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DEMONSTRATIVES AND VISIBILITY: DATA FROM TICUNA AND IMPLICATIONS FOR THEORIES OF DEIXIS

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In many Indigenous languages of the Americas, demonstratives are said to encode whether the referent is visible. Some scholars, however, argue that all visibility meanings in demonstratives are epiphenomenal on spatial, epistemic modal, or nonvision evidential content. Drawing on elicitation, experimental data, and corpus data collected in fieldwork, I argue that two demonstratives of Ticuna (isolate; Brazil, Colombia, Peru) do display visibility meanings. These meanings are encoded and concern the SENSE OF VISION—not space, epistemic modality, or nonvisual forms of evidentiality. These findings support a view of demonstrative meaning as grounded in the perceptual capacities of the human body.

Keywords: demonstratives, deixis, evidentiality, pragmatics, American languages, Amazonian languages, Ticuna language

1. INTRODUCTION. Demonstratives are an exceptional word class. Present in every language (Diessel 1999:2), they are among the most frequent items 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), and 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 conversation—rather than anaphora. Despite the many exceptional properties of exophoric demonstratives, traditional analyses of their meaning are simple. They claim that demonstratives’ DEICTIC CONTENT—the information they convey about the relation between the referent and the discourse participants—concerns only distance (Fillmore 1973:65–67, Anderson & Keenan 1985:281, Diessel 1999:36). More recent work avoids the term ‘distance’, but still holds that the deictic content always concerns space (Enfield 2003, Peeters et al. 2015, Grenoble et al. 2019). As a consequence, exclusively spatial analyses remain accepted in fields from formal semantics (Wolter 2006) to acquisition (Gonzalez-Peña et al. 2020) to psycholinguistics (Stevens & Zhang 2013).

In this article, I challenge exclusively spatial analyses by showing that the deictic content of demonstratives can also concern PERCEPTION. More specifically, I argue that two of the six demonstratives of Ticuna (isolate; Brazil, Colombia, Peru) include infor-

* This article is dedicated to the memory of Ling Cándido Serra, a Ticuna educator, author, and language activist. One of my first Ticuna teachers, Cándido Serra died of COVID-19 in May 2020. He was only forty-five.

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mation about visibility in their deictic content. These two visibility-encoding demonstratives are the dyad-proximal *ye³a²* ‘this (between us)’ and the speaker-distal *je³a²* ‘that (far from me)’.¹ Drawing on elicited, experimental, and observational data, I show that *ye³a²* and *je³a²* convey that the speaker sees the referent at the moment of speech. This meaning arises from encoded perceptual deictic content concerning the literal sense of vision. Contrary to the predictions of exclusively spatial analyses, it does not arise from the demonstratives’ spatial deictic content, nor from any other nonvision (e.g. epistemic) meaning.

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 perceptual capacities of the human body. Linguists understand that our perceptual capacities influence sound systems: for example, that properties of the human auditory system limit the set of possible phonological contrasts. My goal is to provoke readers to consider how perception matters to meaning systems as well—to ask how nonlinguistic properties of perception and cognition, like the prominence of vision over other senses, influence the functional lexicon.

The article is organized as follows. I first review previous arguments about visibility contrasts in demonstratives (§2), and then provide background on the Ticuna language and people (§3). Section 4 describes the language’s demonstrative system. Sections 5–7 are the core of the analysis. I establish the two demonstratives’ visibility requirements using data from semantic elicitation (§5) and a controlled production task (§6); I then show that the requirements arise from encoded deictic content rather than inference (§7). In §8, I validate the analysis against observational data, arguing that—modulo the phenomenon of deferred reference—all uses of demonstratives in a corpus of Ticuna conversation are consistent with my analysis. Section 9 concludes.

2. THE VISIBILITY DEBATE. In many Indigenous languages of the Americas, the deictic content of demonstratives is said to convey information about the referent’s visibility, as well as about its location. Boas (1911:528) was the first to make a visibility claim, writing that three deictic determiners in Kwak’wala (Wakashan; Canada) require the referent to be visible to the speaker. Following Boas, many early Americanists posited visibility contrasts in the demonstratives of languages they studied (Hanks 2011:329). Similar claims continue to appear in recent works about languages from across the Americas (e.g. Romero-Méndez 2009:216, Schupbach 2013:69–73, Brandão 2014:96–98).

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 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 often argued that they never encode visibility (Enfield 2003, 2018, Levinson 2004, 2018a). Instead, they claim, all apparent visibility contrasts arise from either spatial deictic content or epistemic modal and evidential meanings.

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 ‘nonproximal’ demonstrative, which encodes that the referent is ‘not here’ from the speaker’s perspective, and one neutral demonstrative. Enfield (2003:96–102) acknowledges that lack of ‘perceptual access’ may influence speakers to use the nonproximal demonstrative. But since both demonstratives may be used for either visi-

¹ In transcriptions, raised numerals represent lexical tone; 5 is the highest tone.

ble or invisible referents (Enfield 2018:78), he argues that this reflects a bias toward construal of invisible referents as spatially ‘not here’. Summarizing this analysis, Enfield (2003:96) urges analysts to ‘show caution’ before claiming that visibility is ever encoded in demonstratives.

More recently, Levinson (2004, 2018a:30–31) has suggested that apparent visibility requirements are epiphenomenal on either epistemic modal or nonvision evidential meanings. His evidence comes from Yélim Dnye (isolate; Papua New Guinea) and Tiriyó (Carib; Brazil). For Yélim Dnye, Henderson (1995) argues that the demonstrative *wu* encodes that the referent is invisible. However, Levinson’s (2018b) field data demonstrates that *wu* can be used for some visible referents. He therefore proposes that it encodes uncertainty about the referent’s identity—an epistemic modal meaning—rather than invisibility.

Similarly, for Tiriyó, Meira (1999) initially described the demonstrative *më(ni)* as encoding that the referent is invisible. But Meira (2018:236) shows that *më(ni)* has an additional perceptual requirement: it can index only referents that are both invisible and perceived via hearing, such as sounds. Levinson (2018a) argues that the item’s invisibility requirement arises from the auditory evidential requirement, making the visibility meaning epiphenomenal on another form of evidentiality.

Levinson’s (2018a) argument is powerful, for even the most detailed studies of visibility contrasts in demonstratives available today cannot exclude alternative analyses following his model. For example, Gillon’s (2009) careful examination of deixis in Skwxwú7mesh (Salish; Canada) claims that two of the language’s five demonstratives encode that the referent is invisible. However, all of Gillon’s (2009:18–19) examples of these demonstratives involve referents that the speaker 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’s (1990) influential study of deixis in Yucatec Maya (Mayan; Mexico) claims that the presentative demonstrative *hé?el o?* encodes that the referent is visible. Yet one example in the work (Hanks 1990:256) shows a speaker using *hé?el o?* 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 o?* may concern the referent’s identifiability or perceptual accessibility, rather than the sense of vision. Hanks 1990 and Gillon 2009 provide more evidence for visibility contrasts than almost any other study of deixis. Yet even they do not show that those contrasts concern visibility, rather than space, epistemic modality, or nonvision forms of evidentiality. 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 an Indigenous language isolate, spoken by 38,680 to 69,000 people (Lewis et al. 2014, Instituto Socio-Ambiental 2017). Most speakers live along the western course of the Amazon River in Brazil, Colombia, and Peru. Children continue to acquire Ticuna as a first language in most areas in Brazil and Peru, and some areas in Colombia (Santos Angarita 2005).

3.1. DATA SOURCE. Data presented in this article comes from my fieldwork with speakers of Ticuna in the indigenous community of Cushillococha, Peru, over thirteen months between 2015 and 2019. As of September 2019, Cushillococha was home to ~5,000 people, almost all of whom were ethnically Ticuna and spoke Ticuna as their dominant language.

Within the data reported in this article, six people participated in the elicitation described in §5, ten in the experimental task in §6, and about forty-five in the collection of the video corpus described in §8. I describe the participants for each task in the corresponding section. I used both Spanish and Ticuna as metalanguages in all of the research.

3.2. LANGUAGE BACKGROUND. Two features of Ticuna grammar are relevant to the analysis below: noun class and evidentiality.

First, Ticuna displays noun class, possessing five classes. The class assignment of nouns is based primarily on semantic factors such as animacy. All noun phrase constituents, including demonstratives, display noun class agreement. I cite demonstratives using the form for class IV, which is the morphologically default noun class. Demonstratives are distinct from third-person pronouns in their form of noun class agreement, prosodic behavior, syntax, and many other features. Thus, I do not consider pronouns in this article.

Second, other than demonstratives, Ticuna has few morphemes marking evidentiality or epistemic modality. The only propositional evidential is the optional reportative $=\tilde{a}^3$. Epistemic modality is conveyed by the epistemic modal predicates $be^1?ma^2na^4$ and $ky^1?a^5$ ‘it could be that’, which contrast only in their interaction with focus. Both epistemic modals are compatible with a range of sources of evidence, direct and indirect, indicating that neither has an evidential meaning component. Since the epistemic modal and reportative markers convey nothing about perception, I do not investigate their interactions with demonstratives’ perceptual meanings.

4. THE DEMONSTRATIVE SYSTEM OF TICUNA. As background to the analysis of visibility requirements below, I first present the complete demonstrative inventory of Ticuna. Then, as initial evidence for visibility contrasts, I offer two examples of how demonstratives with visibility requirements are used in everyday conversation.

4.1. DEMONSTRATIVE INVENTORY. Ticuna has six nominal demonstratives, shown in Table 1. Nominal demonstratives, equivalent to *this* and *that* in English, can be used either adnominally or pronominally. Locative demonstratives—equivalent to *here* and *there*—are distinct, as are demonstrative adverbs of manner (*like this, like that*). Here I am concerned only with nominal demonstratives, and I refer to them simply as ‘demonstratives’.

Many of the demonstratives appear to be morphologically related. For example, the regional, multifunctional, and remote-past anaphoric demonstratives all end in [ma]. But synchronically, the demonstratives cannot be analyzed as morphologically complex. This is clear for two reasons. First, the phonologically similar demonstratives have no consistent semantic relationship. For example, dyad-proximal ye^3a^2 and multifunctional ye^3ma^2 are phonologically similar, but as the analysis in §§5–7 shows, they share no semantic features. Second, in certain morphological contexts (e.g. preceding the enclitic $=\tilde{t}^1ka^5$ ‘only’), the final syllable of demonstratives can delete without semantic effect.

NOUN CLASS	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V
EXAMPLE NOUN	$ki^3?tfi^1$ ‘knife’	tse^3ra^1 ‘handsaw’	λu^3le^3 ‘canoe’	ta^3ra^5 ‘machete’	pa^4ki^3 ‘young woman’
Speaker-proximal	$da^31?e^2$	da^2a^2	da^31a^1	ja^4a^2	ja^43a^2
Dyad-proximal	$ji^31?e^2$	ji^2a^4	ji^2a^2	je^3a^2	je^43a^2
Speaker-distal	$gu^31?e^2$	gu^2a^4	gu^2a^2	je^3a^2	je^43a^2
Regional	—	do^2ma^4	do^2ma^2	jo^4ma^4	—
Multifunctional	$ji^31?e^2ma^4$	ji^2ma^4	ji^2ma^2	je^3ma^2	je^4ma^2
Remote-past anaphor	$gu^31?e^2ma^4$	gu^2ma^4	gu^2ma^2	je^4ma^4	je^4ma^4

TABLE 1. The demonstratives of Ticuna.

Of the six demonstratives, four are always exophoric, one is never exophoric, and one has both exophoric and nonexophoric uses.

The exclusively exophoric items are speaker-proximal na^4a^2 , dyad-proximal ye^3a^2 ², speaker-distal je^3a^2 , and regional no^4ma^4 . Regional no^4ma^4 has limited productivity. It indexes only regions of space that enclose the speaker, as in *this town*, and time periods that include the present, as in *this year*. Because of the class distribution of nouns denoting such referents, no^4ma^4 lacks forms for noun classes I and V.

The exclusively nonexophoric demonstrative is the remote-past anaphor je^4ma^4 . This item appears in anaphora and certain other nondeictic uses, such as free relative clauses. It is unacceptable in exophoric use. For example, in the experimental task in §6, je^4ma^4 was never volunteered in the forced-choice component and was rejected in 79% of trials in the acceptability judgment component. Additionally, je^4ma^4 imposes temporal requirements on its clause: it appears only in clauses with remote-past temporal reference (Soares 2017, Skilton 2019:237–46).

The sole demonstrative with both exophoric and nonexophoric uses is multifunctional ye^3ma^2 . This item has two exophoric uses. It indexes referents that are proximal to the addressee, and—I argue in §§5–6—it can also index any referent that is not visible to the speaker. Additionally, ye^3ma^2 is the language’s main nonexophoric demonstrative, appearing in anaphoric and other nondeictic uses with no temporal restrictions.

In the following analysis of visibility requirements, I am concerned only with the productive exophoric demonstratives: speaker-proximal na^4a^2 , dyad-proximal ye^3a^2 , speaker-distal je^3a^2 , and multifunctional ye^3ma^2 . I pass over regional no^4ma^4 and the remote-past anaphor je^4ma^4 , as their unproductivity (for no^4ma^4) and unacceptability in exophoric use (for je^4ma^4) make them impossible to compare with exophoric items.

Additionally, the following analysis examines only root forms of demonstratives. All exophoric demonstratives can bear derivational enclitics that modify their deictic content. For example, the enclitic $=?t^5t^2$ ‘really’ intensifies its host’s spatial deictic content, conveying that the referent is especially close to the deictic center (for proximals) or especially far (for the distal). One derivational enclitic, $=\tilde{a}^4ma^4$, modifies its host’s perceptual deictic content. Thus, in §§5–6 I do not consider demonstratives that contain $=\tilde{a}^4ma^4$ or other derivational enclitics; I instead discuss $=\tilde{a}^4ma^4$ in §7.

4.2. PROTOTYPICAL USES OF DEMONSTRATIVES WITH VISIBILITY REQUIREMENTS. My core claim is that two of the exophoric demonstratives just introduced—dyad-proximal ye^3a^2 and speaker-distal je^3a^2 —can index only VISIBLE referents. They require that the speaker sees the demonstrative referent at the moment of speech.

As an example of prototypical uses of ye^3a^2 and je^3a^2 , consider the example of demonstrative reference to a visible object in 1, taken from a recording of child-caregiver interaction. The key participants in 1 are the adult woman, at left in Figure 1, and her four-year-old son, at right. They are being recorded in their home. As the mother holds the infant in her lap, she asks her son to bring her a doll (at back right) to entertain the infant. Pointing and gazing at the doll as shown in Fig. 1, she refers to it four times with je^3a^2 in 1a and 1b, then once with ye^3a^2 in 1b.³

² Spatially, ye^3a^2 conveys that the referent is inside the space of the discourse participants’ joint activity—typically, that the referent is inside the interactive dyad (i.e. between the speaker and addressee). I therefore label it ‘dyad-proximal’.

³ Glosses in examples use Leipzig abbreviations (<https://www.eva.mpg.de/lingua/resources/glossing-rules.php>) along with the following: AL.POSS: alienable possessor, ALT: alternative (disjunction/polar question), \tilde{A}^4MA^4 : visibility-neutralizing enclitic (§7.2), ANIM.O: animate object, CNTF: counterfactual, CONN:



FIGURE 1. ‘Bring that one (*je³a²*) here, that one (*je³a²*), look.’

(1) a. Mother: *je³a²* nu⁵a² na¹ga⁴, *je³a²* di¹?,
je³a² nu⁵a² na¹=ga⁴ *je³a²* di¹?
DEM:DIST(IV) DEM.LOC IMP=transport:ANIM.O DEM:DIST(IV) INTJ:look!
‘Bring **that one** (*je³a²*) here, **that one** (*je³a²*), look,’

b. Mother: *je³a²* mu³ne⁴ka¹ di¹?, *je³a²* di¹?, *ye³a²*
je³a² mu³ne⁴ka¹ di¹? *je³a²* di¹?
DEM:DIST(IV) SP:doll(IV) INTJ:look! DEM:DIST(IV) INTJ:look!
ye³a²
DEM:DYAD(IV)
‘**That** (*je³a²*) doll, look, **that one** (*je³a²*), look, **that one** (*ye³a²*).’
(CL 2018-19.048, tca_201908_child10-child13_cci_video_xa30.mp4, 26:41)

The mother’s four uses of *je³a²* in 1 reflect that she sees the demonstrative referent—the doll—and that it is located outside her reaching space. Additionally, after her fourth token of *je³a²* in 1b, her son turns and faces the doll. She then refers to the doll again with *ye³a²*. This reference conveys that the demonstrative referent is still visible to her, and that it is now located between the speaker and addressee.

By contrast, as an example of a context where *ye³a²* and *je³a²* do NOT appear, consider the demonstrative references to an INVISIBLE object in 2. The key participants in this example, from a different recording of child-caregiver interaction, are an adult woman, seen at right in Figure 2, and her teenage cousin, at left. They are being recorded in the cousin’s home while they play with the woman’s infant.

Before the example in 2, the infant gets up from beside the woman and begins crawling away. Noticing a bad smell, the other participants conclude that the infant has soiled her diaper. In 2a, the cousin comments that catching the infant’s feces is the purpose of the diaper. Making the first mention of the feces, he indexes them with *ji³l²e²ma⁴*, the noun

connective, DFLT.POSS: default possessor (of inalienably possessed noun), EPIST.MOD: epistemic modal, HESIT: hesitation word, INAM.O: inanimate object, INTJ: interjection, LNK: linker/determiner, MULTI: multifunctional, O: object, PROX: proximal, SC: subordinate clause inflection, SP: Spanish word, SUB: subordinator. Additionally, note that the first line of examples shows the surface phonology, while the second (segmented) line shows underlying representations.

Attested examples are from video recordings publicly available online in the California Language Archive (CLA). Below attested examples, I give a folder and file reference, which can be used to locate the recording in the archive. In the electronic versions of this article, a hyperlink to the location in the CLA is embedded in the folder reference. Participants in video recordings provided informed consent for recording, as well as archiving and publication of the recordings.



FIGURE 2. 'It's for that (*ye³ma²*), her you-know-what.'

class I form of multifunctional *ye³ma²*. Next, in 2b, the woman confirms that the smell is coming from feces. Like her cousin, she indexes the feces, which can be smelled but cannot be seen, using *ye³ma²*.

(2) a. Cousin: *ji³¹ʔe²ma⁴ka¹ ni⁴¹ʔi⁴ no⁵¹ri³ ˜a⁴ki⁵e³*
ji³¹ʔe²ma⁴=ka¹ ni⁴¹=i⁴ no⁵¹ri³ ˜a⁴ki⁵e³
DEM:MULTI(I)=PURP 3SBJ=COP 3.AL.POSS HESIT(I)
 'It (baby's diaper) is for **that** (*ye³ma²*), her you-know-what (i.e. feces).'
 b. Mother: *m¹m³¹ ˜e³ma²ta²˜a⁴ na⁴˜i¹ na⁴pa³¹*
m¹m³¹ ˜e³ma²=ta²˜a⁴ na⁴=˜i¹ na⁴=pa³¹
INTJ:yes DEM:MULTI(IV)=only 3=feces 3SBJ=smell.bad
 'Mm-hm, just **those** (*ye³ma²*) feces of hers smell bad.'

(CLA 2018-19.060, tca_201909_child22_cci_video_xa30.mp4, 25:05)

The tokens of *ye³ma²* in 2 do not represent the addressee-centered use of *ye³ma²*, since the infant is not being addressed. They also do not represent the anaphoric use of the item, since the token of *ye³ma²* in 2a is the first mention of the referent in the discourse. Rather, the two tokens of *ye³ma²* instantiate the INVISIBLE use of this demonstrative—they index a referent that the participants do not see, and instead perceive via the sense of smell.

Corpus examples like 1 and 2 provide initial positive evidence for perceptual deictic content, indicating that *ye³a²* and *je³a²* are associated with reference to visible objects, and *ye³ma²* with reference to invisible ones. However, corpus examples are insufficient to test all of the predictions of my visibility claim. Thus, in the following two sections, I provide evidence that visible *ye³a²* and *je³a²* can be used ONLY for referents that the speaker sees. In contrast, *ye³ma²* can be used for any referent that the speaker does not see, whether it is perceived via a sense other than vision—as in 2—or is not perceived through any sense.

5. VISIBILITY REQUIREMENTS: EVIDENCE FROM SEMANTIC ELICITATION. As a first source of negative evidence about the visibility requirements of *ye³a²* and *je³a²*, I examine contexts where the speaker directly perceives the referent via a sense other than vision, such as hearing, smell, or touch.

I show that *ye³a²* and *je³a²* are unacceptable in all contexts of access via senses other than vision. Thus, these items 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 *ŋe³ma²* can index a referent perceived via any nonvision sense, whether hearing, smell, or touch. Thus, contrary to Levinson's (2018a:37) claims about apparent invisible demonstratives, *ŋe³ma²* does not convey either weak epistemic modality or access via a specific nonvision sense, such as hearing. It simply conveys invisibility.

Examples in this section were collected using context-based semantic elicitation (Matthewson 2004). Six language consultants participated in the elicitation. All six were born and raised in the Cushillococha area. Three consultants were women, three were men, and they ranged from thirty-six to about seventy years old. One was a simultaneous bilingual, and five were sequential bilinguals. Three consultants reported speaking Ticuna more often than Spanish, two reported speaking Spanish more often, and one reported speaking both languages with equal frequency. All participants had normal or corrected-to-normal vision.⁴

5.1. REFERENTS PERCEIVED VIA NONVISION SENSES. This section examines which demonstratives can be used in contexts involving direct perception of the referent through a specific nonvision sense. I consider three contexts—one for each of hearing, smell, and touch.⁵

First, in speaking of a referent perceived via HEARING, *ŋe³a²* and *je³a²* cannot be used. Only *ŋe³ma²* and speaker-proximal *ŋa⁴a²* are acceptable. This is illustrated by 3. In 3a, the example sentence gives one participant's response to the context, and 3b shows the combined responses of all six consultants. In 3b, the '# VOL' column indicates the number of participants who volunteered each demonstrative in the context, '# ACCEPT' the number of participants who accepted, but did not volunteer, each item, and '# REJECT' the number of participants who rejected each item.⁶

(3) a. [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.]

✓*ŋe³ma²* / ✓?*ŋa⁴a²* / #*ŋe³a²* / #*je³a²* *wi³ja³e³ i⁴ ŋe⁵ma² ni³¹?i³ tʃa¹?i³ni²?i⁴*
ri¹ tʃo³¹ri³ me⁴³ ni⁴¹?i⁴
✓*ŋe³ma²* / ✓*ŋa⁴a²* / #*ŋe³a²* / #*je³a²*
✓DEM:MULTI(IV) / ✓?DEM:PROX(IV) / #DEM:DYAD(IV) / #DEM:DIST(IV)
wi³ja³e³ i⁴ ŋe⁵ma² ni³¹?i³ tʃa¹?i³ni³?i⁴
song(IV) LNK(IV) DEM:LOC 3=ACC 1SG.SBJ.SC=hear=NMLZ(IV)
ri¹ tʃo³¹ri³ me⁴³ ni⁴¹=i⁴
TOP 1SG.AL.POSS good 3SBJ=COP

'That (✓*ŋe³ma²* / ✓?*ŋa⁴a²* / #*ŋe³a²* / #*je³a²*) song that I hear there, I like it.'

(LWG, CLA 2015-06.042, tca_20170621_lwg_ahs_elicit_001.wav, 0:00–5:15)

⁴ As blind speakers can use perceptual language very differently from sighted speakers (Landau & Gleitman 1985), I did not collect data on—and I make no predictions about—the use of demonstratives by Ticuna speakers with visual impairments.

⁵ Beyond the contexts discussed here, each consultant judged at least three more contexts involving direct nonvision perception. These contexts involved different referents, but the same senses (e.g. perceiving the smell of gasoline rather than perfume). The additional contexts are not discussed because their results were identical. I did not examine the sense of taste because it cannot be effectively isolated from smell.

⁶ Elicited examples are from recordings and fieldnotes publicly available online in the California Language Archive. Below each elicited example, I identify via a three-letter code the consultant who contributed the example. I then give folder and file references that can be used to locate the example in a recording or, if no recording is available, in fieldnotes.

b. Responses:

DEM	# VOL	# ACCEPT	# REJECT	STATUS
ŋe ³ ma ²	3	3	0	✓
ŋa ⁴ a ²	3	1	2	✓
ŋe ³ a ²	0	0	6	#
je ³ a ²	0	1 ⁷	5	#

Both *ŋe³a²* and *je³a²* are unacceptable in 3. Their unacceptability cannot be due to spatial deictic content, epistemic modal content, or evidential content not specific to the sense of vision. The anomaly is not spatial, because the referent in 3 is outside of the speaker's reaching space and therefore meets the spatial deictic requirements of (at least) *je³a²*. Likewise, it is not epistemic modal, because the speaker clearly perceives and identifies the referent. It also does not arise from general direct evidentiality (i.e. a requirement for direct perceptual access via some sense), since the speaker directly perceives the referent via hearing—which is the only sense by which the referent, being a sound, can be perceived.

Second, and in the same way, *ŋe³a²* and *je³a²* also cannot index a referent that the speaker perceives only via SMELL. In speaking of referents known by smell, consultants reject these demonstratives and volunteer *ŋe³ma²*, as shown in 4.

(4) a. [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.]

✓ŋe³ma² / ?ŋa⁴a² / #ŋe³a² / #je³a² pu³ma³ra¹ i¹ji¹?i⁵tʃ²?i⁴ ri¹ na⁴me⁴³?e⁵tʃi².
✓ŋe³ma² / ?ŋa⁴a² / #ŋe³a² / #je³a²
✓DEM:MULTI(IV) / ?DEM:PROX(IV) / #DEM:DYAD(IV) / #DEM:DIST(IV)
pu³ma³ra¹ i¹=ji¹?=?i⁵tʃ²?i⁴ ri¹
perfume(IV) 3SBJ.sc=be.fragrant=really=NMLZ(IV) TOP
na⁴=me⁴³?=?i⁵tʃ²
3SBJ=good=really
'That (✓ŋe³ma² / ?ŋa⁴a² / #ŋe³a² / #je³a²) perfume that is fragrant, it
(smells) good.'

(DGG, CLA 2015-06.040, tca_20170621_dgg_ahs_elicit_001.wav, 20:55-24:13)

b. Responses:

DEM	# VOL	# ACCEPT	# REJECT	STATUS
ŋe ³ ma ²	5	1	0	✓
ŋa ⁴ a ²	1	4	1	?
ŋe ³ a ²	0	0	6	#
je ³ a ²	0	0	6	#

As with 3, the unacceptability of *ŋe³a²* and *je³a²* in 4 cannot arise from spatial deictic content, epistemic modal content, or nonvision evidential content. The anomaly cannot be spatial, since the referent is located on the addressee's body, where visible referents can be indexed with both *ŋe³a²* and *je³a²*. The anomaly also cannot be epistemic modal, because the speaker clearly identifies the referent; and again, it cannot arise from general direct evidentiality, since the speaker directly perceives the referent via smell.

⁷ The consultant who accepted 3 with *je³a²* was only willing to repeat the sentence while pointing to a place where the radio was known to be located. This suggests that he may have interpreted the context-utterance pair as involving deferred reference to an invisible referent via a visible pivot. Per §8.2, this type of context does license *je³a²* for invisible referents.

Third and last, *ŋe³a²* and *je³a²* also cannot be used for referents known via the senses of TOUCH AND PROPRIOCEPTION (awareness of one's own body). For example, in 5, the speaker points to one of their own teeth. They can sense the tooth by proprioception and, if they touch while pointing, touch. This context was presented to the six consultants, plus four other participants, as part of the experimental task discussed in §6. All ten participants in the task volunteered speaker-proximal *ŋa⁴a²* in 5, but all nine who provided judgments also accepted *ŋe³ma²*.⁸ By contrast, participants rejected *ŋe³a²* and *je³a²*.

(5) a. [Context: You point to one of your own front teeth and tell me the tooth hurts. (demonstrative questionnaire scene 1)]

✓da³¹a¹ / ✓ji²ma² / #ji²a² / #gu²a² tʃo¹pi¹ta¹ na⁴luy¹
✓da³¹a¹ / ✓ji²ma² / #ji²a² / #gu²a²
✓DEM:PROX(III) / ✓DEM:MULTI(III) / #DEM:DYAD(III) / #DEM:DIST(III)
tfau¹=pi¹ta¹ na⁴=luy¹
1SG=tooth(III) 3SBJ=hurt

‘This (*✓ŋa⁴a² / ✓ŋe³ma² / #ŋe³a² / #je³a²*) tooth of mine hurts.’

(ECG, CLA 2015-06.067, tca_20170609_ecg_ahs_elicit_001.wav, 1:10–3:27)

b. Responses:

DEM	# VOL	# ACCEPT	# REJECT	STATUS
<i>ŋe³ma²</i>	0	9 (1: ND)	0	✓
<i>ŋa⁴a²</i>	10	0	0	✓
<i>ŋe³a²</i>	0	2 (1: ND)	7	#
<i>je³a²</i>	0	0 (1: ND)	9	#

Participants’ judgments that *ŋe³ma²* is acceptable in 5 show that invisible *ŋe³ma²* is insensitive to its referent’s location. The referent can be part of the speaker’s own body, as in 5, or relatively far from them, as in 3. Additionally, these judgments show that *ŋe³ma²* is compatible with access via the more proximal senses of touch and proprioception, as well as the more distal senses of smell and hearing.

In contrast, participants’ rejections of *ŋe³a²* and *je³a²* in 5 do not provide meaningful information about the items’ perceptual deictic content. Other data on *ŋe³a²* and *je³a²*, not discussed here, shows that these items cannot index the speaker’s own body parts even if they are visible. Therefore, the rejections of *ŋe³a²* and *je³a²* in 5—unlike those in 3 and 4—could arise from either spatial or perceptual deictic content.

5.2. TEMPORAL AND MODAL PROPERTIES OF THE VISIBILITY REQUIREMENT. Knowing that *ŋe³a²* and *je³a²* 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 sees the referent at the moment of speech, in the actual world?

What *ŋe³a²* and *je³a²* require is that the speaker sees the referent at the moment of speech, in the actual world. Their visibility requirement cannot be satisfied by the speaker seeing the referent at other times or in other possible worlds. The requirement CAN sometimes be satisfied by the speaker seeing entities other than the referent (e.g. in 3, hearing the song and seeing the radio or written lyrics). However, this flexibility arises from the phenomenon of deferred reference (Quine 1971), discussed further in §§8.2, rather than from modal or temporal interpretation.

The fixed modal and temporal interpretation of the visibility requirement sets it apart from all other noun phrase implications in Ticuna. Other than the deictic content of

⁸ When a participant did not provide an acceptability judgment, this is indicated as ‘ND’ = ‘no data’.

demonstratives, all other noun phrase implications—for example, the property implication of argument noun phrases—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. For example, if I am discussing what will happen if someone gets married, I can refer to her potential husband as *na⁴=te⁴* (3=husband) ‘her husband’, even if the referent does not meet that description in the actual world.

If the visibility requirement of *ye³a²* and *je³a²* displayed free temporal interpretation, then speakers would be able to use visible demonstratives to index a referent they had seen in the past, even if they did not see it at the moment of speech. Example 6 demonstrates that this prediction is false for *je³a²*; *ye³a²* behaves the same.

(6) [Context: You and I are side by side at a table. I show you a bag of marbles. You see the marbles inside; then I close the bag and place it on the other side of the table. You say:]

✓ji³¹?e²ma⁴ / #gu³¹?e² pe³ti⁴ka¹ Bi³tu⁵a¹ri³ ti⁴¹?i⁴.
✓ji³¹?e²ma⁴ / #gu³¹?e² pe³ti⁴ka¹ Bi³tu⁵=a¹ri³ ti⁴¹=i⁴
✓DEM:MULTI(I) / #DEM:DIST(I) marble(I) Victoria=AL.POSS 3(I)SBJ=COP
‘Those (✓ye³ma² / #je³a²) marbles are Victoria’s.’

(DGG, CLA 2015-06.040, tca_20170830_dgg_ahs_elicit_003.wav, 23:47–24:42)

The speaker in 6 sees the referent just before speaking. Thus, if *je³a²* required only that the speaker saw the referent at some time, it would be acceptable in 6. But it is unacceptable, indicating that the visibility requirement concerns vision at the moment of speech.

Similarly, suppose that the visibility requirement had free modal interpretation. If so, speakers would be able to use visible demonstratives to index a referent they saw at the moment of speech in an alternative possible world—even if they did not see it in the actual world. Example 7 indicates that this prediction is false for both *ye³a²* and *je³a²*.

(7) [Context: 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:]

ŋe⁴?gu²ma³ caja tʃi⁴ wa⁴?na¹gu², ri¹ ✓ji³¹?e²ma⁴ / #ji³¹?e² / #gu³¹?e² pe³ta⁴ka¹?i³ tʃa³dau².
ŋe⁴?gu²ma³ caja tʃi⁴ wa⁴?na¹=gu² ri¹ ✓ji³¹?e²ma⁴ /
CONN SP:box CNTF open=SUB TOP ✓DEM:MULTI(I) /
#ji³¹?e² / #gu³¹?e² pe³ta⁴ka¹=?i³ tʃa³=dau²
#DEM:DYAD(I) / #DEM:DIST(I) marble(I)=ACC 1SG.SBJ=see
‘If the box were open, I would see those (✓ye³ma² / #je³a² / #je³a²) marbles.’ (LWG, CLA 2015-06.042, tca_20170823_lwg_ahs_elicit_002.wav, 17:18–20:00)

5.3. INTERIM SUMMARY: ONLY VISION MATTERS. Data in this section demonstrates that *ye³a²* and *je³a²* cannot be used for referents that the speaker directly perceives via senses other than vision, that the speaker sees only prior to the moment of speech, or that the speaker sees only in possible worlds other than the actual world. By contrast, *ye³ma²* is always acceptable for these referents. Table 2 summarizes this evidence for the perceptual requirements of *ye³a²*, *je³a²*, and *ye³ma²*.

This visibility-based pattern of acceptability persists even when the speaker can directly perceive and identify the referent, as in all of 3–5. It also holds regardless of the referent’s location in space, as discussed in 5. Thus, the perceptual deictic content of *ye³a²*, *je³a²*, and *ye³ma²* must concern vision—not location in space, epistemic modal-

PERCEPTUAL CONTEXT	ηe^3a^2 & je^3a^2	ηe^3ma^2	EXAMPLE
Speaker (only) hears referent	#	✓	3
Speaker (only) smells referent	#	✓	4
Speaker (only) perceives referent via touch/proprioception	#	✓	5
Speaker sees referent (only) before moment of speech	#	✓	6
Speaker sees referent (only) in counterfactual world	#	✓	7

TABLE 2. Perceptual requirements of ηe^3a^2 , je^3a^2 , and ηe^3ma^2 .

ity, general direct evidentiality, or access via specific nonvision senses (cf. Enfield 2003, Levinson 2018a,b).

6. VISIBILITY REQUIREMENTS: EXPERIMENTAL EVIDENCE. All of the contexts discussed in §5.1 involved referents that the speaker perceives via senses other than vision, such as hearing or smell. These contexts provide no evidence about referents that the speaker CANNOT PERCEIVE via any sense. To explore demonstrative reference to such entities, I conducted an experiment using Wilkins's (1999) DEMONSTRATIVE QUESTIONNAIRE stimulus.

This section first describes the demonstrative questionnaire (§6.1) and the distribution of results for the complete task (§6.2). I report results from portions of the task designed to test for visibility requirements in §6.3, and in §6.4 I compare the results to the findings in §5, showing that they support the same analysis.

6.1. METHOD. The demonstrative questionnaire is an exploratory (i.e. not hypothesis-testing), standardized interview guide consisting of twenty-five 'scenes'. In each scene, the researcher sets up a specific spatial array involving the participant, an addressee, and an inanimate object, such as a basket. Once the participant, addressee, and referent are in the array, the researcher prompts the participant to produce a frame sentence referring to the object with a demonstrative. For example, I prompted participants by saying the Ticuna or Spanish equivalent of 'Ask me if the basket is mine', with no demonstrative; they responded with frame sentences of the form 'Is DEM basket yours?'. I designed the frame sentences to be syntactically acceptable if and only if they contained exactly one demonstrative.⁹ Therefore, this portion of the interview represents a FORCED-CHOICE TASK. After participants volunteered one frame sentence, they judged the acceptability of each of the other exophoric demonstratives, unmodified (i.e. without derivational enclitics) and embedded in the same frame. This component represents an ACCEPTABILITY JUDGMENT TASK. Full results of both tasks appear in Skilton 2019:265–73.

PARTICIPANTS. Ten people participated in the demonstrative questionnaire task. They were the six participants from semantic elicitation and four others. The four additional participants declined to participate in semantic elicitation.

All ten participants spoke Ticuna as a first language and were born and raised in the Cushillococha area. Six participants were women, four were men, and they ranged in age from twenty to about seventy years old. Eight participants were sequential bilinguals; two were simultaneous bilinguals. Six participants reported speaking Ticuna more often than Spanish, three reported speaking Spanish more often, and one reported speaking both languages with equal frequency.

⁹ The frame sentence design succeeded at eliciting exactly one demonstrative. Of the 250 forced-choice trials, there was only one where the participant did not volunteer a demonstrative. There were eleven trials where participants volunteered two demonstratives because they produced the frame sentence twice. For trials where participants volunteered two demonstratives, only the first volunteered response is treated as a response to the forced-choice task. The second response is treated as a positive acceptability judgment.

Participant 10's responses to the demonstrative questionnaire task frequently departed from all other participants' responses. Participant 10 had much greater Spanish exposure than the other participants—for example, she normally lived in Lima and participated in the research during a vacation. Thus, this variation likely reflects contact effects of Spanish on her representation of the Ticuna demonstratives. In the results, where participant 10's responses varied from other participants', they are noted with the code 'P10'. She did not participate in semantic elicitation.

6.2. DISTRIBUTION AND INTERPRETATION OF RESULTS. As the forced-choice and acceptability judgment components of the demonstrative questionnaire yield different types of data, I discuss each component separately.

Responses to the forced-choice task indicate which demonstrative is most natural in each scene. Within forced-choice results for each scene, I describe participants as showing 'moderate agreement' if at least six of ten participants volunteered the same demonstrative. (If participants choose randomly from the four demonstratives, the probability of moderate agreement on some single demonstrative is 0.051.) Participants displayed moderate agreement on some demonstrative in nineteen of twenty-five scenes; in the remaining six scenes, no single demonstrative was volunteered by more than five participants. Participants volunteered complex demonstratives, bearing derivational enclitics (§4.1), in thirteen (5.2%) of 250 forced-choice trials. Since derivational enclitics modify deictic content, complex forms are counted separately in all results.

Interpretation of the acceptability judgment task results is complicated by two issues. First, acceptability judgments were divided (not unanimous) in seventy-eight (86.7%) of ninety scene-demonstrative combinations with more than one judgment. Second, and more consequential, participants issued many more positive than negative judgments in the task. The average participant gave 60.0% positive judgments (range = 44.7–78.4%); only three participants issued less than 50% positive judgments. Similarly, the average scene-demonstrative combination with more than one judgment elicited 62.6% positive judgments (range = 0–100%). Only twenty-four combinations (26.7%) elicited less than 50% positive judgments, and only six combinations (6.67%) elicited less than 25% positive judgments.

The large interparticipant variance in the rate of positive judgments, together with the high overall rate of positive judgments, suggests that some participants displayed a YES-RESPONSE BIAS—that is, they sometimes accepted sentences that they actually found anomalous. The presence of a yes-response bias is consistent with fieldwork literature suggesting that consultants sometimes accept anomalous forms for reasons of social desirability (Meakins et al. 2018:152).¹⁰ It also aligns with research in pragmatics showing that, in acceptability judgments of demonstratives, participants may display biases linked to prescriptive rules (Hanks 2009, Stevens & Zhang 2013).

There is no principled way to identify yes-biased participants for exclusion from this data, as no participant displayed an outlier rate of positive judgments, and the demonstrative questionnaire does not contain trials designed to identify bias. Thus, I correct for the yes-bias by calculating an acceptability *z*-score for each scene-demonstrative combination. The acceptability *z*-score (range: -2.61–1.55), calculated over all scene-demonstrative combinations with more than one judgment, represents the acceptability (proportion of positive judgments) of each scene-demonstrative combination relative to all other combinations in the experiment. Lower *z*-scores indicate lower acceptability.

¹⁰ Majid (2011:56) suggests that participants may develop yes-bias over a session due to fatigue. However, fatigue does not explain the yes-bias in this experiment. There was no significant correlation between trial number and proportion of positive judgments (Pearson's *r* = -0.19, *p* = 0.067).

To assign ACCEPTABILITY LABELS in the results, I use both forced-choice and acceptability judgment data. As described above, I take forced-choice data as evidence about naturalness, and I assume that naturalness entails acceptability. Therefore, if participants display moderate agreement on a demonstrative in forced-choice results, I consider that item 'acceptable' (✓). Otherwise, I assign acceptability labels based primarily on acceptability *z*-scores. I mark a demonstrative 'acceptable' (✓) in a scene if it has an acceptability *z*-score greater than 1 (> 86.7% positive judgments). Conversely, I mark a demonstrative 'unacceptable' (#) in a scene if it has an acceptability *z*-score less than -1 (< 38.6% positive judgments) AND was volunteered by no more than one participant in the forced-choice task. If a demonstrative does not meet any of these criteria, I mark it 'not clearly acceptable' (?). These standards are set deliberately high to account for the yes-bias discussed above.

6.3. RESULTS. The demonstrative questionnaire contains three arrays—scenes 15, 18, and 25—where the referent is both (i) not visible to the speaker and (ii) not located within the speaker's reaching space (preventing the use of speaker-proximal *na⁴a²*). The visibility-based analysis in §5 predicts that, because the referent is invisible, speakers will find *ye³ma²* most natural in all of these scenes, and they will not find *ye³a²* and *je³a²* natural or acceptable.

SCENE 15. In demonstrative questionnaire scene 15, the speaker and addressee are at one end of a cleared space. The referent is at the other end, blocked from vision. Figure 3 represents the configuration of the discourse participants and referent (marked with an X) in this scene, and the example sentence in 8 gives one participant's volunteered response.¹¹ Table 3 shows all participants' combined responses to the scene.

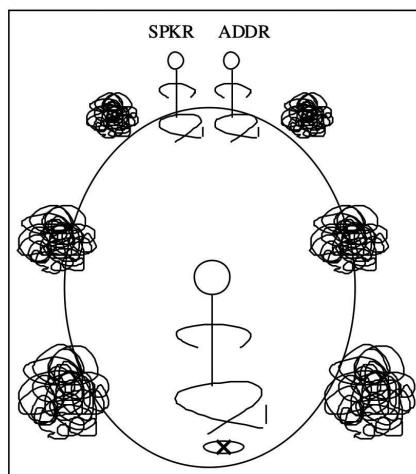


FIGURE 3. Diagram of the context of 8 (demonstrative questionnaire scene 15).

(8) *ŋe³ma² na^{43?}pa⁴?* ri¹, ku³¹ri³ ni⁴¹?i⁴?
ŋe³ma² na⁴³⁼?pa⁴? ri¹ ku³¹ri³ ni⁴¹=i⁴
DEM:MULTI(IV) DFLT.POSS=bucket(IV) TOP 2SG.AL.POSS 3SBJ=COP
'That (ŋe³ma²) bucket, is it yours?'
 (SSG, CLA 2015-06.038, tca_2017_ahsfieldnotes_2016book-2017book1_164-200.pdf, p. 186)

¹¹ Demonstrative questionnaire images are reproduced unmodified from Wilkins 1999. They are licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license (CC BY-NC-SA 4.0) (<https://creativecommons.org/licenses/by-nc-sa/4.0/>) and are © 1999 Max Planck Institute for Psycholinguistics.

DEM	FORCED CHOICE	ACCEPTABILITY JUDGMENTS			STATUS
		# VOL	# ACCEPT	# REJECT	
<i>ŋa⁴a²</i>	0	3	7	-1.36	#
<i>ŋe³a²</i>	0	5	5	-0.525	?
<i>je³a²</i>	1 (P10)	4	5	-0.757	?
<i>ŋe³ma²</i>	6	3	1	0.515	✓

OTHER RESPONSES:

Complex forms	2 (both: <i>ŋe³a²</i> = <i>ã⁴ma⁴</i>)
No demonstrative	1

TABLE 3. Responses to context of 8 (Fig. 3).

In this context, *ŋe³ma²* is the most natural demonstrative, volunteered by six of ten participants in forced choice. By contrast, *ŋe³a²* and *je³a²* are not natural. Root (unmodified) *ŋe³a²* was never volunteered in forced choice; root *je³a²* was volunteered only once, by participant 10 (cf. §6.1). Acceptability judgments toward *ŋe³a²* and *je³a²* were equivocal. Both items displayed negative acceptability *z*-scores (i.e. received fewer positive judgments than the mean), but their *z*-scores were greater than -1, leaving their acceptability category unclear.

It is important in this scenario that *ŋe³a²* and *je³a²* are unnatural, and not clearly acceptable, because the referent is invisible. The problem is NOT with the referent's location in space. This can be seen by comparing 8 to 9, which represents demonstrative questionnaire scene 13. In the context of 9 (Figure 4), the speaker, addressee, and referent are in the same locations as in the context of 8, but the referent is visible.

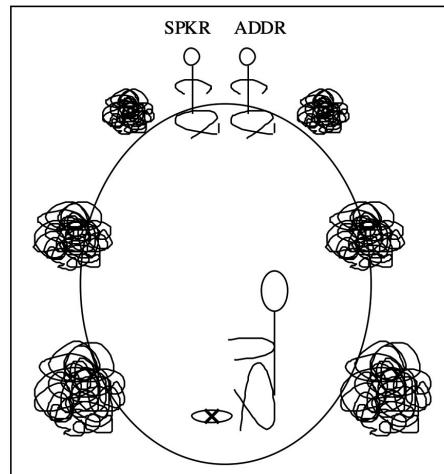


FIGURE 4. Diagram of the context of 9 (demonstrative questionnaire scene 13).

(9) ku³¹ri³ ni⁴¹?i⁴ i⁴ **je³a²** pe⁴?tʃi¹?
 ku³¹ri³ ni⁴¹=i⁴ i⁴ **je³a²** pe⁴?tʃi¹?
 2SG.AL.POSS 3SBJ=COP LNK(IV) DEM:DIST(IV) basket(IV)
 'Is that (**je³a²**) basket yours?'
 (ECP, CLA 2015-06.038, tca_2017_ahsfieldnotes_2016book-2017book1_164-200.pdf, p. 183)

While participants did not achieve moderate agreement on any form in forced choice in the context of 9, five of ten chose root *je³a²*, suggesting that it is fairly natural (Table 4). Furthermore, every participant who did not volunteer *je³a²* accepted it. Thus, *je³a²* is clearly acceptable in the spatial context of 8 and 9 when the referent is visible. The response pattern in 8—where *ŋe³ma²* is the most natural demonstrative, and *je³a²* is not

DEM	FORCED CHOICE		ACCEPTABILITY JUDGMENTS		STATUS
	# VOL	# ACCEPT	# REJECT	<i>z</i> -SCORE	
ja ⁴ a ²	1	3	6	-1.22	#
ŋe ³ a ²	1	5	4	-0.294	?
je ³ a ²	5	4 (ND: 1)	0	1.55	✓
ŋe ³ ma ²	0	8	2	0.723	?

OTHER RESPONSES:

Complex forms 3 (all: $je^3a^2 = \tilde{a}^4ma^4$)

TABLE 4. Responses to context of 9 (Fig. 4).

natural and not clearly acceptable—therefore cannot arise from the referent's location in space. It must arise from the referent's visibility, which represents the only contrast between 8, where the most natural demonstrative is $ŋe^3ma^2$, and 9, where it is je^3a^2 .

SCENE 18. In this scene, shown in Figure 5, the speaker is at one end of a cleared space. The addressee is at the other end, facing away from the speaker. The referent is in front of the addressee; it is visible to the addressee, but not the speaker. Example 10 is one participant's volunteered response in this context.

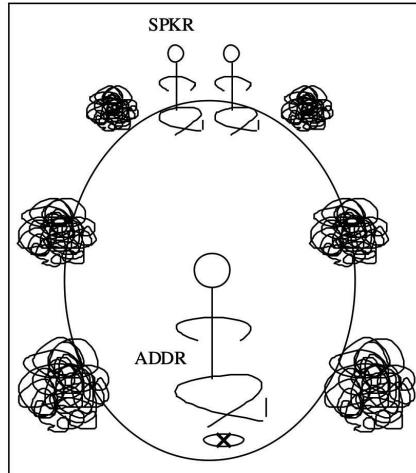


FIGURE 5. Diagram of the context of 10 (demonstrative questionnaire scene 18).

(10) **ji²ma⁴ ta³ru⁵ ri³ɛ¹?na⁵ ku³¹ri³ ni⁴¹?i⁴**
ji²ma⁴ ta³ru⁵ ri³ɛ¹?na⁵ ku³¹ri³ ni⁴¹=i⁴
 DEM:MULTI(II) fire.fan(II) ALT 2SG.AL.POSS 3SBJ=COP
 'Is that (*ŋe³ma²*) fire fan yours?'
 (KSC, CLA 2015-06.051, tca_20180601_ksc_ahs_elicit_002.wav, 12:45–12:53)

DEM	FORCED CHOICE		ACCEPTABILITY JUDGMENTS		STATUS
	# VOL	# ACCEPT	# REJECT	<i>z</i> -SCORE	
ja ⁴ a ²	1	5	4	-0.294	?
ŋe ³ a ²	0	5	4 (ND: 1)	-0.294	?
je ³ a ²	1 (P10)	6	3	0.168	?
ŋe ³ ma ²	8	2	0	1.55	✓

TABLE 5. Responses to context of 10 (Fig. 5).

In the context of 10, $ŋe^3ma^2$ is again the most natural demonstrative, volunteered by eight of ten participants in forced choice (Table 5). $ŋe^3a^2$ and je^3a^2 remain unnatural;

ye³a² was never volunteered, and *je³a²* was volunteered only once (again by participant 10). As in 8, acceptability judgments toward *ye³a²* and *je³a²* were equivocal. Neither item attained an acceptability *z*-score with absolute value greater than 1, leaving their acceptability status unclear.

But recall from §4.1 that—outside of its use to index invisible referents—*ye³ma²* is also an addressee-proximal demonstrative, indexing referents within reach of the addressee. The referent in 10 is with the addressee, and this feature of the scene substantially impacts participants' preference for *ye³ma²* over other demonstratives.

The importance of addressee location in 10 becomes clear when it is compared with 11, which represents demonstrative questionnaire scene 16. In the context of 11 (Figure 6), the speaker, addressee, and referent are all in the same locations as in the context of 10, but the referent is visible to both participants.

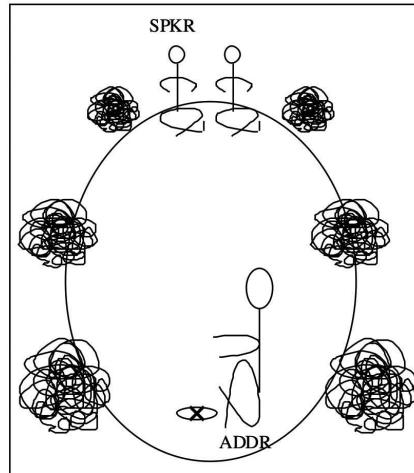


FIGURE 6. Diagram of the context of 11 (demonstrative questionnaire scene 16).

(11) ku³¹ri³ ji¹?i¹? a⁴ **ji²ma⁴** bu³e³ta³re⁴?
 ku³¹ri³ ji¹=?i¹ a⁴ **ji²ma⁴** bu³e³ta³re⁴
 2SG.AL.POSS 3SBJ.SC=COP=SUB LNK(II) DEM:MULTI(II) pot(II)
 'Is that (*ye³ma²*) cooking pot yours?'
 (ABS, CLA 2015-06.039, tca_20170603_abs_ahs_elicit_001.wav, 68:33–69:05)

DEM	FORCED CHOICE	ACCEPTABILITY JUDGMENTS			STATUS
		# VOL	# ACCEPT	# REJECT	
ja ⁴ a ²	0	4	6	-0.941	?
je ³ a ²	0	6	4	-0.109	?
je ³ a ²	1 (P10)	6	3	0.168	?
ye ³ ma ²	9	1	0	N/A	✓

TABLE 6. Responses to context of 11 (Fig. 6).

Despite the visibility of the referent in 11, participants still found *ye³ma²* the most natural demonstrative in the forced-choice task, and they did not find any other demonstrative clearly acceptable in the acceptability judgment task (Table 6). This indicates that in the spatial context of 10 and 11, the referent's addressee-proximal location is sufficient to produce strong judgments in favor of *ye³ma²*, regardless of visibility.

With this background, participants' preference for *ye³ma²* as the most natural demonstrative in 10—and their failure to find any other demonstrative clearly acceptable—could be due either to the referent's invisibility or to the referent's location near the addressee. This illustrates a limitation of the demonstrative questionnaire: it does not balance the visibility of the referent with the location of the referent relative to the addressee.

SCENE 25. In demonstrative questionnaire scene 25, shown in Figure 7, the speaker and addressee are standing together at a lookout point. The speaker points at an invisible referent located beyond the horizon. Example 12 is one participant's volunteered response in this context.

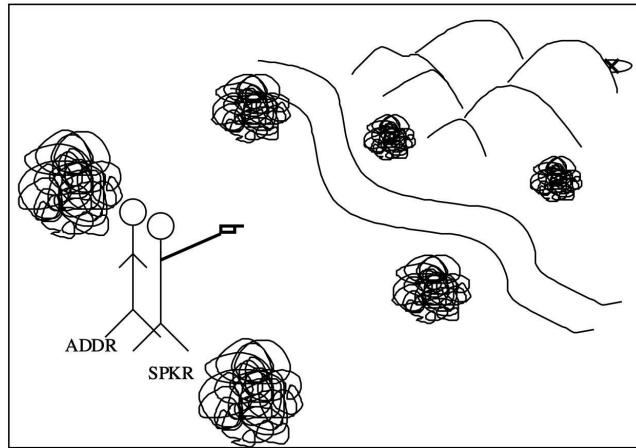


FIGURE 7. Diagram of the context of 12 (demonstrative questionnaire scene 25).

(12) *ma³ri³ ni³¹?³ ku¹dau²?⁴ a⁴ **ye³ma²** i³¹a¹ne¹ a⁴ Galilea?*
*ma³ri³ ni³¹?³ ku¹=dau²=?⁴ a⁴ **ye³ma²***
 PRF 3=ACC 2SG.SBJ.SC=see=SUB LNK(IV) DEM:MULTI(IV)
i³¹a¹ne¹ a⁴ Galilea
town(IV) LNK(IV) Galilea
 'Have you been to **that** (*ye³ma²*) town, Galilea?'
 (KSC, CLA 2015-06.051, tca_20180601_ksc_ahs_elicit_002.wav, 25:10–25:44)

DEM	FORCED CHOICE	ACCEPTABILITY JUDGMENTS			STATUS
		# VOL	# ACCEPT	# REJECT	
<i>na⁴a²</i>	0	1	9	-2.19	#
<i>ye³a²</i>	0	2	8	-1.77	#
<i>je³a²</i>	1	3	6	-1.22	#
<i>ye³ma²</i>	8	2	0	1.55	✓
OTHER RESPONSES					
Complex forms	1 (<i>je³a²=?i⁵?i²</i>) (P10)				

TABLE 7. Responses to context of 12 (Fig. 7).

In the context of 12, *ye³ma²* is again the most natural demonstrative in forced-choice results, chosen by eight of ten participants (Table 7). All demonstratives besides *ye³ma²* are clearly unacceptable, with acceptability *z*-scores less than -1. Additionally, during the acceptability judgment trials, three participants independently volunteered comments that they found *je³a²* unacceptable because they could not see the referent.

In 12 as in 8, the unacceptability of *ŋe³a²* and *je³a²* reflects the referent's invisibility, not its location in space. This can be seen by comparing 12 to 13, which represents demonstrative questionnaire scene 24. In the context of 13 (Figure 8), the speaker and addressee stand together at a lookout point, and the speaker points at a VISIBLE landmark.

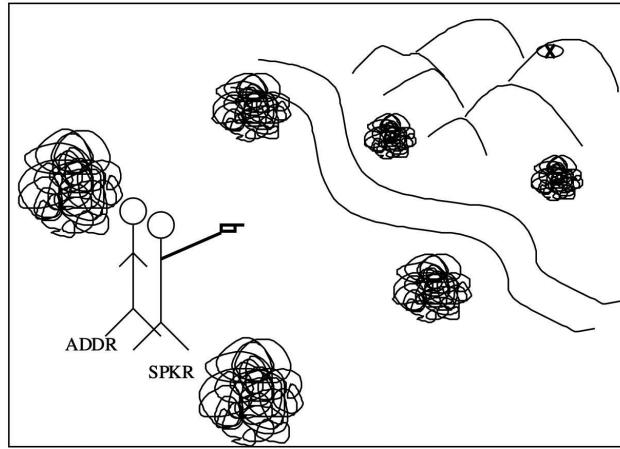


FIGURE 8. Diagram of the context of 13 (demonstrative questionnaire scene 24).

(13) *wi⁴³?i⁴ɛ¹pi³ki⁵na¹ ri¹ Je³a² nai³¹gu² tʃa³?i²na⁴gi⁴*
wi⁴³?i⁴=ɛ¹pi³ki⁵na¹ ri¹ Je³a² nai³¹=gu² tʃa³=i²na⁴gi⁴
 one=times TOP DEM:DIST(IV) tree(IV)=LOC 1SG.SBJ=climb
 'Once, I climbed **that** (*je³a²*) tree.'
 (KSC, CLA 2015-06-051, tca_20180601_ksc_ahs_elicit_002.wav, 23:05–24:04)

DEM	FORCED CHOICE	ACCEPTABILITY JUDGMENTS			STATUS
		# VOL	# ACCEPT	# REJECT	
<i>na⁴a²</i>	1	3	6	-1.22	#
<i>ŋe³a²</i>	1	5	4	-0.294	?
<i>je³a²</i>	8	1	0 (ND: 1)	N/A	✓
<i>ŋe³ma²</i>	0	8	2	0.723	?

TABLE 8. Responses to context of 13 (Fig. 8).

In the context of 13, *je³a²* is the most natural demonstrative, volunteered by eight of ten participants in the forced-choice task (Table 8). *ŋe³ma²* was never volunteered, and its acceptability *z*-score fell below 1, rendering the item not clearly acceptable. This is the opposite pattern from 12, even though both 12 and 13 involve reference to distant landmarks (i.e. members of the same location category). Thus, the unacceptability of *je³a²* in 12 cannot arise from the referent's location: *je³a²* is perfectly natural for distant landmarks, but only if they are visible.

6.4. INTERIM SUMMARY. In the forced-choice component of the demonstrative questionnaire, participants volunteered *ŋe³ma²* as the most natural demonstrative in every scene where the referent was invisible and located beyond the speaker's reaching space. By contrast, participants did not find *ŋe³a²* or *je³a²* natural in any invisible scene. They never volunteered *ŋe³a²* and very rarely volunteered *je³a²*: *je³a²* was volunteered only three times across the three invisible scenes, and two of the three tokens came from participant 10.

In the acceptability judgment component of the task, participants' responses to ηe^3a^2 and je^3a^2 varied between invisible scenes, but they never found the items clearly acceptable. In 8 and 10, participants' judgments of ηe^3a^2 and je^3a^2 were not strongly negative or positive, leaving the items' acceptability category unclear. By contrast, in 12, participants found all demonstratives other than ηe^3ma^2 clearly unacceptable.

This response pattern is not due to the spatial deictic content of the demonstratives. As can be seen by comparing 8 with 9 or 12 with 13, when given the same (non-addressee-proximal) spatial array, participants consistently chose $\eta e^3a^2/je^3a^2$ as the most natural demonstrative when the referent was visible, but ηe^3ma^2 when it was invisible. Only when the referent was near the addressee—prompting the addressee-proximal use of ηe^3ma^2 , seen in 10 and 11—did location impact the contrast between $\eta e^3a^2/je^3a^2$ and ηe^3ma^2 .

Table 9 now summarizes the results of the invisible scenes just presented, and Table 10 summarizes the results of the minimally different visible scenes. Rows for 10 and 11, where the referent is with the addressee, are shaded to represent the ambiguity in these contexts between addressee-proximal and invisible readings of ηe^3ma^2 , which is not present in the other scenes.

FIGURE	EX	DESCRIPTION	ηe^3a^2 & je^3a^2	ηe^3ma^2
3	8	Speaker and addressee together at one end of large cleared space. Referent at other end, invisible to both.	?	✓
5	10	Speaker and addressee at opposite ends of large cleared space. Referent with addressee; it is visible to addressee, but not to speaker.	?	✓
7	12	Speaker and addressee together at lookout point. Referent is distant landmark invisible to both.	#	✓

TABLE 9. Results for ηe^3a^2 , je^3a^2 , and ηe^3ma^2 in invisible scenes of the demonstrative questionnaire.

FIGURE	EX	DESCRIPTION	ηe^3a^2 & je^3a^2	ηe^3ma^2
4	9	Same as example 8, but referent is visible to both.	✓ je^3a^2	?
6	11	Same as example 10, but referent is visible to both.	?	✓
8	13	Same as example 12, but referent is visible to both.	✓ je^3a^2	?

TABLE 10. Results for ηe^3a^2 , je^3a^2 , and ηe^3ma^2 in visible scenes of the demonstrative questionnaire that are minimally different from scenes in Table 9.

In sum, the demonstrative questionnaire results are consistent with the elicitation results presented in §5. They show that, in speaking of invisible referents located beyond their close personal space, Ticuna speakers strongly prefer ηe^3ma^2 as the most natural demonstrative; they do not find ηe^3a^2 or je^3a^2 natural or clearly acceptable. 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. VISIBILITY REQUIREMENTS ARE ENCODED. In this section, I argue that the visibility requirements of ηe^3a^2 and je^3a^2 arise from encoded perceptual deictic content. This content takes the form of a not-at-issue meaning, such as a presupposition, and encodes that the referent is visible to the speaker at the moment of speech. By contrast, I posit that invisible ηe^3ma^2 does not have encoded perceptual or spatial deictic content. Its association with invisible referents does not reflect encoded meaning, but rather arises, via the pragmatic principle of MAXIMIZE PRESUPPOSITION (Heim 1991), from paradigmatic contrast with ηe^3a^2 and je^3a^2 .

I begin by laying out three possible analyses of the perceptual deictic content in ηe^3a^2 , je^3a^2 , and ηe^3ma^2 (§7.1). I then show that the analysis where ηe^3a^2 and je^3a^2 have perceptual deictic content, but ηe^3ma^2 does not, succeeds for two reasons. It accounts for interactions between derivational enclitics and the visibility requirements of $\eta e^3a^2/je^3a^2$ (§7.2), and it explains why the positive visibility requirement of $\eta e^3a^2/je^3a^2$ is stronger than the negative requirement of ηe^3ma^2 (§7.3).

Throughout the section, I assume that addressee-proximal ηe^3ma^2 and invisible ηe^3ma^2 are separate lexical items, and I ignore addressee-proximal ηe^3ma^2 .

7.1. THREE POSSIBLE ANALYSES. There are three logically possible ways to analyze the visibility meanings documented for ηe^3a^2 , je^3a^2 , and ηe^3ma^2 in the preceding sections. The first possible analysis, which I adopt, states that only ηe^3a^2 and je^3a^2 encode visibility information. Under this analysis, ηe^3a^2 and je^3a^2 encode a privative feature [visible]. In contrast, ηe^3ma^2 does not encode any perceptual deictic content, nor does it encode any spatial deictic content. This absence of spatial deictic content reflects that invisible ηe^3ma^2 is insensitive to its referent's location: it can index both referents on the speaker's own body (e.g. in 5) and referents located far beyond the horizon (e.g. in 12). Thus, on this account, ηe^3ma^2 is a maximally vague exophoric demonstrative (as in many analyses of *that*, e.g. Wolter 2006, Doran & Ward 2017).

The vagueness of ηe^3ma^2 is responsible for its use with invisible referents. Acting on quantity-based principles like 'maximize presupposition' (Heim 1991, Schlenker 2012), speakers are motivated to use the member of a paradigm (or other set of alternatives) that presupposes the most information. They therefore avoid using ηe^3ma^2 whenever they can use a demonstrative with encoded deictic content, such as ηa^4a^2 , ηe^3a^2 , or je^3a^2 . However, these other demonstratives all require either speaker-proximal location (for ηa^4a^2) or visibility (for $\eta e^3a^2/je^3a^2$). Speakers therefore have no choice but to use ηe^3ma^2 for non-speaker-proximal, invisible referents. Consequently, ηe^3ma^2 can CONVEY that the referent is invisible, but it does not ENCODE this meaning: its association with invisibility instead arises from inference, as shown in Table 11.

DEM	SPATIAL DEICTIC CONTENT	PERCEPTUAL DEICTIC CONTENT	
		ENCODED	INFERRED
ηa^4a^2	Speaker-proximal	\emptyset	(no inferences)
ηe^3a^2	Dyad-proximal	[visible]	(no inferences)
je^3a^2	Speaker-distal	[visible]	(no inferences)
ηe^3ma^2	\emptyset	\emptyset	[invisible]

TABLE 11. First candidate analysis of perceptual requirements.

A second possible analysis of the visibility requirements, which I reject, states that only ηe^3ma^2 encodes visibility information, bearing a privative feature [invisible]. Under this analysis, ηe^3a^2 and je^3a^2 do not encode any perceptual deictic content. Their visibility requirement arises due to contrast with invisible ηe^3ma^2 , via the same mechanisms described in the first analysis. This analysis is depicted in Table 12.

DEM	SPATIAL DEICTIC CONTENT	PERCEPTUAL DEICTIC CONTENT	
		ENCODED	INFERRED
ηa^4a^2	Speaker-proximal	\emptyset	(no inferences)
ηe^3a^2	Dyad-proximal	\emptyset	[visible]
je^3a^2	Speaker-distal	\emptyset	[visible]
ηe^3ma^2	\emptyset	[invisible]	(no inferences)

TABLE 12. Second candidate analysis of perceptual requirements.

The final possible analysis, which I also reject, proposes that all three visibility-sensitive demonstratives have encoded perceptual deictic content: $\eta e^3 a^2$ and $je^3 a^2$ encode [+visible], while $\eta e^3 ma^2$ encodes [−visible]. Speaker-proximal $na^4 a^2$, which is empirically insensitive to visibility, is the only demonstrative without perceptual deictic content. None of the visibility meanings arise via inference, as illustrated in Table 13.

DEM	SPATIAL DEICTIC CONTENT	ENCODED PERCEPTUAL DEICTIC CONTENT
$na^4 a^2$	Speaker-proximal	\emptyset
$\eta e^3 a^2$	Dyad-proximal	[+visible]
$je^3 a^2$	Speaker-distal	[+visible]
$\eta e^3 ma^2$	\emptyset	[−visible]

TABLE 13. Third candidate analysis of perceptual requirements.

In all three of the analyses above, the encoded perceptual deictic content is presupposed, not entailed. This is clear because the visibility requirements of $\eta e^3 a^2$ and $je^3 a^2$ are projective (Tonhauser et al. 2013), meaning that they still apply when the items are embedded in the family of sentences. Example 14 demonstrates that the visibility requirement of $je^3 a^2$ seen in atomic sentences (14a) projects in all other members of the family of sentences (14b–e). The visibility requirement of $\eta e^3 a^2$ behaves the same.

(14) [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.]

- Atomic sentence
 $\#\mathbf{gu}^{31}\mathbf{?e}^2 \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1 \mathbf{Bi}^3\mathbf{tu}^5\mathbf{a}^1\mathbf{ri}^3 \mathbf{ti}^4\mathbf{?i}^4$.
 $\#\mathbf{gu}^{31}\mathbf{?e}^2 \qquad \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1 \quad \mathbf{Bi}^3\mathbf{tu}^5=\mathbf{a}^1\mathbf{ri}^3 \qquad \mathbf{ti}^4=\mathbf{i}^4$
DEM:DIST(I) marble(I) Victoria=AL.POSS 3(I)SBJ=COP
 Attempted reading: 'That ($je^3 a^2$) marble is Victoria's.'
- Negation
 $\#\mathbf{ta}^4\mathbf{ma}^3 \mathbf{Bi}^3\mathbf{tu}^5\mathbf{a}^1\mathbf{ri}^3 \mathbf{ti}^4\mathbf{?i}^4 \mathbf{ja}^4 \mathbf{gu}^{31}\mathbf{?e}^2 \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1$.
 $\#\mathbf{ta}^4\mathbf{ma}^3 \quad \mathbf{Bi}^3\mathbf{tu}^5=\mathbf{a}^1\mathbf{ri}^3 \qquad \mathbf{ti}^4=\mathbf{i}^4 \qquad \mathbf{ja}^4 \qquad \mathbf{gu}^{31}\mathbf{?e}^2 \qquad \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1$
NEG Victoria=AL.POSS 3(I)SBJ=COP **LNK(I)** **DEM:DIST(I)** marble(I)
 Attempted reading: 'That ($je^3 a^2$) marble is not Victoria's.'
- Polar question
 $\#\mathbf{e}^1\mathbf{?na}^5 \mathbf{Bi}^3\mathbf{tu}^5\mathbf{a}^3\mathbf{ri}^3 \mathbf{ti}^1\mathbf{?i}^1\mathbf{?i}^4 \mathbf{ja}^4 \mathbf{gu}^{31}\mathbf{?e}^2 \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1?$
 $\#\mathbf{e}^1\mathbf{?na}^5 \quad \mathbf{Bi}^3\mathbf{tu}^5=\mathbf{a}^3\mathbf{ri}^3 \qquad \mathbf{ti}^1=\mathbf{i}^4=\mathbf{i}^4 \qquad \mathbf{ja}^4 \qquad \mathbf{gu}^{31}\mathbf{?e}^2$
ALT Victoria=AL.POSS 3(I)SBJ.SC=COP=SUB **LNK(I)** **DEM:DIST(I)**
 $\qquad \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1$
 marble(I)
 Attempted reading: 'Is that ($je^3 a^2$) marble Victoria's?'
- Epistemic modal
 $\#\mathbf{be}^1\mathbf{?ma}^2\mathbf{na}^4 \mathbf{Bi}^3\mathbf{tu}^5\mathbf{a}^1\mathbf{ri}^3 \mathbf{ti}^4\mathbf{?i}^4 \mathbf{ja}^4 \mathbf{gu}^{31}\mathbf{?e}^2 \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1$.
 $\#\mathbf{be}^1\mathbf{?ma}^2\mathbf{na}^4 \quad \mathbf{Bi}^3\mathbf{tu}^5=\mathbf{a}^1\mathbf{ri}^3 \qquad \mathbf{ti}^4=\mathbf{i}^4 \qquad \mathbf{ja}^4 \qquad \mathbf{gu}^{31}\mathbf{?e}^2$
EPIST.MOD Victoria=AL.POSS 3(I)SBJ=COP **LNK(I)** **DEM:DIST(I)**
 $\qquad \mathbf{pe}^3\mathbf{ti}^4\mathbf{ka}^1$
 marble(I)
 Attempted reading: 'It's possible that that ($je^3 a^2$) marble is Victoria's.'

e. Conditional antecedent

#e³ga⁴ Bi³tu⁵a¹ri³ ti¹?i⁴gu² ja⁴ **gu³¹?**e² pe³ti⁴ka¹ ri¹ ti³¹?na¹ ti³¹?i³ na¹?a³.
 #e³ga⁴ Bi³tu⁵=a¹ri³ ti¹=i⁴=gu² ja⁴ **gu³¹?**e²

COND Victoria=AL.POSS 3(I)SBJ.SC=COP=COND LNK(I) DEM:DIST(I)

pe³ti⁴ka¹ ri¹ ti³¹=na¹ ti³¹?i³ na¹=a³

marble(I) TOP 3(I)=DAT 3(I)=ACC IMP=give:SG.INAM.O

Attempted reading: 'If that (**je³a²**) marble is Victoria's, give it to her.'

(DGG, CLA 2015-06.040, tca_20170830_dgg_ahs_elicit_003.wav, 24:52-29:12)

Entailments and conversational implicatures do not project from the family of sentences, including the Ticuna family of sentences in 14. Therefore, any encoded perceptual deictic content is not entailed, but presupposed (cf. Wolter 2006:109), and any inferred content arises from inference via 'maximize presupposition', not conversational implicature. This means that we cannot choose between the above analyses using standard tests for entailment vs. conversational implicature. Instead, we must examine the analyses' language-specific predictions.

7.2. VISIBILITY REQUIREMENTS INTERACT WITH DERIVATIONAL MORPHOLOGY. While the analyses in Table 11 and Table 13 claim that the visibility meanings of ye^3a^2 and je^3a^2 are encoded, the analysis in Table 12 claims that they arise from inference and paradigmatic contrast. Thus, the analysis in Table 12 predicts that morphology should not be able to manipulate the visibility requirement of ye^3a^2 and je^3a^2 .

This prediction is false. When ye^3a^2 and je^3a^2 combine with the derivational enclitic $=\tilde{a}^4ma^4$, previously introduced in §4.1, their visibility requirement changes. They can still index visible referents, but also gain the capacity to index invisible ones. For example, as shown in 15, participant 3 volunteered first $ye^3a^2=\tilde{a}^4ma^4$, then $je^3a^2=\tilde{a}^4ma^4$, in the invisible context represented by Figure 9.

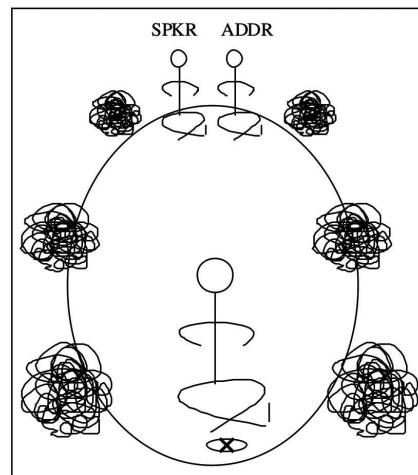


FIGURE 9. Diagram of the context of 15 (demonstrative questionnaire scene 15; shown above as Fig. 3).

(15) *ji²a⁴ā⁴ma⁴ / gu⁴a²ā⁴ma⁴ pe⁴?tʃi¹ ri¹ ku³¹ri³ ni⁴¹?i⁴?*
ji²a⁴=ā⁴ma⁴ / gu⁴a²=ā⁴ma⁴ pe⁴?tʃi¹ ri¹
 DEM:DYAD(II)=Ā⁴MA⁴ / DEM:DIST(II)=Ā⁴MA⁴ basket(II) TOP
ku³¹ri³ ni⁴¹=i⁴
 2SG.AL.POSS 3SBJ=COP
 'That (*ye³a²=ā⁴ma⁴ / je³a²=ā⁴ma⁴*) basket, is it yours?'
*(je³a²=ā⁴ma⁴ volunteered immediately after *ye³a²=ā⁴ma⁴*)*
 (LWG, CLA 2015-06.038, tca_2017_ahsfieldnotes_2016book-2017book1_164-200.pdf, p. 172)

While the complex demonstratives *ye³a²=ā⁴ma⁴* and *je³a²=ā⁴ma⁴* lack absolute visibility requirements, they still have visibility restrictions. They can index referents that are invisible because of their location, as in 15. But they CANNOT index referents that are invisible because of their intrinsic perceptual properties, such as smells and sounds. This is illustrated by 16 and 17.

(16) [Context: You notice that I am wearing some perfume. You cannot see any perfume or anything associated with it, such as the bottle. You tell me you like the perfume. (same as 4)]

#*je³a²ā⁴ma⁴ / √ye³ma² pu³ma³ra¹ ri¹ tʃo³¹ri³ me⁴³ ni⁴¹?i⁴*.
#je³a²=ā⁴ma⁴ / √ye³ma² pu³ma³ra¹ ri¹ tʃo³¹ri³
 #DEM:DIST(IV)=Ā⁴MA⁴ / √DEM:multi(IV) perfume(IV) TOP 1SG.AL.POSS
me⁴³ ni⁴¹=i⁴
 good 3SBJ=COP

'That perfume (#*je³a²=ā⁴ma⁴ / √ye³ma²*), I like it.'

(LWG, CLA 2015-06.042, tca_20170621_lwg_ahs_elicit_001.wav, 5:15–8:25, 16:11–17:10)

(17) [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. (same as 3)]

#*je³a²ā⁴ma⁴ / #je³a² / √pa⁴a² / √ye³ma² wi³ja³e³ ri¹ na⁴me⁴³?e⁵tʃi²*.
#je³a²=ā⁴ma⁴ / #je³a² / √pa⁴a²
 #DEM:DIST(IV)=Ā⁴MA⁴ / #DEM:DIST(IV) / √DEM:PROX(IV)
/ √ye³ma² wi³ja³e³ ri¹ na⁴=me⁴³?i⁵tʃi²
/ √DEM:multi(IV) song(IV) TOP 3SBJ=good=really

'That song (#*je³a²=ā⁴ma⁴ / #je³a² / √pa⁴a² / √ye³ma²*), it's really beautiful.'

(ECP, CLA 2015-06.041, tca_20170627_ecp_ahs_elicit_001.wav, 0:14–2:59)

Since demonstratives with =ā⁴ma⁴ cannot index all types of invisible referents (and can still index visible ones), the enclitic cannot simply mean that the referent is invisible. Rather, =ā⁴ma⁴ is a modal operating on the visibility requirement. Demonstratives with this enclitic require the referent to be visible in a set of possible worlds that differ minimally from the actual world by the location of the referent—for example, in 15, possible worlds where the basket is located on the other side of the barrier. Referents that would be visible only in worlds where the referent has different intrinsic perceptual properties—for example, where smells can be seen—still cannot be indexed with *ye³a²/je³a²=ā⁴ma⁴*.

Since morphology can manipulate the visibility requirement of *ye³a²* and *je³a²*, that requirement must be encoded.¹² This finding is compatible with either the analysis in Table 11, where *ye³a²* and *je³a²* have encoded perceptual deictic content and *ye³ma²* does not, or the analysis in Table 13, where all three visibility-sensitive demonstratives have encoded perceptual deictic content. By contrast, this data is clearly incompatible

¹² This argument does require an assumption that meanings arising from inference cannot be modified by morphology. However, I am not aware of work that disputes this, even among authors who reject a strict ordering of pragmatics after truth-conditional semantics (e.g. Levinson 2000).

with the analysis in Table 12, which treats neither ye^3a^2 nor je^3a^2 as possessing encoded perceptual deictic content.

7.3. NEGATIVE AND POSITIVE VISIBILITY REQUIREMENTS ARE ASYMMETRICAL. The possible analyses also differ in their predictions about the compatibility of ye^3ma^2 with visible referents. Under the analysis in Table 11, ye^3ma^2 has no encoded deictic content of any kind. It therefore could be acceptable with visible referents, though—given the action of ‘maximize presupposition’—it will likely be much less natural and acceptable than demonstratives with encoded deictic content. In contrast, under the analyses in Tables 12 and 13, ye^3ma^2 encodes invisibility. It therefore should never be acceptable with visible referents.

Here, the demonstrative questionnaire results support the prediction of the analysis in Table 11. These results contain no scenes where ye^3ma^2 is clearly acceptable (has an acceptability *z*-score greater than 1) for a visible, non-addressee-proximal referent. However, the results do contain several visible, non-addressee-proximal scenes where ye^3ma^2 attains a quantitatively high level of acceptability. For example, recall 9 and 13 above, where the referent is visible and distal to both speaker and addressee. In these examples, je^3a^2 was the most natural demonstrative, but eight of ten participants still accepted ye^3ma^2 in each scene (acceptability *z*-score = 0.72). This level of acceptability contrasts sharply with the level of acceptability observed for ye^3a^2 and je^3a^2 in invisible scenes, such as 8 and 12 above. While ye^3ma^2 displays acceptability *z*-scores as high as 0.72 in (non-addressee-proximal) visible scenes, ye^3a^2 and je^3a^2 never displayed acceptability *z*-scores higher than 0.17 in any invisible scene, and they mostly displayed negative *z*-scores. Thus, ye^3ma^2 is quantifiably more acceptable for visible referents than ye^3a^2 and je^3a^2 are for invisible ones. In other words, the negative visibility requirement of ye^3ma^2 is asymmetrical with, and weaker than, the positive visibility requirement of ye^3a^2/je^3a^2 .

The analysis in Table 11—where ye^3ma^2 has no perceptual deictic content, and instead gains association with invisibility through paradigmatic contrast—is highly consistent with these findings. On this account, ye^3ma^2 is RELATIVELY acceptable with visible referents because it lacks any encoded deictic content that would exclude them. At the same time, the item fails to be CLEARLY acceptable with visible referents because of ‘maximize presupposition’. In visible arrays, ‘maximize presupposition’ motivates (some) participants to reject vague ye^3ma^2 in favor of the other, presuppositionally stronger demonstratives, at least one of which is always acceptable in a context with a visible referent.

By contrast, the analyses in Tables 12 and 13 cannot accommodate the asymmetry in strength between positive and negative visibility requirements. The analysis in Table 12—where ye^3ma^2 encodes invisibility, while ye^3a^2 and je^3a^2 lack encoded perceptual deictic content—predicts that ye^3ma^2 should have STRONGER visibility requirements than ye^3a^2/je^3a^2 . This is exactly the opposite of what we observe, providing an additional reason to reject this analysis. Similarly, the analysis in Table 13—where all of ye^3a^2 , je^3a^2 , and ye^3ma^2 have encoded perceptual deictic content—treats the demonstratives’ perceptual deictic content as symmetrical. It therefore predicts that their visibility requirements will be equal in strength, rather than that the requirement of ye^3ma^2 will be weaker.

7.4. INTERIM SUMMARY. There are several logically possible analyses of the distribution of encoded vs. inferred perceptual deictic content across the demonstrative inventory of Ticuna (§7.1). The strongest analysis, however, is that ye^3a^2 and je^3a^2 have encoded perceptual deictic content conveying that the referent is visible, while ye^3ma^2

has no encoded perceptual (or spatial) deictic content. Instead, the association of ηe^3ma^2 with invisibility arises from paradigmatic contrast with demonstratives that do have deictic content, combined with the activity of ‘maximize presupposition’. This analysis is shown in Table 14.

DEM	SPATIAL DEICTIC CONTENT	PERCEPTUAL DEICTIC CONTENT	
		ENCODED	INFERRRED
ηa^4a^2	Speaker-proximal	\emptyset	(no inferences)
ηe^3a^2	Dyad-proximal	[visible]	(no inferences)
ηe^3a^2	Speaker-distal	[visible]	(no inferences)
ηe^3ma^2	\emptyset	\emptyset	[invisible]—via ‘maximize presupposition’

TABLE 14. Final analysis of perceptual requirements.

The analysis in Table 14 succeeds because it accounts for both (i) interactions between the visibility requirements of $\eta e^3a^2/je^3a^2$ and derivational morphology (§7.2) and (ii) asymmetries in the strength of visibility requirements between visible $\eta e^3a^2/je^3a^2$ and invisible ηe^3ma^2 (§7.3). No other analysis of the system can account for both of these phenomena.

8. CORPUS EVIDENCE. All of my arguments so far have been based on data collected in highly controlled settings. In this section, I argue that the same analysis also accounts for the use of ηe^3a^2 and je^3a^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 for referents they see at the moment of speech.

8.1. CORPUS SEARCH. To test my visibility claims against observational data, I searched a video corpus of four hours and thirty-seven minutes of Ticuna conversation for all instances of ηe^3a^2 and je^3a^2 . (Because tokens of ηe^3ma^2 are frequently ambiguous between exophoric and nonexophoric readings, I did not search for ηe^3ma^2 .) The corpus, which I collected between 2017 and 2019, consists of unattended camera recordings of seventeen different informal interactions, mostly between close relatives (cf. Rossi et al. 2020).

The search identified forty-eight tokens of ηe^3a^2 and eighty-nine tokens of je^3a^2 . Both demonstratives appeared at least once with the visibility-modifying enclitic $=\tilde{a}^4ma^4$ (§7.2). Table 15 reports the token counts of ηe^3a^2 and je^3a^2 with vs. without $=\tilde{a}^4ma^4$ observed in the search.

DEM	TOKENS WITHOUT $=\tilde{a}^4ma^4$	TOKENS WITH $=\tilde{a}^4ma^4$	TOTAL
ηe^3a^2	47	1	48
je^3a^2	76	13	89

TABLE 15. Token counts of ηe^3a^2 and je^3a^2 in 4 hours, 37 minutes of maximally informal conversation.

From the initial search results, I excluded all tokens produced either (i) by children under five (twenty-one tokens) or (ii) in direct quotations (five 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 (Clark 2013, Küntay & Özyürek 2006). Tokens in direct quotations were excluded because the values of deictics in reported speech may not relate to the immediate speech situation. After these exclusions, forty tokens of ηe^3a^2 (thirty-nine without $=\tilde{a}^4ma^4$, one with) and seventy-one tokens of je^3a^2 (fifty-nine without $=\tilde{a}^4ma^4$, twelve with) remained in the data set.

I then coded the remaining tokens of ηe^3a^2 and je^3a^2 for whether the participant who spoke the demonstrative could see the referent at the moment they produced the item. Even if I could not see the referent in the frame, if the speaker 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 twenty-six of the 111 total tokens, I either could not identify the referent or could not determine the speaker's location. These tokens were marked as uncodable. Table 16 presents the results of this visibility coding of the tokens of ηe^3a^2 and je^3a^2 , again divided between tokens with and without $=\tilde{a}^4ma^4$.

DEM	TOKENS WITHOUT $=\tilde{a}^4ma^4$			TOKENS WITH $=\tilde{a}^4ma^4$		TOTAL
	VISIBLE	INVISIBLE	UNCODABLE	VISIBLE	INVISIBLE	
ηe^3a^2	27	3	9	1	0	40
je^3a^2	38	4	17	7	5	71

TABLE 16. Results of visibility coding on data in Table 15.

On the analysis in §§5–7, all codable tokens of ηe^3a^2 and je^3a^2 without $=\tilde{a}^4ma^4$ should index visible referents. This prediction does not apply to tokens with $=\tilde{a}^4ma^4$, which are acceptable for some invisible referents (§7.2). Yet in Table 16, three of thirty codable tokens of ηe^3a^2 without $=\tilde{a}^4ma^4$, and four of forty-two codable tokens of je^3a^2 without $=\tilde{a}^4ma^4$, index referents that are not visible. These seven invisible tokens appear to contradict the claim that ηe^3a^2 and je^3a^2 encode visibility. Closer inspection, however, shows that all seven involve deferred reference.

8.2. DEFERRED REFERENCE. Deferred reference (Quine 1971, Nunberg 1993) occurs when a speaker indexes one entity, typically present, in order to refer to a second, associated entity, typically absent. The entity indexed is the PIVOT; the entity actually referred to is the DEFERRED REFERENT.

As an English example of deferred reference, suppose that I hold up a photograph of two missing children and say, *Have you seen these children?*. In this utterance, I am drawing attention to the images in the photograph. However, I am not referring to the images, but to the children. 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.

This is a defining feature of deferred reference. Across languages (Haviland 1996, Hanks 2005), the deictic content of demonstratives used in deferred reference tracks the deictic center's relation to the pivot—in the example, my relation to the photograph. It is insensitive to the deictic center's relation to the deferred referent.

Returning to the Ticuna data in Table 16, we find that all seven tokens of ηe^3a^2 and je^3a^2 without $=\tilde{a}^4ma^4$, but with invisible referents, appear in deferred reference. As the account 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 ηe^3a^2 and je^3a^2 require visibility. They show only that in deferred reference, demonstratives' visibility requirements—exactly like their spatial requirements—apply to the pivot, rather than the referent.

Example 18 provides an example of deferred reference from the data presented in Table 16. The key participants in this example are Menris, the woman at right in Figure 10, and her sister Adriana, at left. They are being recorded in Adriana's home. Prior to

18, Menris has been describing planned renovations to her own home (which is not visible to the participants). She says that she wants to build a new cinderblock wall in her kitchen, and as she explains this plan, she produces the utterance in 18. Her utterance includes a token of *ji²a²*, the noun class III form of *ye³a²*.



FIGURE 10. ‘Around there, I’ll also apply mortar to these (*ye³a²*).’

(18) *ŋe⁵a²ma⁴ ta⁴a³ri¹ tʃa³na³na⁴ku²mi¹ a¹ **ji²a²***
ŋe⁵a²=ã⁴ma⁴ ta⁴=a³ri¹ tʃa³=na³=na⁴ku²=mi¹
 LOC.DEM =ã⁴MA⁴ FUT=also 1SG.SBJ=3.O=adhere:PL.O=NI:mass
 a¹ **ji²a²**
 LNK(III) DEM:DYAD(III)

‘Around there, I’ll also apply mortar to **these** (*ye³a²*).’

(CLA 2018-19.039, tca_201907_child1-child2_cci_xa30.mp4, 28:32)

Menris’s token of *ye³a²* in 18 accomplishes deferred reference to an invisible referent via a visible pivot. The pivot is the present and visible cinderblocks that make up the back wall of Adriana’s home. It is clear that these blocks constitute the pivot because, as Menris speaks, she points at them with her right hand. Her hand articulates a splayed shape used to point at referents distributed in space, such as the blocks of the wall; this indicates that she is not pointing through the wall at another referent.

The deferred referent in 18, by contrast, is the absent and invisible cinderblocks that Menris will use to construct the new wall in her home. Though Menris points at the wall in Adriana’s home, this wall cannot reasonably be the referent, since it is already mortared together. Rather, what Menris means in 18 is that she will obtain her own cinderblocks later and construct a wall from them. These blocks, which Menris has yet to acquire at the moment of speech, are the deferred referent of her token of *ye³a²*. The blocks that Menris actually indexes in 18 stand in for this referent because of their physical similarity.

The deferred referent in 18 is not visible to the speaker, because it does not yet exist. I therefore coded this token of *ye³a²* as involving an invisible referent. All six other corpus instances of *ye³a²* and *je³a²* with invisible referents are analogous to 18: the speaker indexes a visible pivot to refer to an invisible entity associated with it. These examples therefore do not represent evidence against the claim that *ye³a²* and *je³a²* have encoded perceptual deictic content. Rather, examples like 18 show only that in deferred reference, the deictic content of demonstratives—perceptual as well as spatial—tracks the properties of the pivot, not the referent. This is a finding about deferred reference, not about visibility, and makes no impact on the visibility claims of the preceding sections.

It could be argued that the conversational corpus lacks invisible tokens of ηe^3a^2 and $\jmath e^3a^2$, outside of deferred reference, only because of its small size. However, work on both English (San Roque et al. 2015:39, n. 4) and other Indigenous American languages (Floyd et al. 2018:186) has shown that small (one-hour) samples of informal conversation display patterns very similar—in the lexicon of perception—to much larger samples (twenty-two to ninety-five hours). The Ticuna corpus searched here was constructed on the same principles as the San Roque et al. 2015 and Floyd et al. 2018 corpora; thus, analyzing a larger corpus would be unlikely to change the results.

9. CONCLUSION. Since Boas's time, documentary linguists have described dozens of Indigenous American languages as displaying visibility-sensitive demonstratives. In recent decades, though, some scholars have disputed these descriptions, arguing that all apparent visibility contrasts in demonstratives are epiphenomenal on spatial, epistemic modal, or nonvisual evidential content (Enfield 2003, Levinson 2018a,b). And at the same time, researchers in other linguistic subfields have held to the claim that demonstratives' deictic content concerns only the referent's location in space (e.g. Wolter 2006).

Theories emphasizing space, epistemic modality, and nonvisual evidential content do account for some languages' demonstrative systems. But they cannot account for demonstratives that encode information about visibility proper. Such demonstratives do exist: I have shown in this study that Ticuna has two, dyad-proximal ηe^3a^2 and speaker-distal $\jmath e^3a^2$. Both demonstratives require that the speaker sees the referent at the moment of speech. As I argued in §§5–6, this requirement concerns the SENSE OF VISION, not location in space, epistemic modality, general direct evidentiality, or access via a specific nonvision sense. Furthermore, as I established in §7, these demonstratives' visibility requirements arise from their encoded perceptual deictic content, not from inference or paradigmatic contrast with other items.

I intend this analysis as an argument against exclusively spatial theories of demonstratives, a response to Levinson's (2018a) claims that demonstratives never encode visibility, and a source of empirical evidence for the Boasian tradition of visibility claims. Within this tradition, future research on visibility-sensitive demonstratives in American languages should investigate whether the apparent visibility meanings actually concern vision (as Boas claimed, and as I argue for Ticuna) or instead epistemic modality (as Levinson suggests). It is especially important for researchers to collect data on reference to entities perceived only via nonvision senses, as in §5. Without this type of data, it is impossible to know whether an apparent invisible demonstrative actually conveys invisibility, or instead conveys lack of access via any sense—a much more general perceptual meaning.

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

The perceptual system's influence on the functional lexicon may extend beyond 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.

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