Complementarity between meronymy and frame of reference use in Diidxa Za

Perspectives from an endangered language

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Geographic grounding
Place, direction and landscape in the grammars of the world
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Synopsis

- Diidxa Za (Isthmus Zapotec, Otomanguean), as many other Mesoamerican languages, readily uses body-part terms to refer to object parts.
- The literature on the topic raises issues as to the degree of productivity of these meronyms and the role of metaphor in their semantic extension.
- I analyze body part-derived meronyms in Diidxa Za in a Structure-Mapping Theory approach
  - (Gentner 1983, Gentner & Markman 1997, Markman & Gentner 2000, *inter alia*)
  - Different degrees of productivity of body part-derived meronyms correspond to different types of comparisons.
  - Meronymy interfaces with frame of reference use

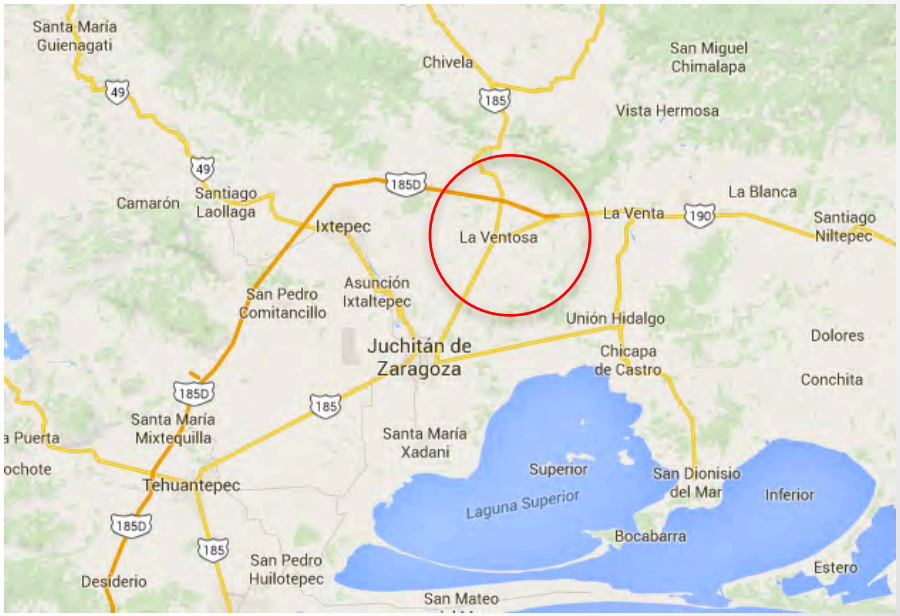
Presentation Outline

- The language: Diidxa Za
- Theoretical overview
- Elicitation and experimental tasks
- Domain comparisons in meronymy assignment
- Division of labor: meronymy and frames of reference
- Conclusions: perspectives from an endangered language

The language

- Diidxa Za
  - a.k.a. Juchiteco (JCH), Juchitán Zapotec, Isthmus Zapotec, zapoteco de la planicie costera
  - Otomanguean > Zapotecan > Zapotec
    - Zapotec languages – as complex as the Romance language family
- Spoken in 22 municipalities in the state of Oaxaca
  - Endangered language
    - 70,000 speakers
    - In only 2 of 22 municipalities are children learning the language (Marcial Cerqueda 2014 ms.)
  - Data mostly from La Ventosa variety
    - In La Ventosa, the youngest speakers are in their 20s

Map 1: State of Oaxaca, Mexico



Map 2: La Ventosa, Juchitán de Zaragoza

Theoretical background

Meronymy in Mesoamerican languages

- Locatives derived from body part terms (BPTs) are considered an areal MA feature (Campbell, Kaufman & Smith-Stark 1986)
  - BPTs as locatives are not unique to MA, but there is a particular prevalence of BPTs which often remain nominal in locative predication which has been reported as a noteworthy phenomenon for MA
- BPT use in locative constructions is attested in
  - Otomanguean
    - Zapotec: **MacLaury 1989**, Lillehaugen 2006, Pérez Báez 2012, Lillehaugen and Sonnenschein (eds.) 2012
    - Mixtec: Brugman 1983, Brugman & Macaulay 1986
    - Triqui: Hollenbach 1987, 1988, 1990
  - Mayan
    - **Tzeltal: Levinson 1994**
    - Tzotzil: de León 1992
  - Tarascan, Totonac: Friedrich 1970, 1971, Levy 1992, 2006

MacLaury 1989 Ayoquesco Zapotec

1. Base: human body
   - "any form is regarded as though it were the human body"
2. Dependency on the "conception of human anatomical organization"
3. Prototypicality is critical: a small set of BPTs can be used in "a transposable locative framework
   - 'face', 'back', 'head', 'stomach', 'ribs, flank', 'lower extremity'
   - Some BPTs are restricted, ex. 'hand', 'neck'
4. "The seven-part vertical framework is maintained with formal integrity"
5. Speakers are tolerant of discrepancies between base and target

- **Metaphor is cited but no description of the type of comparisons is offered**
- **No explanation for the difference in productivity of BPTs is offered.**

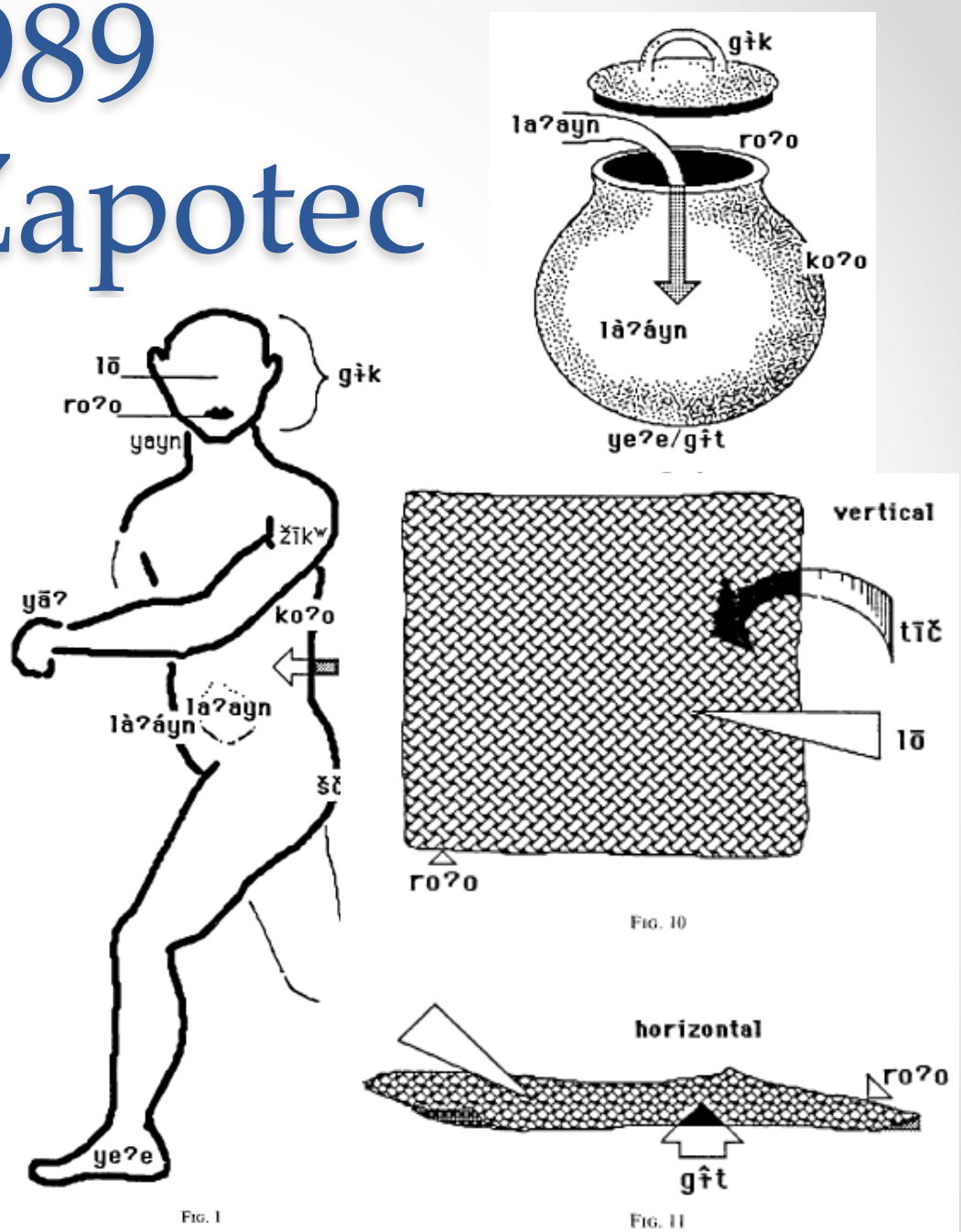


Figure 1. Diagrams of Ayoquesco Zapotec body part terms, adapted from MacLaury 1989:122, 125 and 129

Levinson 1994 Tzeltal Maya

- Rejects an analysis based on metaphor or generative analogy and proposes a precise geometrical algorithm is at play
  - Orientation-free, based on shape analysis
- Critique of metaphor explanation
  - Overgeneration of comparison and semantic extension
  - That not all BPTs are extended outside their semantic domain
  - A lack of involvement of notions such as canonical orientation, normal direction of motion, dangerous end
  - Possible mismatches between the base and the target, ex. Three hands, two noses.
  - Naming of parts of simple objects is contrary to simple/concrete-to-complex/abstract direction in analogy and metaphor.

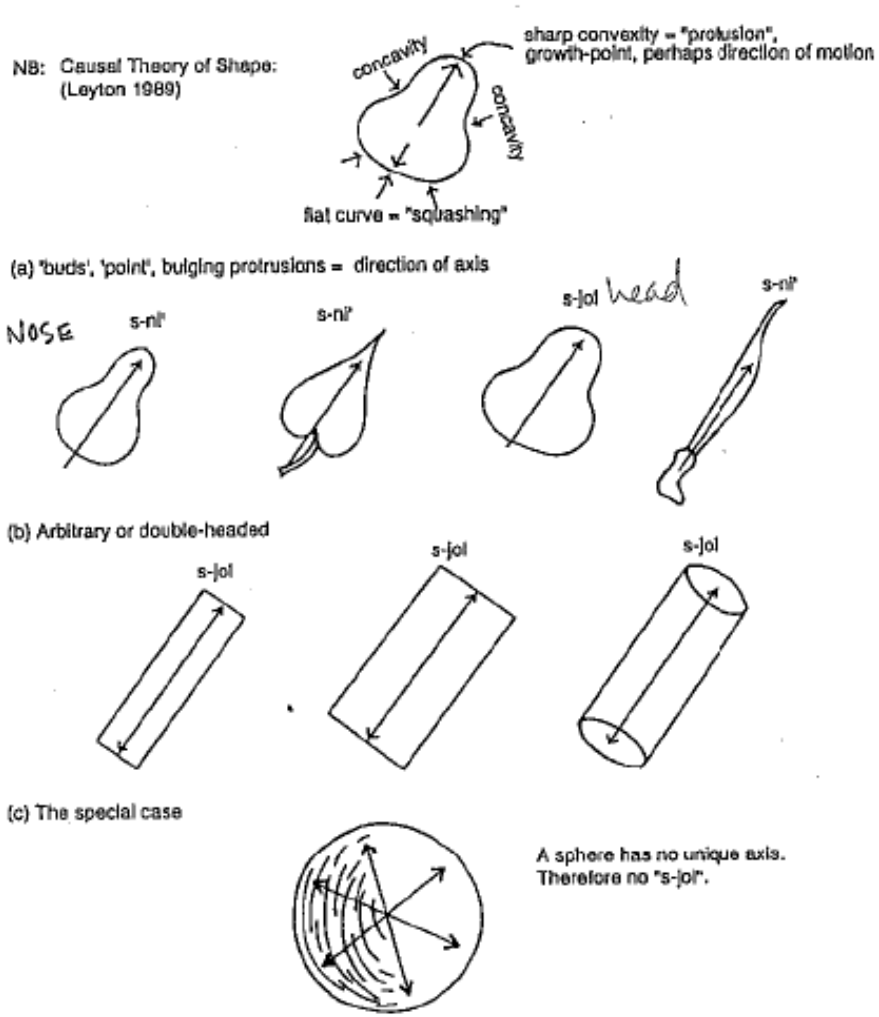


Figure 1. Diagrams of Tzelta body part terms, adapted from Levinson 1994: 818.

Questions/Thoughts

- What is the role of metaphor, if any?
  - Both studies discuss metaphor without a clear analysis of it
  - MacLaury 1989 seems to rely on a view of metaphor as domain mapping
  - Levinson 1994 seems at times to restrict metaphor to analogy
    - However, the arguments against a metaphoric process seem to rely on attribute matching (literal comparison)
  - This makes it difficult to assess the role of metaphor and understand the processes behind the semantic extension of BPTs
- How productive are BPTs and why?
  - MacLaury 1989 does not discuss different degrees of productivity
- Does the meronymic system interface with other systems?

Elicitation and experimental tasks

Preliminary data

- Project for the documentation of the languages of Mesoamerica (PDLMA)
  - Diidxa za Lexical database (Pérez Báez et al. Ms.).
- Data from 15 speakers
  - La Ventosa, Juchitán de Zaragoza and Santa María Xadani
  - Bilinguals

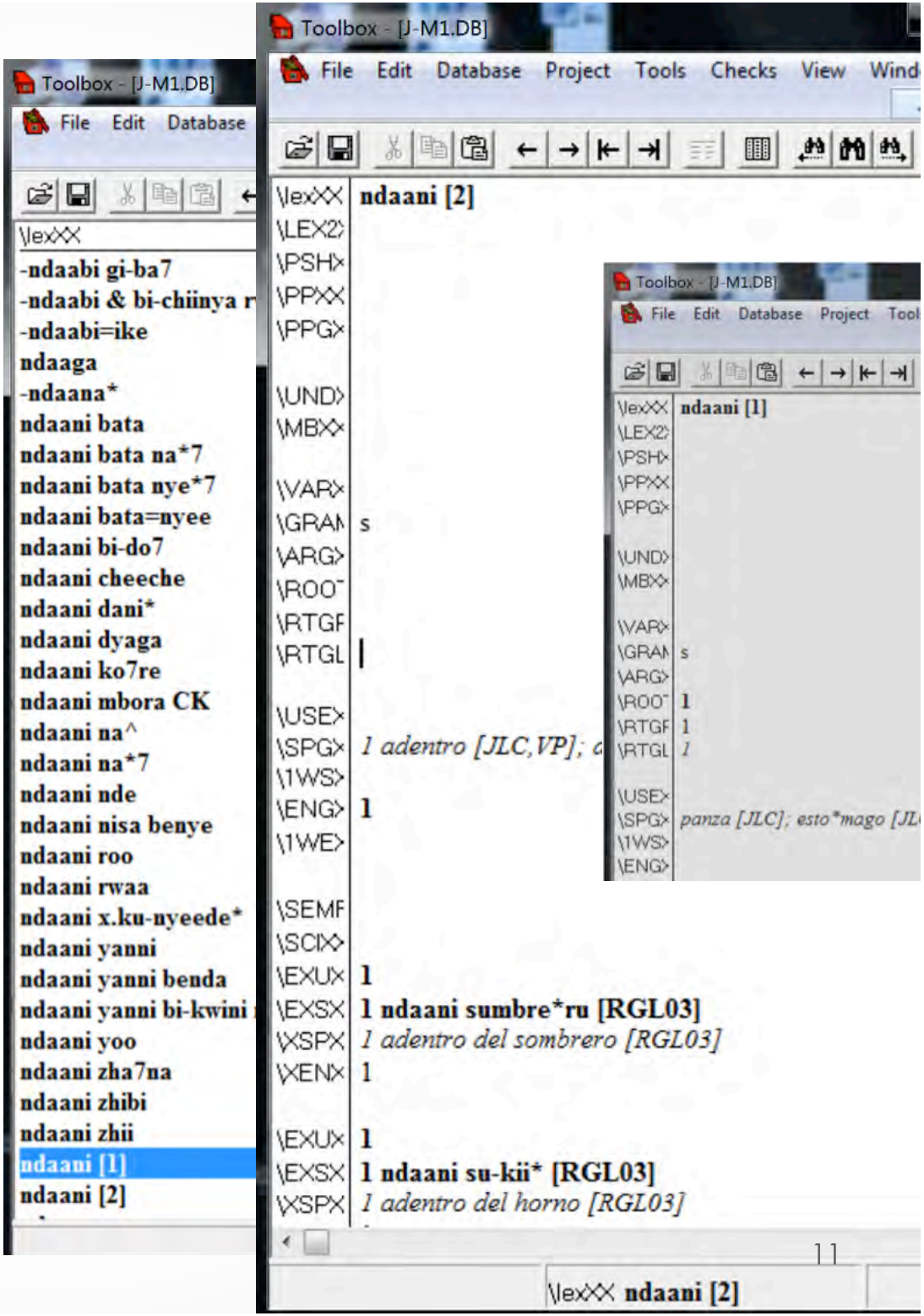


Figure 3. Screen captures, Diidxa Za – Spanish – English lexical database (Pérez Báez, Kaufman and Feke ms)

MesoSpace experimental tasks

- Spatial Language and Cognition in Mesoamerica (MesoSpace I and Ib)
  - Data presented today is from MesoSpace I (Cf. Bohnemeyer 2008)

1. **Meronyms**
   - **Data from 9 participants coded and analyzed**
2. **Novel objects part identification**
   - **Data from 6 dyads coded and analyzed**
3. Novel objects placement
   - Data from 6 dyads
4. Ball and Chair (referential communication task, photo matching)
   - Modeled after Men and Tree (Pederson *et al.* 1998:562)
   - Data from 6 dyads coded and analyzed
5. New Animals in a Row
   - Non-linguistic task modeled after Animals in a Row (Levinson and Schmitt, 1993)
   - Data from 19 participants coded and analyzed

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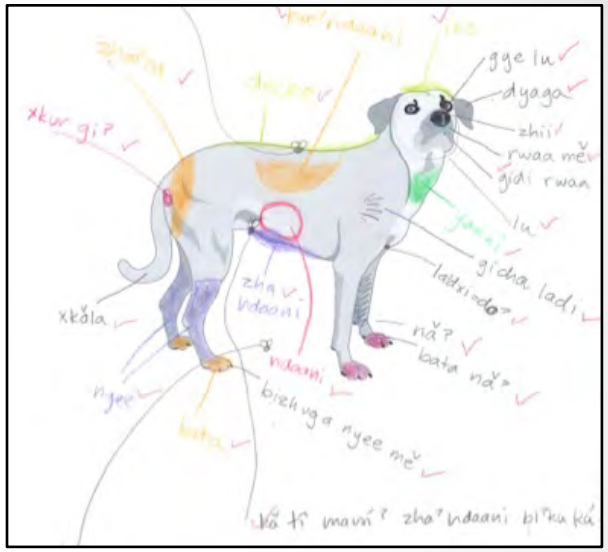
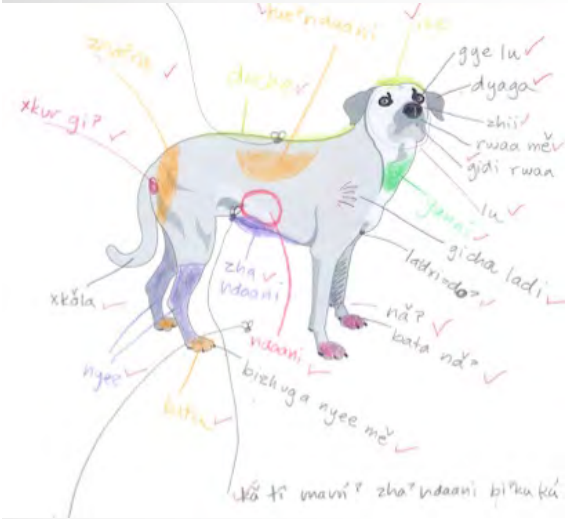
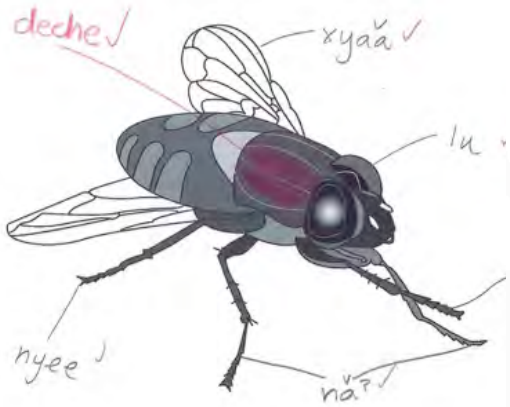


Figure 4. Stimuli – body part drawings
Figure 5. Stimuli – Novel object part identification task #5

Meronyms





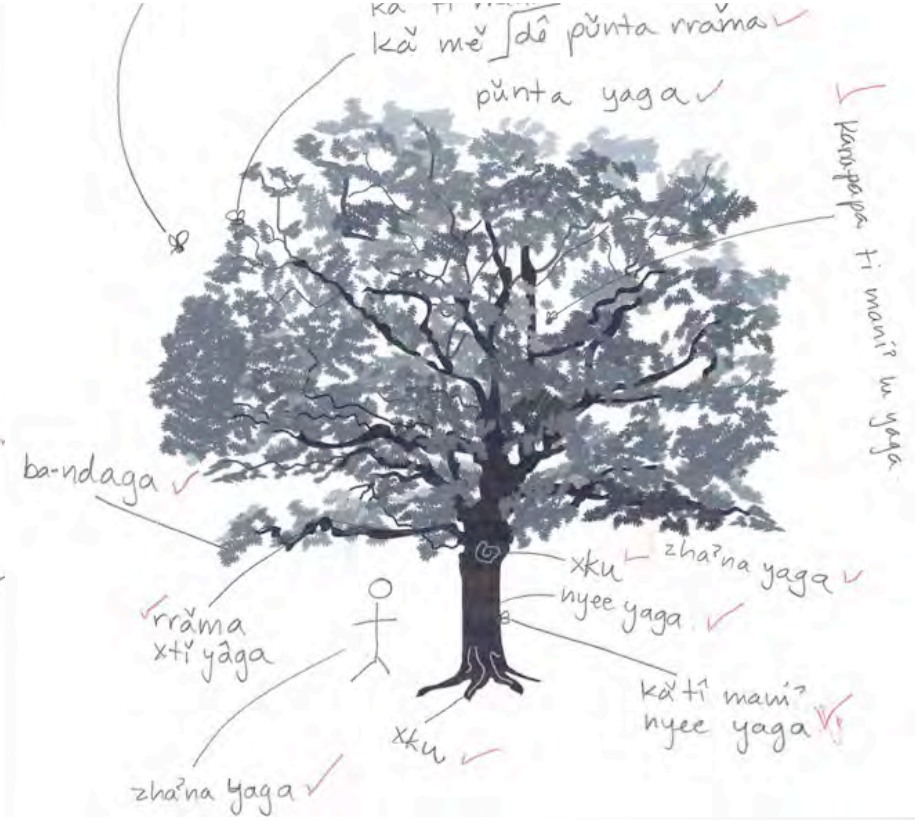
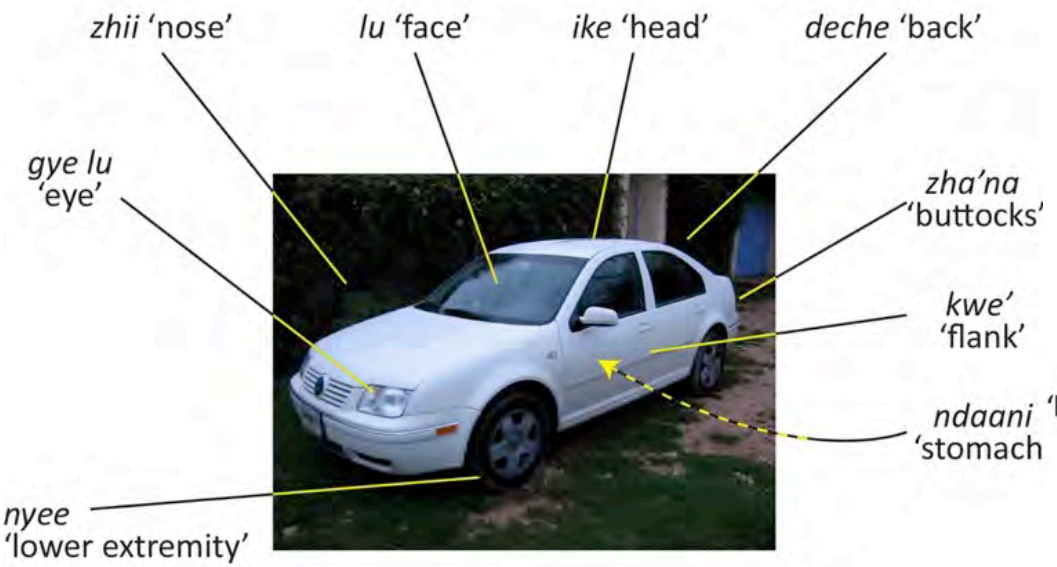
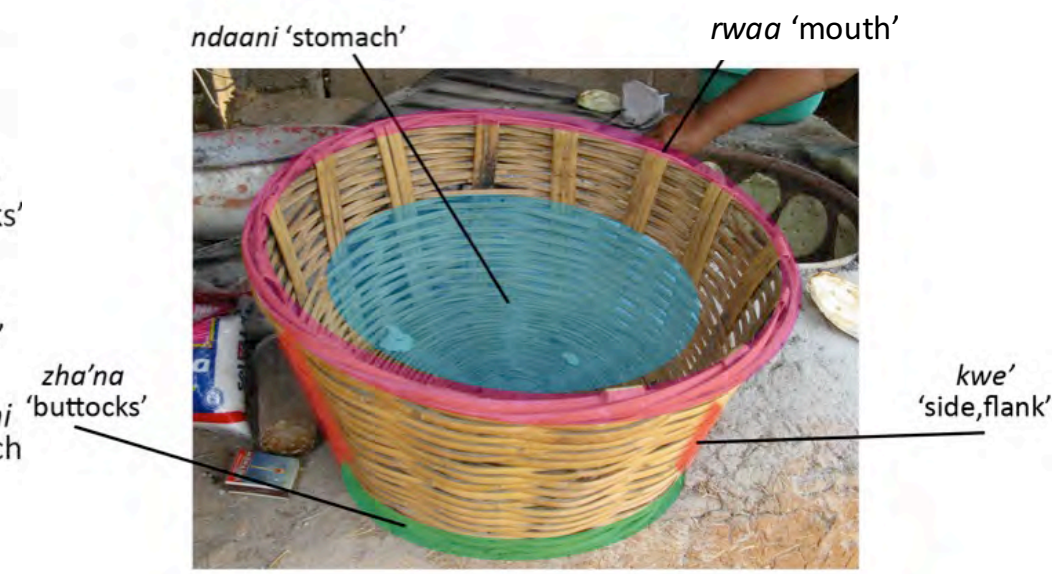


Figure 6 (Top drawings). Stimuli – body part drawings
Figure 7 (Bottom photos). Stimuli – ordinary objects





Novel objects (the *chunches*)

- Stimuli
  - Set of nine novel objects
  - Objects of novel shape intended not to resemble any objects or animals recognized in either Mesoamerican or Euro-American culture
  - Design informed by the literature on BPT use in Mesoamerica

- Research questions
  - How productive are meronymies across the languages of the sample?
  - What is the role of global analogical domain mappings in MA meronymies?
  - To what extent is there variation in the global analogical mappings and shape-analytical labeling algorithms found in different languages?
- Can parts be named with BPTs independently of a match in canonical number of parts in the base?
  - Can we have three "noses" or "nipples"?
    - Yes: *nyee* 'lower extremity', *xidxi* 'breasts'
- Are meryonyms assigned to objects without identifiable features arbitrarily or in analogy to the human body?

Figure 8. Stimuli – Novel object part identification task #3

Figure 9. Stimuli – Novel object part identification task #5

Figure 10. Stimuli – Novel object part identification task #8

Novel objects part identification

- Referential communication task
  - Object-to-object matching tasks
  - Novel objects are prepared with markings
  - Participants extract an object from a bag as to no impose an orientation
  - A director instructs the matcher to replicate the markings
- Central data: verbal descriptions and their referents
  - Data from 6 dyads
  - Notes, audio, video

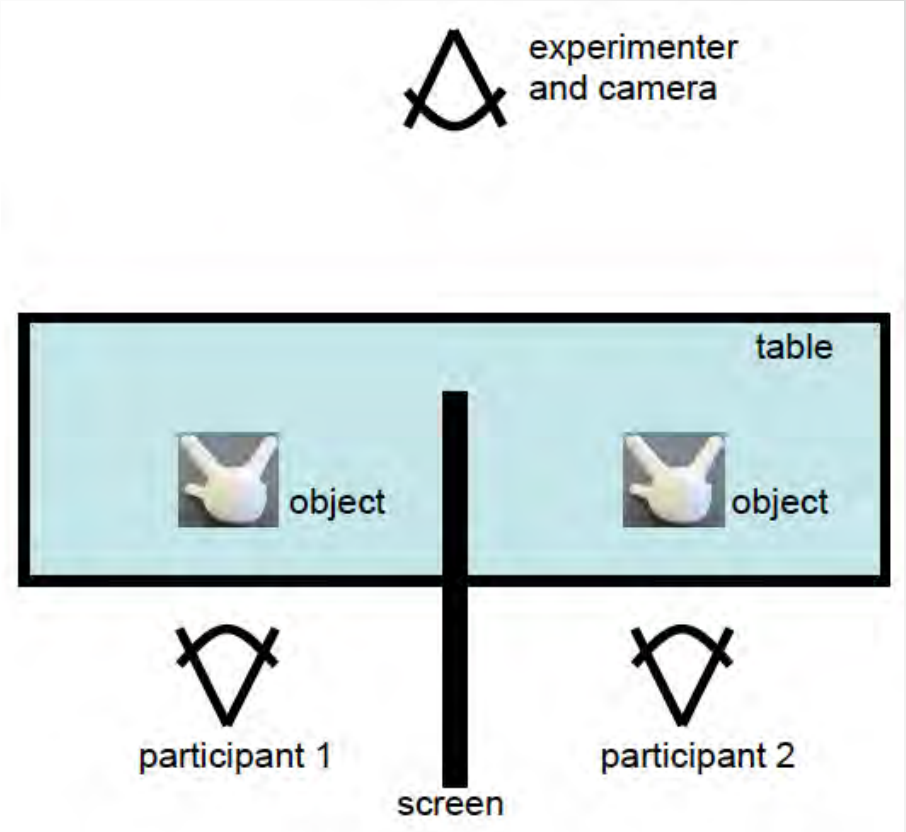


Figure 11. Experimental task setup (Bohnemeyer 2008: 16)

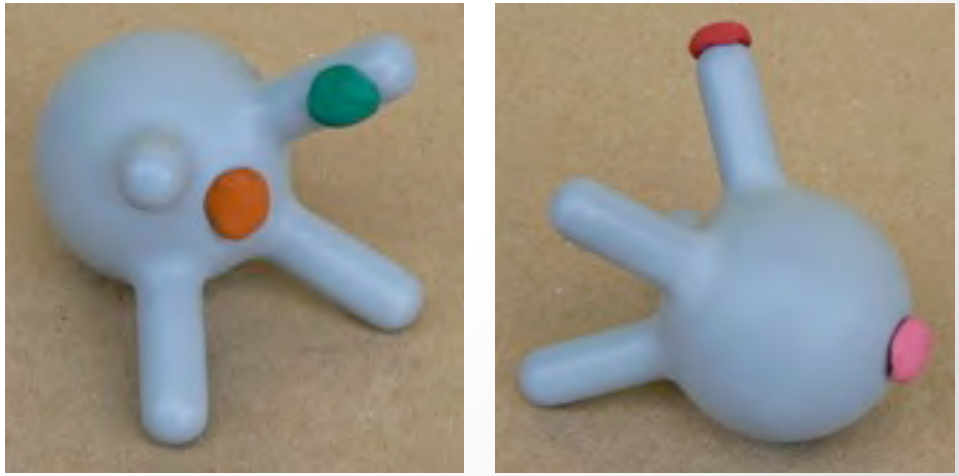
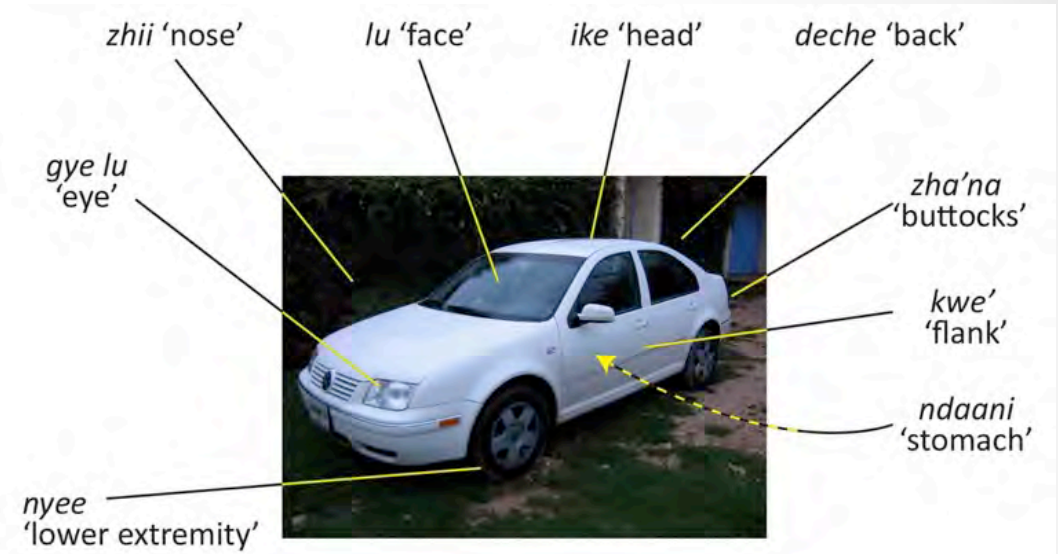


Figure 12. Stimuli – Novel object part identification task #6

Domain comparisons in meronymy assignment…

Overall corpus

- 9 participants provided **134** body part terms BPTs
  - **Less** productive: **90** were used only in a **single** semantic domain
  - 25 were used to refer to animal (human and non-human) bodies
  - **More** productive:
    - **16** were used to refer to animal (human and non-human) bodies, plant parts and object parts
    - **6** most productive BPTs can be used with the simplest of objects



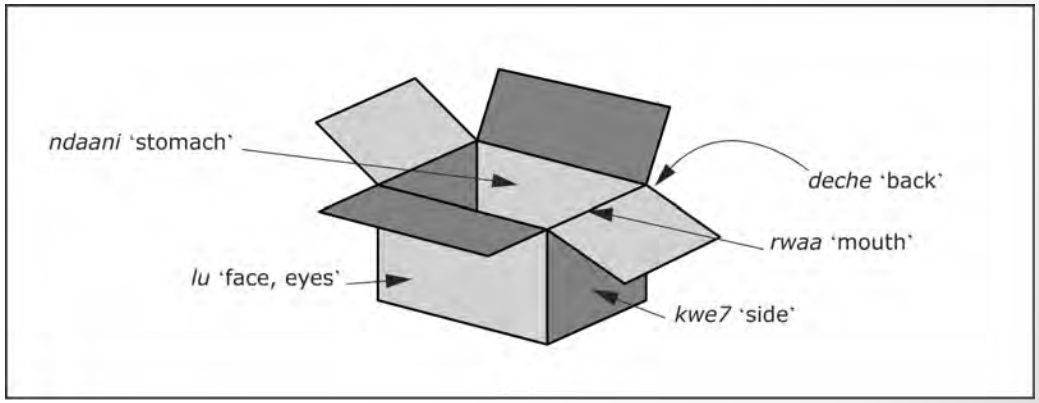


Figure 13 (Top photo). Stimuli – Ordinary object of complex geometry
Figure 14. (Bottom drawing). Stimiuli – Ordinary object of simple geometry

Novel objects – corpus

	TPC	Eng gloss	Note	Frequency	Dyads
1	nyee	lower extremity		47	1-2, 3-4, 7-8, 9-11, 18-19
2	lu	face		46	1-2, 3-4, 7-8, 9-11
3	kwe7	flank		43	1-2, 3-4, 9-11, 18-19,
4	ndaani	stomach, belly		19	1-2, 3-4, 7-8, 9-11, 18-19
5	zha7na	buttocks		15	1-2, 3-4, 9-11,
6	na*7	upper extremity		11	1-2, 3-4, 7-8, 18-19
7	gipi!7, xkipi!7	belly button	unpossessed, possessed	8	1-2, 9-11
8	ike	head		8	1-2, 3-4, 9-11, 18-19
9	dyaga	ear		7	9-11
10	deche	back		6	1-2, 3-4, 7-8, 9-11
11	gye lu	eye		6	1-2, 3-4, 7-8
12	yanni	neck		4	1-2, 9-11
13	zhii	nose		3	3-4, 9-11
14	j.lo*mo	back (non-human)	Sp loan	2	5–6
15	kosta*du	flank	Sp loan	2	1-2
16	rwaa	mouth		2	1-2, 3-4
17	xyaa	wing		2	9-11
18	ko*la	tail	Sp loan	1	18-19
19	kwe7 ti7xi	hip		1	9-11
20	barri*ga	stomach, belly	Sp loan	1	9-11
21	pa*ta	lower extremity (non-human)	Sp loan	1	9-11
22	xidxi	breast, teat		1	9-11

Analytical principles

- In analyzing the use of BPTs to name parts of novel objects, mappings appear mixed
  - With relations as well as attributes
  - With a shared base domain
- Literal similarity and analogy are on a continuum (Gentner 1983:161)
  - *Literal similarity*
    - Mapping of predicates
    - **More predicates are mapped than not**
    - Predicates may include attributes as well as relations
  - *Analogy*
    - Comparison between relational predicates
    - Few or no attributes are mapped

Literal Similarity		Analogy
++	Attributes	--
--	Relations	++

- In abstraction, the base domain is an abstract set of relations

Literal similarity

- ***dyaga*** 'ear'

1) *ko7lu* ***dyaga*** *wiini* *ka!*
no face **ear** small DEM
gi!7di *+ni**
adhered +3i
'no, it is stuck to the ear'

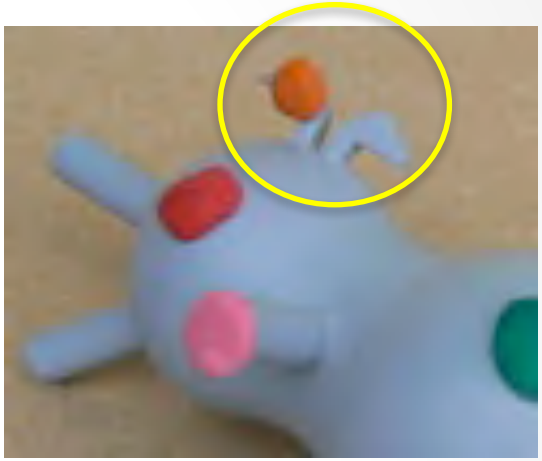


Figure 15. Stimuli – Novel object part identification task #7

	Base domain	Target domain
Attributes	APPENDICES SMALL	APPENDICES SMALL
Relations	TWO/PAIR, OPPOSITE (a,b) ATTACHED (part, volume)	TWO/PAIR, OPPOSITE (a,b) ATTACHED (part, volume)

Literal similarity

Figure 16. Stimuli – Novel object part identification task #7

- ***x.kipi!7*** 'belly button'

2) ra n.apa* +ni* ti+ **x.kipi!7** wiini la!
LOC STA.have 3I INDEF **POS.belly-button** small FOCUS

gi!7di ti+ na-yase!7
adhered INDEF STA-black

'a black (piece) is adhered where it has a belly button'

	Base domain	Target domain
Attributes	CIRCULAR SCAR (?)	CIRCULAR
Relations	DEPRESSION or PROTRUSSION (part, surface), NEAR-INTERSECTION (sagittal axis/plane, transverse axis/plane, frontal axis/plane)	DEPRESSION (part, surface), NEAR-INTERSECTION (sagittal axis/plane, transverse axis/plane, frontal axis/plane)

Analogy

- ***na*7*** 'upper extremity'

3) *ka7* ***na*7*** *wiini*
PL **hand** small
'the hands'

Figure 17. Stimuli – Novel object part identification task #5

	Base domain	Target domain
Attributes	ARTICULATED (MOVABLE?) WITH APPENDAGES	
Relations	EXTENSION (part, whole) TWO/PAIR OPPOSITE (a,b)	EXTENSION (part, whole) OPPOSITE (a, b; c, d)

Analogy

- ***nyee*** 'lower extremity'

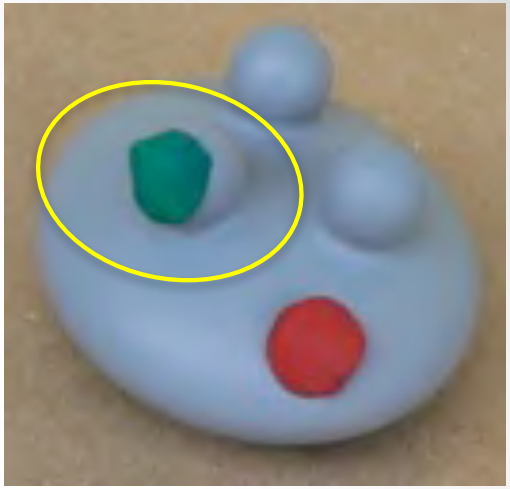


Figure 20. Stimuli – Novel object part identification task #3

4) ***nyee*** *+ni* ka!*
lower-extremity +3I DEM
gi!7di ti+ ndaa bo*la wiini be*rrde*
Adhered DEM+ piece ball small green
'Its leg, a green piece is stuck (to it)'

	Base domain	Target domain
Attributes	ARTICULATED (MOVABLE?) WITH APPENDAGES	
Relations	EXTENSION (part, whole) TWO/PAIR SUPPORT (part, whole) PARALLEL (a,b)	SUPPORT (part, whole)

Analogy

- ***nyee*** 'lower extremity'

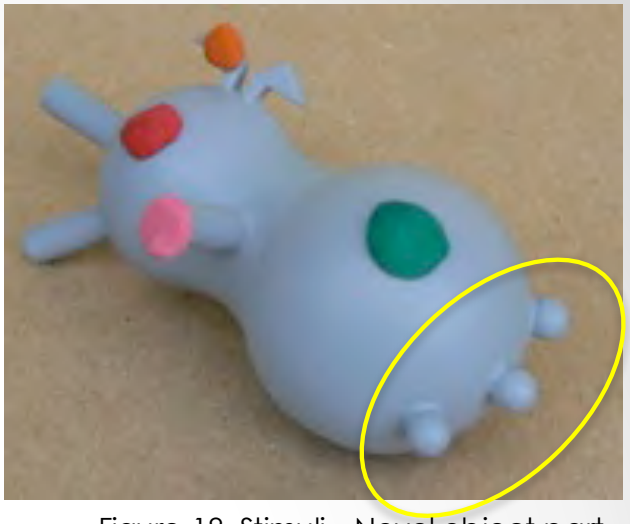


Figure 18. Stimuli – Novel object part identification task #7

5) *ra*	*n.apa**	*+ni**	*chupa**	*chonna**
LOC	STA.have	+3I	dos	tres
nyee		*+ni**	*ka!*	*la!*
lower.extremity		+3I	DEM	FOCUS

'where it has a few legs'

	Base domain	Target domain
Attributes	ARTICULATED (MOVABLE?) WITH APPENDAGES	
Relations	EXTENSION (part, whole) TWO/PAIR SUPPORT (part, whole) PARALLEL (a,b)	SUPPORT (part, whole) "pretend" support seems sufficient to sustain the analogy

Abstraction

- Set of six BPTs
  - Base domain: an abstract relational structure comprised of axis and planes
  - Target domain: may be objects with few to no parts
- These are the most productive BPTs
  - Attested in domains of animal (human, non human) anatomy, plant morphology and object geometry
  - Used in cases of few, simple or no parts

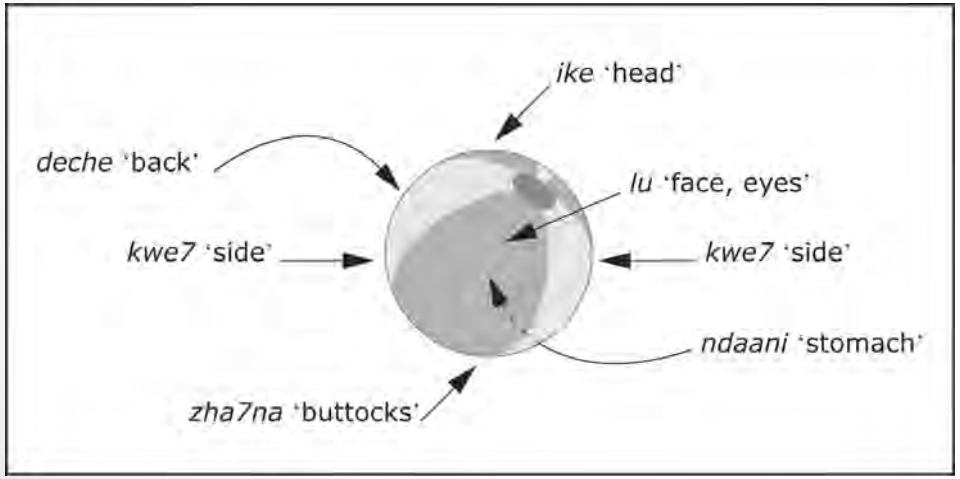


Figure 19. Set of six most productive BPTs applied to ordinary object of simple geometry

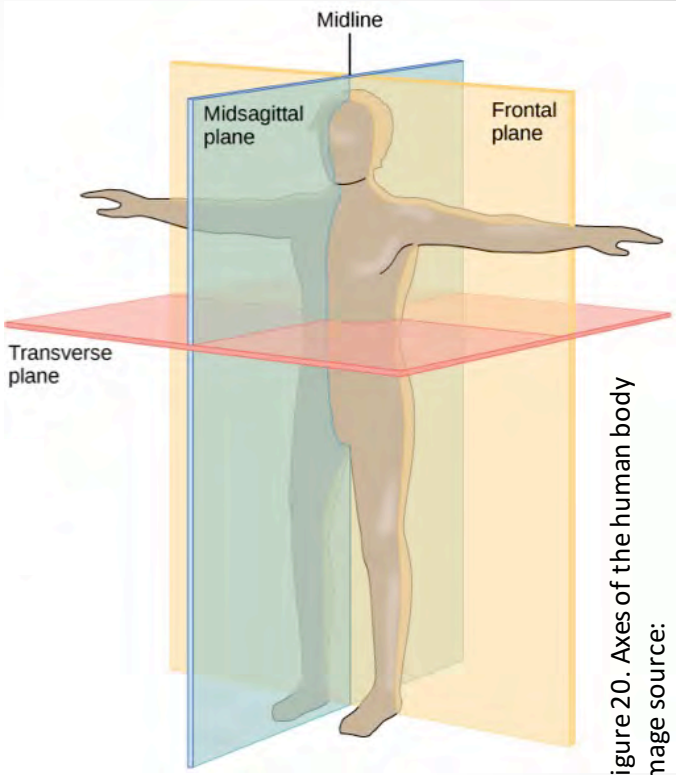
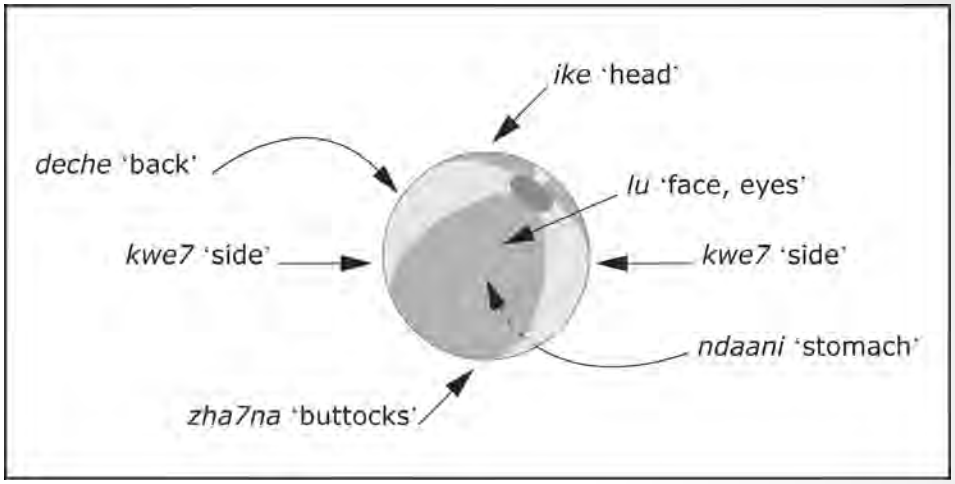


Figure 20. Axes of the human body
Image source: http://biowiki.ucdavis.edu/Textbook_Maps/OpenStax_Biology/7%3A_Animal_Structure_and_Function/33%3A_The_Animal_Body%3A_Basic_Form_and_Function/33.1%3A_Animal_Form_and_Function

TPC	Eng gloss	Abstract relations
ike	*head*	TOP END (vertical axis)
zha7na	*buttocks*	BOTTOM END (vertical axis)
lu	*face*	ANTERIOR (frontal plane)
deche	*back*	POSTERIOR (frontal plane)
kwe7	*flank*	END (transverse axes)
ndaani	*stomach, belly*	INTERIOR (volume)

Interface with Frames of Reference (FoR)

- Mapping in the context of abstraction is dependent upon a projection of a relative FoR
  - This is an otherwise disprefered FoR (Pérez Báez 2011)
  - But a projection from the speaker's perspective is required for mapping in a case of abstraction



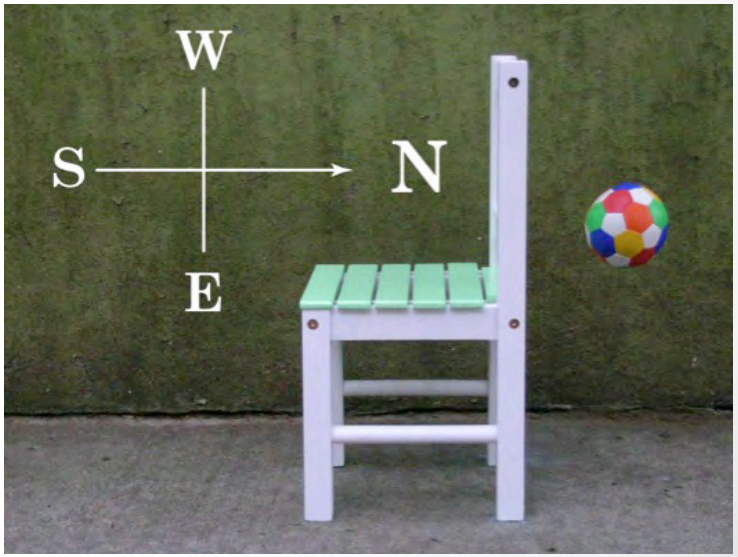


Figure 21 (Top). Set of six most productive BPTs applied to ordinary object of simple geometry
Figure 22 (bottom). Model of an abstract FoR

Summary

Figure 23. Stimuli – Novel object part identification task #7

Figure 24. Stimuli – Ordinary object of simple geometry

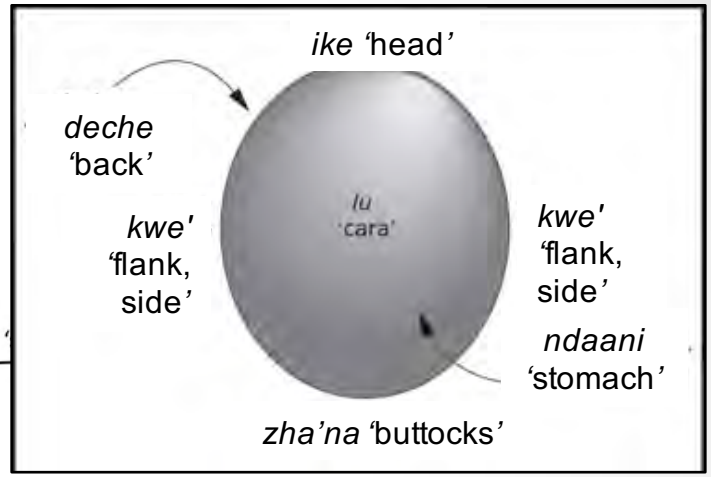


Figure 25. Abstraction of the relational structure between the six most productive BPTs

LITERAL COMPARISON	ANALOGY	ABSTRACTION
++	Attributes	--
--	Relations	++
Mapping of a higher number of predicates including attributes and relations	Mapping of a higher number of relations than of attributes; some predicates are not mapped	The base domain is an abstraction THE MAPPING OF RELATIONS DEPENDS ON THE USE OF THE RELATIVE FoR

Patterns of use

- Critique of metaphor-driven semantic extension: it will over-generate analogies (Levinson 1994)
  - Could the protuberances in NO3 be called knees, noses, knuckles, warts, ears?
    - Probably not

Relator		Relator Type	By Dyad (token)
bo*la wiini	small ball	Loan word	7.8 (2); 9.11 (3); 18-19 (1)
nyee	lower extremity	BPT	1-2 (3); 3-4 (4)
lu	face	BPT	1.2 (1)
xidxi	breast	BPT	9-11 (1) during repair and with visual contact

Figure 26. Stimuli – Novel object part identification task #3

Conventions

- There are clear tendencies for preference of certain BPTs across dyads
  - Preference for 6 BPTs of the abstract relational model
  - And the extremities
- This is indicative of a shared system of conventions of semantic extension
  - That still allows for individual flexibility

TPC	Eng gloss	Prod.	# of dyads	Dyads
nyee	lower extremity	H>A>O	5	1-2, 3-4, 7-8, 9-11, 18-19
ndaani	stomach, belly	H>A>O	5	1-2, 3-4, 7-8, 9-11, 18-19
lu	face	H>A>O	4	1-2, 3-4, 7-8, 9-11
kwe7	flank	H>A>O	4	1-2, 3-4, 9-11, 18-19
na*7	upper extremity	H>A>O	4	1-2, 3-4, 7-8, 18-19
ike	head	H>A>O	4	1-2, 3-4, 9-11, 18-19
deche	back	H>A>O	4	1-2, 3-4, 7-8, 9-11
zha7na	buttocks	H>A>O	3	1-2, 3-4, 9-11
gye lu	eye	H>A>O	3	1-2, 3-4, 7-8
gipi!7, xkipi!7	belly button	H(>A)	2	1-2, 9-11
yanni	neck	H>A>O	2	1-2, 9-11
zhii	nose	H>A>O	2	3-4, 9-11
rwaa	mouth	H>A>O	2	1-2, 3-4
dyaga	ear	H>A>O	1	**9-11**
j.lo*mo	back (non-human)	(A)	1	5–6
kosta*du	flank	?	1	1-2
xyaa	wing	A	1	**9-11**
ko*la	tail	A	1	18-19
kwe7 ti7xi	hip	A	1	**9-11**
barri*ga	stomach, belly	(H)	1	**9-11**
pa*ta	lower extremity (non-human)	?	1	**9-11**
xidxi	breast, teat	H	1	**9-11**
pi*ku	bill	A	1	3-4

Critiques of metaphor-based explanation

1. Overgeneration of comparison and semantic extension
2. That not all BPTs are extended outside their semantic domain
3. Possible mismatches between the base and the target, ex. Three hands, two noses.
4. Naming of parts of simple objects is contrary to simple/concrete-to-complex/abstract direction in analogy and metaphor.

Response based on SMT approach

1. Clear patterns of shared preferences
2. Preferred BPTS from relational model + extremities but other BPTs can be extended too
3. Explained by analysis of different types of comparisons
4. Explained by interface between meronymy and FoR use

Conclusions

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Contributions by endangered languages
to the study of spatial language and cognition

Some languages informing our research

- Otomanguean
  - Zapotec: MacLaury 1989, Lillehaugen 2006, Pérez Báez 2012, Lillehaugen and Sonnenschein (eds.) 2012
  - Mixtec: Brugman 1983, Brugman & Macaulay 1986
  - Triqui: Hollenbach 1987, 1988, 1990
- Mayan
  - Tzeltal: Levinson 1994
  - Tzotzil: de León 1992
- Tarascan, Totonac:
  - Friedrich 1970, 1971, Levy 1992, 2006

Enfield, Majid, van Staden (2006)

- Jahai (Malaysia, Burenhult)
- Lao (Laos, Enfield)
- Kuuk Thaayorre (Australia, Gaby)
- YéLî Dnye (Papua New Guinea, Levinson)
- Punjabi (Pakistan/India, Majid)
- Tiriyó (Brazil/Surinam, Meira)
- Lavukaleve (Solomon Islands, Terrill)
- Tidore (Indonesia, van Staden)
- Savosavo (Solomon Islands, Wegener)
- American Sign Language (USA, Pyers)

Their vitality status

- Tzeltal
  - 260,000, at risk, (ELCat)
- Tzotzil
  - 229,200, at risk (ELCat)
- Tarascan
  - 117,200, threatened (ELCat)
- Totonac
  - Papantla, 80,000, vulnerable (ELCat)
- Isthmus Zapotec
  - 80,000, vulnerable (ELCat)
- Chalcatongo Mixtec
  - Western Alta Mixtec, 61,000, vulnerable (ELCat)
- Copala Triqui
  - Triqui, 25,880, vulnerable (ELCat)
- Ayoquesco Zapotec
  - 880 speakers, endangered (ELCat)
- Tlacolula Valley Zapotec
  - ?, critically endangered (my assessment)
- Punjabi
  - 90M, developing
- Lao
  - 3M, national (Ethnologue)
- American Sign Language
  - 250,000, developing (Ethnologue)
- Tidore
  - L1-26,000, L2-20,000, vigorous (Ethnologue)
- Tiriyó
  - 2,450, threatened (ELCat)
- Savosavo
  - 2,500, threatened (ELCat)
- Lavukaleve
  - 1,700, threatened (ELCat)
- Kuuk Thaayorre
  - 150, endangered (ELCat)
- Jahai
  - 1,000 – 9,999, threatened (Ethnologue)
- Yélî Dnye
  - 4,000, N/A (Levinson 2006)

ELCat: Endangered Languages Catalog

To close

- Our understanding of the human language faculty in all its facets depends heavily on our ability to study a diversity of language of the world
- Our ability to learn about a critical ability that defines humans is threatened by current trends and forecasts for the number of silenced languages

- At GeoGrounding!
  1. Isthmus Zapotec
  2. Chiapas Zoque
  3. Traditional aṣ-Ṣāniʿ Arabic
  4. Dhivehi
  5. Atoll-based Marshallese
  6. Murrinhpatha
  7. Shua
  8. Caac
  9. Finnish
  10. Language contact in Viking-Age colonies in the British Isles, North America, Australia and Greenland
  11. Danish
  12. English
  13. Icelandic, Faroese, Greenlandic
  14. Kalasha
  15. Palula
  16. Acazulco Otomí
  17. Dene
  18. Saaroa
  19. Komnzo
  20. Mexican Spanish

Xki*zhepe’ laatu* • Tak • Thank you