Typology of spatial representation

Lecture 1: Spatial representations in language and cognition; semantic typology

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2017 LSA Linguistics Institute
University of Kentucky, July 5-August 1st, 2017
SYNOPSIS

- What is semantic typology?
- Cognitive Science 2.0
- Spatial representation in language and cognition
- Summary
WHAT IS SEMANTIC TYPOLOGY?

- categorization

Figure 1.1. The spork dilemma
WHAT IS SEMANTIC TYPOLOGY (CONT.)

- semantic categorization and language specificity

Figure 1.2. Basic color terms in the “grue” domain
WHAT IS SEMANTIC TYPOLOGY (CONT.)

- semantic typology: distribution

Figure 1.3. Green and blue terms in WALS (Kay & Maffi 2011)
### semantic typology: generalizations

![Diagram]

**Figure 1.4.** Stage model of implicational generalizations, covering 83% (91/110) of the languages of the World Color Survey (Kay & Maffi 1999: 748)
history

phase I: explicit typological research on semantic categorization starts in the late 19th century

mostly with questionnaire studies such as

- Morgan 1871 on kinship terminology
- Darwin 1872 on gesture

an early study using non-verbal stimuli: Magnus 1877, 1880 on color naming and discrimination

- based on a kit of 10 color chips he sent to 61 field investigators

much of this research was marred by

- underdeveloped methods of linguistic analysis
- racist and social-Darwinist assumptions
history (cont.)

phase II: ethnosemantic research
- focusing primarily on individual languages
- often inspired by the Linguistic Relativity Hypothesis

phase III: resurgence of explicit typology
- but this time with the benefit of a century of advances in linguistics, cultural anthropology, and cognitive psychology
  - starting with Berlin & Kay’s (1969) work on basic color terms
  - in the 1980s
    - Viberg 1984 on perception verbs
    - Dahl 1985 on tense-mood-aspect system
    - Talmy 1985 on lexicalization patterns in motion descriptions
some recent studies

- spatial reference frames in language and cognition
  - Pederson et al. 1998 (alignment in population-specific preferences; 13 populations)
  - Bohnemeyer et al (2014, 2015, ms.) (driving factors underlying biases; 11 populations)

- ‘topological’ spatial relators
  - Levinson, Meira, & L&C 2003 (categories of similarity space; 9 languages)
  - Khetarpal, Majid, & Regier 2009 (optimal partitioning of similarity space; 9 populations)

- events of cutting and breaking
  - Bohnemeyer 2007 (argument structure of verbs; 17 languages)
  - Majid, Boster, & Bowerman 2008 (categorization of similarity space; 28 languages)

- motion events
  - Bohnemeyer et al. 2007 (segmentation constraints; 18 languages)
  - Montero Melis et al 2017 (linguistic and cognitive categorization; 19 populations)

- color
  - Regier, Kay, & Khetarpal 2007 (optimal partitioning of the similarity space in the languages of the WCS)
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why study crosslinguistic semantic variation?

- by studying what is variable across languages in semantic representations of the world

- we hope to discover which aspects of cognition may be innate, biologically determined

- and which are learned and culturally transmitted
in effect, we are “mapping the nature-nurture divide in cognition” (Bohnemeyer 2011)

Figure 2.1. Mapping the nature-nurture divide in cognition
in doing so, we clarify the relation between language and non-linguistic cognition

and contribute to theories of the “syntax-semantics interface”

**Figure 2.2.** The relation between language and nonlinguistic cognition
- The rationale I: sources of knowledge
  - Nature – biological transmission
  - Nurture – cultural transmission
  - Individual experience
the rationale I: source of knowledge (cont.)

- declarative or procedural knowledge
  - innate knowledge
  - learned knowledge
- socially shared knowledge
- culturally transmitted knowledge
- knowledge derived from individual experience

Figure 2.6. Sources of knowledge
the rationale II: the relation between variability and cultural transmission

the encoding of cognition in the human genome does not appear to be variable

there are – fairly superficial – genetic differences across human populations

however, there is currently no evidence suggesting that such differences affect cognition

but see Dediu & Ladd (2007)

it follows that crosslinguistic variation in a given domain of linguistic knowledge is evidence against innateness
the rationale II: the relation between variability and cultural transmission (cont.)

- conversely, absence of crosslinguistic variation in a given domain can have a variety of explanations
  - coincidence
  - variability excluded by the fundamental “design features” of language (cf. Hockett 1963)
  - monogenesis and inheritance from the common ancestor (cf. Dunn et al 2011)
  - innateness

- strong, exceptionless universals are rare among the languages of the world (Evans & Levinson 2009)

- nevertheless, many general tendencies and implicational generalizations hold and call for explanations
this program of inquiry is part of a paradigm shift in the cognitive sciences

that has been in (glacial!) progress for 25 years

**Cognitive science 1.0:**
- rationalist foundational assumptions:
  - innate knowledge
  - symbolic processing
  - modularity

**Cognitive science 2.0:**
- empiricist turn; embrace of:
  - culture-specificity
  - individual variation
  - brain plasticity

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**Figure 2.7.** Clockwise from top: Jerry Fodor; Stephen Pinker; Lila Gleitman; Noam Chomsky

**Figure 2.8.** Clockwise from top: Lissa Newport; Steve Levinson; Mike Tomasello
the empiricist turn in the cognitive sciences resembles a general dynamic in paradigm evolution

by which idealizations previously deemed necessary are made obsolete by empirical progress.

Figure 2.9. Left to right: Galilei’s thought experiment on falling bodies; Mendel’s hybridization experiments; Einstein and the Michelson-Morley Experiment.
proposed versions of the “big picture”

my goal: restoring culture to its rightful place in the theory of human cognition
culture-specificity in cognition

example I: ethnobotany

how many species of trees can you identify and name?

culture-specificity in cognition (cont.)

example II: “dead-reckoning”

how accurately can you point “home”

after having been taken to a windowless room in another town?

Figure 2.8. Results of dead-reckoning pointing accuracy experiments (Levinson 2003: 233-240)
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SPATIAL REPRESENTATIONS IN LANGUAGE AND COGNITION

- how much spatial information gets represented in spoken/written language?
- example: motion paths

Figure 3.1. Moverbs Paths 12, initial frame
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

- cf. Bohnemeyer et al 2007 (Lecture 4)
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 3.3. Mental architecture according to Jackendoff 2002**

- Syntactic structures
- Conceptual structures
- Spatial structures (3D model)
- Visual representations (2½D sketch)
- Haptic representations
- Motor representations
- Representations for auditory localization
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


**Figure 3.4. Aspects of path information codable at CS vs. SpS**
so why typologize spatial representations?

- we can expect spatial representations to have a culture-independent biological basis
  - this should be true particularly in those systems that interface with perception on the dual encoding story

- yet, the difficulty of mapping iconic representations into language predicts much room for cross-linguistic variation

- exploring this variation should have much to teach us about
  - the interaction between the cognitive systems involved (including language)
  - the interaction among innate, culturally transmitted, and individual aspects of cognition
spatial concepts and their representation in language

Figure 8.2. A classification of spatial concepts
The course: overview

- Lecture 1-4: overview of some subfields
- Lecture 5-8: in-depth look
  - How do language, culture, and environment shape reference frame use in discourse and cognition?
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SUMMARY

- semantic typology
  - the study of universals and crosslinguistic variation in semantic categorization
    - semantic categorization – categorization of extra-linguistic reality in linguistic expressions
  - crosslinguistic variation as evidence of cultural transmission
    - any aspect of human cognition and language that is variable across populations is unlikely to be innate
    - uniformity across populations is consistent with innateness, but may have alternative explanations
Cognitive Science 2.0

as an empirical investigation into crosslinguistic variation, semantic typology contributes to a paradigm shift

moving cognitive science

away from its earlier emphasis on innate knowledge, modularity, and symbolic representations
toward an embrace of cultural and individual variation and brain plasticity
perceptual representations are inherently spatial

- they iconically encode spatial properties

- spoken and written language/speech translates these rich iconic representations in impoverished symbolic terms

- the resulting tension between rich, biologically grounded perceptual and impoverished symbolic representations

- makes the semantic typology of spatial representations such a fertile domain

- for the study of the role of culture in the mind
PREVIEW: LECTURE 2

- spatial deixis

- reading: Bohnemeyer 2015; Bohnemeyer 2012a
  - on Canvas shortly


References (cont.)


Thanks!