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Several Problems for Predicate Decompositions

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1 Introduction

- We examine the semantic contrasts encoded in argument/oblique alternations, e.g.

(1) a. Kim cut the pie. (Pie affected)
b. Kim cut at the pie. (Pie not necessarily affected)

- We claim that theories of argument realization must capture three crucial properties of such alternations:
  - **Implicational Contrasts:** Direct argument variants often entail additional properties of the alternating participant not entailed by oblique variants.
  - **Root Dependency:** The contrast exhibited by a given verb in a given alternation depends on the verb.
  - **Verb Hierarchies:** For certain alternations, the ability of certain verbs to alternate predicts the ability of other verbs to do so.
- We argue that these properties result from the fine-grained lexical semantic properties that the verb associates with its arguments.
- We claim that predicate decompositional approaches (Dowty 1979, Levin and Rappaport (Hovav) 1988, 1995, 1998, Pinker 1989, Gropen et al. 1991, Wunderlich 1997, Van Valin and LaPolla 1997, Davis and Koenig 2000, Davis 2001, Koenig and Davis 2004, *inter alia*) fail to capture these properties because they lack the semantic fine-grainedness necessary to express them.
- We argue instead that entailment-based approaches to argument realization (Ladusaw and Dowty 1988, Dowty 1989, 1991, Primus 1999, Ackerman and Moore 2001, Beavers 2005, in press, in prep) provide an appropriate language for capturing these properties.

2 Implicational Contrasts

2.1 Decompositional Analyses

- Consider first the well-known locative alternation (Fillmore 1968):

(2) a. Kim loaded *hay* **onto the wagon**. (locatum=DO, location=OBL)
b. Kim loaded **the wagon** *with hay*. (location=OBL, locatum=DO)

- Following Anderson (1971), there is a putative "holistic" affect for the location when it is the direct object in such alternations, whereby it comes to be completely full:

(3) a.#Kim loaded *the wagon* with hay, and had extra room for the grain.
b. Kim loaded hay *onto the wagon*, and had extra room for the grain.
c. Kim loaded hay *onto the wagon*, filling it up completely.

- Levin and Rappaport (1988) propose that the two variants exhibit the "paraphrase property": the location direct object variant entails the location oblique variant but not vice versa, captured in terms of two distinct but related event templates:

(4) a. John loaded hay onto the wagon. (change-of-location, cf. *put*)
[x cause [y to come to be at z]/LOAD]
b. John loaded the wagon with hay. (change-of-state, cf. *fill*)
[[x cause [z to come to be in STATE]]
BY MEANS OF [x cause [y to come to be at z]/LOAD]]

(5) When the LCS of a verb includes one of the substructures in [(6)], link the variable represented by x in either substructure to the direct [object] variable in the verb's [Predicate Argument Structure].

(6) a. ...[x come to be at LOCATION]...
b. ...[x come to be in STATE]... (*ibid*:25-26, (24), (21)-(22))

— Each template makes a different argument more prominent (less embedded), which determines direct object linking and thus the alternation.

— Furthermore, (4b) embeds (4a), predicting the paraphrase relationship.

- However, this approaches suffers two drawbacks.

- First, in both variants there is at least *some* affect for *both* participants (at least partly moved/filled) regardless of holistic affectedness (Jackendoff 1990:129-130), but this is absent in (4).

- Second, the "paraphrase property" is in fact more complicated than (4) suggests.

- If the locatum is realized as a definite NP rather than a bare plural/mass NP it also yields a holistic reading (Fillmore 1977, Jeffries and Willis 1984, Dowty 1991, Herslund 1995; see Garey 1957, Verkuyl 1972, 1993 on the effect of bare plurals/mass objects):

(7) a.#Kim loaded *the hay* onto the wagon, but needed a truck for the rest.
b. Kim loaded the wagon *with the hay*, but needed a truck for the rest.
c. Kim loaded the wagon *with the hay*, leaving none behind.

- The paraphrase property is relative *to each participant*: each variant associates an additional property with its direct object not associated with the corresponding oblique.

- In fact, this applies to many alternations that involve notions others than holistic affectedness. Many alternations exhibit similar entailment patterns (Beavers 2005):

(8) **Reciprocal alternation** **(Underspecified motion)**
   a. The car and the truck collided. (car and truck in motion)
   b. The car collided with the truck. (car in motion; truck not necessarily)

(9) **Conative alternation I** **(Underspecified holistic affectedness)**
   a. John ate the sandwich. (sandwich all eaten)
   b. John ate at the sandwich. (sandwich not necessarily all eaten)

(10) **Conative alternation II** **(Underspecified affectedness)**
   a. John slashed the canvas. (canvas affected)
   b. John slashed at the canvas. (canvas possibly not affected)

(11) **Dative alternation** **(Underspecified possession/goal)**
   a. John sent Mary the letter. (Mary a goal and possessor)
   b. John sent the letter to Mary. (Mary not necessarily possessor)

(12) **Preposition drop alternation** **(Underspecified holistic traversal)**
   a. John climbed the mountain. (entire mountain traversed)
   b. John climbed up the mountain. (mountain possibly not all traversed)

(13) ***Search* alternation I** **(Underspecified existence)**
   a. John hunted a unicorn in the woods. (unicorn presupposed to exist)
   b. John hunted for a unicorn in the woods. (unicorn might not exist)

(14) ***Search* alternation II** **(Underspecified holistic coverage)**
   a. John searched the woods for deer. (woods totally searched)
   b. John searched in the woods for deer. (woods maybe not all searched)

- Thus the following very general direct argument/oblique contrast emerges (cf. Ackerman and Moore 2001, Beavers 2005, in press, in prep), governing all such alternations:

  (15) In semantically contentful argument/oblique alternations direct arguments are specified for properties left underspecified for corresponding obliques.

- Predicate decompositions do not capture this since all they encode are *structural* differences between co-arguments (cf. Koenig and Davis 2004).

2.2 Entailment-Based Approaches

- In an entailment based approach (Ladusaw and Dowty 1988, Dowty 1989, 1991, Primus 1999, Ackerman and Moore 2001, Beavers 2005, in press, in prep) a verb associates with each participant a set of entailments describing that participant's role in the event.

- Different realization options for each participant are determined by which entailments are associated with it according to some mapping principles (cf. Dowty 1991 on a proto-role analysis of subject/object selection).

- By their very nature, sets of entailments allow the possibility of subset relations. Strict subset relations inherently encode the sorts of implicational contrasts we see above:

(16) For any two sets of entailments R and Q assigned to a participant x, if $R \subset Q$ then Q says more about x (contains more entailments about x) than R does.

- On the basis of this we can place the following general constraint on linking rules that restricts the kinds of semantic contrasts they allow:

(17) For a participant x that can be realized as either a direct or oblique argument of a verb V, it has entailments Q_V as a direct argument and entailments R_V as an oblique where $R_v \subset Q_v$.

- Linking rules for particular alternations will specify which sets of entailments are relevant. For example, whichever way the locative alternation is analyzed we would expect it to yield the following assignments of entailments, which obeys (17):

(18)

Entailments for locatum/location	:	$\left\{\begin{matrix} holistic \\ affected \\ \dots \end{matrix}\right\}$	$\supset$	$\left\{\begin{matrix} affected \\ \dots \end{matrix}\right\}$
Realization of locatum/location	:	DO		OBL

- What were structural asymmetries in predicate decompositions are implicational asymmetries in entailment-based approaches, capturing the generalization in (15).

3 Root Dependency

- The contrasts governed by a given alternation vary depending on the verb. Consider the following verbs involving a locatum moving into contact with a location:

(19) a. Kim cut/sliced/chipped **the window** *with the diamond.*(window affected)
b. Kim cut/sliced/chipped *the diamond* **on the window**.(diamond affected)

- The object is affected somehow; the corresponding obliques are underspecified for this.

- Though not canonical locative alternations, they share many properties in common with *spray/load* alternations (Fillmore 1977, Dowty 1991; see also Gawron 1986):

(20) a. The morphosyntax (*with*=locatum, *in(to)/on(to)*=location).
b. LOCATUM is force-dynamically intermediate (Croft 1991, 1998):

x	⟶	y	⟶	z		x	⟶	y	⟶	z
**** *load*		**********				**** *cut*		**********		
Kim		*hay*		*wagon*		*Kim*		*diamond*		*window*

c. LOCATUM moves relative to LOCATION

- Yet the contrasts are different for *spray/load* vs. *cut/slice* versions of this alternation:

(21)

	Direct Object	**Oblique**
spray/load	x is holistically affected	x is affected
cut/slice	x is affected	no affected specified for x

- The conative alternation shows a similar paradigm of possible contrasts:

(22) a. Kim ate the pie. (holistic) ⇔ b. Kim ate at the pie (slowly). (affected)
c. Kim cut the pie. (affected) ⇔ d. Kim cut at the pie.

- In decomposition theories we would expect to treat *spray* and *cut* the same in terms of the geometry of the event template, e.g. *with* variants have the following form (cf. Guerssel et al. 1985, Laughren 1988 for related analyses of *cut* in conative alternations):

(23) a. *load with*: [[x cause [z to come to be in STATE]]
BY MEANS OF [x cause [y to come to be at z]/LOAD]]
b. *cut with*: [[x cause [z to come to be in STATE]]
BY MEANS OF [x cause [y to come to be at z]/CUT]]

- But how would we capture the lexical idiosyncrasy, i.e. the fact that the "same" alternation has different semantics with different verbal roots?

- Presumably this comes from the root portion of the decomposition, but in general the root plays no role in assigning particular semantics to any participant.

- On an entailment based approach root dependency follows quite naturally:
— Different verbs associate different entailments with their arguments.
— Linking rules determine subset relations dependent on the verb-specific entailments.

- Following Beavers (2005, in press), holistic affectedness entails affectedness so that whatever rule generates the locative paradigm simply strips away the strongest entailment of affectedness provided by the verb, generating the contrasts in (24).

(24)

		spray/load			*cut/slice*		
Entailments	:	$\left\{\begin{matrix} holistic \\ affected \\ \dots \end{matrix}\right\}$	$\supset$	$\left\{\begin{matrix} affected \\ \dots \end{matrix}\right\}$	$\left\{\begin{matrix} affected \\ \dots \end{matrix}\right\}$	$\supset$	$\{\dots\}$
Realization	:	DO		OBL	DO		OBL

- "Root" and "template" are no longer ontologically distinct: the subset structure that determines alternations follows from the nature of the root (sets of entailments).

4 Verb Class Hierarchies

- Consider intances of the dative alternation:

(25) a. Kim gave/sent/threw *Sandy* a ball.
b. Kim gave/sent/threw a ball *to Sandy*.

- Croft et al. (2001) show that, crosslinguistically, *give* verbs and *send* verbs form an implicational hierarchy regarding their ability to undergo the dative alternation:
— *Give* is less likely than *send* to show oblique (allative) realization.
— If *give* alternates then so does *send*: *give* > *send*

- It is widely assumed that FO/dative realizations of recipients are inherently about causation of possession while oblique realizations are inherently about motion (Green 1974, Oehrle 1976, Krifka 2004, Harley 2003, *inter alia*).

(26) Decompositions for ditransitive verbs (from Levin and Rappaport Hovav 2005):
  a. [x CAUSE [y HAVE z]] (causation-of-possession; recipient y is FO)
  b. [x CAUSE [z GO TO y]] (change-of-location; recipient y is oblique)

- Most such approaches to dative alternations assume that all ditransitives have both meanings available, but this does not account for Croft et. al.'s generalization.

- However, Levin and Rappaport Hovav (2005) argue that *give* is unambiguously caused possession while *send* is ambiguous between caused possession and change-of-location.

(27) #John gave a package to London/gave London a package.

- This explains why in many languages *send* verbs exhibit an argument-oblique alternation and *give* verbs do not (cf. German, Hebrew; Francez to appear).

- English is exceptional in allowing *give* verbs to alternate, but for information structural and heaviness reasons (among other things; see Erteschik-Shir 1979, Arnold et al. 2000, Wasow 2002, Bresnan and Nikitina 2003, Rappaport Hovav and Levin 2005).

- This analysis, however, is problematic for two reasons.

A. Why is the relevant oblique marker the allative for *give* when it shows oblique variants (e.g. English alternations; in Finnish *give* categorically takes allative; Karlsson 1999)?

— Levin and Rappaport Hovav (2005:11) note that "[r]ecipients can be expressed either as a first object or as the object of the preposition *to*, since they are semantically compatible with both realizations."

— This suggests that there is a common semantics to the *to* and FO, but this is not encoded in (26). There is no inherent relation between the two decompositions.

- An entailment-based approach naturally models the shared semantics, wherein the set of entailments constituting the role POSSESSOR is a superset of the role GOAL.

(28)
$$\underset{\left\{\begin{array}{c}\text{g is the endpoint of a path}\\ \text{g comes to possess a theme x}\end{array}\right\}}{\text{POSSESSOR}} \supset \underset{\{\text{g is the endpoint of a path}\}}{\text{GOAL}}$$

- Essentially, POSSESSORS are affected GOALS (Jackendoff 1990).

- The notion of path is necessarily abstract (a la Krifka 1998, Beavers to appear): it refers to a scale of coming to be at/with the goal (a relation of "central coincidence" following Hale and Keyser 2002:208), a necessary precondition on coming to be possessed.

- *Give/send* differ in what kinds of non-theme participants they select for, and FO/*to* differ in what kinds of participants they realize:

(29) Role assigned to (recipient) arguments:

Verbs			**Realization Options**		
give	:	POSSESSOR	FO	:	POSSESSOR
send	:	GOAL	*to*	:	GOAL

— The role assigned by *send* is compatible with *to*, thus predicting allative realization. FO realization is possible but monotonically adds the entailment of possession.

— The role assigned by *give* is compatible with FO, thus predicting direct argument realization. Crucially, since the role assigned by *give* subsumes that of *to*, allative realization is trivially also possible but *give* inherently determines the stronger semantics.

∴ The allative is thus expected to be the relevant oblique marker for all ditransitives.

B. Why does *give* not trivially alternate in all languages with an allative marker?

- The decompositions above do not ultimately predict nor rule out an alternation.
- The entailments we posit determine an unique interaction which explains this:

  — This semantics of FO and *to* yield a blocking effect: the stronger realization is preferred for expressing the stronger meaning, which *give* always selects for.

  — Blocking can be overridden if need be for information structural or other factors; in English (a language with relatively fixed word order) alternations are a common way to do many such things (Givón 1984).

- Oblique variants with both *give* and *send* are always possible on this approach; but it is ruled out for *give* unless it can be made non-vacuous in some way.

5 Conclusions

- We have examined three properties of argument/oblique alternations:
  - **Implicational Contrasts:** Direct argument variants often entail additional properties of the alternating participant not entailed by oblique variants.
  - **Root Dependency:** The contrast exhibited by a given verb in a given alternation depends on the verb.
  - **Verb Class Hierarchies:** The ability of certain verb classes to alternate predicts the ability of other verb classes.

  — Decompositions do not capture these semantic generalizations because they focus primarily on the structure of semantic representations.

  — Entailment-based approaches provide an appropriate semantic language.

- Is it possible to augment decomposition approaches to capture the semantic contrasts?

- Presumably yes, if the structures are augmented with semantic information that determines argument realization rather than just structural properties of the decompositions (as in Jackendoff 1990) or if meaning postulates relate different decompositions.
- But this would constitute a kind of semantic structure upon which linking constraints could be stated, potentially obviating the need for the decompositions themselves.
- Whether this is possible or necessary is a matter of future work, but the questions we raise pose challenges for such theories.

References

Ackerman, Farrell and John Moore. 2001. *Proto-Properties and Grammatical Encoding: A Correspondence Theory of Argument Selection*. Stanford, CA: CSLI Publications.

Anderson, Stephen R. 1971. On the role of deep structure in semantic interpretation. *Foundations of Language* 7(3):387–396.

Anderson, Stephen R. 1977. Comments on the paper by Wasow. In P. W. Culicover, T. Wasow, and A. Akmajian, eds., *Formal Syntax*, pages 361–378. New York: Academic Press.

Arnold, Jennifer E., Thomas Wasow, Anthony Losongco, and Ryan Ginstrom. 2000. Heaviness vs. newness: The effects of structural complexity and discourse status on constituent ordering. *Language* 76(1).

Beavers, John. 2005. A semantic analysis of argument/oblique alternations in HPSG. In S. Müller, ed., *Proceedings of the 2005 HPSG Conference*. Stanford, CA: CSLI Publications.

Beavers, John. To appear a. Scalar complexity and the structure of events. In J. Dölling and T. Heyde-Zybatow, eds., *Event Structures in Linguistic Form and Interpretation*. Berlin: Mouton de Gruyter.

Beavers, John. In press. Thematic role specificity and argument/oblique alternations in English. In *Proceedings of WECOL 2004*. University of Southern California, Los Angeles.

Beavers, John. In prep. *Thematic Roles and Argument/Oblique Alternations*. PhD Dissertation, Stanford University.

Bresnan, Joan and Tatiana Nikitina. 2003. On the gradience of the dative alternation. Draft of May 7, 2003.

Croft, William. 1991. *Syntactic Categories and Grammatical Relations: The Cognitive Organization of Information*. Chicago: University of Chicago Press.

Croft, William. 1998. Event structure in argument linking. In M. Butt and W. Geuder, eds., *The Projection of Arguments*, pages 21–63. Stanford, CA: CSLI Publications.

Croft, William, Jóhanna Barðdal, William Hollmann, Maike Nielsen, Violeta Sotirova, and Chiaki Taoka. 2001. Discriminating verb meanings: The case of transfer verbs. handout, LAGB Autumn Meeting, Reading.

Davis, Anthony. 2001. *Linking by Types in the Hierarchical Lexicon*. Stanford, CA: CSLI Publications.

Davis, Anthony and Jean-Pierre Koenig. 2000. Linking as constraints on word classes in a hierarchical lexicon. *Language* 76(1):56–91.

Dowty, David. 1979. *Word Meaning and Montague Grammar*. Dordrecht: Reidel.

Dowty, David. 1989. On the semantic content of the notion 'thematic role'. In G. Chierchia, B. H. Partee, and R. Turner, eds., *Properties, Types, and Meaning*. Dordrecht: Kluwer Academic Publishers.

Dowty, David. 1991. Thematic proto-roles and argument selection. *Language* 67(3):547–619.

Erteschik-Shir, Nomi. 1979. Discourse constraints on dative movement. In T. Givón, ed., *Discourse and Syntax*, pages 441–468. New York: Academic Press.

Fillmore, Charles J. 1968. The case for case. In E. Bach and R. T. Harms, eds., *Universals in Linguistic Theory*. New York: Holt.

Fillmore, Charles J. 1977. The case for case reopened. In P. Cole and J. M. Sadock, eds., *Grammatical Relations*, pages 59–82. New York: Academic Press.

Francez, Itamar. To appear. Possessors, goals and the classification of ditransitive predicates: Evidence from Hebrew. In *Empirical Issues in Syntax and Semantics 6*.

Garey, Howard B. 1957. Verbal aspects in French. *Language* 33(2):91–110.

Gawron, Jean Mark. 1986. Situations and prepositions. *Linguistics and Philosophy* 9:327–382.

Givón, Talmy. 1984. Direct object and dative shifting: Semantic and pragmatic case. In F. Plank, ed., *Objects: Towards a Theory of Grammatical Relations*, pages 151–182. London: Academic Press.

Green, Georgia. 1974. *Semantic and Syntactic Regularity*. Bloomington, IN: Indiana University Press.

Gropen, Jess, Steven Pinker, Michelle Hollander, and Richard Goldberg. 1991. Affectedness and direct objects: The role of lexical semantics in the acquisition of verb argument structure. *Cognition* (41):153–195.

Guerssel, Mohamed, Kenneth Hale, Mary Laughren, Beth Levin, and Josie White Eagle. 1985. A cross-linguistic study of transitivity alternations. In W. H. Eilfort, P. D. Kroeber, and K. L. Peterson, eds., *CLS 21, Part 2: Papers from the Parasession on Causatives and Agentivity*, pages 48–63. Chicago Linguistic Society.

Hale, Kenneth L. and Samuel Jay Keyser. 2002. *Prolegomenon to a Theory of Argument Structure*. Cambridge, MA: MIT Press.

Harley, Heidi. 2003. Possession and the double object construction. In P. Pica and J. Rooryck, eds., *Linguistic Variation Yearbook 2*, pages 31–70. Amsterdam: John Benjamins.

Herslund, Michael. 1995. The applicative derivation and the "spray paint" alternation in Danish. In *Working Papers in Linguistics 25*, University of Trondheim.

Jackendoff, Ray. 1976. Toward an explanatory semantic representation. *Linguistic Inquiry* 7(1):89–150.

Jackendoff, Ray. 1990. *Semantic Structures*. Cambridge, MA: MIT Press.

Jeffries, Lesley and Penny Willis. 1984. A return to the spray paint issue. *Journal of Pragmatics* 8:715–729.

Karlsson, Fred. 1999. *Finnish: An Essential Grammar*. New York: Routledge.

Koenig, Jean-Pierre and Anthony Davis. 2004. The KEY to lexical semantic representations. Unpublished ms., University at Buffalo, the State University of New York.

Krifka, Manfred. 1998. The origins of telicity. In S. Rothstein, ed., *Events and Grammar*, pages 197–235. Dordrecht: Kluwer Academic Publishers.

Krifka, Manfred. 2004. Semantic and pragmatic conditions for the dative alternation. *Korean Journal of English Language and Linguistics* 4:1–32.

Ladusaw, William and David R. Dowty. 1988. Toward a non-grammatical account of thematic roles. In W. Wilkins, ed., *Thematic Relations*, pages 62–72. San Diego, CA: Academic Press.

Laughren, Mary. 1988. Toward a lexical representation of Warlpiri verbs. In W. Wilkins, ed., *Thematic Relations*. San Diego, CA: Academic Press.

Levin, Beth and Malka Rappaport. 1988. What to do with θ-roles. In W. Wilkins, ed., *Thematic Relations*. San Diego, CA: Academic Press.

Levin, Beth and Malka Rappaport Hovav. 1995. *Unaccusativity: At the Syntax-Lexical Semantics Interface*. Cambridge, MA: MIT Press.

Levin, Beth and Malka Rappaport Hovav. 1998. Morphology and lexical semantics. In A. Spencer and A. Zwicky, eds., *The Handbook of Morphology*. Oxford, UK: Blackwell.

Oehrle, Richard T. 1976. *The Grammatical Status of the English Dative Alternation*. Ph.D. thesis, MIT, Cambridge, MA.

Pinker, Stephen. 1989. *Learnability and Cognition*. Cambridge, Mass: MIT Press.

Primus, Beatrice. 1999. *Case and Thematic Roles: Ergative, Accusative and Active*. Tübingen: Max Niewmeyer Verlag.

Rappaport Hovav, Malka and Beth Levin. 2005. All dative verbs are not created equal. Unpublished ms., The Hebrew University of Jerusalem.

Van Valin, Robert D. and Randy J. LaPolla. 1997. *Syntax: Structure, Meaning, and Function*. Cambridge, UK: Cambridge University Press.

Verkuyl, Henk J. 1972. *On the Compositional Nature of the Aspects*. Dordrecht: Reidel.

Verkuyl, Henk J. 1993. *A Theory of Aspectuality: The Interaction between Temporal and Atemporal Structure*. Cambridge, UK: Cambridge Unversity Press.

Wasow, Thomas. 2002. *Postverbal Behavior*. Stanford, CA: CSLI Publications.

Wunderlich, Dieter. 1997. Cause and the structure of verbs. *Linguistic Inquiry* 28(1):27–68.