Event Participants and Implicit Arguments

Experimental Approaches to Verb Meaning
GIVE TAKE/STEAL FRIGHTEN

- Location
- Recipient
- Theme
- Agent
- Victim
- Experiencer
- Time
- Direction of transfer
- Transfer
Thematic Roles and Event Participants

- **Agent**
  - Individual who performs/does the action of the event
- **Patient**
  - Individual who undergoes/is affected by the action of the event
- **Instrument**
  - Individual that assists with the action of the event
- **Source**
  - Where the action initiates
- **Goal**
  - Where the action is going
- **Location**
  - Where the event takes place
- **Time**
  - When the event takes place
- **Experiencer**
  - Individual who comes to be in a mental state
- **Benefactive**
  - Individual who the event is done for.
Thematic Roles and Event Participants

• $\lambda x \lambda e \cdot \text{Agent}(e, x)$
  
  $= \text{def} \lambda x \lambda e \cdot \exists e' [ \text{Do}(e', x) \land \text{Cause}(e', e) ]$

• $\lambda x \lambda e \cdot \text{Patient}(e, x)$
  
  $= \text{def} \lambda x \lambda e \cdot \exists e' [ \text{Become}(e', e) \land \text{Result}(e, x) ]$

• $\lambda x \lambda e \cdot \text{Instrument}(e, x)$
  
  $= \text{def} \lambda x \lambda e \cdot \exists e' [ \text{Assist}(e', x) \land \text{Cause}(e', e) ]$
Aside on Instruments

• Why not just have $\lambda x \lambda e[ \exists e'[ \text{Assist}(e', x) ]$?

  – John broke the window with a stone.
  – The stone broke the window.
  – The window was broken with a stone.
  – *The window broke with a stone. (Anticausitive)
IMPLICIT ARGUMENTS
Agents

• The collector sold the vase immediately.

• The vase was sold immediately.
• The vase was sold by the collector immediately.

• The vase sold immediately.
• *The vase sold by the collector immediately.
Arguments: Entailed or Implicit?

• Event participants can be entailed
  – #The collector sold the vase immediately, yet no one had sold it.
  – #The vase was sold immediately, yet no one had sold it.
  – #The vase sold immediately, yet no one had sold it.
  – #The wheel was spun, but no one spun it.
  – The wheel spun, but no one spun it.

• But only some are implicit
  – The collector sold the vase immediately to raise money for charity.
  – The vase was sold immediately to raise money for charity.
  – #The vase sold immediately to raise money for charity.
  – The wheel was spun to see what prize was won.
  – #The wheel spun to see what prize was won.
Linguistic vs. Conceptual Sources of Implicit Agents in Sentence Comprehension

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While Mauner, Tanenhaus, and Carlson (1995) argued that implicit participant information is derived from linguistic forms (e.g., verb argument structures), their results do not rule out a purely conceptual source for this information. Three experiments were conducted to resolve this question.
• The donated antique vase had sold immediately, yet no one had sold it.  

• The donated antique vase was sold immediately, yet no one had sold it.  

• Rachael is a strict vegetarian so she eats prime rib for dinner every day.  

• Max is incompetent, so we hired him.  

Mauner & Koenig (2011)
Mauner & Koenig (2011)
Summary

• Verbs like ‘sell’ entail agents.
  – Detection rates for agent contradiction is the same in short passives and in intransitives.
  – Similar to more overt contradictions
  – Dissimilar from mere implausibility

• So are implicit agents the same as entailed agents?

Mauner & Koenig (2011)
• The donated antique vase was sold immediately to raise some money for the charity.

• The donated antique vase had sold immediately to raise some money for the charity.

Mauner & Koenig (2011)
Stop-Making-Sense Judgments

The vase had sold immediately to raise some money

The vase was sold immediately to raise some money

Mauner & Koenig (2011)
Mauner & Koenig (2011)
Summary

• Participants rapidly detect violations of rationale clauses in intransitives over short passives.
  – Increased cumulative rejection of the rationale clause making sense starting at the verb.
  – Even when participants were not rejecting the sentence, word-by-word judgment times within the rationale clause were also inflated.
• To prevent the champ from killing his rival, the fight was ended in the fifth.  
  Short Passive

• To prevent the champ from killing his rival, the fight had ended in the fifth.  Intransitive

Mauner & Koenig (2011)
To reduce the noise coming from next door, the door ...

- short passive
- intransitive

Cumulative % "No" Judgments

Word Position

Mauner & Koenig (2011)
To reduce the noise coming from next door, the door...

- Short Passive
- Intransitive

Mauner & Koenig (2011)
Summary

• Preposed rationale clauses lead participants to reject intransitive continuations.
  – This effect emerged at the verb.
  – Some evidence for inflated reading times for intransitive clauses.

• What about other types of event participants?
Aside: Coercion vs. Rationale

Aspectual Coercion
• After several minutes, the rabbit jumped.
• For several minutes, the rabbit jumped.
  – Both are acceptable.
  – But there is a cost to the second.

Implicit Agents
• To prevent the champ from killing his rival, the fight was ended in the fifth.
• To prevent the champ from killing his rival, the fight had ended in the fifth.
  – Only the first is acceptable.
  – And there is a cost to the second.
1. Introduction. The general idea of thematic roles has played an important part in linguistic theory in the past twenty years or so. Since the seminal insights of Gruber (1965), Fillmore (1968), Jackendoff (1972), and
Accommodation and Implicit Themes

No Implicit Theme

• Bill hurried to catch his plane.
• The suitcases were very heavy.

Implicit Theme

• Bill hurried to unload his car.
• The suitcases were very heavy.

Unloaded what!?
Final Sentence Judgments
Summary

• Implicit arguments may guide discourse processes.
  – Accommodation of a definite related to an implicit participant, here an implicit theme, may be eased.
Comprehension of elided structure: Evidence from sluicing

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In sluiced sentences like “Nolan colored, but he wouldn’t tell me what”, the elided clause (“what [Nolan colored _]”) contains a gap not present in the antecedent clause (“Nolan colored”). Previous work has shown that interpret-
Sluicing

The secretary typed something, but I don’t know what exactly.

“The secretary typed”

The secretary typed, but I don’t know what exactly.

“The secretary typed”
Sluicing

The secretary typed, • •
but I don’t know what exactly.

The secretary typed, • •
but I don’t know where exactly.
• The secretary wrote *something*, but nobody seems to remember *what* exactly.

• The secretary wrote *quickly*, but nobody seems to remember *what* exactly.

• The secretary wrote *with* *something*, but nobody seems to remember *with what* exactly.

• The secretary wrote *quickly*, but nobody seems to remember *with what* exactly.
The secretary typed (something/somewhere), but I don’t know what/where exactly.

**Overt vs. Null:** $F_1(1, 39) = 10.25, p < .01; F_2(1, 31) = 4.60, p < .05$

**Argument vs. Adjunct:** $F_1 = 23.01, p < .001; F_2 = 8.47, p < .01$
1. ate  something/with something
2. write something/with something
3. cooked something/with something
4. type something/somewhere
5. cleaned something/somewhere
6. paint something/on something
7. telephoned someone /from somewhere
8. push something/towards something
9. bake something/for some reason
10. dream something/for some reason
11. screamed something/for something
12. moan something/about something
13. curse something/about something
14. sang something/about something
15. mumble something/about something
16. check something/about something

**Instrument (with what)**

**Location (where)**

**Reason (why)**

**Indirect Theme? (for/about what)**
Summary

• No clear interaction as expected for an non-theme arguments.
  – But the stimuli are questionable in terms of the status of non-theme implicit arguments.

• Can we find online evidence for non-agent/non-theme event participants?
Arguments for adjuncts

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Abstract

It is commonly assumed across the language sciences that some semantic participant information is lexically encoded in the representation of verbs and some is not. In this paper, we propose that semantic obligatoriness and verb class specificity are criteria which influence whether semantic
Lexical Encoding Hypothesis

- A participant role is a (semantic) argument of a verb if and only if...
  1. Its presence is required of all situations described by that verb, and
  2. It is required of the denotation of only a restricted set of verbs.
• Which sword did the rebels *kill* the traitor king with *** during the rebellion?  
   Instrument permitted, wh-NP

• Which sword did the rebels *behead* the traitor king with *** during the rebellion?  
   Instrument required, wh-NP

• With which sword did the rebels *kill* the traitor king *** during the rebellion?  
   Instrument permitted, wh-PP

• With which sword did the rebels *behead* the traitor king *** during the rebellion?  
   Instrument required, wh-PP
Summary

• The integration cost of a wh-filler is eased when that filler is an event participant.
General Summary

• Implicit arguments are represented and processed in real-time
  – Implicit agents are detectable with rationale clauses.
  – Implicit themes ease accommodation
  – Implicit instruments ease integration of wh-fillers

• **Question**: But how do we know what event participants are privileged?
ARGUMENTS AND EVENT CONCEPTS
Preconditions for Implicit Arguments

• **Argument Condition**: The verb must encode more arguments than it necessarily must have overtly expressed.
The rabbit biffed the cookie!

Could ‘biff’ mean ‘take’? ‘steal’?
The rabbit biffed the cookie from the baby
Preconditions for Implicit Arguments

• **Argument Condition**: The verb must encode more arguments than it necessarily must have overtly expressed.

• **Event Concept Condition**: The event must be able to be viewed as having certain privileged participants.
Participant structure in event perception: Towards the acquisition of implicitly 3-place predicates

Alexis Wellwood, Angela Xiaoxue He, Jeffrey Lidz, and Alexander Williams*

1 Introduction

In acquiring a semantics, children relate their experience of their world to their experience of speakers. When we study this in the lab, we often presume to understand the first part of this relation: we take for granted how the child will experience the world of our experiment, and test for
PICK-UP

STEAL
Participant to Argument Match

• Acquisition/Learning Heuristic:
  – In basic clauses, the nominal satellites of a verb correspond exactly to the verb’s event participants.
  
  – A clause with $n$ arguments expresses a concept with $n$ participants.
The rabbit biffed the cookie

Participant-to-Argument Match
• ‘biff’ must be a 2-participant concept.

• This would rule out 3-participant event meanings:
  – X gave Y to Z
  – X put Y in Z
  – X stole Y from Z
  – X baked Y for Z
  – X opened Y with Z
  – X passed Y to Z
  – X sent Y to Z
  – X read Y to Z

Argument-to-Participant Match
• Each argument must be matched with an event participant.

• 3-participant concepts can be viewed as 2-participant concepts with an implicit third argument.
  – 2+1-participant event concept

• ‘biff’ must be a 2+ participant concept.
2- or 3-Participant Concepts?

• If any event that can be viewed under an n+m-participant concept is equally likely to be viewed under an n-participant concept, the participant-to-argument matching cannot narrow down the meaning of a verb (Williams 2015).
How do we know whether this event was viewed under a 2-participant or 3-participant concept?
Similarity Judgment Task

How similar were those two videos?

(totally not similar) 1 2 3 4 5 6 7 (totally similar)
4 Experiments

1. Give (3-participant) vs. Hug (2-participant)
   – Initial control study: Obligatory arguments

2. Hit (2-participant) vs. Bean (2+1-participant)
3. Pick-up (2-participant) vs. Steal (2+1-participant)
4. Open (2-participant) vs. Jimmy (2+1-participant)

• Three Conditions:
  – Token – videos are drawn from the same event type.
  – Perceptual – videos are drawn from the same event type, but the action direction is changed.
  – Critical – One video is drawn from each type of event.
Give vs. Hug

- Give: A girl gives another girl a teddy bear.
- Hug: A girl hugs another girl while holding a teddy bear.
Give (3-participant) vs. Hug (2-participant)

Similarity Rating

Response Time
Summary

• Subjects were sensitive to the number of (obligatory) participants
  – The effect came out of response times instead of similarity ratings themselves.
  – Critical comparisons took longer to rate than other ‘same type’ comparisons.

• So what about our implicit argument cases?
Pick-up vs. Steal

- Pick-up: A girl picks up a toy from a table while another girl stands by.
- Steal: A girl steals a toy from another girl’s hands.
Pick-up (2-participant) vs. Steal (2+1-participant)

Similarity Rating

Response Time
Hit vs. Bean

• Hit: A girl hits another girl with her hand while holding a blue ball.

• Bean: A girl beans another girl by throwing a blue ball.
Hit (2-participant) vs. Bean (2+1-participant)
Open vs. Jimmy

- Open: A girl opens a suitcase while holding a hook.
- Jimmy: A girl opens a suitcase using a hook.
Open (2-participant) vs. Jimmy (2+1-participant)

Similarity Judgment

Response Time

![Graphs showing similarity judgment and response time comparisons between Open (2-participant) and Jimmy (2+1-participant).]
Summary

• In each case, subjects noticed the difference between the critical ‘different type’ cases and other ‘same type’ cases.
  – Some 2-argument verbs appear to be related to 3-participant event concepts.

• So how did the class do?
Practical: Open/Jimmy

- N = 8
- 21 Comparisons
  - 2 per event type

- Similarity Judgments, Correlations
  - Max: 0.94
  - Average: 0.83
  - Min: 0.66
Practical: Open/Jimmy

Similarity Judgment

- Critical: 3
- Side Change: 4
- Token: 6
- Identity: 7
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General Summary

• Implicit arguments are represented and processed in real-time

• The event concepts that underlie arguments may create problems for learning.
  – No one-to-one mapping
  – Argument-to-Participants Mapping sets a lower bound for learning.
  – $n$ arguments --> $n+m$ participants.