Language and memory for motion events: The asymmetry between source and goal paths over development

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Conceptual representation  Linguistic representation

“The plane flew into the pot”

SPATIAL LANGUAGE
Spatial language has 2 masters

LANGUAGE AND SPACE

• DIVERGE (what’s in space that isn’t in language)

• CONVERGE (what they share)

  Primitives (e.g. Object-> NP)
  Structural homologies (e.g. Prominence)

.Today: Goal/Source Path asymmetry

GOAL AND SOURCE PATH TYPES

TO-Paths

  • reference object is the GOAL
  e.g. The plane flew into the pot Goal Path

FROM-Paths

  • reference object is the SOURCE
  e.g. The plane flew out of the bowl Source Path

Note: Broadly defining Goal and Source

These path types generalize over event types...

(Jackendoff, 1983; 1990)
Thematic Relations Hypothesis
(Gruner, 1965; Jackendoff, 1983)

1. Jessica ran from the table to the ladder
\[\text{EVENT} \{ \text{GO SPATIAL \{Jessica\} \{FROM \{table\} \{TO \{ladder\}\}}\}\]

2. The pen rolled from the magazine to the cup
\[\text{EVENT} \{ \text{GO SPATIAL \{pen\} \{FROM \{magazine\} \{TO \{cup\}\}}\}\]

3. Brian threw the doll to Laura
\[\text{EVENT} \{ \text{GO POSSES \{doll\} \{FROM \{Brian\} \{TO \{Laura\}\}}\}\]

4. Danny's hair changed from green to red
\[\text{EVENT} \{ \text{GO CHANGE \{hair\} \{FROM \{green\} \{TO \{red\}\}}\}\]

Past findings suggest Goal bias in language

RESEARCH QUESTION 1
Is there a robust Goal bias in language over development?

- Normally developing children (as well as WS children)
- Mature users of language (you and me)
- Across different event types

STUDY 1

- PROCEDURE: What happened?

- PARTICIPANTS
  - 12 normal adults
  - 10 children with WS (mean age 13:7)
  - 10 normally developing children, MA matched to WS (mean age 5:9)

- STIMULI:
  - Events: Manner of Motion and Non-Manner of Motion

- ANALYSIS:
  - Event type by event type
  - Proportion of Goal-PP and Source-PP included

VERB'S COMPLEMENTS:
GOAL-PP AND SOURCE-PP

Note: Source and Goal are both part of the Motion event
2. CHANGE OF POSSESSION EVENTS

GOAL-PP VERBS: select for Goal-PP expressions (e.g., “give”, “throw”)

SOURCE-PP VERBS: select for Source-PP expressions (e.g., “receive” / “get”)

*Overwhelming use of “Goal-PP” verbs by all groups, e.g. ‘give’ not ‘get’, ‘throw’ not ‘catch’.

VERB’S COMPLEMENTS:
GOAL-PP AND SOURCE-PP

3. CHANGE OF STATE EVENTS

4 Change of State events
2 color change
2 face expression change
VERB'S COMPLEMENTS: GOAL-PP AND SOURCE-PP
(For verbs "go", "change", "turn" etc.)

GOAL PP
She turned (from angry) to surprise.
(Lakusta and Landau, 2005, Cognition)

SOURCE PP

4. ATTACHMENT/DETACHMENT EVENTS

ATTACHMENT
‘hook’
‘stick’
‘glue’
DETACHMENT
‘unhook’
‘rip’

This time, Source OR Goal is part of the event.

VERB'S COMPLEMENTS: GOAL-PP AND SOURCE-PP

ATTACHMENT EVENTS

DETACHMENT EVENTS

CONCLUSIONS: STUDY 1

Is there a Goal/Source asymmetry in language over development? **YES**

- Normally developing children as well as children with Williams syndrome
- Mature users of language (you and me)
- Spatial and non-spatial events

GOAL / SOURCE ASYMMETRY

Mapping bias in language

Also shows up....
Early acquisition and use of spatial terms
  - e.g., in early language, Goal prepositions are more frequent in child’s speech than Source prepositions (Pleh, 1998)

Semantic specificity of spatial terms
  - Spatial terms marking Goals applied to narrower range of events than those marking Sources (Bowerman, 1996; Regier & Zheng, 2003)

Spatial term substitution errors

Set of spatial terms in a language
  - If have Source marker, also has analogous Goal marker (Regier, 1997)

Robust Goal bias in Language

Linguistic Phenomena: G/S asymmetry!
- Dutch source directional PPs do not allow P-incorporation, Goals directional PPs do.
- e.g., goal pp can incorporate in between the aux verb ‘is’ and the main verb ‘gek’. Source pp’s don’t do this.
- Omdat zij boom is in geklommen
- Source PPs can be easily displaced (thus, not true argument), Goal PPs cannot.
- Good: From LA, John sent the letter to Chicago
- Bad: To Chicago, John sent the letter from LA

Goal PPs combining with transitive verbs always specify the location or movement of the theme argument. Source PPs can modify either subject or object.
- “John saw Mary in the garden” (modifies Mary’s location) vs. “John saw Mary in the garden from the rooftop” (modifies John’s location)
- “John loaded the hay onto the truck from the ground” (modifies ‘hay’) vs. “John loaded the hay onto the truck in the garden” (modifies ‘hay’)

Locative alternations - PPs are usually Goal PPs (thus goals are true arguments) but swarming in the garden / The garden swarms with bees

RESEARCH QUESTION 2
Is this Goal bias specific to language?
OR
Does it extend to non-linguistic event representations?

- Event representations of pre-linguistic infants
- Non-linguistic event representations of children and adults

RESEARCH QUESTION 3
If a Goal bias extends to non-linguistic event representations, how strong is the homology?

STUDIES 2 & 3

Study 2
Event representations of 12-month-old infants

- Sources and Goals in Motion events involving animates
- Starting points and Endpoints in Motion events involving inanimates

Study 3
Non-linguistic event representations of children and adults

STUDY 2
GOAL BIAS IN 12-MONTH-OLD INFANTS?

Conceptual representation
Linguistic representation
Visual Familiarization Paradigm
(similar to Woodward, 1998)

Experiment 1: Motion events with animate

- 7 Familiarization trials
- 1 Inter-trial
- 6 Test trials

N = 24 11.5 - 12.5 month old infants

Same Source/Diff Goal
Diff Source/Same Goal

18/24 infants looked longer at
Same Source/Diff Goal

(Lakusta et al., 2007, Language Learning and Development, Lakusta et al. in prep)

STUDY 2

1. Do pre-linguistic infants show a Goal bias? YES
2. For what types of events?
   - Animate/Intentional
   - Inanimate/Non-intentional

Experiment 2: Source vs. Goal encoding across conceptual domains

N = 40 11.5 - 12.5 month old infants

2 CONDITIONS

Inanimate balloon
Mr. Balloon

Prior to experiment, infants familiarized with balloon for ~ 60 seconds.
20 seconds of hand hitting balloon around on stage
20 seconds of Mr. Balloon hopping around on stage
Results: Experiment 2

Average Looking Time at Two Different Types of Test Trials

(Lakusta & Carey, under revision)

STUDY 2: SUMMARY

1. Do pre-linguistic infants show a Goal bias? YES

2. For what types of events?
   - Animate/Intentional? YES
   - Inanimate/Non-intentional? NO

EVIDENCE FOR A WEAK HOMOLOGY...

STUDY 3: Adults and 4-year-olds

- Experiment 1:
  Is there a non-linguistic Goal/Source asymmetry for motion events?

- Experiments 2 & 3:
  How general is this across different event types?
  - Physical events
  - Modulated intentional events

METHOD

(Detecting Changes Method)

- Show people pairs of video-taped Manner of Motion events.

- The 2nd event sometimes has a change (Source, Goal, Filler).

- Participants judge whether events are the same or different.

RESULTS

(Lakusta & Landau, in press, Cognitive Science)
STUDY 3

- **Experiment 1:**
  Non-linguistic Goal/Source asymmetry in motion events? YES

- **Experiments 2 & 3:**
  Generality across different event types?
  - Physical events
  - Modulated intentional events

RESULTS

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<tr>
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<th>STARTING POINT</th>
<th>ENDPOINT</th>
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<td><strong>Adults (n = 24)</strong></td>
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<td><strong>Children (n = 14)</strong></td>
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(Lakusta & Landau, in press, Cognitive Science)

EXPERIMENT 2: SUMMARY

- **Experiment 2:** Goal/Source asymmetry does NOT extend to Physical, unintentional events
  *(Note: when people describe these very same events they do show an asymmetry)*

- Intentionality may play a key role in Goal bias
- Evidence in support of weak homology
Experiment 3: ‘Look Back’, Adults
N = 14 adults

Average Proportion Correct for Two Different Types of Test Trials

Experiment 3: ‘Look Back’, Children
N = 14 4-year-olds

Average Proportion Correct for Two Different Types of Test Trials

EXPERIMENT 3: SUMMARY
• When Figure moves from Source to Goal while looking back at Source, children and adults no longer show a Goal bias
• Intentionality may play a key role in Goal bias

CONCLUSION
NON-LINGUISTIC COGNITION
Goals > Sources
parallel structure
BUT...
LANGUAGE
Goals > Sources

CONCLUSIONS
NON-LINGUISTIC THOUGHT
Intention
Telicity constraint
Endpoints > Starting points
Pragmatic constraints
new information > old information
Confluence of constraints

LANGUAGE
Confluence of constraints

How do children learn to collapse over domains for purposes of expressing Paths in language?

What factors might reduce / reverse a Goal bias?

Broad Goal and Source categories in pre-linguistic thought?
Thank you

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