The principle of canonical orientation revisited: Evidence from Mesoamerican languages


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Outline

• Spatial reference frames and the Principle of Canonical Orientation (POCO)
• MesoSpace: team, goals, tools
• The Ball & Chair study
• 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)
  (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.)

• Reference frames and the interpretation of spatial relators

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

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

The Principle of Canonical Orientation (POCO)

• Levelt (1984, 1996) describes speakers’ preference for use of aligned frames
• Intrinsic use requires canonical orientation of ground object
• POCO predicts a constraint against “disaligned” intrinsic frame use

Fig. 4. A non-canonically positioned chair: #The ball is under the chair.
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POCO (cont.)
• Experimental research (Carlson-Radvansky & Irwin 1993)
  – Participants describe stimuli, allowing them to observe the effects of each frame type in isolation
  – Findings: the selection of vertical relators depends on their cumulative applicability across the three types of frames

Fig. 5. Percentage of above responses by trial type in experiment 4 of Carlson-Radvansky & Irwin 1993. Trial types are distinguished in terms of the frame types in which 'above' is applicable to the stimulus. (The objects shown are not the actual stimuli.) (Levelt 1996: 90)

POCO (cont.)
• Bohnemeyer & Tucker 2010
  – POCO not always adhered to
  – Yucatec speakers make use of a ground object's axes and use an intrinsic frame type

An atypical description from English speakers:
(1) The ball is under the chair.

Yucatec description of Picture 1.6:
(2) Le=boola=ko’ y=anal te’ tl tu’k=kutal mab’u=ko’.
DET=ball=D2 A3=underside DADV where IMPF-A3=st:inch.DIS person=D2
'The ball, under (lit. at) its underside) there where a person sits…'

Research Questions
• How does POCO apply in other (non-English) languages?
• What factors, if any, might influence the applicability of POCO?

POCO (cont.)
– (gravitational) absolute frames play the strongest role in licensing vertical relators
  • relative frames play the weakest
  – 30% of trials supporting ‘disaligned’ intrinsic frames elicited above – in violation of POCO
  • so even in English, POCO is merely a tendency, not an absolute constraint

Fig. 5. Percentage of above responses by trial type in experiment 4 of Carlson-Radvansky & Irwin 1993. Trial types are distinguished in terms of the frame types in which 'above' is applicable to the stimulus. (The objects shown are not the actual stimuli.) (Levelt 1996: 90)

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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’ani’abal (E. Mateo)
      • Tzeltal (several variants; G. Polian)
      • Yucatec (PI: J. Bohnemeyer)
    – Mixe-Zoquean
      • Ayutla Mixe (R. Romero)
      • Sacleapanec (G. Gutierrez)
      • Tecpatán Zoque (R. Zavala)
    – Oto-Manguean
      • Ishmus (Juchitán) Zapotec (G. Pérez)
      • Otomi (N. Hernández, S. Hernández, E. Palancar)
    – Huave (S. Herrera)
    – Purépecha (A. Capistrán)
    – Totonac-Tepehuan
      • Huexcauhtla Tepehua (S. Smythe)
    – Uto-Aztecan
      • Pajapan Nawat (V. Peralta)

Fig. 6. Ball & Chair Pic 1.6

Research Questions
• How does POCO apply in other (non-English) languages?
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MesoSpace: team, goals, tools (cont.)

- 3 non-MA “controls” & Spanish
  - Seri (C. O’Meara)
  - Cora (Uto-Aztecan; V. Vázquez)
  - Mayangna (E. Benedicto, A. Eggleston in collaboration with the Mayangna Yulbarangyang Balna)
- 2 (interrelated) domains
  - frames of reference
  - meronyms

Fig. 9 Meronyms in Ayoquesco Zapotec (left) and Tenejapa Tseltal (adapted from MacLaury 1989 and Levinson 1994)

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

The Ball & Chair study (cont.)

- coding
  - we coded descriptions of the location of the ball
    - distinguishing among eight categories
      - “allocentric (or “disaligned”) intrinsic”
      - egocentric intrinsic (‘direct’; Danziger 2010)
      - egocentric extrinsic = relative
      - intrinsic and relative aligned (Carlson-Radvansky & Irvin 1993)
      - geocentric (= geomorphic, landmark-based, or absolute)
      - vertical absolute
      - vertical absolute and intrinsic aligned (Carlson-Radvansky & Irvin 1993)
      - topological (no reference frame involved; Piaget & Inhelder 1956)

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The Ball & Chair study (cont.)

- the present study - B&C data from 11 varieties
  - 6 Mesoamerican languages
    - Yucatec Maya (J. Bohnemeyer)
    - Ayutla Mixe (R. Romero)
    - San Ildefonso Tuteltepec Otomi (N. Hernández, S. Hernández, E. Palancar)
    - Purépecha (or Tarascan; A. Capistrán)
    - Chacoma Tseltal (G. Polian)
    - Juchitán (Isthmus) Zapotec (G. Pérez)
  - 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)

The Ball & Chair study (cont.)

- Of the 48 pictures in the set, 10 have configurations that afford POCO violations, where the chair is in non-canonical orientation;
- POCO violations
  - coded as allocentric intrinsic
  - used vertical relators

Fig. 12 Target B&C photos - chairs in non-canonical orientation
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Findings

- POCO violations occur across languages of the sample

Findings (cont.)

- Fisher Exact test
  - languages differ significantly in their propensity to violate POCO (p < .001)
    - i.e. use vertical relators to refer to the ground object’s intrinsic axes, even when said object is in non-canonical orientation
  - What factors could contribute to this variation between languages?

Discussion: Influence of the Sprachbund??

- Could POCO violability be an areal feature?

Discussion: Variation an artifact of Intrinsic preference in Mesoamerica?

- Increased POCO violation may be an artifact of increased preference for intrinsic frames
- Compare POCO violations in target items to use of Intrinsic throughout the data set
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POCO and Intrinsic use: correlation?

POCO and Intrinsic use

- Correlation: 0.56727679
- Approaching significance
  - P-value > 0.05
- Suggests a possible effect
  - (needs additional data)

Discussion: Influence of Meronymy?

- Impact of POCO reduced by the pervasive use of meronyms in encoding spatial relations?
  - E.g. Yucatec àanal
    - A bodypart term used to denote a spatial region

Yucatec description of Picture 1.6:

(2) Le=bóola=x’, y=àanal te’l tu’x k-u=kutáal
  mán=ë’o’, koh-ch tu=chan bá’ë’l (...)
  person=02 hit/MIDDLE-INC PREP:A3=IMP IMPF:A3=INCH,DIS

‘The ball, under (lit. at) its underside) there where a person sits
(it’s) touching (the chair’s) thing (…)’

Meronymy Data

- Preliminary results from MesoSpace tasks:
  - Subset of data from the Novel Objects task

Meronymy Data

- Preliminary results from MesoSpace tasks:
  - Subset of data from the Novel Objects task
- Percentage of parts named using meronyms
- If we compare POCO violations to the meronym usage in languages of the sample, we should see a correlation
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POCO and Meronymy

- Correlation: 0.781261797
- Significant!
  - P-value < 0.01**
- Suggests an effect

Future Directions

- Perform analyses using finalized meronymy results
- Add more languages
- Further investigations of the relationship between meronymy and reference frame use
- Collecting more data using additional Ball & Chair sets

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References