

Periphrastic use: the expression of goals

Lilia Rissman
Johns Hopkins University

1. Introduction

English provides several means for talking about instruments:

- (1) a. I generally brush my teeth with a toothbrush.
- b. Chloe used an old blanket to put out the fire.
- c. This spray kills mosquitoes instantly.

As with other thematic roles, we lack a precise notion of what "instrumenthood" entails. Instruments are commonly described as:

- Tools
- The means of an event
- A causal intermediary in an event

Complicating matters, the sentence types in (1) do not show identical behavior:

- (2) a. I ate the potatoes with a fork.
- b. *The fork ate the potatoes.
- (3) a. The bus crushed the tricycle with its tire.
- b. *The bus used its tire to crush the tricycle.
- (4) a. I used my left hand to cut the bread. (implicit knife)
- b. *I cut the bread with my left hand. (implicit knife)

Rather than attempt to define "instrument," I provide an analysis of periphrastic *use*, as in (1b). The ambiguity of (5) provides a clue to the meaning of *use* (c.f. Lakoff 1968):

- (5) Timmy used his fork to get a cookie.

Interpretation 1: instrumental: e.g. Timmy speared the cookie with a fork

Interpretation 2: double goal: e.g. Timmy used his fork (to eat his dinner) in order to get a cookie

Work on anankastic conditionals suggests that the *to*-infinitive expresses goal-related content (c.f. von Stechow & Iatridou 2005, Nissenbaum 2005, Werner 2006). The similarity of the two readings suggests that instrumentality invokes the agent's goals as well, a novel approach to understanding instruments.

I propose a possible worlds account of *use*: worlds where the instrument is part of the event are more highly ranked with respect to the agent's goals than worlds where the instrument is not involved.

2. Previous approaches to instrumenthood

Many analyses represent instrumental meaning in terms of undefined primitives:

Nilsen (1973): Instruments are -INTENT, +CAUSE, +CONTROLLER, ±CONTROLLED, ±ANIMATE

Jackendoff (1990):

- (6) a. Phil opened the door with a key.
 b.
$$\left[\begin{array}{l} \text{CAUSE} ([\text{PHIL}], [\text{INCH} [\text{BE} ([\text{DOOR}], [\text{OPEN}])]]) \\ \text{AFF} ([\text{PHIL}], [\text{DOOR}]) \\ [\text{BY} \left[\begin{array}{l} \text{CAUSE} ([\text{PHIL}], [\text{AFF} ([\text{KEY}], [\text{DOOR}])]]) \\ \text{AFF} ([\text{PHIL}], [\text{KEY}]) \end{array} \right]] \end{array} \right]$$

Other analyses define instruments as causal intermediaries:

Croft (1991): an instrument is "intermediate in a causal chain between the subject (initiator) and the direct object (final affected entity)" (178)

Koenig et al. (2008):

- (7) a. Harold used a knife to cut the bread.
 b. **cause**(s1, s2) ^ **ACT**(s1, Harold, knife) ^ **CONTACT**(s2, knife, bread) ^ **cause**(s2, s3) ^ **INCISED**(s3, bread)

Koenig et al. don't provide an analysis of *use* per se: *use* is presumed to introduce an instrument and individual verbs specify the role of the instrument in the event, as in (7b).

Koenig et al. point out that, counter to the consensus that instruments play a causal role in events, the role of the instrument is in fact not always strictly causal. Consider the examples in (8), and corresponding causal paraphrases in (9):

- (8) a. Harold used a ladder to paint the ceiling.
 b. Chloe used a spoon to eat the ice cream.
 c. Fred used olive oil to cook the vegetables.
- (9) a. ? Harold standing on the ladder caused the ceiling to become painted.
 b. ? Chloe manipulating the spoon caused her to eat the ice cream.
 c. ? Fred putting olive oil on the vegetables caused them to become cooked.
 d. The contact between the knife and the bread caused the bread to be cut.

The intuition is that the spoon in an eating event is less directly part of the chain of causation than a knife in a cutting event. Koenig et al. introduce the predicate **help** (among others) to deal with this issue. For example, the class of verbs that includes *eat* has the basic structure in (10):

(10) a. **help**(s1, s3) \wedge PRED₂(s1, **A**, **I**) \wedge PRED₁(s3, **P**)

b. An eventuality e_1 **helps** the occurrence of token e_2 of the event category C iff there is an ordering of tokens of C along a pragmatically defined scale ... and e_1 caused the token e_2 of C to be higher on that ordering than it would otherwise have been (214)

Extending the notion in (10b), I argue that ordering of worlds with respect to the agent's goals is crucial for understanding the meaning of *use*.

3. Why goals?

3.1 *Use* is broad

For a single verb, the object of *use* may play many different roles in an event:

- (11) a. Harold used a roller to paint the ceiling.
b. Harold used only his left hand to paint the ceiling. (implicit brush)
c. Harold used a ladder to paint the ceiling.
- (12) a. Chloe used a serrated knife to cut the bread.
b. Chloe amazingly used her foot to cut the bread. (implicit knife)
c. Chloe used a ladder to cut the highest branches from the tree.

Although each verb specifies a certain causal sequence of events, the object of *use* need not occupy a particular position within this causal sequence, and may play a fairly peripheral role, as in the ladder examples. The meaning of *use* should not therefore be expressed directly in terms of causation.

3.2 Reasoning about goals guides our inferences

At first glance, (13) would seem to refute a non-cause meaning of *use*:

(13) Harold used a plate to eat the steak.

(13) is odd, perhaps because the plate does not occupy a more direct role in the causal chain. If Harold is at a crab boil, however, where crabs are typically eaten on a table covered with paper, the sentence becomes interpretable:

(14) Harold used a plate to eat the crab.

Given the context, we make the inference that the plate is relevant to Harold's goals, which could be wanting to keep the table clean or distinguishing himself from those around him. Note that sentences without *use* allow other kinds of relevance implicatures:

(15) Harold had a plate when he ate the crab.

Perhaps Harold lives in a country where plate possession while eating crab is illegal. *Use*, in contrast, seems to express information about goals in particular: this goal-based approach allows us to capture the range of "instrumental" meanings in (11-12) within a unified denotation for *use*.

4. Analysis

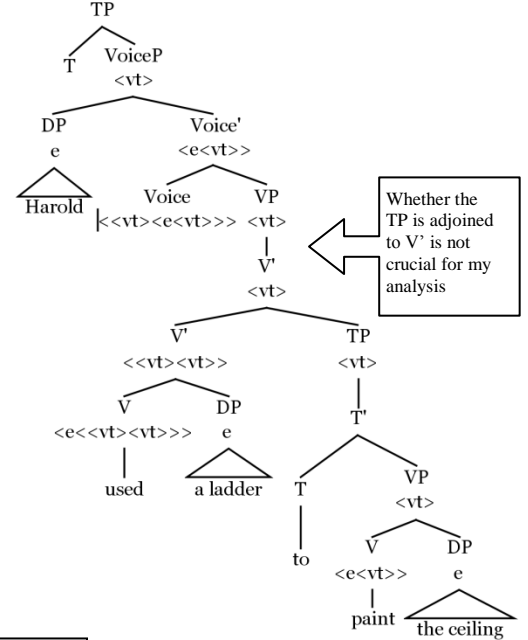
To make clear the intuition behind the analysis, I present first a quasi-formal version:

- (16) $\|use\|^{c,w} = \lambda x \in D_e. \lambda P_{\langle vt \rangle}. \lambda e \in D_v. P(e) \ \&$
 x is the patient of a subevent e' &
 $\forall w'$ s.t. e' occurs in w' , $\exists w''$ s.t. e'' does not
 occur in w'' and w' is more highly ranked w.r.t.
 the agent's goals than w''

In *Harold used a ladder to paint the ceiling*, for example, the ladder makes the painting task easier. What "easier" means is that for all worlds where Harold acts on the ladder, there is some worse world in which Harold does not act on the ladder. This notion is formalized in (17):

- (17) $\|use\|^{c,w} = \lambda x \in D_e. \lambda P_{\langle vt \rangle}. \lambda e \in D_v.$
 $P(e) \wedge \exists e': e' \subset_w e \wedge Pat(e', x) \wedge Ag(e') = Ag(e) \wedge$
 $O(e)(w) \wedge O(e')(w) \wedge$
 $\forall w': (w' \in f(w) \wedge O(e')(w')) \rightarrow$
 $(\exists w'': (w'' \in f(w) \wedge \neg O(e')(w'')) \wedge w' <_{g(w)} w'')$

v is the type of events	$f(w)$ is a circumstantial modal base
$O(e)(w) \equiv e$ occurs in w	$g(w)$ an agent-oriented teleological ordering source
$e' \subset_w e \equiv e'$ is a subevent of e in w	



1. $\lambda x \in D_e. \lambda P_{\langle vt \rangle}. \lambda e \in D_v.$

The instrument DP complement is type $\langle e \rangle$.

The *to*-phrase is type $\langle vt \rangle$; I assume it is a complement given the incompleteness of *Harold used a ladder*.

Voice introduces the subject (cf Kratzer 1996).

2. $P(e) \wedge \exists e': e' \subset_w e \wedge Pat(e', x) \wedge Ag(e') = Ag(e) \wedge O(e)(w) \wedge O(e')(w)$

The event e has the property P ; there exists a subevent e' where the object of use is the patient of e' , the agent of $e =$ the agent of e' , e and e' occur in w .

This presupposition serves the same role as the (ACT, agent, instrument) subevent in the Koenig et al. analysis. The details of e' and e are supplied by context:

Harold used a ladder to paint the ceiling.

Entailments: painting(e); Ag(e, e') = Harold; Pat(e', a ladder); O(e)(w); O(e')(w)

Pragmatic interpretations:

1. Harold climbs the ladder, allowing him to get close enough to the ceiling to paint it (with a roller or brush, etc.)

2. Harold dips the ladder in paint and touches it against the ceiling, eventually covering the ceiling with paint

3. $\forall w': (w' \in f(w) \wedge O(e')(w')) \rightarrow$

for all circumstantially accessible worlds w' in which the subevent occurs...

The circumstantial modal base $f(w)$ contains relevant facts about w such as:

The ceiling is 10 feet high.

Harold is 6 feet tall.

Harold's ladder is 8 feet tall.

4. $(\exists w'': (w'' \in f(w) \wedge \neg O(e')(w'') \wedge w' <_{g(w)} w''))$

there exists some circumstantially accessible world w'' where the subevent does not occur such that w' is ranked higher than w'' in the agent-based teleological ordering source.

For simplicity, strict partial order defined as (von Stechow & Iatridou 2004/2005):

(18) For any set of propositions P , $<_P =$

$\forall w', w'': w' <_P w'' \text{ iff } \forall p \in P (w'' \in p \rightarrow w' \in p) \wedge \exists p \in P (w' \in p \wedge w'' \notin p)$

The ordering source $g(w)$ contains propositions expressing the agent's goals in w , e.g.:

I do tasks quickly.

I do not get paint on myself.

I do not get physically tired when doing tasks.

For all worlds in which Harold acts on the ladder, there exists a lower-ranked world in which Harold does not act on the ladder. For example, w'' could be a world where Harold jumps up and down in order to reach the ceiling with a brush.

(19) $\| \text{Harold used a ladder to paint the ceiling} \|^{c,w} =$

$\exists e \in D_v \text{ s.t. } \text{painting}(e) \wedge \text{Ag}(e) = \text{Harold} \wedge \text{Pat}(e) = \text{a ladder} \wedge \text{is a ceiling} \wedge$

$\exists e': e' \subset_w e \wedge \text{Ag}(e') = \text{Ag}(e) \wedge \text{Pat}(e', \text{ladder}) \wedge \text{O}(e)(w) \wedge \text{O}(e')(w) \wedge$

$\forall w': (w' \in f(w) \wedge \text{O}(e')(w')) \rightarrow$

$(\exists w'': (w'' \in f(w) \wedge \neg \text{O}(e')(w'') \wedge w' <_{g(w)} w''))$

4.1 Not all instruments can bring about events

The analysis must rule out sentences such as (20):

(20) #Harold used a cloud to cut the bread.

(20) is only interpretable to the extent that we can construct an e' that could conceivably be a subpart of a cutting event.

4.2 Use requires an agent

The analysis requires that the event and subevent have an agent, predicting that *use* should not be felicitous in non-agentive contexts. This prediction seems to be borne out:

- (21) a. *While he was asleep, John used his sleeping bag to mop the floor.
b. *Phyllis accidentally used a pair of scissors to cut her dress.
c. *The bus used its tire to crush the tricycle.

Note that the *with*-counterparts of (21) are acceptable:

- (22) a. While he was asleep, John mopped the floor with his sleeping bag.¹
b. Phyllis accidentally cut her dress with a pair of scissors.
c. The bus crushed the tricycle with its tire.

4.3 The role of the modal base

The denotation of *use* states that there is always a worse world in which the subevent does not occur. This analysis relies on the modal base to rule out trivially worse worlds, such as worlds where Harold doesn't act on the ladder and his cat dies. Such worlds are assumed to be not circumstantially accessible from the evaluation world (c.f. Kratzer 2005)

5. Purpose *to*-clause ambiguity

As noted in the introduction, sentences such as (23) are ambiguous:

(23) Timmy used his fork to get a cookie.

Interpretation 1: instrumental: e.g. Timmy speared the cookie with a fork

Interpretation 2: double goal: e.g. Timmy used his fork (to eat his dinner) in order to get a cookie

My analysis of *use* in conjunction with analyses of anankastic conditionals suggests how the two readings might be distinguished. I also argue that the similarity between these two readings supports the analysis of *use* as expressing goals.

¹ Thanks to an anonymous SALT reviewer who pointed out this example.

Anankastic conditionals

This work has included a discussion of *to*-clauses given the semantic similarity between (24a-b):

- (24) a. If you want to go to Harlem, you have to take the A-train.
 b. You have to take the A train (in order) to go to Harlem.

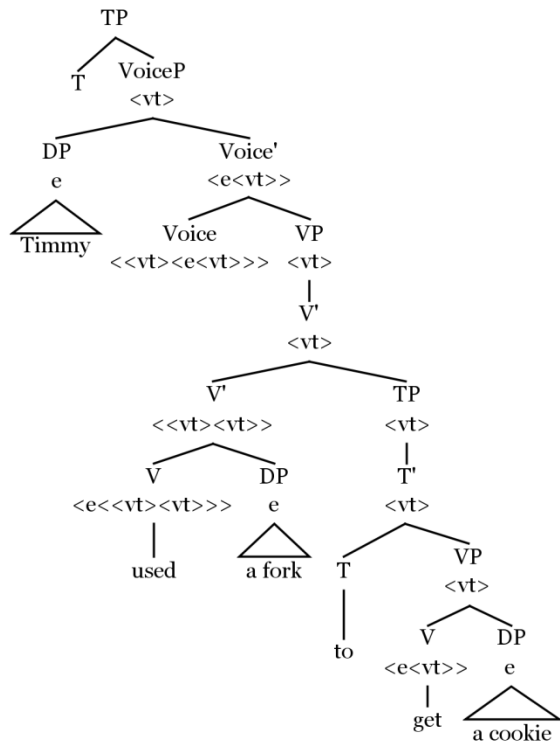
Nissenbaum (2005), for example, argues that *if*-conditionals have an implicit *to*-clause. He analyzes the (*in order*) *to* phrase as an adjunct expressing that in all worlds compatible with the goals relevant to some event, PRO goes to Harlem in those worlds:

- (25) $\| \text{ (in order) to go to Harlem} \|^{c, w} =$
 $\lambda e \in D_v. \forall w' [w' \text{ is compatible with the goals relevant to } e: \text{PRO goes to Harlem at } w']$

This property of events composes with the matrix clause via predicate modification.

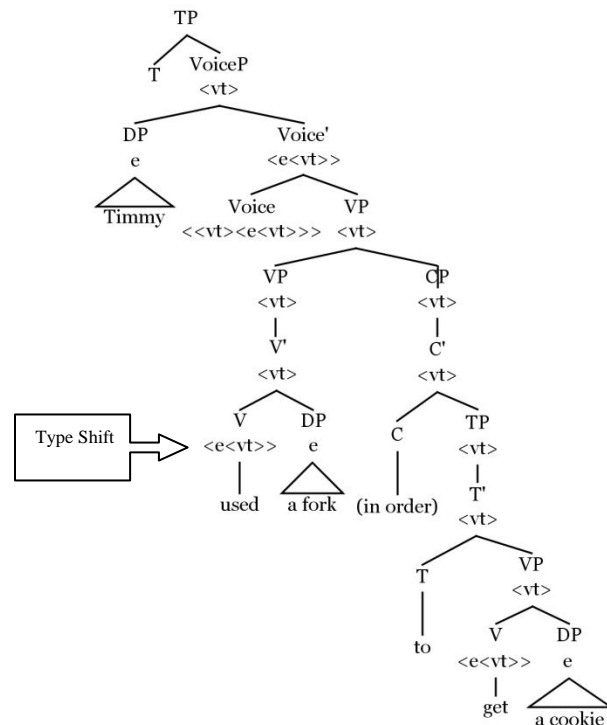
The two interpretations correspond to two syntactic/semantic structures:

Instrumental:



- The property of events in the *to*-clause is entailed

Double goal:



Type Shift

- The property of events in the *to*-clause is not entailed
- TP argument of use is implicit: we might know, e.g. Timmy's parents offered him a cookie as a reward for eating with his fork

Interestingly, *use* sentences may have an instrumental reading even when an *in order to* adjunct is present:

(26) Timmy used a fork in order to get a cookie.

To get this reading, the goal expressed in the adjunct must be identified with the property of events argument of *use*. The possibility of such a process indicates that the goal-based analysis of *use* is correct.

5. Conclusion

I have argued that a goal-based analysis of *use* captures the flexibility of this element more succinctly than a causation based analysis. In future work I will address the differences between *with* and *use*, including whether *with* has a teleological foundation as well.

Thank you!

Contact: rissman@cogsci.jhu.edu

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