Learning Political Bias with Exposure to Fake News:

An example of long-term learning in ACT-R

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ACT-R Workshop 2017

Project

Politicians' long history of trying to influence opinions

New: a coordinated effort to pass off "news" items as peer-disseminated information

Common social influence

Most of my peers think …

Maybe they're right

Common social influence via social media

100 likes

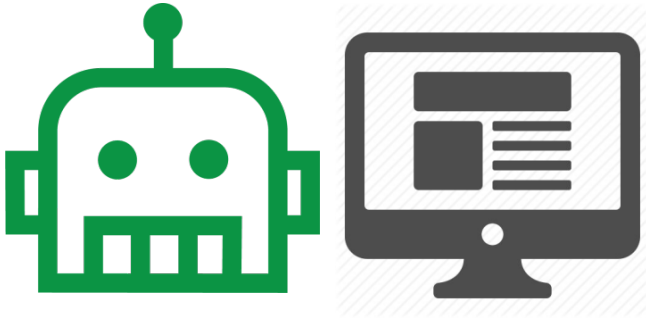
1,000,000 likes

More people believe …

Maybe they're right

Fraudulent social influence via social media

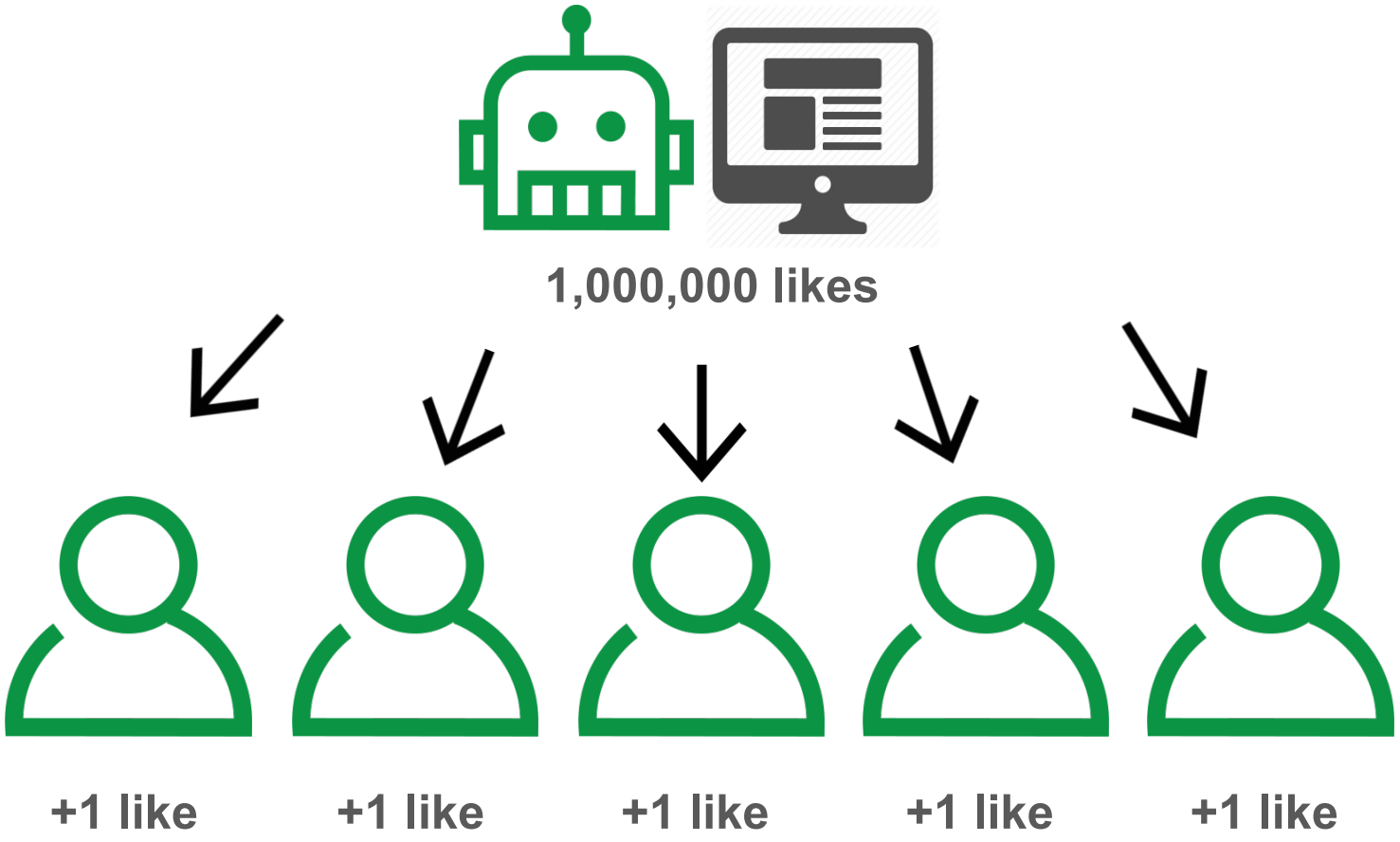
100 likes



1,000,000 likes

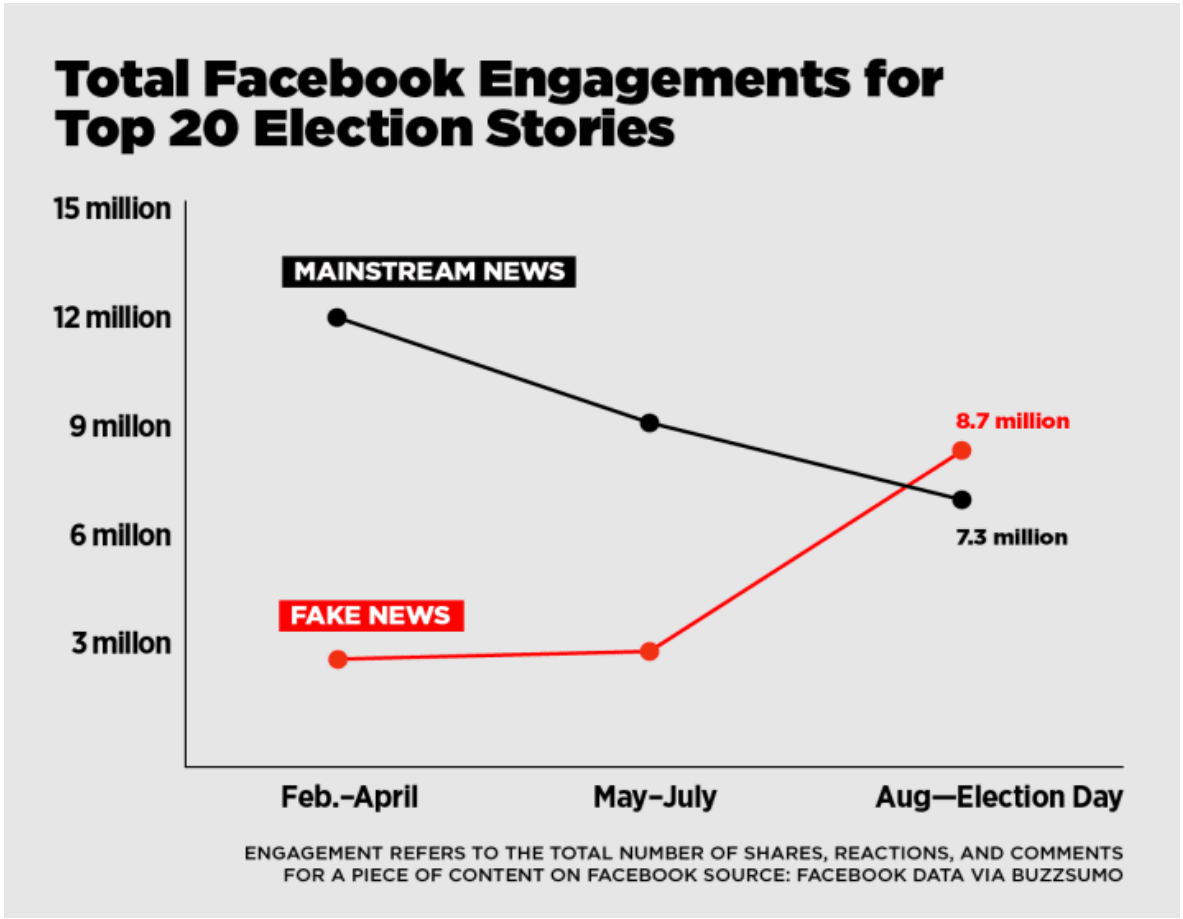
More “people” believe …

Maybe they’re right


1,000,000 likes
+1 like
+1 like
+1 like
+1 like
+1 like

Research Questions

- How might **repeated exposure** of **fake news** from peers affect political opinion (social influence)?
- Can **cognitive biases** explain how **radical ideas** become “believable” with repeated exposure?
- Can ACT-R be used with these concepts to explain real polling data?



Data

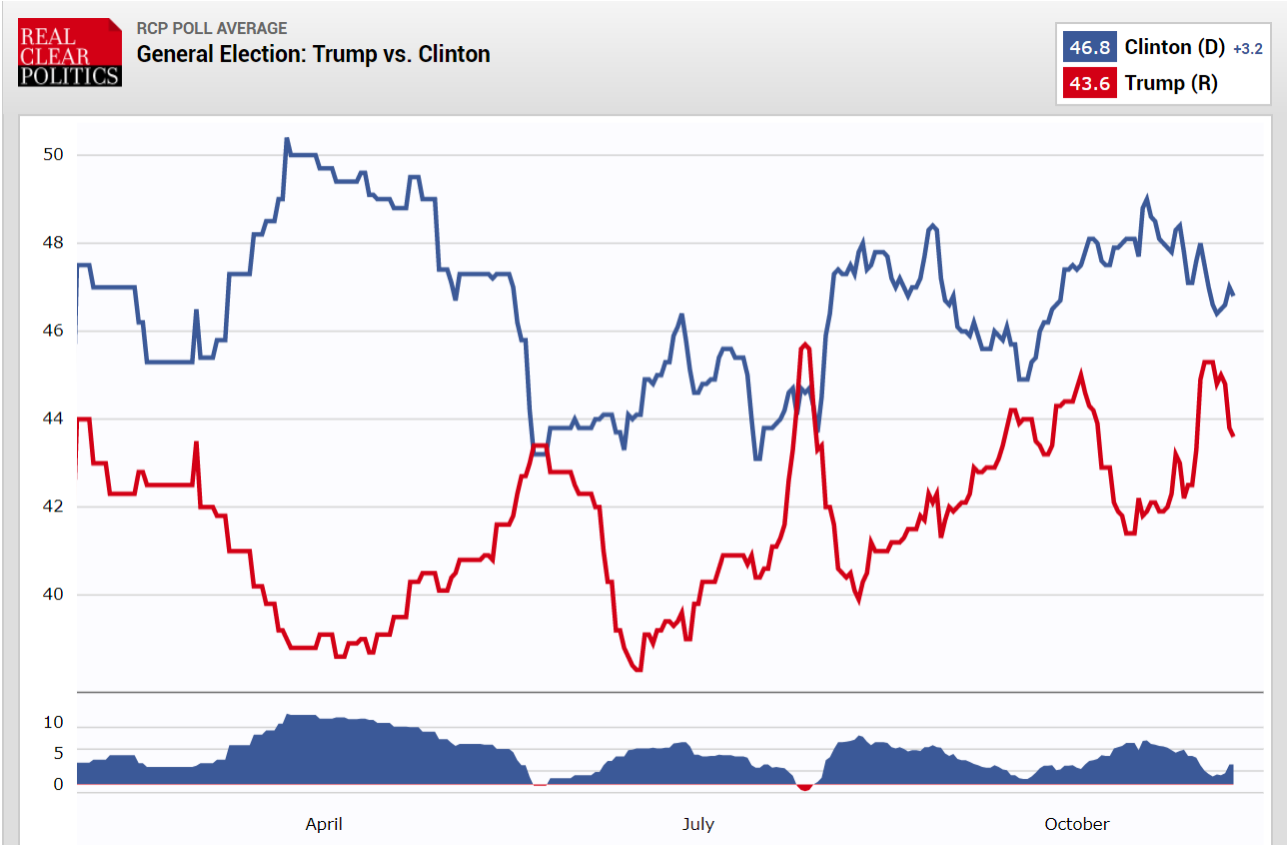
Fake news:
100 anti-Clinton | 9 anti-Trump
(Stanford)

Real news:
115 Trump | 100 Clinton articles

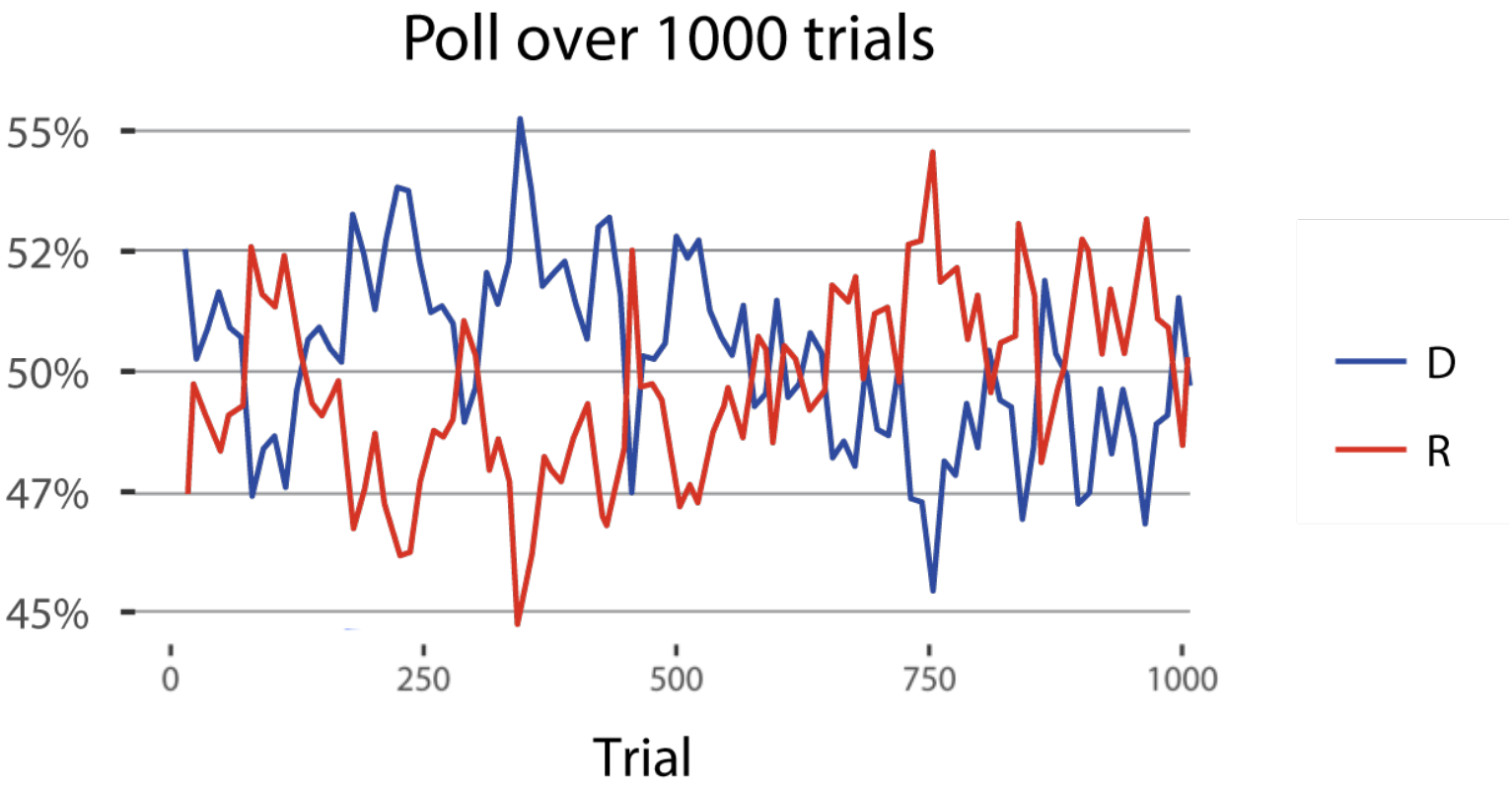
Clinton favorability ratio:
64 negative | 36 positive articles

Trump favorability ratio:
77 negative | 23 positive articles
(Politico)

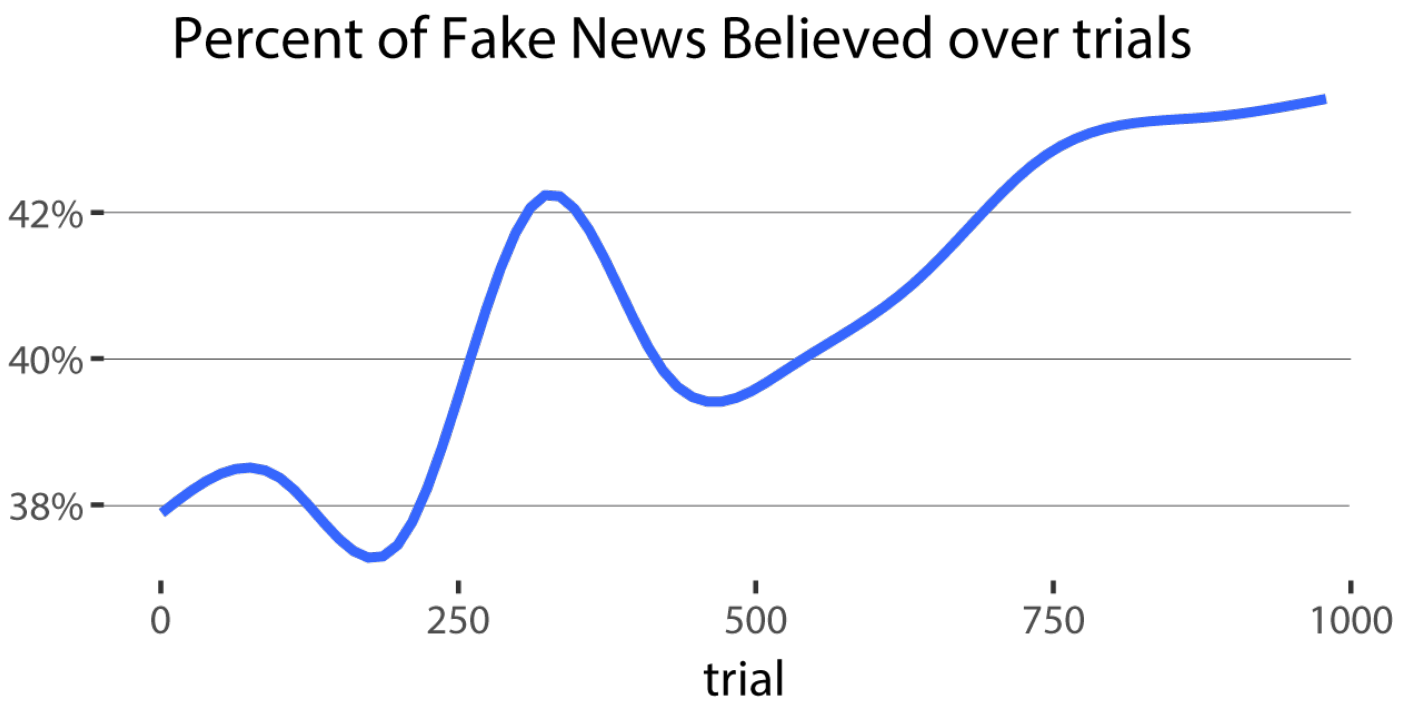
Poll Averages



Model Results



Model increased belief in fake news over time

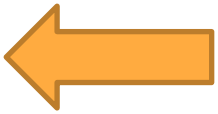


But…

ACT-R operates in Newell's band of …

Levels of "Cognition"

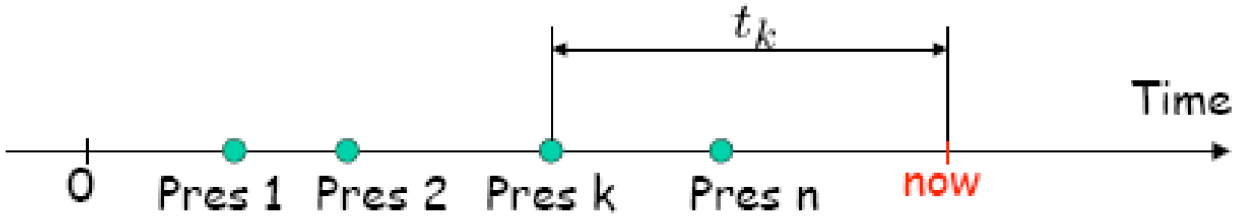
t (sec)	*Time Terms*	*Band*	*System*
$10^{11\text{-}13}$	10^4-10^6 years	Evolutionary	Archeology
10^{10}	Millennia	Historical	Written History
10^9	~50 years	Historical	Personal history
10^8	Years	Historical	(Expertise)
10^7	Months	Social	(Expertise)
10^6	Weeks	Social	Culture
10^5	Days	Social	Culture
10^4	Hours	Rational	Task
10^3	10 min	Rational	Task
10^2	Minutes	Rational	Task
10^1	10 sec	Cognitive	Unit task
10^0	1 sec	Cognitive	Operations
10^{-1}	100 ms	Cognitive	Deliberate act
10^{-2}	10 ms	Biological	Neural circuit
10^{-3}	1 ms	Biological	Neuron
10^{-4}	100 μs	Biological	Organelle



} ACT-R

*Combining of Figures 3-3, 3-14, (& my additions) form Newell's UTC

Declarative Memory's Subsymbolic Representation: Base-level Activation



$$A_i = \ln\left(\sum_k^n t_k^{-d}\right)$$

t_k time since the k-th presentation of the chunk i

d decay parameter (sgp :bll 0.5)

Mathematically transform the ages to compute the current strength of a memory

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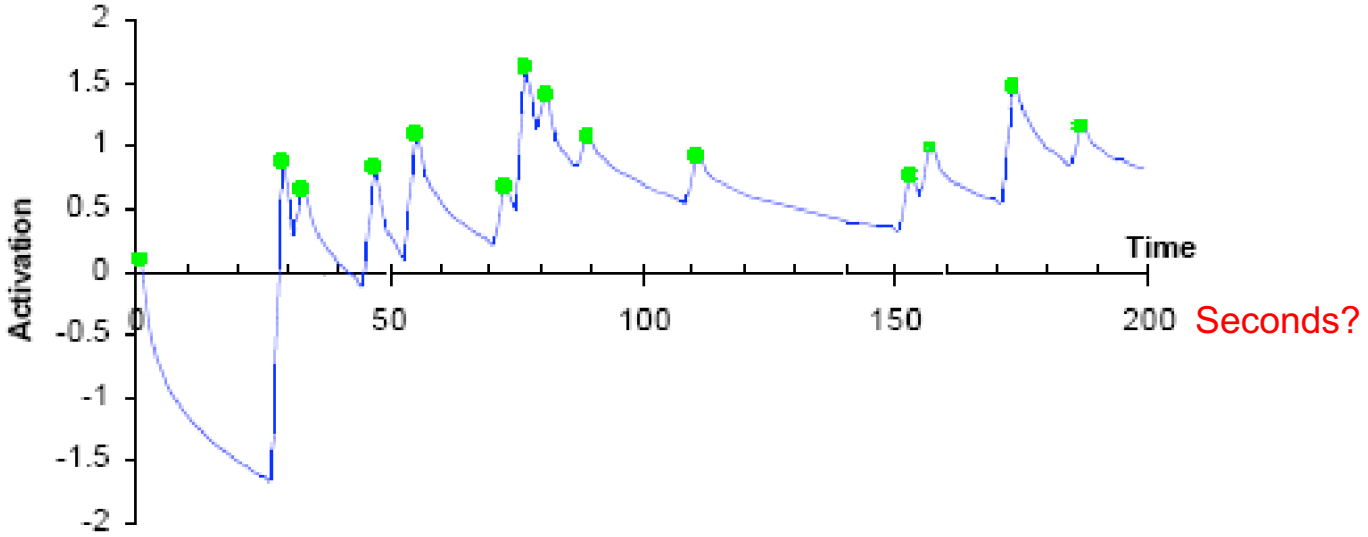
Declarative Memory's Subsymbolic Representation: Base-level Activation



Seconds? Check the Reference Manual:

run-full-time

Syntax:

run-full-time run-time **{:real-time** real-time?} -> [**nil** | time-passed event-count break?]

Arguments and Values:

run-time ::= a number greater than 0 indicating the number of seconds to run

real-time? ::= a generalized boolean to indicate whether to run in real time and possibly the scale for the real time clock (default is nil)

time-passed ::= a number indicating the number of seconds in model time which passed during the run

event-count ::= a number indicating how many events were executed during this run

break? ::= [**t | nil**] indicating whether the run terminated due to a break event

==

In Tutorial, Unit 7, learning past tense “U” curve, tens of thousands of samples… Lisp environment includes: (run-full-time 200)

Seconds? Tutorial 7:

Learning past tense “U” curve, tens of thousands of samples…

Lisp environment includes: (run-full-time 200)

200 x 30,000 = 6,000,000 seconds = 69.44 DAYS

Architectural issues?

1. Is it reasonable to just skip cognition ahead between events…

What about intervening activities, i.e., events that might affect these chunks via spreading activation?

2. Does spreading activation and similarity effects work over months?

(Seems contrary to compartmentalizing experiences. Return from different ”life” and remember events prior to absence “like it was yesterday”…)

Thank You.