

Time, The Review

COGS 200

November 27, 2014

OR

The last day
of class

Evaluations



- COGS 200
 - Course evaluations are now accessible to COGS 200 students
 - CLOSED to submission, Dec. 1, 11:59 pm
 - PLEASE do them: they help us to make COGS 200 even better than it is already!
- The COGS program
 - Undergoing External Review, spring 2015
 - Include program suggestions on your COGS 200 evaluation, OR
 - Email Laurie or Chris with your thoughts, OR
 - Email Jamie Russell, COGS admin: jamie.russell@ubc.ca
 - Help make the whole program better!

Final Exam

- December 16
- 3:30 pm
- Earth Sciences Building 1013
- 2207 Main Mall
- Format
 - Pretty-short answer questions
 - Less-short answer questions (like the individual assignments)
 - One longer, synoptic essay
 - *Synoptic*: Taking or involving a comprehensive mental view

The (Sapir-) Whorf Hypothesis

- aka Linguistic Determinism: we see the world the way we do because of the language we use to learn and think about it
- Time in English is a unidirectional series of units
 - Past, present, future
 - Units: minutes, hours, days, weeks, seasons, twilight, noon, etc.
 - Descriptors are predominantly spatial metaphors
- Time in Hopi is “durating”
 - No tense
 - No spatial metaphors or spatial gestures
- Experimental evidence
 - Mandarin and English differences in talking about time affect response to sentences about time
 - “Vertical” vs. “horizontal”
- Linguistic determinism and translation



This just in!

Chen, *American Economic Review*, 2013

- Compared speakers of languages that mark the future on the verb (*he will go; he is going to go*) and speakers of languages that do not (*he goes*, still talking about the future), e.g., German
- ... “Speakers of ...languages with little to no grammatical distinction between the present and future appear more future-oriented in numerous monetary and non-monetary behaviors.
 - 31% more likely to have saved in any given year,
 - have accumulated 39% more wealth by retirement,
 - are 24% less likely to smoke,
 - are 29% more likely to be physically active, and
 - are 13% less likely to be medically obese.”

Time and action

- How to think about control of movement in real time?
- “Natural logic”
 - We solve equations to catch a ball
 - Control of a physical system with n degrees of freedom involves 2^n possibilities → combinatorial explosion
- Instead, movement as emergent
 - Arrested falling (no central controller)
 - Pose as goal (stimulation results in pose, regardless of movements required)



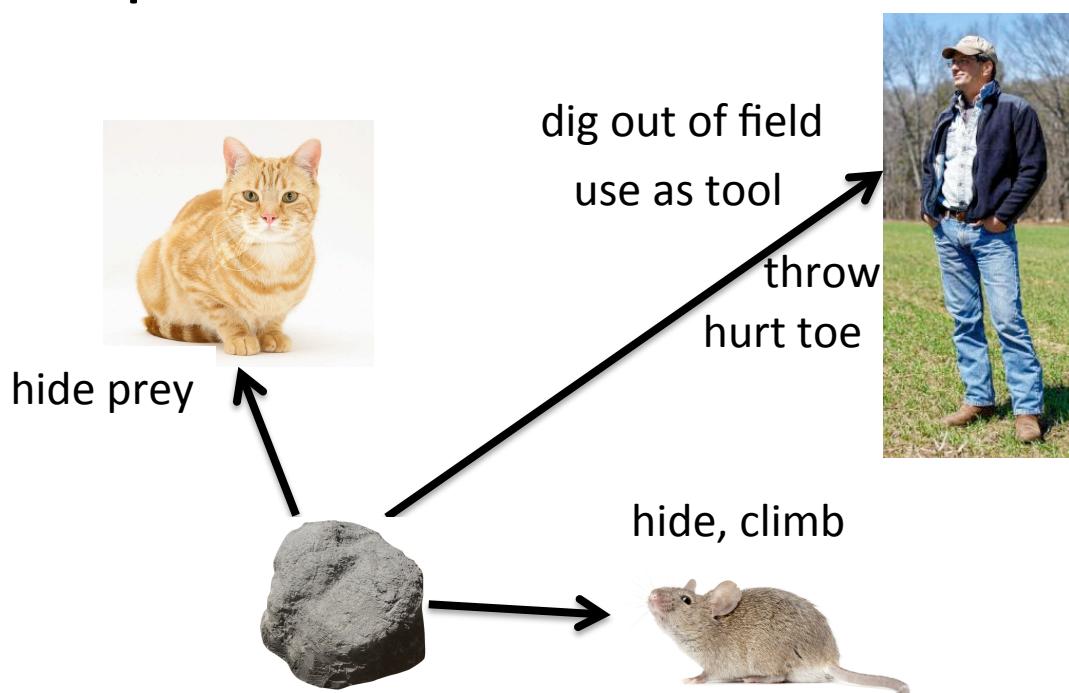
Time and action

- Complex behavior doesn't have to result from a complex representation: Simon's ant
- Can emerge from local interaction in the world, without a central controller or internal representation of the world
 - The world as its own model
 - Metronome (or human gait, finger movement, etc.) entrainment
 - Gibson's affordances



Gibson's affordances

- “a relation between an object, or an environment, and an organism that *affords* the opportunity for that organism to perform an action.”



Issues of time in Computer Science

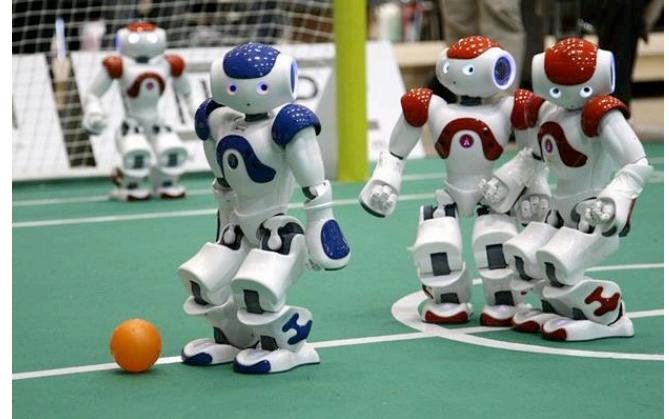
- Processes that require the same resources can't be concurrent
- Processes that require reference to real-time information (that can change with time) can't be represented with a formal logic that can't accommodate flexibility
- Time required for transmission in distributed systems must be taken into account

Problems involving time



- Transitions from one state to another
- Controlling the flow of processes
- Causal system (can be online): output depends only upon previous and present inputs
- Acausal system (offline): can use future input as well

Embodied robot systems



- React to external environment
- Intelligence emerges from the coupling of agent (human or computer) and the world
- Design: prioritized constraint satisfaction
- Enables the ability to play soccer
 - Not possible in GOFAIR, which assumes deterministic, closed fully observable world, represented in mind of single agent, acting serially