

ACT-R+?: Including Social and Emotional Cognitive Functionality

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Think. Learn. Succeed.



2011 PGSS Recommendation

Presented trends in:

- research and publications on emotions and
- dual process concepts of cognition

Suggested need to extend ACT-R “beyond rational”

So, where are we?

- Trends leveled off
- Research on emotion becoming scientifically acceptable
- But, we’re just starting ...

Meanwhile...

AGENT_ZERO

Toward Neurocognitive Foundations
for Generative Social Science

JOSHUA M. EPSTEIN

Their need

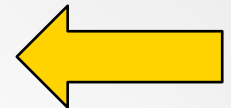
Computational Social Science needs a principled approach to modeling the full scope of human behavior in Newell's "social" band and higher.

Because

- we're not rational all the time;
- and we're not just rational and emotional,
- but we also need physiological and social functionality, i.e., all of causes of behavior in daily life over days, weeks, ...

Newell's Levels of "Cognition"

<i>t</i> (sec)	<i>Time Terms</i>	<i>Band</i>	<i>System</i>
10^{11-13}	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 μ s	Biological	Organelle



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

What social “functions of the mind”?

- Reasoning with & without social content
(Fisk, 2010; Wason, 1968; Cosmides, 1989)
- Self-Awareness (Kelly, et al., 2002) & Social Self-Regulation
(Bandura, 1991)
- Discerning animate-inanimate objects
(Caramazza & Shelton 1998)
- Face Recognition & Social Communication
(Sergent, et al., 1992; Haxby, Hoffman, & Gobbini, 2002)
- “IFF&F”, mind-reading, interpreting intentions
- Theory of Mind & Simulation capabilities
- Perceive trustworthiness & decide how much to trust
- Minding Norms (Conte & Andrighetto, 2013)
- and many more.

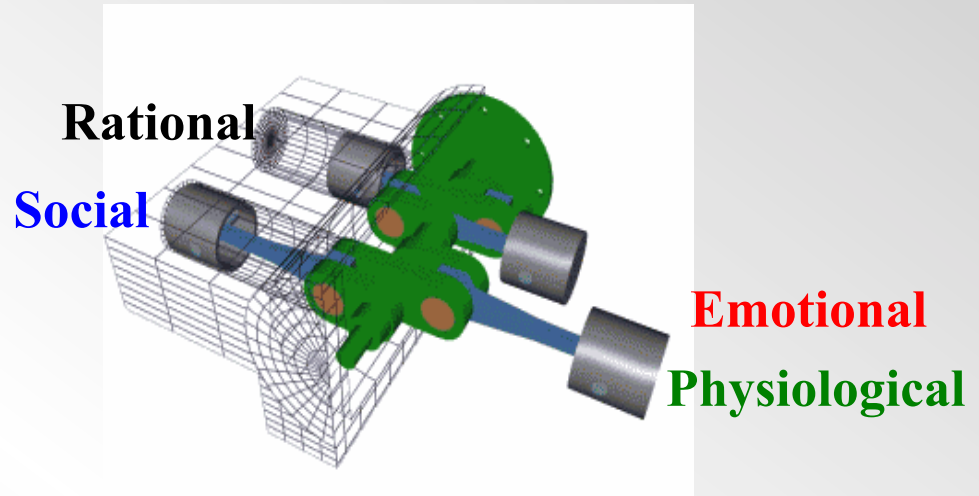
Planned Proposal

We should extend the ACT-R architecture to include the functions of the mind that deal with:

- rational behavior,
- emotions,
- physiology, and
- and other humans

in response to the environment for days.

Possible Evolution of ACT-R



ACT-R's 1-cylinder (rational!)
revolutionary horseless carriage

could evolve into ...



but Good and Bad news:

Characterize how people would behave in response to a **nuclear WMD event** during the first 30 days in a “megacity”.

That means ...

- **24 million instantiations of ACT-R?**
- **running for 2.5 million seconds?**

(one for each person in #8 (NYC) running for 30 days)

=OR=

but Good and Bad news:

- a new develop a new architecture at 3+ orders of magnitude above ACT-R?

Thank you

I'D LIKE TO THANK MY MENTORS
MY FRIENDS AND FAMILY, AND—
OF COURSE—THE WRITHING MASS
OF GUT BACTERIA INSIDE ME.

I MEAN, THERE'S LIKE ONE OR
TWO PINTS OF THEM IN HERE;
THEIR CELLS OUTNUMBER MINE!

ANYWAY, THIS WAS A
REAL TEAM EFFORT.

