

ANBI 159: Biological and cultural perspectives on intelligence

Lecture 9: Some learning, some Theory of Mind, take II

<http://weber.ucsd.edu/~jmoore/courses/>

Trial and error:
What else is there?

Imitation
Stimulus enhancement
Response facilitation
Emulation

Once again, end up with several ways to interpret very similar behavior, and not even clear *which* is “more intelligent”.

& insight is both difficult to prove, and rare even in us ...



PLATE IV. GRANDE ON AN INSECURE CONSTRUCTION (NOTE BELTZAN'S SYMPATHETIC LEFT HAND)

Finding windows to complexity of representations

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Another approach is to ask what animals “know” - what are simplest representations they must use to generate behavior; focus not on complexity of output, but on complexity of intermediary representation.

On this view, presume complexity of representation is basis for whatever “it” is that differs between rats and apes, that we call intelligence.

Start search in realm of social behavior

Communication (but not just any)

To study representations, need “windows” into minds of other species.

Communication seems logical (not going to learn about mind by watching eat), but not just any communication -- e.g., FAP gull's beak:

When doing what should be doing, can just be instinct - bees have complex dance language but is it “smart”???

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Implies:

- 1) You 'understand' that your own mental experiences are just that.
- 2) *you* "believe" that the other has beliefs -- i.e., other has a mind that you can manipulate.



Clip of Meg Ryan faking an orgasm to prove to Billy Crystal that he can't always identify the real thing; he can be deceived.

To do this, she needs to (a) understand her own "reflexive" behavior (theory of *own* mind), and (b) understand that he has beliefs that can be manipulated.

What's involved, cognitively, here?

"When Harry Met Sally" 1m 23s

Theory of Mind (ToM)

In short, to deceive, may need a *Theory of Mind (ToM)*.

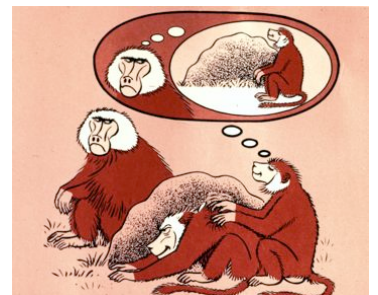
This is not trivial -- many students FAIL to employ ToM when writing papers or giving presentations, not to mention perspective-taking in relationships.

Extends to judgments about groups of people: 'I didn't have problem with X, why should they?' (cf. debates about affirmative action...)

Theory of Mind (ToM)

Problem is, deception **COULD** be via conditioning.

How can we tell???



Theory of Mind (ToM): Sally-Ann

Have experimenter (call her Sally), confederate (Ann), subject, 2 boxes, and some object.

Ann puts object in box #1 "for safekeeping" and then leaves room; Sally switches it to Box #2.

When Ann comes back in, does the subject expect her to look in Box #1, or Box #2?

Before age 3.5 children tend to say #2; because they know answer, assume everyone knows answer - lack ToM. Older, realize Ann likely to have a false belief.

Theory of Mind (ToM): Sally-Ann

ToM = 'intelligence'?

Probably not -- many autistics fail Sally-Ann test, but intellectual abilities good.

Might such high-function autistics have learned via conditioning how to behave *as if* they had real ToM???

Well, possible; how would one know?

Theory of Mind (ToM): Sally-Ann

How administer ToM tests to nonhumans?

- 1) same as for humans, use response - e.g. gaze time - as measure (video follows).
- 2) ask which human knows food location (Byrne describes).

Povinelli - > 100 trials before 3 of 4 chimps chose knowledgeable informant \approx 70% of time, suggests they were learning.

Theory of Mind (ToM): Sally-Ann



Alan Alda in Marc Hauser's lab, doing expt. with tamarin (small New World monkey). He puts apple in box & leaves; Hauser switches. On Alda's return, tamarin looks longer (= 'surprised') if Alda goes to the correct box -- tamarin 'understands' that Alda *should* have (false) belief that apple hadn't moved.

Several variants; in all, monkey seems to understand what Alda should/shouldn't know if he was/was not in the room when apple was switched...

Animal Einsteins 5m

Sally-Ann & Morgan's canon

Need understand classical conditioning to interpret ToM study.



Morgan's canon; evidence for ToM ambiguous

Apes come closer to appearing to have ToM than **rhesus** monkeys, which get noplacement on the Povinelli experiment (bucket over head etc), after hundreds of trials. On other hand, **tamarins** maybe 'get' Sally-Ann. *Any ideas??*

It seems possible to test for *something* related to 'intelligence', but we're *not sure what it is*.

MODULE II:

Whatever it is, **why is it there?**

Tried view intelligence via learning performance or trying to get at nature of representations; ??

Now turn to what "it" might be for, on assumption there *is* an "it".

Two general classes of hypotheses, ecological & social (touched on deception); *today ecological*.

Basic ecological issues are finding food and avoiding being food. Animals that most often are food not too 'bright', so focus on role *finding* food.

