AL.POSS 3SBJ= COP  
'That (*je’a=â’ma*) basket, is it yours?' (volunteered immediately after a)  
(LWG: 2017.1.172)
Despite the broader perceptual range of \( \eta e^a = \hat{\eta} ma^4 \) and \( je^a = \hat{a}^4 ma^4 \), the forms still have perceptual restrictions. The \( = \hat{a}^4 ma^4 \) forms can index referents which are invisible because of their location, as in (18), but they cannot index referents which are invisible because of their intrinsic perceptual properties. Only \( \eta e^ma^2 \) can be used for such referents, as shown in (19).

(19) Context: You and I notice a bad smell on the breeze. You tell me it is the smell of gasoline. We cannot see any gasoline stain or container of gasoline. (Same as 1)

\[
\# \eta e^a \hat{a}^4 ma^4 / j e^a \hat{a}^4 ma^4 / \sqrt{\eta e^3 ma^2} pa^3 a^1 ne^{3i} \text{gasolina} = e^{e^3 ma^3} ni^{4i} ?i^4.
\]

\[
\# \eta e^3 a^2 = \hat{a}^4 ma^4 / \sqrt{\eta e^3 ma^2} 0 = pa^{43} = a^1 ne^1 = ?i^4
\]

\[
\# \text{DEM:dist(IV)} = \hat{a}^4 \text{MA}^4 / \text{DEM:multi(IV)} 3 \text{SBJ.Sc} = \text{smell.bad} \quad \text{AREAL.SBJ} = \text{NMLZ(IV)}
\]

\[
\text{Sp:gasoline} = \text{vapor} \quad 3 \text{SBJ} = \text{COP}
\]

'That smell \( \# \eta e^a \hat{a}^4 ma^4 / j e^a \hat{a}^4 ma^4 \) is gasoline vapor.'

(LWG: 2017.2.86)

Since demonstratives with non-contrastive \( = \hat{a}^4 ma^4 \) can index some (18), but not all (19), kinds of invisible referents (19), \( = \hat{a}^4 ma^4 \) does not simply mean that the referent is invisible. Rather, non-contrastive \( = \hat{a}^4 ma^4 \) appears to be a modal operating on the visibility requirement: demonstratives with non-contrastive \( = \hat{a}^4 ma^4 \) referent must be visible in a set of possible worlds that differ minimally from the actual world by the location of the referent (e.g., in 18, possible worlds where the basket is on the other side of the bystander’s body). Referents that would be visible only in worlds where the referent has different intrinsic perceptual properties (e.g., where smells can be seen) still cannot be indexed with \( \eta e^a / je^a = \hat{a}^4 ma^4 \) (19). Since this derivational morpheme can manipulate the visibility requirement of \( \eta e^a^2 \) and \( je^a^2 \), that requirement cannot arise from inference. It must be encoded.\(^\text{14}\)

### 7.3 The encoding analysis of the perceptual requirements succeeds

Given the weaknesses of the two inference-based analyses, the best way to account for the perceptual requirements of \( \eta e^a^2, je^a^2, \) and \( \eta e^3 ma^2 \) is to posit that all three of the items encode a binary feature [visible]. This feature is shorthand for a projective meaning encoding whether the speaker sees the demonstrative referent at the moment of speech.

I propose that \( \eta e^a^2 \) and \( je^a^2 \) encode [+visible]. Invisible \( \eta e^3 ma^2 \) encodes [-visible]; it is a separate lexical item from the addressee-centered use of \( \eta e^3 ma^2 \). \( pa^a^2 \) is underspecified for [visible], accounting for its acceptability both for referents that the speaker sees and for those which they perceive through other senses. This analysis is shown in (20).

---

\(^\text{14}\) This argument does require an assumption that meanings arising from inference cannot be suppressed by morphology. However, I am not aware of work in pragmatics that disputes this assumption, even among authors who reject a strict ordering of pragmatics after truth-conditional semantics (e.g., Levinson 2000).
The encoding analysis accounts for the data on referents perceived through non-vision senses (§5), as well as the Demonstrative Questionnaire data (§6). Participants disprefer or reject $\eta{e}^3{a}^2$ and $je{e}^3{a}^2$ in the invisible scenes of the Demonstrative Questionnaire (§6), as well as in the examples of access via hearing and smell in §5, because of the items’ encoded [+visible] feature. This analysis also accounts for the acceptability of $\eta{e}^3{a}^2$ and $je{e}^3{a}^2$ with =ã$^4ma^4$ for some – but not all – invisible referents (§7.2.2): this acceptability arises because =ã$^4ma^4$ modifies the demonstratives’ visibility requirement.

My claim that the visibility meanings of $\eta{e}^3{a}^2$, $je{e}^3{a}^2$, and $\eta{e}^3ma^2$ are all encoded does not represent a claim that inference plays no role in demonstrative use in Ticuna. Although I attribute the visibility meanings to encoded content, I leave open the possibility that demonstratives could gain additional perceptual meanings via inference – whether from their encoded perceptual deictic content, or from spatial deictic content. For example, several participants in the Demonstrative Questionnaire volunteered comments that speaker-proximal $ja{a}^2$ is most appropriate in contexts where the speaker is handling the referent (i.e. perceives it via touch) at the moment of speech. This association between $ja{a}^2$ and access via touch likely arises from the item’s spatial deictic content, which conveys that the referent is within the speaker’s reach. Handling something is a stereotypical case of having it within reach; thus, the touch association is potentially a stereotype implicature.

### 8 Comparison with corpus evidence

All of my arguments so far have been based on data collected in highly controlled settings. In this section, I substantiate the claims of §§5-7 by analyzing the use of $\eta{e}^3{a}^2$ and $je{e}^3{a}^2$ in naturally occurring data. Based on a corpus of video-recorded conversation, I show that – modulo the phenomenon of deferred reference (Quine 1971) – speakers use root forms of these demonstratives only to index referents which they see at the moment of speech.

In order to test my visibility claims against observational data, I searched a video corpus of 4h37m of Ticuna conversation for all instances of $\eta{e}^3{a}^2$ and $je{e}^3{a}^2$. The recordings in the corpus, which I collected between 2017 and 2019, were made with unattended video cameras. The data represents maximally informal conversation between people who know one another well, mostly family members talking in their homes. The portion of the corpus sampled for this analysis included 17 different interactions.

Searching the corpus identified 48 tokens of $\eta{e}^3{a}^2$ and 89 tokens of $je{e}^3{a}^2$. Both demonstratives appeared at least once with the enclitic =ã$^4ma^4$ (§7.2.2). Table 5 reports the token counts of

### (20) Encoding analysis of perceptual requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Spatial Deictic Content</th>
<th>Encoded Perceptual Deictic Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ja{a}^2$</td>
<td>Spkr-proximal</td>
<td>Ø</td>
</tr>
<tr>
<td>$\eta{e}^3{a}^2$</td>
<td>Dyad-proximal</td>
<td>[+visible]</td>
</tr>
<tr>
<td>$je{e}^3{a}^2$</td>
<td>Spkr-distal</td>
<td>[+visible]</td>
</tr>
<tr>
<td>$\eta{e}^3ma^2$ – Invisible</td>
<td>Ø</td>
<td>[-visible]</td>
</tr>
<tr>
<td>$\eta{e}^3ma^2$ – Addr</td>
<td>Addr-proximal</td>
<td>Ø</td>
</tr>
</tbody>
</table>
ηε’a² and je’a² in root form (i.e., without =ā’ma⁴) vs. with =ā’ma⁴ observed in the search.¹⁵

Table 5: Token counts of ηε’a² and je’a² in 4h37m of maximally informal conversation

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Root tokens (without =ā’ma⁴)</th>
<th>Tokens with =ā’ma⁴</th>
<th>Total token count</th>
</tr>
</thead>
<tbody>
<tr>
<td>ηε’a²</td>
<td>47</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td>je’a²</td>
<td>76</td>
<td>13</td>
<td>89</td>
</tr>
</tbody>
</table>

From the set of tokens represented in Table 5, I excluded all tokens produced either (a) by children under five (21 tokens) or (b) in direct quotations (5 tokens). Tokens produced by young children were excluded because children do not attain adult-like use of demonstratives until at least five years of age (e.g., Küntay & Özyürek 2006). Tokens in direct quotations were excluded because the values of deictics in reported speech are not necessarily calculated from the immediate speech situation. After these exclusions, 40 tokens of ηε’a² (39 without =ā’ma⁴, 1 with) and 71 tokens of je’a² (59 without =ā’ma⁴, 12 with) remained in the data set.

I then coded the remaining tokens of ηε’a² and je’a² for whether the participant who spoke the demonstrative could see the referent at the moment that they produced the item. Even if I could not see the referent in the frame, if the speaker’s behavior indicated that they could see it – for example, if they commented on the referent’s visual appearance – I coded the token as involving a visible referent. In 26 of the 111 total tokens, I either could not identify the referent, could not determine its location, or could not determine the speaker’s location. I did not attempt to code these tokens for visibility, and therefore marked them as uncodable. The majority of all uncodable tokens (19 of 26) were uncodable because both the speaker and the referent were off camera.

Table 6 presents the results of this visibility coding of the tokens of ηε’a² and je’a², again divided between tokens of the items with vs. without =ā’ma⁴.

Table 6: Results of visibility coding for tokens of ηε’a² and je’a² in 4h37m of maximally informal conversation

<table>
<thead>
<tr>
<th>Demonstrative</th>
<th>Visible</th>
<th>Root tokens</th>
<th>Uncodable</th>
<th>Tokens with =ā’ma⁴</th>
<th>Visible</th>
<th>Invisible¹⁶</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ηε’a²</td>
<td>27</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>je’a²</td>
<td>38</td>
<td>4</td>
<td>17</td>
<td>7</td>
<td>5</td>
<td>12</td>
<td>71</td>
</tr>
</tbody>
</table>

To understand the data in Table 6, recall from §§5-6 that in controlled settings, root ηε’a² and je’a² were consistently volunteered and accepted only to index referents that the speaker sees at the moment of speech. Thus, if observational and controlled data are identical, all codable tokens of root ηε’a² and je’a² should index visible referents. This prediction does not apply to tokens of ηε’a² and je’a² with =ā’ma⁴, which are acceptable (§7.2.2) for some invisible referents.

¹⁵ I did not search for all tokens of invisible ηε’ma⁴ because, at the token level, ηε’ma⁴ is often ambiguous between exophoric and non-exophoric readings. Therefore, it is impossible to isolate exophoric tokens for visibility coding (and coding must apply only to exophoric tokens, or it will be biased toward invisible referents).

¹⁶ All tokens with =ā’ma⁴ were codable. Consistent with §7.2.2, all invisible referents of tokens with =ā’ma⁴ were referents that, given their intrinsic properties, can be seen (e.g., people, plants, clothing).
Looking to the raw data in Table 6, we see that 27 of the 30 codable tokens of root $\eta e^3a^2$, and 38 of the 42 codable tokens of root $je^1a^2$, index visible referents. However, three of the 30 codable tokens of $\eta e^3a^2$, and four of the 31 codable tokens of $je^1a^2$, index a referent that is not visible. These tokens appear to contradict the claim that $\eta e^3a^2$ and $je^1a^2$ encode visibility.

Closer inspection of the invisible tokens of $\eta e^3a^2$ and $je^1a^2$, however, shows that all involve **deferred reference** (Quine 1971; Nunberg 1993). Deferred reference occurs when a speaker indexes one entity, typically present in the surround, in order to refer to a second, associated entity, typically absent from the surround. The referent which is present in the surround is the ‘pivot,’ and the one which is absent is the ‘deferred referent.’

As an English example of deferred reference, consider the following scenario. Suppose that I hold up a photograph of two missing children and say, *Have you seen these children?*. In this utterance, I am drawing my addressee’s attention to the photograph and the images of the children that it contains. However, I am actually referring not to the images, but to the children themselves. My utterance is therefore an act of deferred reference. The pivot is the photograph; the deferred referent is the actual children. Within my utterance, the deictic content of the demonstrative *these* conveys the relation between me and the pivot – the photograph is near me. It does not convey a relation between me and the deferred referent, as the children's location is unknown. By contrast, the head noun of my demonstrative noun phrase (*children*) and the agreement on my demonstrative (plural) track properties of the deferred referents (the children), not of the pivot (the photograph).

Both of these features are defining of deferred reference. Across languages (Haviland 1996; Hanks 2005), the deictic content of the demonstratives used in deferred reference tracks the relation between the deictic center and the pivot – in the example, between me and the photograph. By contrast, the other features of a demonstrative noun phrase used in deferred reference, such as the head noun and the number or noun class agreement on the demonstrative, track properties of the deferred referent (in the example, the children).

Returning to the Ticuna data represented in Table 6, we find that **all seven** tokens of root $\eta e^3a^2$ and $je^1a^2$ with invisible referents appear in deferred reference. As the account of deferred reference just laid out predicts, in each token, the deferred (i.e. actual) referent is invisible, but the **pivot** is visible. These tokens therefore do not represent counterexamples to the claim that $\eta e^3a^2$ and $je^1a^2$ require visibility. They show only that in deferred reference, the visibility requirement applies to the pivot rather than the referent.

To see what deferred reference to an invisible referent via a visible pivot looks like, consider (21). The key participants in this example are Menris, sitting on the right in the video still, and her sister Adriana, lying in the hammock on the left. Menris and Adriana are being recorded in Adriana’s house.

Prior to the utterance in (21), Menris has been telling Adriana about renovations she plans to make to her house (which is not visible to the participants). In (21), Menris states that she plans to replace the wooden walls of her kitchen with cinderblock walls. Explaining her plan, Menris points at the cinderblock wall of Adriana’s home, as shown in the video still, and says, ‘I’ll
apply mortar to these.’ The item in her utterance that I have glossed as ‘these’ is $ji^2a^2$, the noun class III form of $\eta e^a^2$.

(21) tca_201907_child1-child2_cci, 28:22

Menris’ token of $\eta e^a^2$ in (21) accomplishes deferred reference to an invisible referent via a visible pivot. The pivot in (21) is the cinderblocks that make up the back wall of Adriana’s house. The real (deferred) referent, however, is the cinderblocks – which Menris has not yet actually obtained – which she will use to construct her new kitchen.

Two aspects of Menris’ behavior demonstrate that the pivot in (21) is the cinderblocks of the back wall. First, as Menris produces (21), she indexes the wall by pointing at it with her right arm. Her right hand articulates a splayed shape, used to point at referents distributed in space – like the blocks of the wall. Second, Menris employs the dyad-proximal demonstrative $\eta e^a^2$. Spatially, $\eta e^a^2$ conveys that the referent is within the space occupied by the participants’ joint activity. The back wall of the house meets this requirement, since it partially defines the space of Menris and Adriana’s interaction.

The wall, however, is only the pivot in (21), not the (deferred) referent. Since the cinderblocks of Adriana’s home are already mortared together, Menris cannot be taken as claiming that she will apply mortar to them. Rather – as the context of this turn indicates – Menris actually plans to obtain her own cinderblocks sometime in the future, then construct her new wall from them. These blocks are the deferred referent of her token of $\eta e^a^2$. The blocks that Menris actually indexes in (21) stand in for this referent by virtue of their physical similarity to it.
The deferred referent in (21) is not visible to the speaker; in fact, it does not even exist at the moment of speech. As such, I coded this token of \( \eta^e a^2 \) as involving an invisible referent. All six other corpus instances of \( \eta^e a^2 \) and \( je^a^2 \) for invisible referents are analogous to this example: the speaker indexes a visible pivot in order to refer to an invisible entity associated with it. In these acts of deferred reference, all of the deictic content of the demonstratives, both spatial and perceptual, tracks the properties of the pivot. Just as we saw in the English example that opened this section, the properties of the deferred referent are irrelevant, at least for the deictic component of the utterance.

Examples like (21), then, do not represent evidence against the claim that \( \eta^e a^2 \) and \( je^a^2 \) encode visibility. They indicate only that in deferred reference, the visibility requirement of these items – exactly like their spatial requirements – applies to the pivot rather than the (deferred) referent. As such, the conversational data represented in Table 6 is fully consistent with the claim that root \( \eta^e a^2 \) and \( je^a^2 \) require visibility.

It could be argued that the conversational corpus lacks invisible tokens of \( \eta^e a^2 \) and \( je^a^2 \), outside deferred reference, only because of its small size. However, work on both English (San Roque et al. 2015: 39n4) and other Indigenous American languages (Floyd et al. 2018: 186) has shown that small (1-hour) samples of conversation are very similar – in the lexicon of perception – to much larger samples (22-95 hours). The Ticuna corpus described above was constructed on the same principles as the San Roque et al. (2015) and Floyd et al. (2018) corpora; thus, repeating the analysis on a larger corpus likely would not change the results.

### 9 Conclusions

Since Boas’ time, documentary linguists have argued that visibility-sensitive demonstratives exist and have described dozens of Indigenous American languages as displaying them. But – with some exceptions, such as Hanks (1990) and Gillon (2009) – they have provided little evidence for these claims.

As a result, scholars interested in demonstratives as spatial language have probed the evidence for whether visibility contrasts really exist. Finding this evidence weak, they have argued that apparent visibility contrasts in demonstratives always arise from spatial, epistemic modal, or non-visual evidential content (Enfield 2003; Levinson 2018a). Together, these arguments suggest a more general theory that demonstratives never encode information about vision – though they may encode other epistemic or evidential information.

At the same time as this theory has emerged, researchers in many other fields of linguistics have held to exclusively spatial analyses of demonstratives – those which treat the items’ deictic content as concerning only location in space (e.g., Wolter 2006). These theories may account for some demonstrative systems, but for others they are deeply flawed. One of their most basic flaws is that they do not account for demonstratives which encode information about the referent’s visibility as well as its location.
In this paper, I have evaluated both the Enfield-Levinson theory, and an exclusively spatial theory, against data on the demonstratives of Ticuna. I showed that two of the demonstratives of Ticuna, dyad-proximal $\eta'\text{a}^2$ and speaker-distal $\text{je}'\text{a}^2$, can index only referents that the speaker sees at the moment of speech. Another demonstrative, $\eta'\text{ma}^2$, can index only referents that the speaker does not see.

Crucially, the perceptual requirements of $\eta'\text{a}^2$, $\text{je}'\text{a}^2$, and $\eta'\text{ma}^2$ concern vision as a sense of the human body. As I argued in §§5-6, they cannot be analyzed as concerning space, epistemic modality, general direct evidentiality, or access via hearing. Whether vision is encoded in all three of the visibility-sensitive demonstratives of Ticuna, or only in some, is an analytical question, not an empirical one. However, as I demonstrated in §7, the most adequate analysis is that all three encode information about vision.

I intend this analysis as a source of empirical evidence for the Boasian tradition of visibility claims, an argument against exclusively spatial theories of demonstratives, and a response to Levinson’s cross-linguistic claims that demonstratives never encode visibility. Importantly, I do not intend it as an argument against the language-specific claims about visibility made by Levinson (2018a) and Enfield (2003). Those authors’ data makes clear that the demonstratives of their object languages do not encode visibility. But – though Levinson and Enfield’s arguments hold for the data they examine – they do not hold for every language with an apparent visibility contrast in demonstratives. Though demonstratives do not universally encode visibility, they do encode it in Ticuna, and likely also in many other languages of the Indigenous Americas.

Future research on demonstratives in American languages should return to the languages which have been described as displaying visibility contrasts, to investigate whether the apparent visibility meanings actually concern vision (as Boas claimed, and as I argue for Ticuna) or instead epistemic modality (as Levinson and Enfield suggest). It is especially important for researchers to collect data on reference to entities perceived only via non-vision senses, of the kind that I supply in §5. Without this type of data, it is impossible to know whether an apparent invisible demonstrative conveys lack of access via any sense, or specifically lack of visual access.

More broadly, this study also provides evidence that domain-general properties of human perception can influence the functional lexicon. We already know that (non-linguistic) properties of perception structure the lexicon of content words in domains such as color (e.g., Regier et al. 2005) and spatial relations (e.g., Khetarpal et al. 2009). The existence of visibility contrasts in demonstratives is consistent with these findings, suggesting that non-linguistic perception structures the lexicon of functional items as well.

There is no reason to believe that the perceptual system’s influence on the functional lexicon should stop with demonstratives. Future researchers, therefore, should also examine what other functional items may encode embodied, perceptual information in lieu of the more abstract meanings traditionally proposed in semantics. They might ask, for example, whether speakers’ use of grammatical number markers actually tracks the absolute cardinality of sets, per standard analyses, or instead the (disparate) human visual perception of number – as an analysis foregrounding perception would predict.


References


