Meronymy and reference frames: Preliminary evidence

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with contributions from the MesoSpace team of researchers

Meronomy Across Languages
September 28, 2013
Outline

• Introduction
  – Spatial frames of reference
  – MesoSpace: team, goals, tools

• Tasks for data collection
  – Reference Frames: Ball & Chair
  – Meronymy: Novel Objects I

• Findings

• Discussion
Spatial Frames of Reference

• two kinds of *place functions* (Jackendoff 1983) – i.e., functions from reference entities into regions
  • *topological* (Piaget & Inhelder): perspective- or frame-free
    – independent of the orientation of the ground, the observer, and the figure-ground array (the configuration)

Fig. 1. Some configurations that might be described in terms of topological place functions

(1.1) *The apple is on the skewer*
(1.2) *The band aid is on the shin*
(1.3) *The earring is in the ear (lobe)*
Spatial frames of reference (cont.)

- **projective** – framework-dependent
  - the place function returns a region defined in a coordinate system centered on the reference entity
  - the axes of the coordinate system are derived from an **anchor**
    - in **intrinsic** frames, the anchor is the reference entity/ground
    - in **relative** frames, it is the body of an observer
    - in **absolute** frames, it is some environmental entity/feature

**Intrinsic**

*The ball is front of the chair.*

**Relative**

*The ball is to the right of the chair.*

**Absolute**

*The ball is east of the chair.*

**Fig. 2.** The three types of spatial reference frames distinguished in Levinson 1996, 2003
Spatial frames of reference (cont.)

- Reference frames are used in the interpretation of spatial relators

<table>
<thead>
<tr>
<th>The ball is in front of the chair</th>
<th>true in a relative frame?</th>
<th>true in an intrinsic frame?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ball is left of the chair</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Fig. 3.** Truth conditions of intrinsic and relative descriptions of Ball & Chair 3.9
• No grammatical restrictions on what frames may be used

• However, a possible lexico-syntactic factor that may influence frame use
  – the productive use of shape-based meronyms in the representation of space
Research Questions

• How do preferences for reference frame types interact with systems of meronym assignment?
  – Is there a significant (i.e. predictable) correlation?
  – Is there a causal relationship?
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MesoSpace: team, goals, tools

- **Spatial language and cognition in Mesoamerica**
- **13 Mesoamerican (MA) languages** (Campbell, Kaufman, & Smith-Stark 1986)
  - **Mayan**
    - Chol (J.-J. Vázquez)
    - K’anjob’al (E. Mateo)
    - Tseltal (several variants; G. Polian)
    - Yucatec (PI: J. Bohnemeyer)
  - **Mixe-Zoquean**
    - Ayutla Mixe (R. Romero)
    - Soteapanec (S. Gutierrez)
    - Tecpatán Zoque (R. Zavala)
  - **Oto-Manguean**
    - Isthmus (Juchitán) Zapotec (G. Pérez)
    - Otomí (N. Hernández, S. Hernández, E. Palancar)
  - **Huave** (S. Herrera)
  - **Purépecha** (A. Capistrán)
  - **Totonac-Tepehuan**
    - Huehuetla Tepehua (S. Smythe)
  - **Uto-Aztecan**
    - Pajapan Nawat (V. Peralta)
• 6 non-MA “controls”
  – Seri (C. O’Meara)
  – Cora (Uto-Aztecan; V. Vázquez)
  – Mayangna (E. Benedicto, A. Eggleston in collaboration with the Mayangna Yulbarangyang Balna)
  – Mexican, Nicaraguan, and Barcelonan Spanish (R. Romero; E. Benedicto, A. Eggleston)

• 2 (interrelated) domains
  – frames of reference
  – meronyms

Fig. 7 The MesoSpace team

Fig. 8 Meronyms in Ayoquesco Zapotec (left) and Tenejapa Tseltal (adapted from MacLaury 1989 and Levinson 1994)
Some MesoSpace Goals

• Observed co-occurrence of
  – bias against relative (observer-projected) frames of reference
  – highly productive use of meronymic terminologies that are based primarily on object geometry across the languages of the Mesoamerican (MA) area.
Hypothesized correlation

- Speakers of languages with productive meronymy systems are habituated to object-geometry; a thinking-for-speaking effect then causes them to disfavor the relative
- Therefore, if a language has productive meronyms (measured by lexical meronyms in the Novel Objects task), their relative use should be low (measured by the percentage of pictures for which a relative frame was used).
Mesoamerican Confound

• The causal effect of productive meronymy on frame use is masked by the Mesoamerican area, since these properties may be shared via historical contact
• Evidence from outside Mesoamerica is needed
MesoSpace 1b

“Spatial language and cognition beyond Mesoamerica”
( NSF award #BCS 1053123)

• Meronym data from outside Mesoamerica
  – Jahai (Mon-Khmer, Malaysia; N. Burenhult)
  – Kujireray (Joola, Senegal; R. Watson)
  – Vietnamese (Mon-Khmer; J. Lovegren)
  – Wan (Mande, Côte d’Ivoire; T. Nikitina)
  – Bashkir (Turkic, Russia; T. Nikitina)
  – Yurakaré (isolate, Bolivia; R. van Gijn and V. Hirtzel)
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The Ball & Chair study

- Task for studying reference frame use in discourse
  - a referential communication task: Ball & Chair (B&C)
    - replacing Men & Tree (M&T) in Pederson et al (1998) etc.
    - B&C allows us to discover selection preferences for any of the reference frame types
  - 4 sets of 12 photos; ~5 pairs per population

Fig. 9. Design of the Men and Tree task (Pederson et al. 1998: 562)

Two sets of 12 photos, shuffled and placed randomly in front of each player. Within the set of photos are a target subset and some distractors.

Fig. 10. Two of the Ball & Chair photos, featuring an intrinsic contrast
The Ball & Chair study (cont.)

• the present study - B&C data from 12 varieties
  • 7 Mesoamerican languages
    – Yucatec Maya (J. Bohnemeyer)
    – Ayutla Mixe (R. Romero)
    – San Ildefonso Tultepec Otomí (N. Hernández, S. Hernández, E. Palancar)
    – Purépecha (or Tarascan; A. Capistrán)
    – Chacoma Tzeltal (G. Polian)
    – Juchitán (Isthmus) Zapotec (G. Pérez)
    – Tepehua (S. Smythe-Kung)
  • 2 non-Mesoamerican indigenous languages
    – Seri (C. O’Meara)
    – Sumu-Mayangna (E. Benedicto, A. Eggleston, Mayangna Yulbarangyang Balna)
  • 3 varieties of Spanish
    – from Barcelona (A. Eggleston), Mexico (R. Romero), and Nicaragua (A. Eggleston)
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Novel Objects

• Referential communication tasks
  – Part identification task (NO I)
    • Identify parts that are ‘landing sites’ for playdough
  – Placement task (NO II)
    • Use relators and meronyms to describe placement of playdough around the object
Meronymy Data

• Novel Objects I data from 12 languages:
  – 7 Mesoamerican languages
    • Yucatec Maya (J. Bohnemeyer)
    • Ayutla Mixe (R. Romero)
    • San Ildefonso Tultepec Otomí (N. Hernández, S. Hernández, E. Palancar)
    • Purépecha (or Tarascan; A. Capistrán)
    • Chacoma Tseltal (G. Polian)
    • Juchitán (Isthmus) Zapotec (G. Pérez)
    • Tepehua (S. Smythe-Kung)
  – 3 non-Mesoamerican indigenous languages
    • Seri (C. O’Meara)
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Findings: Reference Frames

Fig. 12 Percentage of photos with relative use
Findings: Reference Frames

<table>
<thead>
<tr>
<th>Language</th>
<th>Relative %</th>
<th>Pictures w/ Relative Usage</th>
<th>Total Pictures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona Spanish</td>
<td>45%</td>
<td>131</td>
<td>288</td>
</tr>
<tr>
<td>Nicaraguan Spanish</td>
<td>35%</td>
<td>84</td>
<td>240</td>
</tr>
<tr>
<td>Mexican Spanish</td>
<td>34%</td>
<td>49</td>
<td>144</td>
</tr>
<tr>
<td>Yucatec Maya</td>
<td>18%</td>
<td>43</td>
<td>240</td>
</tr>
<tr>
<td>SIT Otomí</td>
<td>18%</td>
<td>43</td>
<td>240</td>
</tr>
<tr>
<td>Seri</td>
<td>16%</td>
<td>39</td>
<td>240</td>
</tr>
<tr>
<td>Sumu-Mayangna</td>
<td>14%</td>
<td>40</td>
<td>288</td>
</tr>
<tr>
<td>Ayutla Mixe</td>
<td>10%</td>
<td>25</td>
<td>240</td>
</tr>
<tr>
<td>Tepehua</td>
<td>6%</td>
<td>9</td>
<td>144</td>
</tr>
<tr>
<td>Isthmus Zapotec</td>
<td>5%</td>
<td>14</td>
<td>288</td>
</tr>
<tr>
<td>Tarascan</td>
<td>5%</td>
<td>11</td>
<td>240</td>
</tr>
<tr>
<td>Tselfal Maya</td>
<td>4%</td>
<td>10</td>
<td>240</td>
</tr>
</tbody>
</table>

**Fig. 13** Percentage and raw frequencies of photos with relative use
Findings: Lexical Meronym Use

• ¿Qué porcentaje de las partes nombradas por los participantes se nombraron a través del uso de merónimos?

• Como merónimos solo consideramos expresiones léxicas (que sean simples o complejas) que describan un tipo de entidad como parte de otra entidad.
Findings: Lexical Meronym Use

Fig. 14  Percentage of meronym use
Fig. 15  Percentage of meronym use and relative use
Meronymy and relative use

• Correlation of meronym use to relative use
  -0.710129109

• Significant!
  P-value < 0.01**

• Suggests an effect
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Future Directions

- Perform analyses using finalized meronymy results
- Include data from more languages
- Compare meronymy use in NO I and frame use in NO II
- Further investigations of the relationship between meronymy and reference frame use
Thanks!
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References


