Causation in Semantics and Grammatical Structure
Week 2: Lexical decomposition and CAUSE

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October 19, 2019

1 Background: Dowty 1979

1.1 Lexical decomposition

Dowty 1979, Ch. 2: theories of decomposition are aimed at explaining certain regularities that appear across the lexicon

- before generative semantics, this involved finding certain kinds of conceptual/paradigmatic regularities (Jakobson 1936, Hjelmslev 1953)

	[+FEMALE]	[+ MALE]	[+ JUVENILE]
[+ HUMAN]	woman	man	child
[+ BOVINE]	cow	bull	calf
[+ EQUINE]	mare	stallion	foal

  - idea: treat meanings, like phonemes, as a system of (optional) contrasts

- this allows us to capture certain entailment relations

(1) $[\![\text{mare}]\!] := \lambda x.\text{EQUINE}(x) \wedge \text{FEMALE}(x)$
  a. $\text{mare}(x) \vdash \text{EQUINE}(x)$
  b. $\text{mare}(x) \vdash \text{FEMALE}(x)$

- **features** are non-logical constants: on this kind of view, learning word meanings in a language involves learning which words/sequences of sounds pick out which (preexisting) conceptual features

Dowty (1979):

- the basic project of decomposition seems good, but:
  - less interested in features as features

  - interested in atomic components of meaning as expressing certain kinds of relations in the lexical that allow us to draw conclusions about temporal structure, possibility/necessity, and so on
  - (this is like the pure logical entailment in example 1, but deals with different kinds of relations)

- causatives, and their non-causative relatives are an example of this (cf. Lakoff 1965)

1.1.1 Background to Fodor (1970)

Lakoff (1965) observes a pattern in the English lexicon involving a large set of verbs:

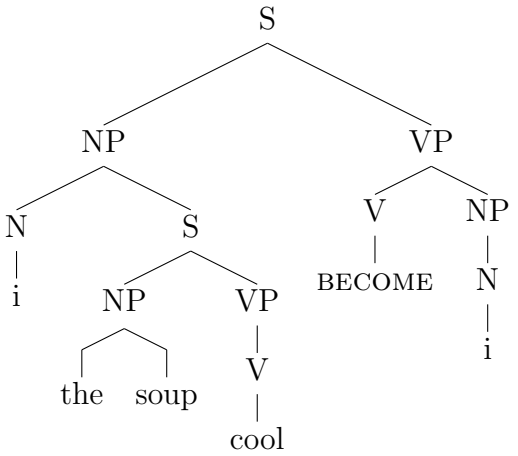
(2)	a. The soup was **cool.**	(3)	a. The metal was **hard**	STATIVE
	b. The soup **cooled.**		b. The metal **hardened.**	INCHOATIVE
	c. Juri **cooled** the soup.		c. Juri **hardened** the metal.	CAUSATIVE

- Lakoff wants to analyze this in terms of **transformational** grammar: derive the inchoatives and causative by performing certain operations on the statives
- this is meant to account for certain regularities: e.g., selectional restrictions

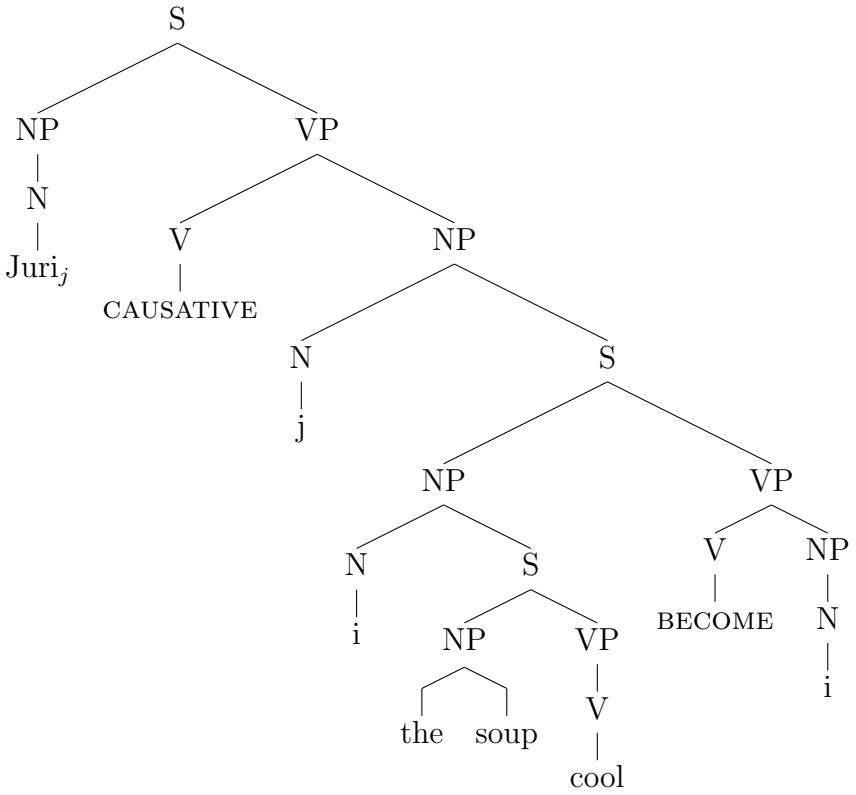
  (4) a. #The number was cool.
  b. *predicts:* #The number cooled.
  c. *predicts:* #Juri cooled the number.

- go from [Y be ADJ] to:
  - inchoative: [Y BECOME ADJ] or [Y COME TO BE ADJ] to
  - causative: [X CAUSE [Y BECOME ADJ]]

(5) a.



b.



- transformations involve moving elements around in the structure – a transformation which gets *cool* and inchoative next to one another permits to be realized as the verb *cool*, and so on

1.1.2 Dowty's goals

Dowty wants to argue that features like +CAUSATIVE or +INCHOATIVE are fundamentally different than +FEMALE or +MALE:

- +FEMALE and +MALE relate items in the lexicon at the conceptual level
- +CAUSATIVE and +INCHOATIVE are in a sense more derivational (esp. when considered with respect to examples like *cool, harden, redden, break*)
- they give us certain kinds of logical relationships between different claims (lexical meaning propagates to have compositional effects)
- they also explain systematic temporal properties, for instance
- **Upshot:** verbal predicates and event descriptions differ with respect to temporal properties, Dowty wants to develop a theory of lexical decomposition that also explains **aspectual** variation

1.1.3 Lexical aspect

Some (very light) background on lexical aspect:

- **aspect** in general has to do with temporal properties of events
- **grammatical** or **viewpoint** aspect is marked on verbs (in some languages, e.g. French, Spanish) and tells us what sort of perspective to take on an event being described
- **lexical aspect** (also, *aspectual class, aktionsart*) has to do with the inherent temporal and durational properties of the events themselves
  - are they instantaneous, do they take place over time, do they look the same over their duration or involve patterns or a trajectory?
- lexical and grammatical aspect interact (certain combinations are unacceptable or uninterpretable, or require some adjustments to meaning)

Vendler's aspectual classes (Vendler 1957, Vendler 1967):

1. **States**: *know, understand, be cool, be tall*
   States don't change over time or have inherent endpoints; if a state holds for some period of time, then it holds for every subperiod of that period of time, and any given moment 'looks' like any other.
2. **Activities:** *run, jog, talk, sleep, dance*
   Activites take place over time, and, like states, they lack inherent endpoints. They are not uniform over the period during which they occur; e.g., to *run* you have to move your legs in certain ways, so at one moment during a running event your right foot might be on the ground, but at another your left foot might be. Activities can't really be true at an instant.
3. **Accomplishments:** *draw a circle, build a house, bake a cake*
   Accomplishments also take place over time, but they progress over time and come to an inherent endpoint or *culmination*. Something is different (some result state holds) at the end of an accomplishment, so they involve a change of state in some sense.
4. **Achievements:** *arrive, summit, win, realize*
   Achievements have result states, like accomplishments, but they lack duration: you can think of them as picking out a moment of transition itself.

Note: Many classifications now add a fifth type to the four Vendlerian classes

5. **Semelfactives:** *hit, tap, cough, jump, knock*
   Semelfactives are a bit like achievements in that they are punctual, but no real change happens. They are often interpreted iteratively, and then behave like activities

Basic contrasts:

- in English, we can use progressive marking to check whether a situation described has internal movement/structure (Vendler 1967, Kenny 1963).

States	*Activities*	*Accomplishments*	*Achievements*
know	run	paint a picture	recognize
believe	walk	make a chair	spot
have	swim	deliver a sermon	find
desire	push a cart	draw a circle	lose
love	drive a car	push a cart	reach
		recover from illness	die

Figure 1: More examples from Dowty (1979, p.54)

(6) a. *The soup was being cool. State
b. Juri was dancing. Activity
c. Juri was baking a cake Accomplishment
d. *Juri was reaching the house. Achievement

- states are out because there's no process or dynamicity involved
- achievements are out for a different reason – they are punctual, so you can't 'get inside' and watch them as ongoing
- both activities and accomplishments involve something happening, which you can 'watch' as it progresses

- predicates with endpoints and those without contrast in terms of **telicity**: we can test for this using temporal modifiers that contain an event within a period of time

(7) a. *The soup was cool in five minutes. State
b. *Juri danced in one hour. Activity
c. Juri baked a cake in one hour. Accomplishment
d. Juri reached the house in one hour. Achievement*

- the results of the *in*-adverbial test contrast with the results of a test for *atelicity* using *for* adverbials instead

(8) a. The soup was hot for five minutes (and then it became cool again). State
b. Juri danced for one hour. Activity
c. ?Juri baked a cake for one hour. Accomplishment
d. ?Juri reached the house for one hour. Achievement

- other tests and patterns: see the chart on p.60 of Dowty, and the summary of patterns on pp.66–71

- it's worth taking a close look at these summaries because they give you a good idea of what kinds of things to think about and how to find, organize, and present your evidence when you want to make linguistic and semantic arguments
- NB: some of the tests (imperatives, modification with *deliberately, carefully*, whether a verb can appear as the complement of *force* or *persuade* are tests for **agency**, not temporal structure. Dowty acknowledges this, and these are crucial to his arguments for DO decompositions

Takeaway points:

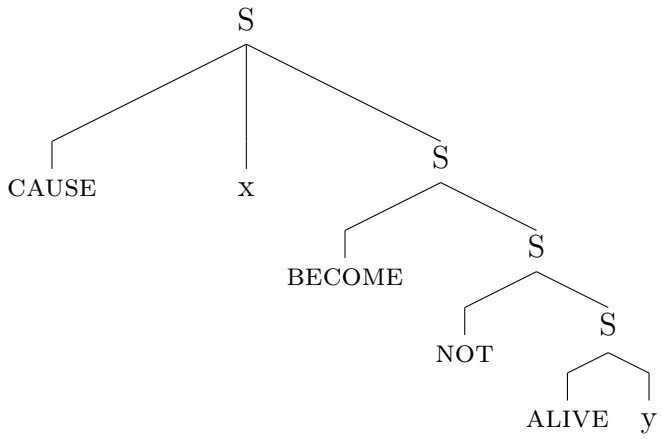
- states and activities have their ongoing nature in common, but contrast in terms of internal change/structure
- activities and accomplishments both involve processes, but contrast in terms of natural endpoints (compare: *eat cake* to *eat a cake*)
- achievements contrast with everything else in terms of punctuality
- event types/aspectual classes are related to one another in specific ways
  - in addition to involving an activity, accomplishments are related to states
  - they involve a change of state, so some result state holds after the culmination of an accomplishment
  - achievements can be thought of as capturing a transition from a state to its negation (cf. Von Wright 1963, see Dowty, p.73–75)
- Dowty wants to try and capture these relationships in terms of the lexical decomposition of certain predicates, so:
  - the analysis involving DO, BECOME, CAUSE, etc is not just a theory of lexical meaning
  - it's also a theory of aspect which aims to capture certain logical/temporal relationships that are also systematic in the lexicon
  - for example, he claims that achievements can all be analyzed as BECOME/COME ABOUT, which encodes the change of state (and a presupposition that the state did not hold before), and a result state:
    - *realize* can be broken down into *know* and an inchoative
    - if (cf. Givón 1972), BECOME comes with a presupposition, then this explains the presupposition associated with *realize*
    - it also explains the entailment relationship between *realizing* and *knowing*
  - we're interested in Dowty's decomposition of accomplishments, which he argues involve CAUSE

2 Causative alternations and decomposition

> "Lakoff, McCawley, Ross, and others began to suggest that the 'deepest' level of underlying syntactic structure would turn out to have all the properties formerly attributed to semantic representation – i.e. a 'level' of linguistic structure fully representing the meaning of a single sentence but not containing words specific to a single language." Dowty 1979, p.43

- Building on Lakoff's analysis of the alternation between $cool_{\text{ADJ}}$, $cool_{\text{INTR}}$ and $cool_{\text{TR}}$ McCawley (1968) suggests that **lexical causatives** can be decomposed in the same way
  - e.g., *kill* (transitive, having a causal meaning) can be related to *die* (intransitive, involving a change of state), and *dead* (a result state)
- McCawley's structure is a bit different, but the details aren't essential:

(9)



- in order to replace the abstract semantic elements with a single predicate *kill*, having the right complex meaning, things need to move around in the tree to get the right components of meaning together
  - this is accomplished by means of certain **transformations**, including **predicate raising**, which (for our purposes) we can think of as a rule governing when certain elements of meaning can appear 'higher' (prior) in a sentence than where they were underlyingly generated
  - e.g., *alive* should be most closely related to *y* here, but we have to move it so we can sever it from the argument and combine it with *become, not,* and eventually the whole thing can combine with *cause* to give us *kill*
- after transformations/movement, we have a process of **lexical insertion**, in which parts of the tree are realized as lexical items available in a language
  - it so happens that [CAUSE [BECOME [NOT [ALIVE]]]] can be replaced in English with *kill* – but, if we replace *alive* with an alternative state (e.g. *happy*), there might not be a word that replaces the whole cluster

- this is relevant for McCawley (1978): languages might differ in terms of their alternatives and their lexical insertion options

Arguments for and against decomposition:

Argument 1: *Do so*/distributional tests

(10) a. Floyd caused the glass to melt and it surprised me that he did so.
b. Floyd caused the glass to melt and it surprised me that it did so.

- assumptions:
  - *do so* has to replace a full constituent
  - if both transitive and intransitive *melt* (under *cause*) have the same 'deep' structure, then they should have the same constituents
- so, in the case of *kill*:

(11) a. Floyd caused Bill to die and it surprised me that he did so. ambiguous
b. Floyd killed Bill and it surprised me that he did so. unambiguous

- for Fodor (1970), this shows that the constituent *Bill become not alive* isn't present in the *kill* structure, because *do so* can't pick it out
- Some problems with this argument:
  - is *melt* any different?

    (12) ??Floyd melted the glass and it surprised me that it did so.

  - this is okay for Fodor, actually, because he doesn't think that the derivational analysis is right for *melt* either
  - this argument depends on the order in which you think raising, *do so*, and lexical insertion occur.

Argument 2: Temporal modification

- Fodor claims that (13) is fine, but (14) is not

(13) Floyd caused the glass to melt on Sunday by heating it on Saturday.
(14) ??Floyd melted the glass on Sunday by heating it on Saturday.

(Is (13) really fine?)

- Similarly:

(15) Floyd caused Bill to die on Sunday by stabbing him on Saturday.
(16) ??Floyd killed Bill on Sunday by stabbing him on Saturday.

- So, for Fodor, this is argument that neither can be derived from an underlying *cause* structure, because the same constituents aren't available in the lexical causative cases
- What Fodor is observing is differences in the temporal structure of the periphrastic and lexical causatives:
  - Dowty points out that there's no reason that *cause* has to mean the same thing as a decompositional element CAUSE (Dowty's causal factor vs. *cause*)
  - for instance, CAUSE might impose a certain event structure that *cause* does not
  - McCawley draws on a pragmatic argument to explain the difference here; we'll see further discussion of direct and indirect causation next week

Argument 3: Instrumental adverbials

- the background assumption here involves the idea that instruments are linked to things which are subjects in some (embedded) sentence

(17) Juri contacted Mary by using the telephone.

(18) Juri expected Mary to treat her cold by taking aspirin.

- this gives us a test to see whether *Bill* is a subject in some embedded structure:

(19) a. Floyd caused Bill to die by swallowing his tongue — ambiguous
b. Floyd killed Bill by swallowing his tongue. — unambiguous

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