Path to L2 via CS

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Overview

- Path in language and cognition
- Jackendoff's arguments for path at CS
- The case against a path semantics for Yucatec
- The L2 evidence
- Summary and implications
- Acknowledgments

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Path in language and cognition

- how much spatial information gets represented in language?
  - test case: motion paths

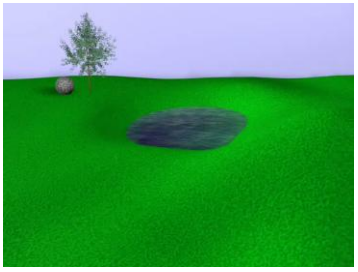

Figure 1. *Moverbs Paths 12, initial frame*

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- English: encoding of **source**, **route**, and **goal** as 'path functions'
  - » assigned to descriptions of reference entities (*grounds*)

(1.1) *The ball rolled*
from the tree
past the pond
to the hill

- for a typological survey of options in other languages, see Bohnemeyer *et al.* 2007

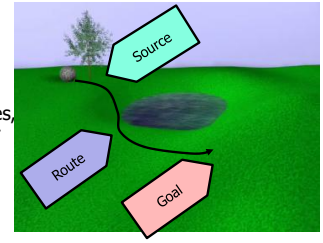

Figure 2. *Referential grounds and path functions*

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- how much spatial information is represented in the mind?
  - assumption I: at least ***two*** systems of internal representation in central cognition
    - one symbolic, with algebraic structures similar to those of natural language syntax, and directly interfacing with it
      - such as Jackendoff's (1987, 1996, 1998, 2002) **Conceptual Structure (CS)**
    - one iconic and image-schematic, directly interfacing with the perceptual systems
      - such as Jackendoff's **Spatial Structure (SpS)**

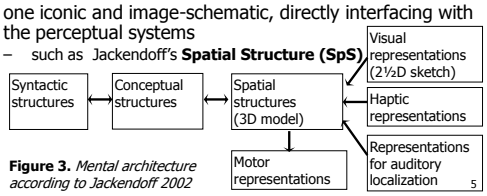

Figure 3. *Mental architecture according to Jackendoff 2002*

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- assumption II: the representation of spatial information at SpS is much richer than that at CS
  - iconic systems have an inherent advantage over symbolic ones when it comes to encoding space
    - cf., e.g., Bierwisch 1996, Jackendoff 1996, Byrne & Johnson-Laird 1989, *inter alia*

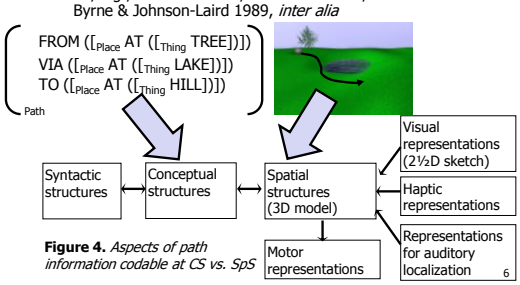

Figure 4. *Aspects of path information codable at CS vs. SpS*

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- assumption III: any kind of spatial information encoded at CS must also be interpreted at SpS
  - because as spatial information, it must by definition be interpretable to the visual system and the motor systems
  - whereas the opposite does not hold
    - e.g., a great deal of shape and manner-of-motion information is apparently not interpreted at CS
- questions
  - *what* information is encoded at SpS only and *what* information is duplicated at CS?
  - which aspects of SpS and CS are used for spatial memory and reasoning
    - and which merely serve as conduits to the peripheral systems, i.e., language, perception, and motor representations?
  - to what extent is the division of labor between CS and SpS universal
    - and to what extent does it vary with language and culture?

- Jackendoff's (1983) position
  - path functions must be encoded at CS
    - argument I: cognitive necessity
      - this argument became obsolete with the addition of SpS to central cognition in Jackendoff 1987
    - argument II: linguistic necessity – path functions must be encoded at CS because they are expressed in English
      - Jackendoff recognizes the possible alternative of a **state change** semantics for motion descriptions
        - » e.g., Miller & Johnson-Laird 1976; Dowty 1979

(1.2) a. *The ball rolled to the hill*

b. $[_{Event}$ GO $([_{Thing}$ BALL$], [_{Path}$ TO $([_{Place}$ AT $([_{Thing}$ HILL$])])])]$

c. $[_{Event}$ INCH $([_{State}$ BE_{LOC} $([_{Thing}$ BALL$], [_{Place}$ AT $([_{Thing}$ HILL$])])])])]$

- a state change semantics is independently motivated for other event descriptions

(1.3) a. *The ball split*

b. $[_{Event}$ INCH $([_{State}$ BE_{IDENT} $([_{Thing}$ BALL$],$ $[AT_{IDENT}$ $([_{Property}$ SPLIT$])])])]$

  - but Jackendoff rejects a state change semantics as insufficient for English motion descriptions - see below for the evidence
- path functions in fact are a core component of CS
  - this is entailed by the **Thematic Relations Hypothesis**

> "**Thematic Relations Hypothesis (TRH)**:
> In any semantic field of [EVENTS] and [STATES], the principal event-, state-, path-, and place-functions are a subset of those used for the analysis of spatial location and motion. Fields differ in only three possible ways:
>
> a. what sorts of entities may appear as theme;
> b. what sorts of entities may appear as reference objects;
> c. what kind of relation assumes the role played by location in the field of spatial expressions." (Jackendoff 1983: 188; emphasis JB & RRM)

  - as such their encoding at CS is presumably innate and universal

- the case advanced in Bohnemeyer (in press)
  - Jackendoff's arguments for path semantics are convincing for English
  - however, they do not carry over to Yucatec Maya
  - Yucatec motion descriptions systematically have a state change semantics
  - conjecture, supported by indirect evidence: Yucatec speakers do not encode path at CS
    - relying instead on SpS for reasoning about motion
  - implication: path functions are not universals of CS
    - what by the TRH is a core component of CS may nevertheless be language-specific

- this study
  - we further explore one of those sources of indirect evidence drawn on in Bohnemeyer (in press)
  - we compare descriptions of animated motion videos in the L2 Spanish of L1-Yucatec speakers
    - to L2 Spanish descriptions by L1-English speakers and to L1 Spanish descriptions
  - a pilot study shows transfer of state change semantics for L1-Yucatec speakers
    - while L1-English speakers have no difficulties mastering the path semantics of Spanish
  - we argue that the difficulties L1 Maya speakers have with expressions of path functions in Spanish
    - are reflection of their not being accustomed to encoding path functions at CS

Overview

Jackendoff's arguments for path at CS

- the linguistic arguments for path at CS
  - **route** path functions aren't easily decomposed
    - in state change terms
      - » since they involve location of the Figure/Theme, not at the beginning or end of the event, but in between

(2.1) a. *The eagle soared **across the canyon***
b. *The train went **through the tunnel***
c. *The expedition **crossed the river***
d. *The horse jumped **over the fence***

- Bohnemeyer (in press): a similar point can be made wrt. *complex* paths
  - in which *both* source and goal (and/or via) are specified

(2.2) *The ball rolled **from the tree to the hill***

  - this does not appear to happen in state change descriptions unless motion metaphors are involved

(2.3) *The lights went **from green to red***

  - **Fictive Motion** metaphors (Talmy 1996, 2000)
    - involve path functions in state descriptions

(2.4) a. *The highway extends **from Denver to Indianapolis***
b. *The house faces **away from the mountains***
c. *The firehouse is **across the street from the library***
(Jackendoff 1983: 167-172)

- we take these to robustly demonstrate path semantics in English motion descriptions
  - but as shown in Bohnemeyer (in press), they do not carry over to Yucatec

Overview

The case against a path semantics for Yucatec

- Background
  - Mayan
    - Yucatecan branch
      - along w/ Lakandón, Itzá, Mopan
  - 759,000 speakers age 5+ in Mexico in 2005
    - http://www.inegi.gob.mx
  - polysynthetic
  - verb-initial, "VOS"
  - split-intransitive
    - or 'active-inactive'
  - field work *JB* since 1991

Figure 5. *Approximate geographic area where Yucatec is spoken*

- overview of the argument
  - direct evidence against path semantics in Yucatec
    - path-neutral *ground phrases*
    - motion descriptions compatible with non-figure-motion scenarios
  - Jackendoff's arguments and Yucatec
    - motion involving route grounds underspecified
    - no composition of complex path functions
    - no fictive motion metaphors
  - conjecture: no encoding of path functions at CS
    - plausibility argument: thinking for speaking
    - indirect evidence: no spatial metaphors for temporal connectives
    - anecdotal evidence: widespread L1 transfer in motion descriptions in L2 Spanish

- direct evidence against path semantics in Maya
  - path-neutral *ground phrases*
    - **ground phrase**: the argument/oblique that dominates the ground-denoting nominal
    - in Indo-European languages the ground phrase encodes locative and path functions
    - this holds for *S-framed* and *V-framed* languages alike

	S-framed: English		V-framed: Spanish	
loc	(3.1) a. *The cart **is***	***in** the box*	(3.2) a. *El carro **estaba***	***en** la caja*
goal	b. *The cart **went***	***into** the box*	b. *El carro **entró***	***en** la caja*
source	c. *The cart **went***	***out** of the box*	c. *El carro **salió***	***de** la caja*
		ground phrase		ground phrase

- in contrast, Yucatec ground phrases are path-neutral
  - they encode merely place functions (Bohnemeyer & Stolz 2006; Bohnemeyer in press)

(3.2) a. *Le=kàaro=o´ ti´=**yàan***
DET=cart=D2 PREP=EXIST(B3SG)
'The cart, it is in the box'

b. *Le=kàaro=o´ h-**òok***
DET=cart=D2 PRV-enter(B3SG)
'The cart, it entered (lit. in) the box'

c. *Le=kàaro=o´ h-**hóok´***
DET=cart=D2 PRV-exit(B3SG)
'The cart, it exited [lit. in] the box'

ich | ti´ *le=kàaha=o´*
in / PREP DET=box=D2

ich | ti´ *le=kàaha=o´*
in / PREP DET=box=D2

ich | ti´ *le=kàaha=o´*
in / PREP DET=box=D2

ground phrase

- so if there is path encoding in Yucatec, it has to happen exclusively in the verb root
  - but the evidence from non-figure-motion scenarios shows that this is not the case either

– Yucatec motion descriptions are compatible with non-figure-motion scenarios
- location change verbs that do not entail motion of the figure/theme were first described by Kita 1999
  - for Japanese *hairu* 'enter' and *deru* 'exit'
- in Yucatec, the same phenomenon arguably generalizes to all verbs of 'inherently directed motion' (Levin 1993)
- consider Figure 6
  - *out of context,* (3.3) would be infelicitous
    - » as a description of this scenario:

Figure 6. *First and last frame of ENTER_EXIT 03*

(3.3) #Le=bòola=o'h-**òok** te=síirkulo=o'.
DET=ball=D2 PRV-enter(B3SG) PREP:DET=circle=D2
'The ball, it entered the circle.' (ENTER_EXIT 03 EMB)

– but (3.3) is not semantically in contradiction w/ Figure 6
  - » it merely triggers a strong implicature to figure motion
  - » and this implicature may be blocked or cancelled in context

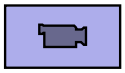
(3.4) *H=tàal* *le=àaro* *y=iknal* *le=bòola=o';*
PRV=come(B3SG) DET=ring A3=at DET=ball=D2

le=bòola=o´ *h=**òok**-ih.*
DET=ball=D2 PRV=enter-B3SG

'The ring came to the ball; the ball, it entered.' (ENTER_EXIT 03 SBM)

- another example: change of location in the vertical

Figure 7. *First and last frame of FIGURE_GROUND 14*



(3.5) *Le=chan tàabla=o´ h=péek-nah-ih,* *káa=h=**na´k***
DET=DIM plank=D2 PRV=move-CMP-B3SG káa=PRV=ascend(B3SG)

le=chan kanìika *y=éetel* *che´* *te'l* *y=óokol=o'.*
DET=DIM marble A3=with wood there A3=on=D2

'The little plank, it moved, (and) the little marble and the tree ascended there on top.' (FIGURE_GROUND 14 EMB)

- result state reference works even better with such scenarios

(3.6) *Le=tàabla=o´* *káa=h-háarax-nah=e',*
DET=plank=D2 CON=PRV-slide-CMP(B3SG)=D3
'the plank, it slid,'

káa=h-em *kàabal.*
CON=PRV-descend(B3SG) low
'(and) it went down.'

Káa=h-p'áat *le=bòola* *y=óokol* ***na´k**-a´n.*
CON=PRV-quit\ACAUS(B3SG) DET=ball A3=on **ascend**-RES(B3SG)
'(And) the ball ended up on top of it ascended.' (FIGURE_GROUND 14 RMC)

- final example: teleportation across an obstacle

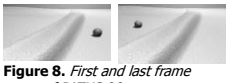
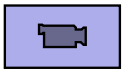


Figure 8. *First and last frame of PATHS 06*



(3.7) *Káa=h=sáat=e',*
CON=PRV=lose/ACAUS (B3SG)=TOP
'(When/and) (the ball) vanished,'

káa=h=ka'=chíik-pah=e´ *tu=láahun-tséel*
CON=PRV=REP=appear-SPONT(B3SG)=TOP PREP:A3=other:one-side
'(and) it reappeared, on the other side'

le=pak´ ***màah**-a´n* *yàan=o'.*
DET=wall pass:CMP-RES(B3SG) EXIST(B3SG)=D2
'of the wall it was(, having) passed.' (PATH 06 RMC)

– compatibility w/ such scenarios suggests
- location change verbs do not entail motion of the figure along a path (or even motion of *any* entity)

– not all location change verbs are compatible with non-figure-motion scenarios
- the data suggest a cline of acceptability

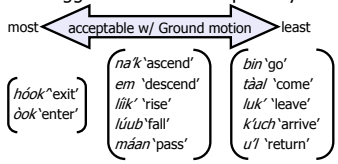


Figure 9. *Acceptability of location change roots w/ non-figure motion scenarios*

- the source of this cline seems to be that the verbs on the right presuppose stationary grounds

- Jackendoff's arguments and Yucatec
  - location change involves a locative state plus some description of how it changes during the event
    - routes cannot without "oversimplification" be reduced in this manner
    - but Yucatec descriptions of location change involving routes seem to show just this oversimplification
      - one single location change root - *máan* 'pass' – is used to describe location change vis-à-vis all route grounds

(3.8) *Túun* *bin* *u=balak'=e',*
PROG:A.3 go A3=roll=TOP
'(The ball) was going rolling,'

*káa=h-**máan*** *t-u=bèel* *le=trèen=o'…*
CON=PRV-**pass**(B3SG) PREP-A3=way DET=train=D2
'(and) it **passed along/across/over** the railroad tracks…' (MLand M1 NMP & RMC)

- a possible state change decomposition for *máan* 'pass'

(3.9) $[_{Event}$ INCH $([_{State}$ BE_{LOC} $([_{Thing}$], $[_{Place}$ PAST $([_{Thing}$]])])])]]

- no composition of complex path functions
  - motion descriptions involving complex path functions are difficult to represent in a state change semantics
  - but Yucatec lacks such descriptions!
    - due to the path-neutrality of ground phrases, it's impossible to express location change wrt. more than one ground per clause
      - » cf. Bohnemeyer *et al.* 2007 for details and a typological survey of other languages in this respect

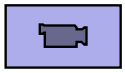


Figure 10. *First and last frame of ECOM B4*

- a maximally densely packaged description of the clip in Figure 10 is illustrated in (3.10)

(3.10) *Le=chan* *síirkulo* *chak=o'* *k-u=luk'-ul* *u=balak'*
DET=DIM circle red(B3SG)=D2 IMPF-A3=leave-INC A.3=roll
'The little circle, it left rolling'

y=iknal *le=chan* *kwáadrado* *áasul=o';* *k-u=máan* *u=balak'*
A3=at DET=DIM square blue(B3.SG)=D2 IMPF-A3=pass A3=roll
'at the little blue square; it passed rolling'

xan *y=óok'ol* *le=chan* *che'* *k'an=o';* *k-u=náak-al*
also A.3=on DET=DIM wood yellow(B.3.SG)=D2 IMPF-A.3=reach-INC
'also on the little yellow plank; it reached'

u=balak' *ti'* *te'l* *y=iknal* *le=chan* *triàangulo=o'.*
A.3=roll LOC there A.3=at DET=DIM triangle=D2
'rolling there at the little triangle.' (ECOM B4 EMB)

- no fictive motion metaphors
  - Yucatec location change verbs can be used metaphorically in reference to static situations
    - but are then subject to the same constraints as in dynamic descriptions – no more than one ground per clause, etc.
    - example: 'co-extension paths' in the sense of Talmy 2000 Vol. I: 138-139

(3.11) The road extends from Señor via Tixcacal to Yaxley

(3.12) *Le=bèeh* *he'l=a',* *k-u=hóok'-ol* *Señor,*
DET=way PRSV=D1 IMPF-A3=exit-INC Señor
k-u=ts'o'k-ol=e', *k-u=máan* *Tixcacal,*
IMPF-A3=end-INC=TOP IMPF-A3=pass(INC) Tixcacal
k-u=ts'o'k-ol=e', *k-u=k'uch-ul* *Yaxley*
IMPF-A3=end-INC=TOP IMPF-A3=arrive-INC Yaxley
'This road here, it exits Señor; then [lit. that having ended] it passes [through] Tixcacal; then [lit. that having ended] it arrives [in] Yaxley.'

- English metaphors that cannot be rendered with the change of location verbs aren't expressed in Yucatec
  - so it may be more appropriate to speak of 'fictive change of location' in Yucatec – cf. Matsumoto 1996 for Japanese
  - example: no 'line of sight' or 'sensory path' metaphors
    - » e.g., (3.13) is the closest equivalent of 'You looked through the window'

(3.13) *Káa=t-a=pakat-ah* *te=béentanah=o',*
CON=PRV-A2=look.at-CMP(B3SG) PREP:DET=window=D2
káa=t-aw=il-ah *ba'x yàan* *ich le=nah=o'.*
CON=PRV-A2=see-CMP(B3SG) what EXIST(B3SG) in DET=house=D2
'[When/and then] you looked (lit. at it) at the window, [when/and then] you saw what was in the house.'

- conjecture: no path encoding at CS
  - just because path functions aren't expressed in Yucatec does not mean they are not encoded at CS
    - in the mind of Yucatec speakers
  - a plausibility argument: thinking for speaking
    - along the lines of Slobin (1996, 2003)
    - assumption (Jackendoff): CS encodes linguistic meaning
    - it follows that a Yucatec observer of an event who derives a CS representation with a path semantics
      - would be unable to express this representation linguistically without first translating it into a state change representation
    - so the presence of path functions in the CS of Mayan would actually present an obstacle to event description

- indirect evidence: no spatial metaphors for temporal connectives
  - it has often been suggested that temporal connectives such as *after* and *before* are based on path metaphors
    - e.g., Clark 1973; Traugott 1978
  - Yucatec lacks such expressions, resorting instead to aspectual operators; cf. Bohnemeyer (1997, 1998, 2002)
    - e.g., instead of (3.14), one gets (3.15):

(3.14) *Everyday after Pedro writes a letter, he smokes a cigarette*

(3.15) *Pedro=e´ sáansamal=e´* *le=k-u=ts'o'k-ol*
Pedro=TOP RED:tomorrow=TOP DET=IMPF-A3=end-INC
u=ts'íib-t-ik *hun-p'éel* *kàarta=o',*
A.3=write-APP-INC(B3SG) one-CL.IN letter=D2
k-u=ts'u'ts'-ik *hun-p'éel* *chamal.*
IMPF-A3=suck-INC(B3SG) one-CL.IN cigarette
'Pedro, every day, it being finished his writing a letter, he smokes a cigarette.'

- anecdotal evidence: widespread L1 transfer in motion descriptions in L2 Spanish
  - L1-Yucatec speakers often use ground phrases in Spanish utterances Yucatecan-style, i.e., path-neutrally

(3.16) a. *¿Dónde vienes?*
L2SPA where come:PRS:2SG
'Where do you come?' [intended: 'where from?']
b. *¿De dónde vienes?*
L1SPA from where come:PRS:2SG
'Where do you come from?'
(3.17) a. *El ratón salió en su agujero.*
L2SPA the rat exit:PAST:3SG in its hole
'The mouse came out in its hole.' [intended: 'of its hole']
b. *El ratón salió de su agujero.*
L1SPA the mouse exit:PAST:3SG from its hole
'The mouse came out of its hole.' (Lehmann 1992: 626)

- interim summary
  - direct evidence for the absence of path encoding in Yucatec
  - indirect evidence for the absence of path encoding in the CS of Yucatec speakers

Overview

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The L2 evidence

- and now: a pilot study probing the L2 evidence
- rationale
  - if native speakers of Yucatec are unaccustomed to expressing path functions at CS
    - they should have greater difficulties processing path expressions in L2 Spanish
      - compared to L2 speakers who routinely express path functions in their native language (cf. Slobin 1996: 89-91)
  - conversely, if Yucatec L1-speakers are used to representing path functions at CS
    - and merely do not map these into language
    - there is no obvious reason why they should find it significantly harder to master Spanish path expressions
      - than L2 speakers whose native language expresses path

- background on bilingualism in Quintana Roo
  - Spanish dominates public life in the centers of the larger cities and Yucatec does everywhere else
  - in rural communities, Spanish is restricted to communications with outsiders
    - and to school, church, and much of the mass media
  - the first three grades of primary school are bilingual
    - after that formal education is exclusively in Spanish
  - literacy is largely restricted to Spanish
  - males age 70 and older, and many much younger women, tend to be functionally monolingual

- our test populations
  - six L1-Yucatec speakers, five males and one female, in their 30s through 60s
    - recorded by JB in the field in Quintana Roo in June-July 2008
    - all grew up in a rural village where Yucatec dominates in most settings in public and at home
    - all had little exposure to Spanish until they entered school
  - four L1-English speakers, two males and two females, in their 20s through 30s
    - recorded by RRM in Mexico City in March of 2009
    - American students at the Universidad Nacional Autónoma de México

    - all had lived in Mexico City for 1-2 years at the time of recording
    - all had been learning Spanish for several to up to 10 years at the time of recording
  - three L1-Spanish speakers, two females and one male, in their 30s
    - recorded by RRM in Mexico City in March of 2009
    - the women have lived in Mexico City all their lives; the man is from the state of Sonora
- the stimuli: the **Motion verbs** (Moverbs) clips
  - 96 computer-animated digital video clips
    - created by Steve Levinson (2001)

    - featuring a variety of location change scenarios varied according to
      - geometry of grounds and spatial relations (place functions) involved
      - figure motion vs. ground motion vs. figure teleportation vs. ground teleportation
      - perspective (toward/away from observer vs. neutral)
    - Figures 1 and 6-8 above illustrate
  - we collected descriptions of three subsets of the clips
    - Enter-Exit (21 clips total)
    - Figure-Ground (24 clips total)
    - Paths (16 clips total)
  - in the following analysis, we disregard the clips featuring teleportation ("beaming")
    - the analysis is based on target set of 46 clips
- design
  - the participants watched each clip as many times as they desired
  - interpretations of unfamiliar entities would be negotiated

  - eventually, the participants would narrate the content of a clip
    - so as to answer the question 'What happened in this video?'
  - the elicitation was conducted in Spanish to the extent possible
- general assessment of the Spanish skills of the L2 speakers
  - both populations showed mastery of basic Spanish clause structure
  - both populations frequently produced typical L2 production errors
    - especially errors in gender and number marking in agreement and pronominalization
  - the Mayans made what impressionistically seem more L1-Spanish-like lexical choices than the Americans

- coding
  - Spanish path verbs and Yucatec location change verbs are extensionally broadly equivalent
  - we focused instead on the prepositions and **satellites** (adverbs) used in combination with the Spanish verbs
    - in monolingual Spanish, these reflect the path function encoded
- response types
  - illustrated here with examples produced by L1-Yucatec speakers
  - bounded path encoding

(4.1) *Se metió* *la canica* ***adentro***
inserted itself the marble inside(ALL)
'The marble inserted itself into it'
(Enter-Exit 12 MEP)

  - preposition/satellite used non-L1-like and apparently path-neutrally

(4.2) *Empezó* *rodando,*
started rolling
salió en medio
exited in the middle
de las maderitas
of the wood pieces(DIM)
'It started rolling, it exited in the middle of the little wooden things' (Enter-Exit 19 SME)

(4.3) *La pelota* ... *rueda y* ***sube***
the ball rolls and ascends
sobre *la tabla redonda*
on the round board
'The ball ... rolls and ascends on the round board'
(Figure-Ground 04 FEE)

The L2 evidence (cont.)

– indeterminate descriptions
  • the preposition or satellite used has both path and locative uses in L1 Spanish
    – so it is impossible without further evidence to determine whether a given L2 use does or does not encode path

(4.4) *La crayola* ***entra en*** *un tunel*
the crayon enters in a tunnel
'The crayon enters in(to) a tunnel'
(Enter-Exit 16 RMC)

– no ground phrase

(4.5) *Se* ***baja*** *rodando*
itself lowers rolling
'It rolls down' (Paths 09 MNP)

The L2 evidence (cont.)

– ground phrase is direct object

(4.6) *Sobre el puente* *se desplaza* *la bola*
above the bridge itself dislocates the ball
y ***cruza*** ***el río***
and crosses the river
'The ball moves over the bridge and crosses the river' (Paths 03 EMB)

– unbounded/atelic description

(4.7) ***Gira*** ***a la orilla*** *del muro*
turns on the edge of the wall
'It rolls along the wall' (Paths 08 RMC)

The L2 evidence (cont.)

– distribution - multi-clausal descriptions, one clause encoding location of the figure or of some event
  – and another either unbounded motion or location change wrt. an implicit (unexpressed/anaphoric) ground

(4.8) *Sale* *la pelota ...* *rodando*
exits the ball rolling
y *se para* *fuera* *del corral*
and stops itself outside of the corral
'The ball exits ... rolling and stops outside of the corral' (Enter-Exit 02 NMP)

The L2 evidence (cont.)

– place-denoting adverbial clauses
  • the ground is described by a clause headed by *donde* 'where'
    – which unlike in L1-Spanish is not marked for the path function
      » this response type was produced only by the L1-Yucatec speakers

(4.9) El circulo corrió y se metió
the circle ran and inserted itself
donde ***está*** ***la canica***
where is the marble
'The circle ran and inserted itself where the marble is' (Enter-Exit 03 MEP)

The L2 evidence (cont.)

– non-motion descriptions
  • location change of figure vis-à-vis ground is framed in non-motion terms

(4.10) *Vino* *el,* *la rodaja* *arrimando* *un poco*
came the(M) the(F) slice approaching a little
y ***acaparó*** ***la-la pelotita***
and captured the-the ball(DIM)
'The, the onion ring came approaching a little and captured the-the little ball' (Enter-Exit 12 SME)

The L2 evidence (cont.)

• results

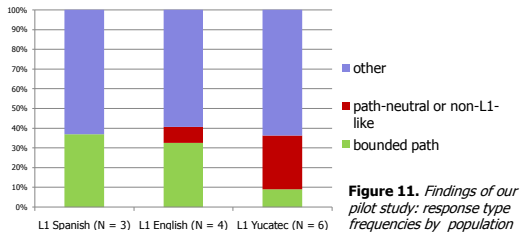

Figure 11. *Findings of our pilot study: response type frequencies by population*

– 'other' in Figure 11 conflates all response types except for 'bounded path encoding'
  • and 'path-neutral or non-L1-like'

The L2 evidence (cont.)

- the L1-English speakers produced bounded-path descriptions 3 times as frequently as the Mayans
  - in 32.6% of their descriptions (60 tokens) to the L1-Yucatec speakers' 9.1% (25 tokens)
- the Yucatec speakers produced path-neutral or L1-like descriptions 3 times as often as the Americans
  - in 27.2% of their descriptions (75 tokens) to the L1-English speakers' 8.2% (15 tokens)

- problems
  - inductive statistics difficult to apply in view of uneven number of observations
  - very large 'other' category
    - large differences across the populations especially in the use of unbounded descriptions, distribution strategy

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Overview

- Path in language and cognition
- Jackendoff's arguments for path at CS
- The case against a path semantics for Yucatec
- The L2 evidence
- Summary and implications
- Acknowledgments

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Summary and implications

- motion is systematically framed as state change in Yucatec
  - path functions are not encoded
    - evidence: path-neutral ground phrases; compatibility with non-figure-motion scenarios
  - Jackendoff's arguments for the necessity of a path semantics for English do not apply to Yucatec
    - no fictive motion metaphors; descriptions of motion with respect to route grounds are drastically underspecified
  - indirect evidence for absence of path functions from the CS of Yucatec speakers
    - lack of temporal connectives expected to be based on path metaphors

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Summary and implications (cont.)

- L2 evidence as a window onto CS
  - Yucatec speakers frequently transfer their path-neutral motion semantics to L2 Spanish utterances
    - anecdotal data provided initial evidence for this, which has been corroborated by the pilot study presented here
  - by conjecture this reflects a difficulty in processing the path semantics of Spanish expressions
    - stemming from lack of habituation to path encoding at CS
      - if Yucatec speakers were accustomed to expressing path at CS
        - » there would be no obvious reason why Spanish path expressions should present a significant challenge to them
  - much independent evidence is needed to validate and calibrate the use of L2 data
    - as evidence in research on the language-cognition interface

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Summary and implications (cont.)

- L2 evidence as a window onto CS
  - Yucatec speakers frequently transfer their path-neutral motion semantics to L2 Spanish utterances
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  - much independent evidence is needed to validate and calibrate the use of L2 data
    - as evidence in research on the language-cognition interface

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Summary (Cont.)

- implications for the architecture of cognition
  - the encoding of path information at CS, as opposed to SpS, may be language-specific
  - via the Thematic Relations Hypothesis, this entails language-specificity of a core component of CS
- implications for language evolution
  - Jackendoff's (2002: 231-264 and elsewhere) scenario
    - CS predates language, is shared among all higher animals
    - language evolves as a system of external representations for CS
  - language-specificity of core parts of CS supports an alternative scenario
    - on which CS coevolved with language as an interface between language and SpS

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References

Bohnemeyer, J. (in press). The language-specificity of Conceptual Structure: Path, Fictive Motion, and time relations. In B. Malt & P. Wolff (Eds.), *Words and the world. Oxford: Oxford University Press*.

Bohnemeyer, J. (1997). Yucatec Mayan lexicalization patterns in time and space. In M. Biemans & J. v.d. Weijer (Eds.), *Proceedings of the CLS Opening Academic Year 1997-1998* (pp. 73-106). Tilburg: Center for Language Studies.

Bohnemeyer, J. (1998). Temporal reference from a Radical Pragmatics perspective: Why Yucatec does not need to express 'after' and 'before'. *Cognitive Linguistics, 9,* 239-282.

Bohnemeyer, J. (2000). Event order in language and cognition. In H. de Hoop & T. van der Wouden (Eds.), *Linguistics in the Netherlands 17* (pp. 1-16). Amsterdam: John Benjamins.

Bohnemeyer, J. (2002). *The grammar of time reference in Yucatec Maya*. Munich: LINCOM.

Bohnemeyer, J. (2003a). Invisible time lines in the fabric of events: Temporal coherence in Yucatec narratives. *Journal of Linguistic Anthropology, 13*, 139-162.

Bohnemeyer, J. (2003b). The unique vector constraint. In E. van der Zee & J. Slack (Eds.), *Representing direction in language and space* (pp. 86-110). Oxford: Oxford University Press.

Bohnemeyer, J. (2004). Split intransitivity, linking, and lexical representation: the case of Yucatec Maya. *Linguistics, 42,* 67-107.

Bohnemeyer, J. (2007). The pitfalls of getting from here to there: Bootstrapping the syntax and semantics of motion event expressions in Yucatec Maya. In M. Bowerman & P. Brown (Eds.), *Cross-linguistic perspectives on argument structure: Implications for learnability*. Mahwah, NJ: Lawrence Erlbaum. 49-68.

Bohnemeyer, J., Enfield, N., Essegbey, J., Ibarretxe-Antuñano, I., Kita, S., Luebke, F. et al. (2007). Principles of event segmentation in language: The case of motion events. *Language 83(3): 495-532* .

References (Cont.)

Bohnemeyer, J. & Stolz, C. (2006). Spatial reference in Yucatec Maya: A survey. In S. C. Levinson & D. P. Wilkins (Eds.), *Grammars of Space* (pp. 273-310). Cambridge: Cambridge University Press.

Byrne, R.M.J. & Johnson-Laird, P.N. (1989). Spatial reasoning. *Journal of Memory and Language,* 28, 564-575.

Clark, H. H. (1973). Space, time, semantics, and the child. In T. E. Moore (Ed.), *Cognitive development and the acquisition of language* (pp. 27-63). New York, NY: Academic Press.

Dowty, D. R. (1979*). Word meaning and Montague Grammar*. Dordrecht, Netherlands: Reidel.

Fillmore, C. J. (1971). *Santa Cruz lectures on deixis*. Bloomington: Indiana University Linguistics Club.

Gruber, J. S. (1965). *Studies in lexical relations*. Doctoral dissertation, Massachusetts Institute of Technology.

Jackendoff, R. (1983). *Semantics and cognition*. Cambridge, MA: MIT Press.

Jackendoff, R. (1987). *Consciousness and the computational mind*. Cambridge, MA, etc.: MIT Press.

Jackendoff, R. (1990). *Semantic structures*. Cambridge, MA: MIT Press.

Jackendoff, R. (1992). *Languages of the mind*. Cambridge, MA: MIT Press.

Jackendoff, R. (1996). The Architecture of the Linguistic-Spatial Interface. In Bloom, P., M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 1-30). Cambridge, MA: MIT Press.

Jackendoff, R. (2002). *Foundations of language*. Oxford: Oxford University Press.

Kita, S. (1999). Japanese ENTER/EXIT verbs without motion semantics. *Studies in language, 23*, 307-330.

References (Cont.)

Lehmann, C. (1992). Yucatecische lokale Relatoren in typologischer Perspektive [Yucatec spatial relators in typological perspective]. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung, 45,* 626-641.

Levin, B. (1993). *English Verb Classes and Alternations*. Chicago, IL: University of Chicago Press.

Levinson, S. C. (2000). *Presumptive meanings*. Cambridge, MA: MIT Press.

Levinson, S. C. (2001). Motion verb stimulus, version 2. In S. C. Levinson & N. J. Enfield (Eds.), *'Manual' for the field season 2001* (pp. 9-11). Nijmegen: Max Planck Institute for Psycholinguistics.

Levinson, S. C., Meira, S., & The Language and Cognition Group (2003). 'Natural concepts' in the spatial topological domain – adposition meanings in crosslinguistic perspective. *Language, 79*, 485-516.

Marr, D. 1982. *Vision*. New York: Freeman.

Matsumoto, Y. (1996). Subjective motion and English and Japanese verbs. *Cognitive Linguistics, 7*, 183-226.

Miller, G. A. & Johnson-Laird, P. N. (1976). *Language and perception*. Cambridge: Cambridge University Press.

Talmy, L. (1985). Lexicalization patterns. In: T. Shopen (Ed.), *Language typology and syntactic description. Vol. 3: Grammatical categories and the lexicon* (pp. 57-149). Cambridge: Cambridge University Press.

Talmy, L. (1996). Fictive motion in language and "ception". In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and space* (pp. 211-276). Cambridge, MA: MIT Press.

Talmy, L. (2000a). *Toward a cognitive semantics. Vol. I: Concept structuring systems*. Cambridge, MA: MIT Press.

References (Cont.)

Talmy, L. (2000b). *Toward a cognitive semantics. Vol. II: Typology and process in concept structuring*. Cambridge, MA: MIT Press.

Traugott, E. C. (1978). Spatio-temporal relations. In J. H. Greenberg (Ed.), *Universals of human language. Vol. 3: Word structure* (pp. 369-400). Palo Alto, CA: Stanford University Press.

Van Valin, R. D. Jr. & LaPolla, R. J. (1997). *Syntax*. Cambridge: Cambridge University Press.

Wilkins, D. P. & Hill, D. (1995). When GO means COME: Questioning the basicness of basic motion verbs. *Cognitive Linguistics, 6*, 209-259.

Zavala, R. (1993). *Clause integration with verbs of motion in Mayan languages*. MA Thesis, University of Oregon.

Zwarts, J. (2005). Prepositional aspect and the algebra of paths. *Linguistics and Philosophy, 28*, 739-779.