Why I Dedicated My Life to Computing

Joanna J. Bryson
Because I’m Interested in How Things Work
Things
Human Emotions & Human Intelligence

(D’Amato 1998, Behavioural Pharmacology)
Making Emotions
(Tanguy, Bryson & Willis 2007; Bryson & Tanguy 2009)

I’ve got good news and bad news...

Code & video available online.
No Emotions

(Rohlfshagen & Bryson 2008, 2010)
Easy Emotions

(Rohlfshagen & Bryson 2008, 2010)
Human Intelligence & Human Culture

Video courtesy Bernard Theirry, CNRS
Human Intelligence & Human Culture

Video courtesy Bernard Theirry, CNRS
Not all monkeys do this! A lot of species couldn’t sit this close to their father! Why the difference?

Video courtesy Bernard Theirry, CNRS
Culture in non-human primates

Whiten et al 1999
Culture in non-human primates

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Culture in non-human primates
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Why don’t these guys have buildings?
• **Altruism** thought to be difficult to evolve.

• In fact, communicating strategies for finding food benefits those near you, who are probably related, creating selective pressure for **culture**.

• The faster you communicate and longer you live, the bigger your culture can be.

(Čače & Bryson 2005, 2007; Bryson et al 2010)
Aggregation for Information

• Can the utility of shared information create selective pressure for aggregation?

Work in progress:

• Fission / Fusion with flexible parties (with J. Lehmann)

• Mongolian Asses (with Kaczensky & Waltzer)
it is nor hand, nor foot, nor arm, nor face, nor any other part belonging to a man.

What’s Consciousness?

**Glenn Matsumura, Wired 2007**

**Tad McGeer's passive dynamic walker**

**SG5-UT Robotic Arm**

**Chuck Rosenberg’s IT, 1997**

**National Geographic: Robot Revolution**
Conscious Systems

by any other name?

Leonardo can now generalize the task goal to a new configuration

Andrea Thomaz, MIT

Charlie Kemp, GA Tech
Conscious Systems
by any other name?

How about “spreading-activation implementation of bounded depth-first search”?

Andrea Thomaz, MIT
Conscious Systems

1. Hold stimulus in mind.
2. Search primed responses.
3. Takes time proportional to uncertainty.
   - Concurrent cognitive systems
   - You, your browser & Google all remember the episode.

Davide Vecchi, KLI
Human Intelligence and Computer Games

(Partington & Bryson 2005) Thanks: Binns, Mansfield, Kwong, Grey, Drugowitsch, Brom et al.
BOD Development Cycle

1. Initial decomposition $\Rightarrow$ specification.

2. Scale the system.
   i. Code one behavior and/or plan.
   ii. Test and debug code (test earlier plans).
   iii. Simplify the design.

3. Revise the specification.

4. Iterate.
1. Specify (high-level) what the agent will do.

2. Describe activities as sequences of actions. *competences and action patterns*

3. Identify sensory and action primitives from these sequences.

4. Identify the state necessary to enable the primitives, cluster primitives by shared state. *behavior modules*

5. Identify and prioritize goals / drives. *drive collection; emotions / durative state*

6. Select a first *(next)* behavior to implement.
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Simplify the Design

Trade off representations: plans vs. behaviors

- Use simplest plan structure unless redundancy (split primitives for sequence, add variable state in modules).
- If competences too complicated, introduce primitives or create more hierarchy.
- Split large behaviors, use plans to unify.
- All variable state in modules (deictic).

(Bryson, AgeS 2003)
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Partington’s Video (2005)

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Why I Dedicated My Life to Computing?
Because Building Thinking Stuff is Cool
Thanks!

Philipp Rohlfshagen

Cyril Brom (et al)

Tristan Caulfield

Jan Drugowitsch

Sam Partington
Thanks!

Ivana Čače

Avri Bilovich

Will Lowe,
Julia Lehmann,
Ludwig Huber,
Anna Wilkinson,
Marta Manser

Rob Jenks

Marios Richards

Petra Kaczensky