

Periphrastic *Use*: a Modal Account of Instrumentality*

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1. Introduction

English provides several means for talking about instruments:

- (1) a. Chloe cut the bread with a knife.
- b. Chloe used a knife to cut the bread.

As with other thematic roles, we lack a precise notion of what "instrumenthood" entails. Instruments have been characterized as the "means" of an event (Rappaport & Levin 1988, Jackendoff 1990), or a causal intermediary in an event (Talmy 1976, Croft 1991, Goldberg 2002, Koenig, Mauner, Bienvenue & Conklin 2008), but these notions are seldom explicated or formalized. Furthermore, the data in (2-3) indicate that *with* and *use* do not even make the same semantic contribution:

- (2) (where Nancy is holding a pair of scissors and trips):
 - a. Nancy accidentally cut her dress with the scissors.
 - b. *Nancy accidentally used the scissors to cut her dress.
- (3) a. I used my heritage to grow and become a better person.
- b. *I grew and became a better person with my heritage.

To shed light on the nature of instrumenthood, I provide an analysis of periphrastic *use*. I propose that the direct object of *use* plays a role in satisfying an agent's goals but is not necessarily a causal intermediary: in particular, worlds where the instrument is part of the

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event are ranked more highly with respect to the agent's goals than some world where the instrument is not involved.

2. Previous Approaches to Instrumenthood

2.1 Overview

Previous analyses of instruments are limited in two primary ways: they either represent instrumental meaning in terms of undefined predicates, or they analyze the instrument exclusively as a causal intermediary. As an example of the first approach, Nilsen (1973) proposes that instruments are $-INTENT$, $+CAUSE$, $+CONTROLLER$, $\pm CONTROLLED$ and $\pm ANIMATE$. In Rappaport & Levin (1988), (1a) denotes an event where Nancy causes the bread to become cut BY MEANS OF Nancy bringing the knife in contact with the bread. Jackendoff (1990) introduces the predicate BY, which serves an identical function. These analyses lack explanatory force, given their reliance on undefined predicates.

A second common approach is to analyze an instrument as a causal intermediary. For example, Talmy (1976) proposes that the basic causative situation has the structure [(caused event) RESULT FROM (causing event)], and an instrument is the Figure within the causing event. For Croft (1991), the instrument is "intermediate in a causal chain between the subject (initiator) and the direct object (final affected entity)" (178). In Goldberg (2002), (1a) involves a conjunction of the causative and *with* constructions, where the *with* construction introduces a causal intermediary. Finally, Koenig et al. (2008) propose that (1a-b) have the causal semantic structure shown in (4):

- (4) $ACT(s1, Chloe, knife) \wedge cause(s1, s2) \wedge CONTACT(s2, knife, bread) \wedge cause(s2, s3) \wedge INCISED(s3, bread)$

In this representation, Chloe acts on the knife, which causes the knife to contact the bread, which causes the bread to become incised.

Many of these analyses assume that both *with* and *use* introduce the abstract role INSTRUMENT. For example, Koenig et al. (2008) state that "the object of *with* and the direct object of *use* target very similar, if not identical, L- thematic roles" (180). The data in (2-3) indicate that *with* and *use* should not receive the same analysis; in this paper, I will focus on the semantic properties of *use*. I will use the term "instrument" only to refer to the direct object of *use*, without presupposing that INSTRUMENT is an atomic role type in the grammar (see Fillmore 1968, Van Valin & Wilkins 1996).

2.2 Testing the Causal Intermediary Analysis

In Section 2.2, I consider whether the direct object of *use* is necessarily a causal intermediary in an event. The analyses of instrumenthood described above do not include formal definitions of causation. To evaluate the claim that the direct object of *use* is a

causal intermediary, I first employ the counterfactual definition of causation proposed by Lewis (1973):

- (5) $c \text{ CAUSE } e \rightarrow \neg O(c) \Box \rightarrow \neg O(e)$
 where c and e are events and $O(c)$ is true in w iff c occurs in w ;
 $A \Box \rightarrow C$ expresses the proposition that if A were true, C would also be true¹

I will also employ Koenig et al.'s representation of causal event structure, as in (4). This choice does not limit the scope of my argument, as the causal intermediary analyses above share the same basic structure: an agent acts on an instrument, which causes some other event. Applying the definition in (5) to the causal structure in (4) yields the statements in (6a-b):

- (6) a. $\neg O(\text{ACT}(s1, \text{Chloe}, \text{knife})) \Box \rightarrow \neg O(\text{CONTACT}(s2, \text{knife}, \text{bread}))$
 b. $\neg O(\text{CONTACT}(s2, \text{knife}, \text{bread})) \Box \rightarrow \neg O(\text{INCISED}(s3, \text{bread}))$

(6a) states that if Chloe had not acted on the knife, the knife would not have come into contact with the bread; (6b) states that if the knife had not come into contact with the bread, the bread would not have become incised. These statements should both be true if the structure in (4) captures the meaning of *Chloe used a knife to cut the bread*. This prediction is confirmed, in the sense that worlds where Chloe does not act on the knife but the knife comes into contact with the bread are substantially different from the world of evaluation. Some additional circumstance would be required, such as a great wind picking up the knife and dropping it onto the bread.

The causal structure in (4) also corresponds to the causal paraphrases in (7):

- (7) a. Chloe acting on the knife caused the contact between the knife and the bread.
 b. The contact between the knife and the bread caused the bread to be cut.

These statements are intuitively true, provided that *Chloe used a knife to cut the bread* is true. A causal intermediary analysis is thus able to capture the meaning of (1b).

This finding does not generalize to all *use* sentences, however. Consider (8):

- (8) Chloe used a ladder to paint the ceiling.

(8) may be true in different situations, such as Chloe dipping a ladder in paint and touching it repeatedly against the ceiling. More likely, Chloe climbed the ladder, allowing her to easily reach the ceiling with a brush or roller. If instruments are necessarily causal intermediaries, then the ladder should be a causal intermediary in either scenario. If Koenig et al. were to assign a causal event structure to the second more likely scenario, it might take the form in (9):

¹ From Lewis (1973): "A $\Box \rightarrow C$ is true (at a world w) iff either (1) there are no possible A-worlds (in which case A $\Box \rightarrow C$ is *vacuous*), or (2) some A-world where C holds is closer (to w) than is any A-world where C does not hold"

- (9) **ACT**(s1, Chloe, ladder) ^ **cause**(s1, s2) ^ **PROXIMAL**(s2, ladder, ceiling) ^ **cause**(s2, s3) ^ **PAINTED**(s3, ceiling)

Given the structure in (9), (8) would denote an event where Chloe acts on the ladder, which causes the ladder to become proximal to the ceiling, which causes the ceiling to become painted. Applying the definition of causation in (5), both of the statements in (10) should be true if (8) is true:

- (10) a. $\neg O(\mathbf{ACT}(s1, \text{Chloe}, \text{ladder})) \Box \rightarrow \neg O(\mathbf{PROXIMAL}(s2, \text{ladder}, \text{ceiling}))$
 b. $\neg O(\mathbf{PROXIMAL}(s2, \text{ladder}, \text{ceiling})) \Box \rightarrow \neg O(\mathbf{PAINTED}(s3, \text{ceiling}))$

(10b) states that if the ladder were not proximal to the ceiling, the ceiling would not have become painted. Suppose that Chloe's ceilings are relatively low and that she can reach them by standing on her tiptoes. In this scenario, (10b) is clearly false. That is, having the ladder close to the ceiling is not necessary for painting, although it might be helpful.

Suppose, however, that Chloe has high ceilings. Now it seems true that in the closest worlds to the world of evaluation, if the ladder is not proximal to the ceiling, the ceiling does not become painted. This finding conflicts with our intuitions about the causal paraphrases of (9), however:

- (11) a. Chloe acting on the ladder caused the ladder to be close to the ceiling.
 b. #The ladder being close to the ceiling caused the ceiling to become painted.

(8) implies (11a) but not (11b). That is, the mere presence of the ladder close to the ceiling does not *cause* the ceiling to become painted; Chloe must take some additional action. Even in the high-ceilings scenario, the ladder seems to play a more distant "helping" role. Dowty (1979) in fact points to cases like these in arguing that Lewis' counterfactual theory overgenerates, conflating *necessary precondition* with *cause* (see Eckardt 2000 for discussion). Thus in some cases the instrument is a causal intermediary, in others a necessary precondition, and in others only a "helper":

- (12) a. Chloe used a knife to cut the bread. (causal intermediary)
 b. Chloe used a ladder to paint the ceiling. (high ceilings: precondition)
 c. Chloe used a ladder to paint the ceiling. (low ceilings: helper)
 d. Chloe used a fork to eat the apple. (helper)

2.3 Instrumental Variety

Researchers have long noted that different elements may play different kinds of instrumental roles in events. Nilsen (1974) in fact identifies eight different instrument types, including proper parts, as in *I used my left foot to kick the ball*, and materials, as in *I used bricks to build the castle*. Many researchers have proposed that verbal semantics drives these differences. For example, Marantz (1984), Ono (1992) and Schutze (1996) argue that individual verbs encode the distinction between "intermediary" instruments,

such as the knife in (12a), and "facilitating" instruments, such as the fork in (12d). They argue that the intermediary/facilitating distinction determines whether the instrument may appear in subject position:

- (13) a. The knife cut the bread.
b. *The fork ate the apple.

Koenig et al. also propose that verbs determine instrumental role type. Although they primarily utilize causal intermediary event structures such as in (4), they note that some instruments, such the fork in (12d), are not causal intermediaries. For these instrument types, they introduce the predicate **help**, paraphrased in (14):²

- (14) e_1 **helps** e_2 iff e_1 causes e_2 to be higher on a pragmatically defined scale than it would otherwise have been

Help appears in the event semantics for a variety of verbs such as *eat*, *play* and *hunt*. Koenig et al. thus encode the helping role as a lexical property of particular verbs.

The distinction between intermediary and facilitating roles is not in fact entirely verb-dependent, however:

- (15) 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.
- (16) 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.

(15-16) show that a range of different instrumental roles is available for each verb. Rather than have instrumental role type follow from verbal semantics, I propose that the meaning of *use* produces this range of interpretations. While verbal semantics certainly constrains the range of instrumental interpretations, the meaning of *use* must be flexible enough to allow instruments that are causal intermediaries, necessary preconditions or helpers. I propose an analysis of *use* that extends Koenig et al.'s notion of a pragmatically defined scale. In particular, I propose that *use* denotes an ordering of worlds with respect to the agent's goals.

As for the instrument subject data in (13), which Marantz and others interpret as evidence for verb-specific instrumental roles, (17) includes several cases where the instrument plays a causal intermediary role but is not a possible subject:

- (17) a. *The stick beat the pony.
b. *The brush painted the wall.

² **help** appears in a basic event structure such as **help**(s1, s3) \wedge PRED₂(s1, **A**, **I**) \wedge PRED₁(s3, **P**).

Along with Schlesinger (1989) and DeLancey (1991), I argue that *beat* and *paint* simply prohibit non-volitional subjects, ruling out the sentences in (17). The verb *cut* places no such restrictions on its subject, allowing (13a). Within Dowty's (1991) proto-role framework, "instrument subjects" are not instruments but non-sentient, non-volitional agents. This issue is thus orthogonal to the meaning of *use*.

3. Syntax and Semantics of the Infinitival *to*-clause

The semantic and syntactic behavior of the infinitival *to*-clause provide an entry point into the meaning of *use*. The relationship between *use* and the infinitival clause, which I will call a "*use*-infinitival," has been discussed within the literature on infinitival adjuncts (Faraci 1974, Bach 1982, Jones 1985, Huettner 1989, Jones 1991, Whelpton 2003). Huettner's (1989) taxonomy of infinitival adjuncts includes the types in (18):

- | | | |
|------|--|-------------------------|
| (18) | a. I bought that dog [to protect myself]. | Rationale clause |
| | b. I built that shelf [to hold my cookbooks]. | Purpose clause |
| | c. The ice melted [to form a puddle]. | Result clause |
| | d. Garfield was elected [only to be assassinated]. | Outcome clause |

Faraci, Bach, Jones and Huettner argue that the *use*-infinitival is a purpose clause. I argue in contrast that the *use*-infinitival does not in fact fall into any of the categories in (18). Rather, the *use*-infinitival is an argument of *use*.

Incidentally, *use* sentences may also have readings where the infinitival clause is in fact a rationale clause. Consider (19):

- (19) Timmy used a fork to get a cookie.

In the dominant reading of (19), Timmy perhaps reached into the cookie jar and speared a cookie with his fork. Under this reading, (19) is roughly synonymous with (20):

- (20) Timmy got a cookie with his fork.

This first "instrumental" reading is the focus of my investigation. As Lakoff (1968) points out, a secondary reading of (19) is also available: perhaps Timmy's parents have told him that if he eats his food with a fork rather than his hands, he will get a cookie as a reward. Huettner argues that under this reading, the infinitival is a rationale clause. The most common diagnostic of a rationale clause is that *in order* may be inserted without changing the sentence's meaning (Jones 1985). When *in order* is inserted into (19), only the second reading is available:

- (21) Timmy used his fork in order to get a cookie.

In this second "rationale" reading, the *use*-infinitival is implicit. That is, (21) might mean something like (22):

- (22) Timmy used his fork [to eat his dinner] in order to get a cookie.

Unlike *use*-infinitivals, rationale and purpose clauses are forward-looking, expressing possibilities or intentions that need not ever be fulfilled.³ In (18b), for example, I built a shelf, but that shelf may not have ever actually held anything. In *use* sentences, by contrast, the event in the infinitival clause is entailed to have occurred, assuming an instrumental reading:

- (23) a. *I used chopsticks to eat the noodles but I didn't end up eating them.
b. *I used a chef's knife to carve the turkey but I couldn't carve it.
c. *I used my fist to break the window but the window wouldn't break.

Result clauses such as in (18c) are also factive, as are outcome clauses, which Whelpton (2003) refers to as "telic clauses." Nonetheless, result clauses only modify inchoative main clauses, and outcome clauses evoke the sense that the outcome is unexpected (Huettner 1989).

What then is the semantic relationship between *use* and the infinitival clause? I propose that the infinitival is an argument of *use*. That is, the "using" event always stands in a relation to some larger event. For example, when the infinitival clause is absent, its presence is understood:

- (24) a. I would have used the cuff of my coat or a bleach wipe.
b. Rita used an assumed name.
c. I objected to them using enhanced interrogation techniques.
d. He used the same weapon that the Christmas Day bomber used.

Using the coat cuff is understood to be part of an event such as cleaning or wiping. We similarly imagine that Rita's use of an assumed name is part of an event such as paying for a hotel or buying a train ticket. In only a few instances does *use* seem to stand on its own:

- (25) a. Angie used a can of clam sauce in the casserole.
b. Ronnie started using drugs when he was 16.

Lakoff (1968) analyzes (25a) as involving a separate "use-up" sense of *use*. I propose that (25b) also involves a separate "using drugs" sense of *use*. *Using drugs* is essentially synonymous with *doing drugs*, indicating that no additional event context is required. The fact using drugs can be abbreviated as simply *using* also suggests that this sense of *use* is idiomatic.

³ *Use*-infinitivals also have different control properties from purpose clauses. In purpose clauses, the matrix theme controls the obligatory gap, whether the gap is in subject or object position:

- i. I bought a dog_i [e_i to bark at the neighbors].
ii. I brought a book_i [to read e_i to the children].

For *use*-infinitivals, in contrast, the gap is always controlled by the matrix subject:

- Chloe_i used chopsticks_k [e_i/*_k to eat her noodles].

Setting the use-up and use-drugs senses aside, the data in (23-24) indicate that *use* takes a property of events as an argument. Nonetheless, *use* sentences denote more than one event, given how *use* interacts with manner adverb modification:

- (26) a. Reba used the chopsticks to eat the noodles gracefully.
b. Reba used the chopsticks gracefully to eat the noodles.

If (26a-b) denoted only a single eating event, they should be synonymous. Instead, (26a) indicates that the eating event was graceful, while (26b) indicates that Reba's manipulating the chopsticks was somehow graceful. This "using" event, where the agent "acts on" the instrument, may be quite general: one may use a hammer, or a technique, or an assumed name. In my analysis, I encode the instrument as a patient of the using event, parallel to Koenig et al.'s **ACT**(s1, A, I) subevent in (4). This acting-on event takes place in the context of the event specified in the *use*-infinitival, which is an argument of *use*.

4. *Use* Expresses Goals

I argued in Section 2.2 that a causal intermediary analysis of *use* is not flexible enough to capture the full range of instrumental role types. I argue in this section that a goal-based analysis provides this flexibility. In the case where Chloe's apartment has low ceilings, what does it mean that she used a ladder to paint the ceiling? Presumably acting on the ladder made the task easier and quicker for her. In this sense, instrumentality is a modal notion: a world where we use an instrument is better than some world where we do not. In particular, I propose that *use* involves a ranking of worlds with respect to the goals of an agent: for all worlds where the agent acts on the instrument, there is some worse-ranked world where the agent does not act on the instrument.

As evidence that *use* involves a goal-based ranking, I observe that we make goal-based inferences when interpreting the role of the instrument in a *use* sentence:

- (27) Harold used a plate to eat the crab.

(27) is odd without supportive context: how is the plate relevant? Imagine then that Harold is at a crab boil, where crabs are usually served on a table covered with paper. We now infer that perhaps Harold wants to flaunt crab boil conventions, or doesn't want to get the table dirty. Crucially, these are inferences about how the plate will help Harold meet his goals. Note that not all relevance implicatures involve reasoning about goals:

- (28) Harold touched his plate while eating crab.

In (28), we infer that perhaps touching his plate is a signal to some onlooker, or that he is forbidden to touch his plate, etc.

Analyzing *use* in terms of goals also establishes a relationship between *use* infinitivals and rationale clauses, as in (18a). Within the literature on anankastic

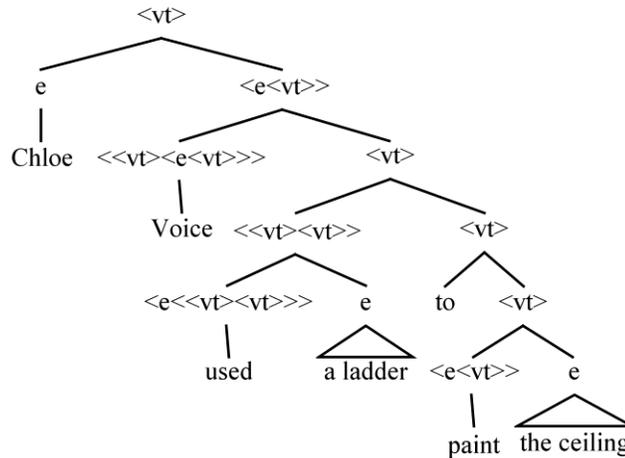
conditionals (Sæbø 2001, von Stechow & Iatridou 2004/2005, von Stechow, Krasikova & Penka 2005, Huitink 2005, Nissenbaum 2005, Werner 2006), rationale clauses have received a teleological analysis.⁴ For example, Nissenbaum proposes the analysis in (29):

$$(29) \parallel_{\text{adjunct}} (\text{in order}) \text{ to go to Harlem} \parallel^{a, w} = \lambda e. \forall w' [w' \text{ is compatible with the goals relevant to } e: \text{PRO goes to Harlem at } w']$$

An analysis where both rationale clauses and *use*-infinitivals express goal-related content is desirable, given the similarity of the "instrumental" and "rationale" readings of (19).

5. Analysis

In my analysis of *use*, I utilize a type-driven, Montague-style compositional semantics and the lambda calculus notation developed in Heim & Kratzer (1998). I propose that *use* is type $\langle e \langle \langle vt \rangle \langle vt \rangle \rangle \rangle$, where v is the type of events. *Use* has two arguments: the instrumental DP (type e) and the infinitival clause (type $\langle vt \rangle$). The instrument is the patient of the event e , indicating that the agent "acts on" the instrument. Following Kratzer (1996), I assume that Voice introduces the subject:



Use introduces an event e' such that e is a subevent of e' . For all worlds where both e' and e occur, there exists some world less highly ranked with respect to the agent's goals where e' occurs but e does not occur:

$$(30) \parallel \text{use} \parallel^{c, w} = \lambda x \in D_e. \lambda P_{\langle vt \rangle}. \lambda e \in D_v. \text{Pat}(e, x) \wedge \\ \exists e': e \subset_w e' \wedge P(e') \wedge \text{Ag}(e') = \text{Ag}(e) \wedge O(e)(w) \wedge O(e')(w) \wedge \\ \forall w': (w' \in \cap f(w) \wedge O(e)(w') \wedge O(e')(w')) \rightarrow \\ (\exists w'': (w'' \in \cap f(w) \wedge \neg O(e)(w'') \wedge O(e')(w'') \wedge w' <_{g(w)} w''))$$

⁴ Anankastic conditionals and rationale clauses have similar meanings:

- i. If you want to go to Harlem, you have to take the A-train.
- ii. You have to take the A- train in order to go to Harlem.

$O(e)(w) \equiv e$ occurs in w ; $e \subset_w e' \equiv e$ is a subevent of e' in w ; $f(w)$ is a circumstantial modal base; $g(w)$ is an agent-oriented teleological ordering source. Strict partial order defined as in von Stechow & Iatridou (2004/2005):

- (31) 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 details of e and e' are supplied by context: for example, for (8), e might be an event of Chloe climbing the ladder. The circumstantial modal base $f(w)$ contains relevant facts about w , such as that Chloe is 6 feet tall, her ceiling is 9 feet tall, and her ladder is 8 feet tall. The ordering source $g(w)$ contains propositions expressing Chloe's goals in w , such as wanting to do tasks quickly and not get paint on her clothes. *Use* expresses that for all worlds in which Chloe paints the ceiling and acts on the ladder, there exists a lower-ranked world in which Chloe paints the ceiling but does not act on the ladder. For example, w'' could be a world where Chloe jumps up and down in order to reach the ceiling with a brush.

- (32) $\| \text{Chloe used a ladder to paint the ceiling} \|^{c,w} =$
 $\exists e \in D_v \text{ s.t. } Ag(e) = \text{Chloe} \wedge Pat(e, \text{ladder}) \wedge \exists e': e \subset_w e' \wedge \text{painting}(e')$
 $\wedge Pat(e') = \text{tn.n is a ceiling} \wedge Ag(e') = Ag(e) \wedge O(e)(w) \wedge O(e')(w) \wedge$
 $\forall w': (w' \in \cap f(w) \wedge O(e)(w') \wedge O(e')(w')) \rightarrow$
 $(\exists w'': (w'' \in \cap f(w) \wedge \neg O(e)(w'') \wedge O(e')(w'') \wedge w' <_{g(w)} w''))$

6. Additional Features of Analysis

6.1 Event-subevent Relation

The analysis must rule out sentences such as in (33):

- (33) a. #Harold used his red socks to paint the ceiling.
 b. #Harold used his lungs to paint the ceiling.

Suppose that Harold is a professional painter whose capricious boss demands that he wear red socks, or he will be fired.⁵ Although worlds where Harold wears red socks are presumably more consistent with his goal of not being fired, (33a) is infelicitous in such a scenario. Similarly, although breathing would satisfy Harold's goal of staying alive, (33b) is infelicitous.

I propose that the event-subevent relation between e and e' rules out these sentences. In particular, an event that is spatiotemporally contained within a second event is not necessarily a subevent of that event. Evidence from the imperfective paradox provides support for this view (Dowty 1977, Parsons 1990, Landman 1992, Portner 1998). Preparatory events may be subevents of a larger accomplishment:

⁵ Thanks to Alexander Williams (p.c.) for pointing out this example.

(34) Harold was painting the ceiling when he was shot.

(34) may be true if Harold had only laid out the dropcloth or set up the ladder but had not begun applying paint to the ceiling. An incidental event is not necessarily a subevent of painting, however. If Harold had just been standing around whistling, (34) would not be true. Intuitively speaking, the event of setting up a ladder is somehow *related* to the event of painting, whereas whistling is not: only the former is a subevent of painting.

Returning to the infelicitous examples in (33), I propose that the mere act of wearing red socks is not a subevent of painting, nor is the act of breathing. These events are incidentally related to painting in space and time but do not contribute to the mereological structure of the painting event. Giving contextual support, however, they may form a part of this structure: (33a) is felicitous if Harold's red socks are magical and give him extra strength and motivation. Breathing may also be a subevent of painting if one's ability to breathe while painting is called into question:

(35) Harold used scuba gear to paint the ocean floor.

This description of the mereological structure of events is only a sketch: the nature of the event-subevent relation is not well understood. Further empirical investigation is required to understand and develop a theory of this relation.

6.2 When the Instrument is Necessary

I have argued that the meaning of *use* must allow for situations where the instrument is helpful but not causally required. In some situations, however, the instrument is required to achieve an event. Recall the case where Chloe has high ceilings that she simply cannot reach without climbing a ladder. At first glance, my analysis predicts that (8) should be false in this situation: for all worlds where Chloe acts on the ladder and paints the ceiling, there is no world where she does not act on the ladder but still paints the ceiling.

Addressing this issue requires reconsidering what it means for an event to occur. In Parson's analysis of the progressive, accomplishments are not inherently telic. That is, (34) involves a painting event that does not culminate. Bach (1986) also argues that events may be partial. Extending this approach, a situation where Chloe is trying but failing to paint the ceiling is a partial instance of painting. Thus there will be a world in which a painting event occurs but an acting-on-the-ladder event does not occur. Indeed, if one of Chloe's goals is to successfully paint the ceiling, this world may be worse precisely because she does not achieve this goal.

6.3 Agency

The use of a teleological ordering source predicts that *use* should not be possible in non-agentive contexts, as only agents have goals. This prediction is borne out:

- (36) a. *While he was asleep, John used to 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 (36) are acceptable:

- (37) a. While he was asleep, John mopped the floor with his sleeping bag.⁶
b. Phyllis accidentally cut her dress with a pair of scissors.
c. The bus crushed the tricycle with its tire.

These data support the goal-based analysis of *use*. In some circumstances, however, *use* may have a non-human subject:

- (38) a. In the microscope I saw the bacterium use its flagellum to propel itself around its environment.
b. Although most nectars are colorless, some plants use bright colors to advertise their liquid appeal.

I argue that in such utterances we construe non-human organisms and complex systems as having agency and goals. When a plant is described as advertising itself, we are construing it as having intention.

6.4 The Role of the Modal Base

The donation of *use* only requires that there be some worse world such that *e'* occurs but *e* does not occur. Consequently, the analysis runs the risk of being trivially true, in the sense that circumstances could always be worse. That is, there will always be a world where Chloe paints the ceiling but doesn't act on the ladder and her cat dies, or her hair falls out, etc. My analysis relies on the modal base to rule out such trivially worse worlds. Following Kratzer (2005), such worlds are assumed to be not circumstantially accessible from the evaluation world.

7. Conclusion

A primary goal of my investigation has been to unpack the notion of "instrument." Given the subtle disparities between *use* and *with* shown in (2-3), I have proposed an analysis of *use* that does not utilize the concept INSTRUMENT as an atomic predicate in the grammar. An important next question then, is how the meanings of *use* and *with* are similar and how they might differ. Clearly *with* cannot involve a goal-based ordering: the data in (36-37) indicate *with* does not require an intentional agent, and only intentional agents have goals. I have proposed in this paper that *use*-instruments should receive a modal analysis; I leave future research to consider whether *with*-instruments also express an ordering over worlds.

⁶ Thanks to an anonymous SALT reviewer who pointed out this example.

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