

The Semantics of Time

Rob Seaman
IVOA InterOp
30 Oct 2008



Thanks to...

- Steven Pinker: *The Stuff of Thought*
- Bill Watterson: *Calvin and Hobbes*

and a shout-out to Douglas Hofstadter...



...Eternal Golden Braids

- endless loop, n . See loop, endless
- loop, endless, n . See endless loop



Typical circular definitions:

- To order means ‘to command’
- To command means ‘to direct’
- To direct means ‘to order’
- To instruct means ‘to give orders’
(etc.)
- To request means ‘to demand politely’
- To demand means ‘to claim as if by right’
- To claim means ‘to ask for or demand’
- To ask means ‘to make a request’
(etc.)



Focus on how verbs work

“I spent 20 years doing research on regular and irregular verbs, [...] because it seemed to me that they tapped into a fundamental distinction in language processing, indeed in cognitive processing, between memory lookup and rule-driven computation.”

– *Steven Pinker*



How language is acquired

“The problem was, how do you account for how a little kid, who has no prior knowledge of how a particular language works and who isn’t going to get explicit lessons about how to use which words in which circumstances, figures out what words mean and what sentences they can be used in?”



“Scientific language is metaphorical”

“When we put together the power of **metaphor** with the **combinatorial** nature of language and thought, we become able to create a virtually infinite number of ideas, even though we are equipped with a finite inventory of concepts and relations.”



The locative rule

- Content locative:

Hal loaded hay into the wagon.

- Container locative:

Hal loaded the wagon with hay.

Locative rule: if you can say it one way, you can say it the other, a case of *alternation*



The rule has its limits

Amy poured water into the glass.

But not:

Amy poured the glass with water.



Limits...

...mean something fundamental about the way we think.

“Verb-construction mismatches are *negative* exceptions: they fail to exist despite the fact that a rule does generate them.” (this is the “dog that didn’t bark”)

“Children have no direct evidence from parents’ speech that these forms are **ungrammatical**.”



Holism effect

Focusing on the container implies it is full:

Hal loaded the wagon with hay.

...but a focus on contents can be any amount:

Hal loaded hay into the wagon

- A property of direct objects, in general
- Rather, a property of **concepts** that tend to be expressed linguistically as direct objects



Why?

- The ubiquity of metaphor
- A physical model underlying it all
- Language (not just English) treats a *changing* entity as a *moving* entity, i.e., change means moving from one state to another



Physics, implicit

- Compare:
 - Brush, dab, daub, plaster, rub, slather, smear, smudge, spread, streak, swab

with

- Dribble, drip, drop, dump, funnel, ladle, pour, shake, siphon, slop, slosh, spill, spoon



Comparison, continued

- The first list permits saying either:

- Smear grease on the axle.

or

- Smear the axle with grease.



Comparison, #2

- The second list does not:
 - Siphon water from the glass.

or

- Siphon the glass with water.



It's the physics that's different

- First list involves forcing a substance against a surface -
 - In second list, the agent allows gravity to do the work:
 - Brush, dab, daub, plaster, rub, slather, smear, smudge, spread, streak, swab
- vs
- Dribble, drip, drop, dump, funnel, ladle, pour, shake, siphon, slop, slosh, spill, spoon



With different physics...

...a focus on the container rather than the contents may no longer make sense in the same way



Another example

Consider that:

- Verbs of forcing a substance into a container *alternate*:
 - *Cram, crowd, jam, pack, stuff, wad*

while

- Verbs of wrapping a flexible thing around a solid object, do not:
 - *Coil, spin, twirl, twist, whirl, wind*



Verbs fall into microclasses

- Defined by geometry, physics, and human purpose:
 - To cause a layer to cover a surface (liquid and solid):
 - *Douse, inundate, blanket, coat, cover, plate, smother, tile*
 - To add something to an object, making it better or worse:
 - *Adorn, burden, clutter, embellish, festoon, infect, pollute, season*
 - To cause a mass to be coextensive with a solid or layer:
 - *(liq.) drench, saturate, soak, (sol.) interlace, intersperse, vein*
 - To add an object that impedes movement of something:
 - *(liq.) Block, clog, dam, plug, (sol.) bind, chain, entangle, lash*
 - To distribute a set of objects over a surface:
 - *Dapple, riddle, speckle, splotch, spot, stud*



Events are objects, linguistically

- Was 9/11 one event or two at the WTC?
 - Two separate planes hit two separate buildings...
 - as a result of one plan
 - ...but the insurance is for \$3.5B *per event*
- Events are described in the same way as “things”
- **Metaphor is ubiquitous**



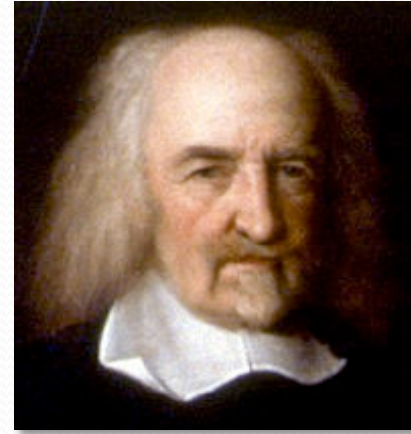
Time *is* space

- We *move* a meeting from 3:00 to 4:00
- Discrete events:
 - *To cross the street*
- Or continuous activities:
 - *To stroll*
- Events as iterations, compare:
 - *Hit the nail*
with
 - *Pound the nail*

Wisdom from



and



Loopholes –

according to the *Times of India*:

- “Loophole comes from the Dutch word 'liupen', meaning 'to peer'. Loopholes were a vertical slit or opening in the wall of a fortification such as a castle, allowing a defender to look out or shoot while remaining protected.
- Metaphorically, therefore, the word means a gap, omission, error, ambiguity that one can exploit.”

– Nishant Choudhary, Alwar



Thomas Hobbes said:

All generous minds have a horror of what are commonly called "Facts". They are the brute beasts of the intellectual domain.



John Calvin said:

*Build a man a fire and he will be warm for a day;
set him on fire and he will be warm for the rest of
his life.*



Newton (Huey) said:

Power is the ability to define phenomena.

© Cartoonbank.com



"You're supposed to push your envelope from the inside, Connors!"