Bipartite indexicals in Yucatec
SULA 9, Santa Cruz, CA, May 6, 2016
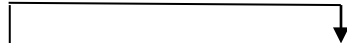Jürgen Bohnemeyer   jb77@buffalo.edu
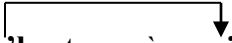
Abstract
A curious and under-researched property of some Mayan languages (I present data from Mopan, Tseltal and Yucatec) is the bipartite morphology of space- and time-indexical expressions. These expressions combine a *base* – an element that appears in the syntactic position in which the referent of the indexical is interpreted (i.e., enters the semantic composition) – with a clause-final *particle*. Strikingly, it is this second element, the particle, that determines whether the bipartite indexical is interpreted anaphorically or exophorically. Clauses do not accept more than one such particle. In case of multiple triggers in a single clause, the particle that is realized is determined according to a hierarchy whereby exophoric triggers trump anaphoric ones. The two constituents of bipartite indexicals seem to loosely map into the two tiers of Kaplan's (1989) theory of indexicality, with the final particles primarily expressing 'character', a mapping from possible contexts into contents, and the non-final component primarily expressing 'content', a mapping from worlds to extensions. A Situation-Semantic analysis is proposed which treats the indexical particles as imposing constraints on 'resource situations' involved in the interpretation of the base.

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1. A first acquaintance with the phenomenon: Yucatec [1]

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[1] Examples (1)-(3), (7)-(8), (11), and (18) are based on Blair & Vermont-Salas 1965-1967. Examples (4) and (6) are from the unpublished text *Bix u meta'l hump'éel k'axbil nah* by Esteban Pool Kaaw recorded and transcribed by Christian Lehmann with the aid of Ramón May Cupul. In some cases, the examples have been simplified for expository purposes. Examples (5), (8)-(9), (14)-(17), and (20)-(21) were elicited with the Demonstrative Questionnaire (Wilkins 1999). The remaining examples have been collected in other contexts. The orthographic representation is morphemic rather than morpho-phonemic. The orthography applied is based on Lehmann (1998). In the interlinear morpheme glosses, the following conventions are used: '-' for affixes; '=' for clitics; '+' for compounding; '\' for subsegmental realization or infixation. Abbreviations in the glosses include the following: 2- 2nd person; 3 – 3rd person; A – set-A ('ergative'/possessor) clitics; ATP – antipassive derivation; B – set-B ('absolutive') suffixes; CAUSE – causal preposition; CON – narrative perfective aspect connective; D1 – immediate clause-final indexical particle; D2 – non-immediate clause-final indexical particle; D3 – text-deictic clause-final

(1) **He'l** hun-p'íit ts'àak=**a'**!
PRSV one-bit cure\ATP=D1
'**Here's** some medicine!'

(2) K-u=bin Xokempich **le=bèeh** *he'l=a'*?
IMPF-A3=go Xokempich DEF=way PRSV=D1
'Does **this way here** go to Xokempich?'

(3) Ba'x **le=he'l=o'**? Ba'x u=k'àaba'?
what DEF=PRSV=D2 what(B3SG) A3=name(B3SG)
'What's **this**? What's its name?'

(4) U=hòol+nah ken u=bin
A3=hole+house SR.IRR A3=go
te'l t-u=mòoy=**a'**.
there PREP-A3=apse=D1
'The door is what will end up **here in the apse**'

(5) le=lìibro **yàan** **te'l=o'**
DEF=book [EXIST(B3SG) there=D2]$_S$
'the book **that's there**' (distal or anaphoric!)

(6) **Le=te'l=a'**, es que kul-ub.[2]
DEF=there=D1 is.which sit-INSTR(B3SG)
'This one here, it's a pillar (lit. thing for sitting)'

(7) A=ti'a'l **le=nah=a'**?
A2=property(B3SG) DEF=house=D1
'Is **this house** yours?'

(8) A=ti'a'l **lel=a'**?
A2=property(B3SG) DEF=D1
'Is **this** yours?'

(9) A=ti'a'l **le=lìibro=o'**?

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particle; DET – determiner stem; EXIST – existential/locative/possessive predicate; F – feminine prefix; IMPF – imperfective aspect; INC – incompletive aspect; INCH – inchoative derivation; INSTR – instrument nominalization; IRR – irrealis modality; NEG – negation; PREP – generic preposition; PROG – progressive aspect; PROSP – prospective aspect; PRSV – presentative stem; PRV – perfective aspect; SG – singular; SR – subordinator.

[2] As can be seen here, the clause-final particles aren't always clause-final. They appear in two positions: (i) on the right edge of the sentence, but preceding any non-embedded sentence-final material; (ii) on the right edge of left-dislocated phrases.

A2=property(B3SG)   DEF=book=D2
'Is **that** book yours?'

(10)   Káa=h-òok
         CON=PRV-enter(B3SG)
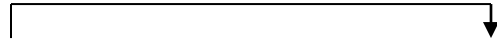
         le=x-ch'úup   chak   u=nòok'**=o'**, (...)
         DEF=F-female red(B3SG) A3=garment=D2

         '(And then) **the woman** dressed in red entered, (...)'

(11)   Ba'x k'ìin   k-uy=úuch-ul   **lel=o'**?
         what sun   IMPF-A3=happen-INC DEF=D2
         'What day does **that** usually happen?'

Table 1. *Yucatec spatial deixis (based on Hanks 1990: 18–19)*

Base		Indexical particle					Gloss
		=a' (D1)	*=o'* (D2)	*-be'*	*=i'*	*=e'* (D3)	
Present-ative	*he'l*	*he'la' / he' ...=a'*					'Here it is'
			he'lo' / he' ...=o'				'There it is'
				he'l ...-be'			'There it comes (audible)'
Ad-verbial	*te'l*	*te'la' / te' ...=a'*					'Right there/here'
			te'lo' / te' ...=o'				'There'
	ti'				*ti' ...=i'*		'There (anaphoric)'
	way					*way ...=e'*	'(In) here'
	tol		*tolo' / to ... =o'*				'(Out) there'
Ad-nominal	*le*	*lela' / le ... =a'*					'This'
			lelo' / le ... =o'				'That'
						le ...=e'	'As for that one'

2. Other languages

Mopan (Mayan, Yucatecan; Belize, Guatemala):

(12) (…) inw=ätan-t-aj   **ix=ch'up**   **a**   **la'**
           A1SG=wife-APP-CMP(B3SG) DET.F=female   DET.N D1
      '(…) I married **this lady**.' (Danziger 1994: 894)

(13) Walak u=tz'aj   kolor a   **viidyo a   kana'**?
      HAB   A3=give(B3SG) color DET.N video   DET.N D2
      'Does **that video (camera)** take (lit. give) color (pictures)?' (Danziger 1994: 894)

Tseltal (Mayan, Greater Tseltalan; Chiapas):

(14) **Lum**   ay   **in-e**
      there   EXIST(B3SG)?-D2
      'It's over there' (Brown 2006: 239)

(15) **Li'** ay-**i**
      here EXIST(B3SG)-D1
      'Here it is' (Brown 2006: 240)

Structures reminiscent of the Mayan bipartite deictics are also documented in several varieties of Otomí (Western Oto-Manguean, central Mexico), including Eastern Highland Otomí (Voigtlander and Echegoyen 1985) and Ixtenco Otomí (Lastra 1997), and in Seri (isolate, Sonora; O'Meara 2010).[3]

Table 2. *Definite articles and demonstrative adjectives (based O'Meara 2010: 66, after Moser & Marlett 2005: 843)*

Property of referent classified by the verb root	Definite article singular	Definite article plural	Proximal demonstrative	Medial demonstrative	Distal demonstrative
'Standing' (support at end of dominant vertical axis)	*cop/cap*	*coyolca*	*hip-cop, hiz-cop* [liquid]	*ti-cop, tacop* [liquid]	*him-cop*
			hiz-coyolca	*ta-coyolca*	*him-coyolca*
'Sitting' (support at end of non-dominant vertical axis)	*quij*	*coxalca*	*hip-quij*	*ti-quij*	*him-quij*
			hiz-coxalca	*ta-coxalca*	*him-coxalca*

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[3] The adnominal demonstratives of Seri derive from nominalizations of posture and motion verbs, creating a system of demonstrative classifiers (more on this below). The nominalizations themselves form definite articles. They produce the adnominal demonstratives in combination with one of three morphemes that are the primary locus of the expression of spatial deixis, not unlike in Mayan languages. Compare the second and third column of Table 2 to the three columns on the right.

'Lying' (support along dominant vertical axis)	*com*	*coitoj*	*hip-com*	*ti-com, ta-com* [group]	*him-com*
			hiz-coitoj, hiz-com [group]	*ta-coitoj*	*him-coitoj*
Unspecified	*quih, cah* [focus]	*coi*	*hiz-quih*	*ta-quih, ti-quihtim* [movement]	*him-quihtim*
			hiz-coi	*ta-coi*	*him-coi*
Flexible material			*hip-quih*	*ti-quih, ti-cah* [focus]	*him-quih*
			hiz-quihtolca	*ta-quihtolca*	*him-quihtolca*
Referent is a place	*hac*		*hiz-ac*	*ta-hac*	*him-cac*
				ta-cahjoj	*him-cahjoj*
Moving toward a goal			*hip-moca*	*ti-moca*	*him-moca*
			hiz-mocat	*ta-mocat*	*him-mocat*
Moving away from a source			*hip-intica*	*tintica*	*him-intica*
			hip-inticat	*tanticat*	*him-inticat*

3. A more detailed look at Yucatec

(16)   There can be only one: The Highlander Principle and the hierarchy of particles
        =*a'*   =*o'*/=*e'*   =*i'*
        D1   > D2/D3 >   D4

(17)   D4 =*i'* with negation
        Lel-o'b=**o'**   **ma'**   pèek'-o'b=**i'**,   kristyàan-o'b
        DEM-3PL=D2 NEG(B3SG) dog-B3PL=D4   Christian-B3PL
        'As for those ones, they are not dogs, they are humans.'
        (Andrade & Máas Colli 1999:62)

(18)   D4 =*i'* with an anaphoric place adverb

        (…) te'l chik'in=**o'** náats'   te=lu'm=**o'**
        there   west=D2   near(B3SG)PREP:DEF=earth=D2

        ti'   pek-ekbal

there(B3SG)   supported.as.if.fallen.down-DIS(B3SG)

hun-p'éel chan   bòola=**i'**.
one-CL.IN DIM   ball=D4

'(…) there in the west, nearby on the ground, **that's** where a little ball is lying.'

(19)   Evidence for D1 > D4

Tak   káa=h-sùut-nah   t-u=tsòon=**e'**,
even   CON=PRV-turn-CMP(B3SG)   PREP-A3=shoot\ATP=D3

tak **be'òora ma'**   wèen-ek-en=**a'**
even now   NEG(B3SG)   sleep-SUBJ-B1SG=D1

'Since he returned from hunting, until now I have not slept'
(Bohnemeyer 2002: 133)

(20)   Evidence for D3 > D4
Le=**ma'**   k'uch-uk-en=**e'**   káa=h-hóok'   leti'
DEF=NEG(B3SG) arrive-SUBJ-B1SG=D3 CON=PRV-exit(B3SG) it
'(When) I had not yet arrived, she left' (Bohnemeyer 2002: 135)

(21)   Evidence for D1 > D2

(…) tuméen   don Ignacio Bravo   h-tàal
CAUSE   don Ignacio Bravo   PRV-come(B3SG)

u=hets'-kun-t   **le=màaya-s-o'b way** túun   ba'tehil-o'b=**a'**
A3=quiet-CAUS-APP(B3SG) DEF=Maya-PL-PLhere   PROG:A3   fight-PL=D1

'(…) because don Ignacio Bravo came to pacify the Mayas who were fighting here'

(22)   D3 =e' as topic marker; evidence for variation between D2 =o' and D3 =e'[4]

Hun-p'éel téen=**e'**,   hun-túul   máak=**e'**,
one-CL.IN time=D3   one-CL.AN   person=D3

káa=h-k'áax   le=ha'=**o'**/=**e'**
CON=PRV-fall(B3SG) DEF=water=D2/=D3

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[4] Both versions of the sentence were judged to be equally good by all four speakers I consulted.

ma'   t-u=pak'   u=kòol=**i'**
NEG(B3SG)   PRV-A3=plant(B3SG)   A3=clear\ATP=D4

'One time, (there was) a man, when the rain fell, he didn't plant his *milpa*' (i.e., he didn't plant corn at the onset of the rainy season)

Table 3. *All together now: Yucatec spatial, temporal, and person deictics in one epic table (Hanks 1990: 18-19)*

TABLE **1.1** Synopsis of Maya Deictics

ID Base[a]		a?	o?	b'e?	i?	e?	∅	Gloss
				Terminal Deictics				
OSTEV	hé?e(l)	hé?el a?						'Here it is (Tact Pres)'
	hé?e(l)		hé?el o?					'There it is (Vis Dir)'
	hé?e(l)			hé?e b'e?				'There it is (Aud Dir)'
DMOD	hé?e(l)					hé?el e?		'Indeed, for sure'
DLOC	té?e(l)	té?el a?						'Right there, here (Immed)'
	té?e(l)		té?el o?					'There (Non-Immed)'
	tí?				tí?i?			'There (Anaph)'
	way					way e?		'(In) here (Incl)'
	to(l)		tol o?					'(Out) there (Excl)'
DNOM	le(l)	lel a?						'This one (Immed)'
	le(l)		lel o?					'That one (Non-Immed)'
	le				le ti?			'The one'
	le						le	'The (def art)'
PART	t-	t-en						'I (1sg)'
	t-		t-eč					'You (2sg)'
	t-	t-ó?on						'We (1pl)'
	t-		t-é?eš					'You (2pl)'
	le				le ti?			'He, she, it, the one (3sg)'
	le				le ti?-ó?ob'			'They, the ones (3pl)'
DTEMP[b]	walakil	walakil a?						'This time (of day)'
	b'eh?òora	b'eh?òora a?						'Now, presently'
	tolakhéak		tolakhéak o?					'Back then (shared, distant past)'
	b'ehé?el a					b'ehé?elae?		'Now, today, nowadays'
	taánt					taánt e?		'Just (immed past)'
	laáyli					laáyli e?		'Still, even, now'
DMAN	b'ey	b'ey a?						'Like this'
	b'ey		b'ey o?					'Like that, so'
	b'èey						b'èey	'So, thus, since'

[a] Grammatical categories of IDs: OSTEV (ostensive evidential adverb); DMOD (deictic modal auxiliary); DLOC (deictic locative adverb); DNOM (deictic nominal); PART (participant deictic); DTEMP (deictic temporal adverb); DMAN (deictic manner adverb).
[b] Partial display of DTEMPs.
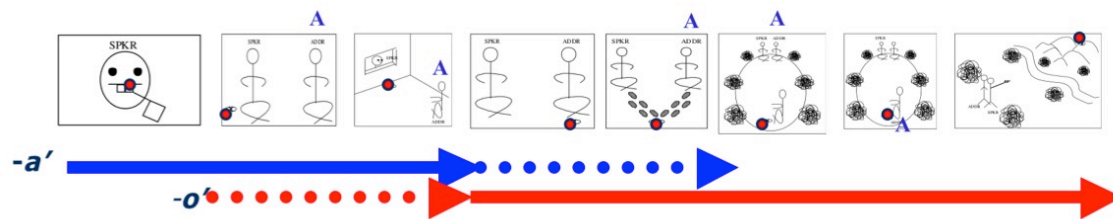
D2 =*o'* is not inherently exophoric: Bohnemeyer (2012)

Figure 1. *Summary of responses to eight of the 25 Demonstrative Scenes (Wilkins 1999)*

4. Bipartite indexicals vs. reinforcers
Bipartite indexicals bear a superficial resemblance with 'reinforcer' constructions (e.g., Roehrs 2010 and references therein):

(24) a. **This** book **here**
      b. **That** book (**over**) **there**
(25) a. #**This** book **there**
      b. #**That** book **here**

The key difference consists in reinforcer constructions involving traditional demonstratives with proper deictic force (or 'character'; Kaplan 1989) as one constituent. In contrast, no constituent of a bipartite deictic is a proper European-style demonstrative: The constituent that represents the place of the referent in the semantic composition does not have deictic force; and the element that expresses the 'character' is a clause-level functional element, not a determiner or adverbial. Yucatec in fact employs constructions akin to reinforcers as well:

(26) Le=ràadyo=o'   (**yàan**   **te'l**=o'),   *hach   ma'+lóob.*
      DEF=radio=D2   EXIST(B3SG)   there=D2   really   NEG+bad(B3SG)
      'That radio (that is over there) is really nice'

(27) A=ti'a'l   le=lìibro   (**he'l**)=o'?
      A2=property(B3SG)   DEF=book   PRSV=D2
      'Is that book (there) yours?'

These reinforced forms appear to be primarily used for referents on which joint attention has not already established and to which the speaker cannot easily draw the addressee's attention:
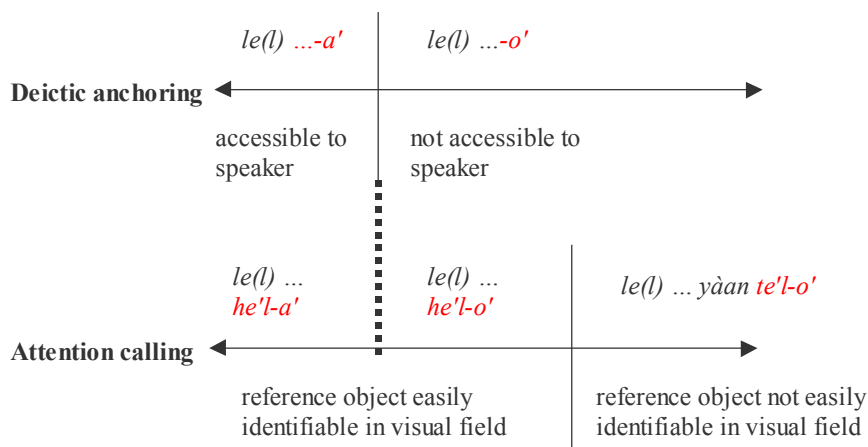

Figure 2. *Anchoring and attention calling in Yucatec spatial deictics (Bohnemeyer 2012: 121)*

5. Bipartite indexicals and Kaplan's (1989) two-tier theory of indexicality
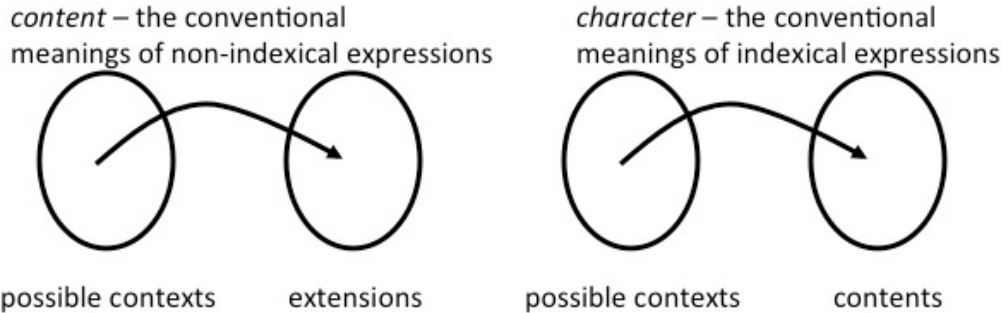

Figure 3. *Kaplan's theory schematically*

- In Yucatec bipartite deictics, character is predominately expressed by the clause-final particles:
    - D1 *=a'* expresses exophoricity and proximity to the deictic center;
    - D2 *=o'* is an underspecified indexical used for both exophoric and anaphoric reference;
    - D3 *=e'* is used for both anaphoric and text-deictic reference;
    - D4 *=i'* is used for anaphoric reference to places and (for unknown reasons) for negation.[5]

- The non-final part of the bipartite deictics determines where the referent of the indexical enters the semantic composition of the sentence. In this sense, it is associated with the expression of 'content'.

- However, the mapping is not a strict isomorphism
    - Elements of content in the particles: the restrictions of D4 *=i'*
    - Some of the non-final components appear to be inherently exophoric
        - (*way …=e'/=a'* 'here'; *be'òora …=a'/=e'*)

6. Questions

- What is the semantic motivation underlying the bipartite structure of Yucatec indexicals, and what is its pragmatic function?

- The deictic particles are expressed at the sentence level. This constitutes an apparent syntax-semantics mismatch. Why does this happen?

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[5] It is of course very possible that there are two homophonous D4 particles. However, Occam's Razor mandates that this should not be our first assumption.

- The Highlander Principle stipulates that every Yucatec matrix clause (and every LDed /topicalized phrase) is assigned to exactly one type of indexical reference. What is the semantic motivation and pragmatic function of this?

- Most Yucatec spatio-temporal indexicals exhibit the bipartite structure, but none of the pronominal expressions do. Why is this?

Table 4. *Distribution and functions of the two paradigms of Yucatec cross-reference markers*

Environment	Set A	Set B
Transitive verbs (active voice)	A(ctor)	U(ndergoer)
Intransitive verbs; transitive verbs in non-active voice	S (the single argument of intransitive clauses in incompletive 'status')	S (the single argument of intransitive clauses in completive, subjunctive, extrafocal 'status')
Other lexical categories	Possessor of nominal	S of non-verbal predicates

Table 5. *The morphological forms of the two paradigms of cross-reference markers*

Number	Person	Set A	Set B
SG	1	*in(w)=*	*-en*
	2	*a(w)=*	*-ech*
	3	*u(y)=*	*-Ø (/-ih)*
PL	1	*(a)k=...(-o'n)*	*-o'n*
	1 INCL	*(a)k=...-o'ne'x*	*-o'ne'x*
	2	*a(w)=...e'x*	*-e'x*
	3	*u(y)=...o'b*	*-o'b*

(28) Síi **in**=ìiho-**ech**, **in**=pàal-**ech**, ko'x!
      yes A1SG=son-B2SG A1SG=child-B2SG HORT
      '**You** ARE **my** son alright, **you** ARE **my** child; let's go!' (Lehmann ms.a)

Table 4. *The paradigm of independent pronouns*

Number	Person	Form
SG	1	*tèen*
	2	*tèech*
	3	*leti'*
PL	1	*to'n*
	2	*te'x*
	3	*leti'o'b*

(29) A'l **tèen**, José, ba'x le=he'l=o', ba'x u=k'àaba'.
      say(B3SG) me José what(B3SG) DEF=PRSV=D2 what(B3SG)A3=name
      'Tell **me**, José, what that there is, what is it's name.' (BLAIR & VERMONT-SALAS 1965)

(30) Hay-p'éel àanyos yàan **tèech**?
      how-CL.IN year:PL EXIST(B3SG) you
      'How old are you (lit. how many years are **with you**)?'

7. Toward a Situation-Semantic treatment

7.1. Background on information-based Situation Semantics – The following is excerpted from Devlin (2006).

- The propositional content of natural language utterances is assumed to have the format $s \vDash \sigma$, where s denotes a situation, σ an 'infon' or situation type, and $\vDash$ the 'support' relation, which indicates that s makes σ factual.

- Infons have the internal form $\ll R, a_1, ..., a_n, 1 \gg$ or $\ll R, a_1, ..., a_n, 0 \gg$, indicating that relation R does (*1*) or does not (*0*) apply to arguments ('objects') $a_1, ..., a_n$ in a situation characterized by the infon.

- The interpretation of a natural language utterance is assumed to involve maximally three distinct situations: the **described situation**, which the utterance is about; the **utterance situation**, and a **resource situation**.

  - The utterance situation uniquely assigns the roles of speaker and addressee, along with the time and place of the utterance.

  - **Resource situations** are situations distinct from topic and utterance situation that are invoked by utterances to support meaning components that are generally not at issue in the utterance. Resource situations for example license the uniqueness presupposition of definite descriptions and provide the antecedents of non-deictic(ally used) pronouns. Cf. especially Cooper (1996: 5-16) for a detailed treatment.

- Linguistic expressions are treated as carrying two kinds of meaning: an **abstract meaning**, which is more or less the meaning specified in the interlocutors' mental lexicon and grammar, and a **meaning-in-use**, which is more or less the referent associated with a particular token in a particular utterance.
  - The meaning-in-use of an expression α, denoted $\|\alpha\|$, is viewed as a relation $u\|\alpha\|a$ between the utterance (situation) u that contains the particular token of α and a semantic object a of the relevant type picked out by α in the context of u.
    - For example, the English pronoun *I* refers in any given utterance to the speaker of that utterance:

(31) $u\|I\|a$ iff $u : U(I)$ and $a = a_u$ (Devlin 2006: 14),

        where $u : U(I)$ stipulates that u is of type $U(I)$ (see below)

  - The abstract meaning of an expression α, denoted $\mathcal{M}(\alpha)$, is a mapping of the semantic types of the objects mapped by the meaning-in-use.
    - In the case of *I*, this is a mapping between the type of utterances containing *I* (32) and the type of objects that can be identified with the speaker a_u (33).

(32) $U(I) = [\dot{u} \mid \dot{u} \vDash \ll\text{speaking-to}, \dot{a}_u, \dot{b}_u, \dot{l}_u, \dot{t}_u, 1\gg \wedge \ll\text{utters}, \dot{a}_u, \text{I}, \dot{l}_u, \dot{t}_u, 1\gg]$

(33) $E = [\dot{a} \mid \dot{a} \vDash \ll=, \dot{a}, \dot{a}_u, \dot{l}_u, \dot{t}_u, 1\gg]$ (Devlin 2006: 15)

- Expressions such as $\dot{u}, \dot{a}_u, \dot{b}_u, \dot{l}_u, \dot{t}_u$ are **parameters** (i.e., variables).
- $\dot{a}_u, \dot{b}_u, \dot{l}_u, \dot{t}_u$ refer to the speaker, addressee, place, and time of utterance.
- (32) and (33) are **type-abstraction** rules that define types with respect to the situations in which exponents of these types occur (not unlike lambda abstraction).

  - The mapping itself may between $U(I)$ and E may be expressed as in (34):

(34) $\|I\| = \{(u, a) \mid u : U(I)\ \&\ a : E \text{ such that } U(I)[\mathcal{M}(I)]E\}$ (Devlin 2006: 15)

- The context-dependence of the meanings of natural language expressions can be captured by means of **speaker-connections**. These are functions that map the utterance situation into the meaning-in-use the expression is associated with in the utterance context.

  - For example, non-deictic uses of the pronoun *he* require a resource-situation-based speaker connection $c^{res}_u(\text{HE})$ that singles out an individual object as in (35):

(35) $c_u^{res}(\text{he}) = h$ such that $r \vDash \ll\text{male}, h, 1\gg$ for some resource situation r

  - A crude way of defining tense meanings via speaker-connections is represented in (36), where t_u denotes again the time of utterance (cf. Devlin 2006: 20):

(36) $c_u(\text{PRS}) = t_u$

$c_u(\text{PAST}) =$ some t such that $t \prec t_u$

$c_u(\text{FUT}) =$ some t such that $t_u \prec t$

- The propositional content of (37a) can be represented as in (37b), which is supported by the resource situation described in (37c):

(37) a. *Floyd presented a paper*

b. $s_u \vDash \exists \dot{p}\exists \dot{i} \ll\text{presents}, f, \dot{p}, \dot{i}, 1\gg$

   where s_u is the described situation and $\dot{i}$ is constrained by $c_u(\text{PAST})$

c. $r_k \vDash \ll\text{person}, f', t_f, 1\gg \wedge \ll\text{named}, f', \text{FLOYD}, t_f, 1\gg$

   $\wedge \ll\text{male}, f', \text{FLOYD}, t_f, 1\gg.$

- o (37a) presupposes the *existence* of a suitable resource situation in which there is an individual that uniquely satisfies the properties stipulated in (37c) – but it doesn't *specify* this resource situation.

- In contrast, the propositional content of (38a) is represented in (38b), with (38c) specifying the appropriate resource situations:

(38)   a.   *Floyd presented the paper*

   b. $s_u \vDash \exists \dot{t} \ll\!presents, f, \dot{p}, \dot{t}, 1\!\gg$

         where s_u is the described situation and $\dot{t}$ is constrained by $c_u(\text{PAST})$

   c. $r_k \vDash \ll\!person, f', t_f, 1\!\gg \wedge \ll\!named, f', \textsc{Floyd}, t_f, 1\!\gg$

         $\wedge \ll\!male, f', \textsc{Floyd}, t_f, 1\!\gg$

      $\&\ r_p \vDash \ll\!paper, p', t_p, 1\!\gg$

7.2. Why information-based Situation Semantics?

- The advantage of Situation Semantics for the purposes of modeling the semantics of bipartite indexicals lies in the ability to tie the semantic contribution of the sentence-level particles to the specification of a particular kind of *resource situation*. It is plausible that this resource situation is an utterance-level semantic property and thus should be specified at the sentence level.

- The decision to go specifically with the traditional *information-based* variety of Situation Semantics (Barwise & Perry 1983; Cooper 1996; Devlin 2006) is motivated by the non-trivial challenge attached to representing resource situations in the technically less "exotic" alternative, *probabilistic* Situation Semantics (Kratzer 1989, 2002, 2014).

- For a treatment of the semantics of English demonstratives in probabilistic Situation Semantics, see Elbourne (2008).

7.3. Bipartite deictics in Situation Semantics – Consider the contrast between D1 =*a'* and D2 =*o'*, setting the semantically more specific D3 and D4 aside for the moment.

- In a nutshell, the proposal is that both D1 and D2 introduce a resource situation to the interpretation of the utterance. In addition, D1 requires this resource situation to be a part of the utterance situation characterized in terms of speaker proximity. As in Bohnemeyer (2012), D2 picks up distal interpretations under exophoric reference by scalar implicature (cf. Figure 1). Speaker's connections fix these context-dependencies as indicated in (39)-(40):

(39) c_u^{res} (=a') = $\{(l, t) \mid r \vDash \ll\!speaker\_proximal, u, l, t, 1\!\gg$ for some resource situation $r\}$

(40) $c_u{}^{res}$ (=o') = {$(l, t) \mid r \models \ll R, l, t, 1 \gg$ for some resource situation r}

- In either case, the resource situations serve to introduce places and times that can then be picked up in the semantic interpretation of the base.
- In the case of =o', the nature of this resource situation is left unspecified. This is in accordance with the fact that =o' has both exophoric and anaphoric interpretations and that the exophoric interpretations are driven by scalar implicature (Bohnemeyer 2012; cf. Figure 1).
- In the case of =a', the resource situation is required by (39) to be 'speaker-proximal'. This property can be defined via more primitive topological proximity relations as follows:

(41)   a. $S(u) = [\dot{e} \mid \dot{e} \models \ll \text{speaker\_proximal}, u, l, t, 1 \gg]$

     b. $T(u) = [\dot{e} \mid \dot{e} \models \ll \text{proximal}_l, u, l_e, l_{au}, 1 \gg \curlywedge \ll \text{proximal}_t, u, t_e, t_u, 1 \gg]$

     c. $w \models (S(u) \Rightarrow T(u))$

- The propositional content in (41c) is a **constraint**. It stipulates that in the actual world w, speaker-proximal situations are situations whose location l_e is proximal to the location of the speaker a_u of utterance situation u and whose time t_e is proximal to the utterance time t_u. Bohnemeyer (2012) presents evidence in support of speaker-proximity, but not addressee-proximity, to influence the use of =a'; cf. Figure 1.

- Now consider the example in (42):

(42)   A=ti'a'l   **le**=nah=**a'**/=**o'**
            A2=property(B3SG)   DEF=house=D1/=D2
            '**This/that house** is yours'

- The propositional content of this sentence can be captured as in (43) regardless of which particle is selected (b_u is the addressee of the utterance):

(43) $s_u \models \ll \text{owns}, b_u, h, t, 1 \gg$

- The propositional content of the sentence is supported by a resource situation triggered by the definite determiner *le*. The nature of this resource situation is constrained by the deictic particle. =a' selects (44a), while =o' is compatible with the less restrictive (44b):

(44)   a. $r \models \ll \text{house}, h', t_h, 1 \gg \curlywedge \ll \text{speaker\_proximal}, u, l_u, t_u, 1 \gg$

     b. $r \models \ll \text{house}, h', t_h, 1 \gg$

- Temporal deictics (cf. Table 1) are straightforwardly accommodated to this treatment since the speaker-proximality property is defined with respect to both places and times.

7.4. Answers – The proposed analysis suggests the following answers to the questions raised in §6:

- What is the semantic motivation underlying the bipartite structure of Yucatec indexicals, and what is its pragmatic function?
    - *The particles serve to identify the involvement of a resource situation in the interpretation of an utterance and classify this resource situation.*

- The deictic particles are expressed at the sentence level. This constitutes an apparent syntax-semantics mismatch. Why does this happen?
    - *Resource situations are involved in the interpretation of utterances, i.e., in the mapping from sentences to contexts. Arguably, no syntax-semantics mismatch is involved.*

- The Highlander Principle (16) stipulates that every Yucatec matrix clause (and every LDed /topicalized phrase) is assigned to exactly one type of indexical reference. What is the semantic motivation and pragmatic function of this?
    - *The Highlander Principle stipulates that if an utterance requires a speaker-proximal resource situation for its interpretation, this fact must be marked by selecting =a'. Given the narrower specification of this type of resource situation, this markedness relation makes perfect sense.*

- Most Yucatec spatio-temporal indexicals exhibit the bipartite structure, but none of the pronominal expressions do. Why is this?
    - *I can offer only a partial answer to this question so far: the interpretation of* deictic *pronouns does not involve resource situations (cf. (31)-(34) above). It is conceivable that this particle-less rule is then extended to anaphoric pronouns for the benefit of uniformity, but that is at best a weak explanation.*

8. And now for some wild-eyed speculation – While the bipartite indexicals of Mayan languages seem exotic at first sight, better-studied languages such as English likewise systematically classify utterances in terms of whether or not their interpretation is anchored to the utterance situation. They do so, however, through tense inflection. Strikingly, Yucatec has been described as a tenseless language (Bohnemeyer 1998, 2002, 2009).

(45)   **Táan**   in=mèet-**ik**   le=nah=o'
       PROG   A1SG=do:APP-**INC**(B3SG) DEF=house=D2
       'I am/was/will be building the house'

Future research will have to examine whether this distribution of properties is coincidence.

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