

## The role of discourse context in determining the argument structure of novel verbs with omitted arguments

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### Introduction

The interpretation of verb meaning hinges in large part on the argument structure of the verb. In a series of experiments, young children have been found to use the number and type of arguments that appear with a verb in order to determine its meaning (e.g., Fisher 1996, 2002, Goldberg 2004; Landau & Gleitman 1985; Lidz, Gleitman & Gleitman 2003; Naigles 1990). For example, when hearing the novel verb *blick* in “She’s *blicking* her”, a child is likely to conclude that the verb refers to an act with two participants, one acting on the other, more often than when hearing the verb in “She’s *blicking*”. A verb’s subcategorization frame is thus a significant cue in the acquisition of verb meaning.

However, languages vary with respect to how and when surface arguments are realized. There is a clear motivation from conversational pragmatics for leaving recoverable arguments unsaid, as expressed in Horn’s (1984a) R Principle or Grice’s (1967) Maxim of Quantity: say no more than you must. There is no need to utter arguments that are recoverable in the discourse context. As might be expected, then, many languages, perhaps the majority of languages in the world, routinely allow recoverable arguments, both subjects and objects, to be omitted. These languages include, for example, Hindi, Hungarian, Japanese, Korean, Laos, Russian, and Thai. Typical dialogues from Russian are shown in (1), Korean in (2) and Thai in (3):

- (1) A: <Did Ivan buy a newspaper?>  
B: Net, ne kupil.  
“No, (he) didn’t buy (it)”
- A: <Did you introduce Ivan to Masha?>  
B: Da, pedstavil.  
“Yes, (I) introduced (him) (to her)” (Franks 1995)
- (2) A: <I ran across a big fat bug this morning>  
B: kulayse, cwuki-ess-e?  
So kill-PAST-SententialEnding  
“So, did (you) kill (it)?”  
A: Ani, tomanka-key naypelie twu-ess-e  
No, run away-comp leave let-PAST-SententialEnding  
“No, (I) let (it) run away” (W. Nahm, personal communication, 2/16/99)
- (3) Setting up the dinner table  
A: <Do we need spoons?>  
B: (nodding) ca dai tak dai ngai kha  
“So (we) can scoop up (food).”
- A friend asked another friend about dinner.  
A: tham eng ru plaw  
“Did (you) make (it) yourself?”  
B: tham eng

The existence of languages that readily omit arguments raises the issue of how verb meanings can be learned in those languages. A seemingly critical cue to verb meaning, namely the number of arguments, is not reliably present in the input data children receive. The present research began to explore additional factors that may facilitate the understanding of verb meaning when the number of relevant arguments is not available in each sentence.

In order to address this question, we investigated a particular hypothesis, that maintenance of *discourse coherence* may lead learners to expect that certain arguments are semantically present as part of the interpretation of the verbal action, even if they are not overtly expressed. An experimental test was designed and implemented with Thai-speaking adults to examine the role of discourse coherence in determining the argument structure of a new verb. By manipulating the discourse context surrounding a novel verb, we investigated whether listeners assume that a potential argument that is *prominent in the preceding and subsequent discourse context* could be an omitted argument of an unknown verb.

We presented listeners with short discourse contexts in which a novel verb was embedded. The novel verb was presented with only one argument overtly expressed: the subject. We investigated whether listeners inferred that the novel verb was semantically intransitive, matching the number of arguments overtly expressed, or semantically transitive with an object argument unexpressed. We conjectured that if an argument was made contextually prominent in the preceding discourse (because it was expressed in subject position in the previous two sentences), then it may be assumed to be involved as an omitted argument in the target sentence with an ambiguous novel verb. We additionally hypothesized that if a particular argument was used in a prominent position (subject position) in the following sentence, listeners may assume that the argument must have been involved in the immediately preceding sentence so that it retains a prominent position across the two sentences. Based on these speculations pertaining to the relationship between discourse pragmatics and argument omission, we predicted that in order to maximize discourse coherence, listeners would be more likely to assume that an ambiguous novel verb was transitive when an argument was prominent in the preceding and/or immediately following discourse.

Conversely, if the only argument expressed with a novel verb is the only one to have been particularly prominent in the preceding discourse and continues to be prominent in the subsequent discourse, then listeners would have no reason to assume that any other argument is involved as an unexpressed object argument, even if another argument is made available (in a less prominent position) in the preceding discourse. Thus the novel verb would be interpreted intransitively.

## **Method**

### *Subjects*

Thirty-two Thai-speaking adults (16 women and 16 men) participated in a forced choice comprehension test. All were native speakers of Thai. Four additional participants were tested but were excluded from the analysis because they did not meet the experimental criteria. Three exclusively chose either transitive or intransitive scenes in all test trials, and one made more than one error in the filler trials.

### *Stimuli*

Eight pairs of pictures were taken. In each pair, one photograph depicted an unfamiliar causal action with a female and a male participant; for instance, Participant A (female) lifted Participant B (male)'s leg up by holding his knee. The other showed a corresponding action with only one participant; e.g. Participant A lifted her own leg up by holding her knee. Action

descriptions are provided in Appendix A. The gender of the agent of the action and the left-right order in which the two-participant and one-participant scene appeared on the computer screen were balanced across trials. The picture pairs were presented to every subject in the form of a Power Point presentation.

Each picture pair was accompanied by a short story recorded in Thai by a female Thai speaker. The stories are presented in Appendix B. The penultimate sentence of each story contained a novel verb with only a subject argument overtly expressed. The unfamiliar verb was, therefore, interpretable as either an intransitive verb or a transitive verb with an omitted object argument. The made-up verbs were coined to sound like possible verbs in Thai (e.g., *blick*, *kane*, *mong*).

Four versions of each story were created, such that each verb could appear in four different discourse contexts; the critical discourse contexts are illustrated in English in (4) through (7). The stories were edited such that the same recorded target sentence was used in each condition. The four conditions involved systematic variation in whether a potentially omitted logical object was made prominent in the preceding or following discourse context. Two characters appeared in each story.

In one version of each story, the potentially omitted logical object was not prominent in either the preceding or following discourse; an example is shown in (4). Example (5) shows the version of the same story in which the potentially omitted object was not prominent in the preceding context but was made prominent in the following context. In example (6), the potential object was made prominent in the preceding but not in the following context. In (7), the potentially omitted logical object was prominent in both the preceding and the following context.

- (4) Not prominent in Preceding or Following context (-P & -F):  
This morning Nit and Pon went to the market together.  
Nit carried Pon's basket.  
Nit walked slowly.  
Suddenly, Nit blicked quickly.  
Then, Nit fell down.
- (5) Not prominent in Preceding; Prominent in Following context (-P & +F)  
This morning Nit and Pon went to the market together.  
Nit carried Pon's basket.  
Nit walked slowly.  
Suddenly, Nit blicked quickly.  
Then, Pon fell down.
- (6) Prominent in Preceding; not Prominent in Following context (+P & -F)  
This morning Pon and Nit went to the market together.  
Pon carried Nit's basket.  
Pon walked slowly.  
Suddenly, Nit blicked quickly.  
Then, Nit fell down.
- (7) Prominent in Preceding and Following context (+P & +F)  
This morning Pon and Nit went to the market together.  
Pon carried Nit's basket.  
Pon walked slowly.  
Suddenly, Nit blicked quickly.  
Then, Pon fell down.

The stories that were used include repeated lexical NP subjects. This strategy is decidedly marked in English, as evidenced by the "repeated name penalty" found by Gordon et al. (1993). However, in Thai, it is quite natural to repeat names instead of using pronouns or null subjects (see Ratitamkul, in preparation for discussion).

Four presentation lists were created, such that each participant received two items in each of the four discourse contexts described above, and each item was presented equally often in each discourse context. Participants were randomly assigned to presentation lists, with the constraint that an equal number of men and women received each list.

In addition to the eight test trials, five filler stories with the same structure were included. These stories contained verbs with all their noun phrase arguments overtly expressed. Three contained real Thai verbs, two transitive and one intransitive, roughly corresponding to the English verbs "punch", "kick", and "crawl." The other two practice items contained overtly transitive nonsense verbs; these were intended to clearly refer to the 2-participant action of the corresponding picture pairs.

The resulting 13 stories, along with their associated pairs of pictured scenes, were presented in a fixed order. The sequence began with two real-verb practice items, one transitive and one intransitive (*punch, crawl*) followed by one overtly transitive novel verb filler trial.

### *Procedure*

All instructions and stimulus items were in Thai; English translations are given in the text. Participants were told that they would see pairs of pictures, and listen to some short stories containing unfamiliar words. Their task was to select the picture that they thought best matched the verb. They were encouraged to guess if they were not sure. Those who chose only 2-participant or 1-participant scenes for all test trials, or who gave a wrong answer in more than one filler trial were excluded from the study.

The experimenter started each trial by introducing the story participants. Pictures of the two story participants standing still were shown side-by-side on a computer screen; simple introductory phrases equivalent to "This is A, and that is B" were used. Then, the stimulus picture pair was displayed while the story played twice. The experimenter then asked, "Which picture shows A (verb)-ing?", or "Which picture shows A (verb)-ing B?" in the case of overtly transitive filler items. The subject's choice was recorded.

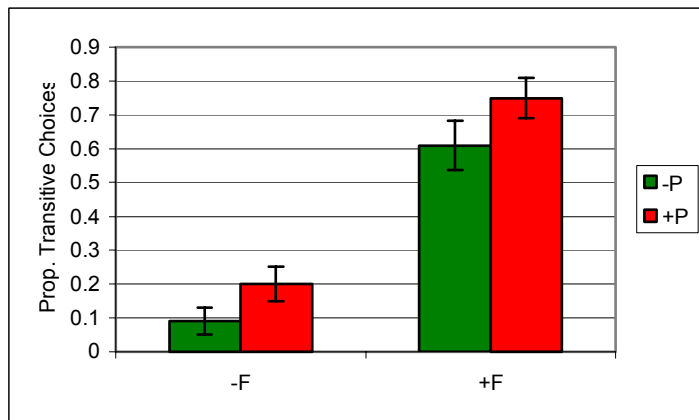
We measured the extent to which subjects chose to interpret each novel verb as transitive (by choosing the 2-participant picture), thereby assigning an unexpressed patient argument to the overtly intransitive verb. Responses in trials containing the verb *mong* (see Appendix) were not included in the analyses because participants showed an overall strong intransitive bias for this item. Two-participant scenes were chosen only 12% of the time across the four discourse contexts for this item, while the average for the other 7 items was 41%.

## **Results**

As shown in Figure 1, the likelihood of choosing a two-participant pictured event when presented with an overtly intransitive novel verb was strongly affected by the discourse context in which the novel verb was presented. When the potential omitted object argument had not been made prominent in either the preceding or following context (-P & -F), participants chose two-participant scenes only 9% of the time. However, as predicted, participants were more likely to interpret the novel verbs as transitive with an unexpressed object if the potential object had been made prominent either in the following context (-P& +F), the preceding context (+P & -F), or in both (+P & +F). The following context appeared to have a stronger effect on participants'

choices: When the potential omitted object was the subject of the following sentence (the +F conditions in Figure 1), participants chose 2-participant events more than 60% of the time.

**Figure 1** Mean proportion transitive choices in each context (error bars show SE)



This pattern was supported by a 2 x 2 ANOVA conducted on the proportion of 2-participant choices, with preceding discourse prominence (+P vs. -P) and subsequent discourse prominence (+F vs. -F) as within-subject factors. There was a significant effect of following discourse prominence ( $F(1,31) = 70.54, p < 0.001$ ) as well as preceding discourse prominence ( $F(1,31) = 4.43, p < 0.05$ ). The interaction of preceding and following discourse prominence was not significant ( $F(1,31) = 0.07, p = 0.8$ ).

## Discussion

The results of the experiment indicate that speakers of Thai, a language where arguments are frequently omitted, pay heed to discourse context information when they interpret a novel verb. In particular, they have been found to be sensitive to maintaining the prominence of an argument that was prominent in the preceding discourse and/or the subsequent discourse. This suggests that verb meaning is not determined exclusively by matching a given sentence to a given context, but by matching a given *discourse* to a given context.

The experimental results revealed that listeners selected two-participant scenes most often when the novel verbs were presented in the +P&+F condition, followed by the -P&+F condition, the +P&-F condition, and least of all in the -P&-F condition. Inspection of Figure 1 suggests that, at least in these materials, the effect of following context was larger than the effect of preceding context. These results suggest that subsequent prominence (in subject position) may play a strong role in determining whether a potential argument is an actual, unexpressed argument of a novel verb. The apparent switch of topic from one sentence to the next might have encouraged listeners to incorporate the new topic into the immediately preceding sentence, by assuming that it had been an omitted object of the novel verb. The interpretation of a novel verb may be revised, or may remain indeterminate, until information is incorporated from the following sentence. Furthermore, the *preceding* discourse prominence of a particular potential argument also affects the comprehension of verb argument structure.

The apparently stronger effect of the prominence of a potential argument in the subsequent discourse may be owing to a causative interpretation of the novel verbs. When listeners tried to integrate the following sentence into their discourse representation, it may have been most natural to assume a causal relationship between the action expressed by the novel verb (e.g., *Suddenly, Nit blinked quickly*) and the event described by the subsequent sentence (*Then, Pon fell down*). A different argument in subject position of the subsequent sentence was readily

incorporated as an omitted argument having a patient role in a causal relationship designated by the novel verb.

While we report here that adults can integrate discourse cues into their understanding of novel verbs, whether children acquiring such languages make use of the same cues as an aid in verb learning is as yet unknown. But research exists that makes the idea plausible. Allen (2000) reported that children as young as two years old, acquiring Inuktitut as their first language, attended to features of informativeness in their speech production. Children were found to produce arguments and be informative when the status of the referents was unclear to listeners, and omit arguments when it was obvious which referents were involved in the discourse. It was thus manifest that children used pragmatic knowledge in determining when arguments could be left unexpressed in their productions of known verbs. In terms of speech comprehension, 3-year-olds in a preferential-looking procedure were shown to use cues from discourse to interpret the referent of an ambiguous pronoun (Song & Fisher 2002; Song 2004). Children tended to look longer at a contextually prominent referent as they heard an ambiguous pronoun. When a referent was made prominent by appearing sentence-initially and as a grammatical subject, it was more readily interpreted as the antecedent of a subsequent pronoun. Hence, discourse prominence of a referent seems to play a role in children's comprehension as well.

It is then possible that children, like adults, draw on discourse cues as they acquire the meaning of an unfamiliar verb. If so, this would shed light on children's acquisition of verb meaning when the number of overtly expressed arguments is not a reliable cue. While overt syntactic structures and real world scene observations are clearly cues to verb meaning, we suggest that preserving discourse coherence is another cue to determining verb meaning.

## Conclusion

This research investigated the effect of discourse contexts on the interpretation of verb meaning in a language where an object argument omission is permitted. It was shown that Thai-speaking adults were attentive to two aspects of ongoing discourse: the preceding and subsequent prominence of potential arguments, in deciding whether an overtly intransitive novel verb should be interpreted as having an unexpressed object argument. Listeners' attention to these two particular factors can be viewed as attempts to increase the discourse coherence of a passage containing an ambiguous novel verb.

## Appendix A

<i>Stimulus verb</i>	<i>Transitive scene</i>	<i>Intransitive scene</i>
blick	A lifts B's leg up by holding B's knee	A lifts her leg up by holding knee
kane	A holds B's arms up in the air in triangular shape	A holds his arms up in the air in triangular shape
mong	A covers B's mouth by hand	A covers his mouth by hand
gabe	A set B's arm up by holding B's elbow	A set her arm up by holding elbow
loon	A pulls B's leg backward	A moves his leg backward
phaam	A uses both hands to push B's head forward	A uses both hands to push her head forward
daat	A closes B's eyes with both hands	A closes her eyes with both hands
piim	A turns B's head using both hands	A turns his head using both hands

### Familiar verb fillers

punch	A punches B	A punches into the air
crawl	A pushes B's shoulders	A crawls on the floor
kick	A kicks B	A kicks into the air

### Unfamiliar verb fillers

sun	A pulls B's shirt using both hands	A pulls her shirt using both hands
cop	A pokes B's stomach with elbow	A pokes with elbow into the air

## Appendix B

### **blick**

—This morning Nit and Pon went to the market together. Nit carried Pon's basket. Nit walked slowly. Suddenly, Nit *blicked* quickly. Then, Nit fell down.

### **kane**

—Keng and Ploy were friends. One day, Keng went to Ploy's house. Keng was thinking what to play. Suddenly, Keng *kane*d once. Then, Keng turned around.

### **mong**

—Pook and Tau were having lunch. Pook served food to Tau. Pook poured water. Suddenly, Pook *monged* tight. Then, Pook stopped eating.

### **gabe**

—Last Saturday Non and Kaew studied together. Non turned to Kaew. Non wanted to do something new. Suddenly, Non *gaped* fast. Then, Non moved away.

### **loon**

—Ton and Maprang were strolling together. Ton sang to Maprang. Ton looked around. Suddenly, Ton *looned* very quickly. Then, Ton fell down.

### **phaam**

—Sai was chatting with Nop. Sai stared at Nop's face. Sai felt bored. Suddenly, Sai *phaamed* hard. Then, Sai did not want to talk anymore.

### **daat**

—One evening Pong and Noi were watching TV together. Pong sat beside Noi. Pong turned left and right. Suddenly, Pong *daated* softly. Then, Pong got up.

### **piim**

—Som and Karn were working together. Som walked to Karn's desk. Som looked outside the window. Suddenly, Som *piimed* slowly. Then, Som sat down.

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