Reasoning about sentience: Inferences among capacities for affect, autonomy, & perception

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Background

A variety of unusual entities—from simple polygons to blobs of fiberfill—can evoke social responses, even from infants (Csibra et al., 1999; Hamlin et al., 2007; Heider & Simmel, 1944; Johnson et al., 1998). In the absence of animal morphology, what prompts people to infer that an entity is sentient?

We examined conceptual connections among **3 lower-level capacities posited to be core components of the lay concept of sentience: *affect*, *autonomy*, and *perception***.

Previous studies have presented sentient capacities in combination: in goal pursuit displays, e.g., an agent perceives a goal, desires it, and self-propels toward it. We developed a method for presenting these capacities in isolation, allowing us to address the following questions:

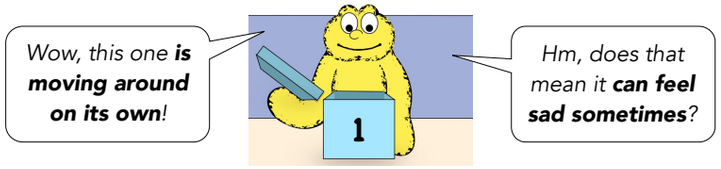
- **What are the individual roles of affect, autonomy, and perception in reasoning about sentience?** Is a single capacity enough to trigger inferences about the whole suite of capacities?
- **Are certain capacities particularly strong cues to sentience?** E.g., does affect imply other capacities more strongly than autonomy?
- **How does reasoning about sentience relate to judgments of biological animacy?** To what extent do people consider sentience and inanimate material composition mutually exclusive?

Procedure

To present sentient capacities in isolation, we showed participants a character talking about a series of hidden entities:

On each trial, he provided a **FACT** about an entity…

…and then asked a **QUESTION** about it.



Both the **FACT** and the **QUESTION** were drawn from a set of 16 items, including 3 categories of sentient capacities and a 4th category of material cues to inanimacy, as a comparison:

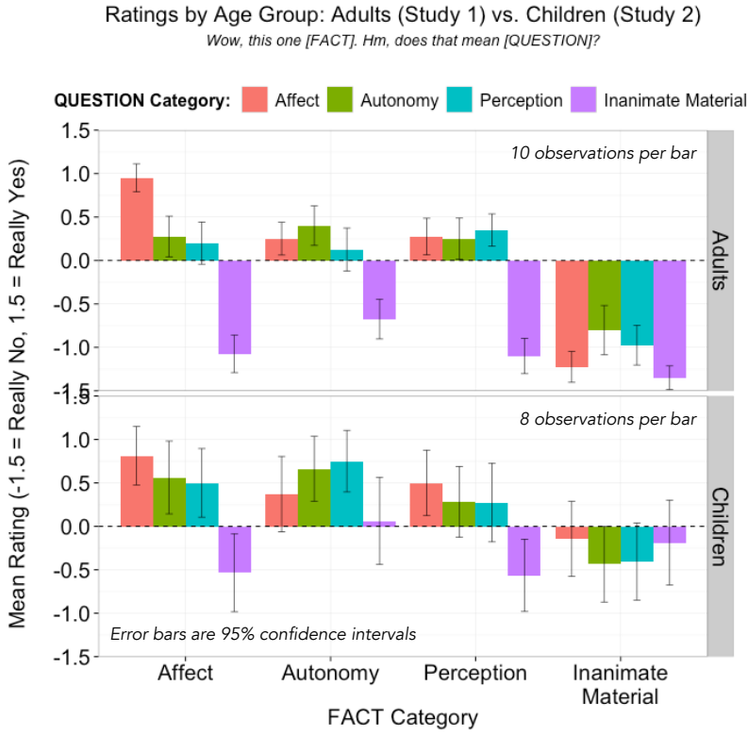
- **Affect**: e.g., *feels happy right now*; *can be in a bad mood sometimes*
- **Autonomy**: e.g., *is moving itself around the box*; *can make sounds on its own*
- **Perception**: e.g., *can see me*; *can hear what's going on around it*
- **Inanimate Material Composition**: e.g., *is made out of metal [plastic, …]*

Participants responded on a 4-point scale from *Really No* (scored as -1.5) to *Really Yes* (scored as 1.5).

Studies & Results

Study 1: 80 adults with US IP addresses via Amazon Mechanical Turk

Study 2: 64 children ages 4;5–5;8 (M = 4;11) at a university preschool



- Generally, **participants responded only somewhat positively to inferences among sentient properties**, e.g., affect → perception, autonomy → affect ($0.13 < \beta < 0.95$, $0.85 < t < 6.49$).
- By contrast, **participants responded quite negatively to inferences between a sentient property and an inanimate material**, e.g., inanimate material → perception, affect → inanimate material ($-1.23 < \beta < -0.68$, $-8.37 < t < -4.61$).
- **Children were somewhat more tolerant of the possibility of sentient inanimates**: Children responded more positively than adults to inferences between a sentient property and an inanimate material ($0.36 < \beta < 1.08$, $1.65 < t < 4.88$), but not to inferences among sentient properties ($-0.14 < \beta < 0.63$, $-0.63 < t < 2.85$).
- **Facts about affect, autonomy, and perception were roughly equal cues to sentience**, generally licensing inferences about other sentient properties and blocking attributions of inanimacy.

Acknowledgements

Special thanks to the staff and families at Bing Nursery School, and to Co Tran for research assistance. This material is based upon work supported by the National Science Foundation Graduate Research Fellowship Program under Grant No. DGE-114747, and by a William R. & Sara Hart Kimball Stanford Graduate Fellowship.

Findings

Striking developmental continuities:

- **Conceptual links among sentient capacities are reliable, but moderate.** Capacities for affect, autonomy, and perception are neither redundant nor independent: One piece of information about affect, autonomy, or perception was enough to suggest other sentient properties, but not enough to invoke the entire suite.
- **Sentience and animacy are more strongly linked**: Both adults and children reasoned that if an entity has sentient capacities, it is not likely to be made out of inanimate materials, and vice versa.

Subtle developmental differences:

- **Children are somewhat more willing than adults to entertain the possibility of entities being both sentient and inanimate.**

General takeaway: Affect, autonomy, and perception are conceptually linked—but non-redundant—components of the lay concept of sentience. By 5 years, children reason in an adult-like way about the links among these capacities, but they are more flexible than adults in their judgments of whether sentient capacities are strictly limited to biologically animate beings.

Questions for Social & Moral Reasoning

How does reasoning about lower-level sentient capacities inform moral judgments? Does information about a low-level capacity for autonomous behavior lead people to treat an entity as a moral agent, responsible for its actions? Are low-level capacities for perceptual vs. affective experiences equally important for judgments of who/what should be protected from harm? (See Gray et al., 2011, 2012.)

Could the "developmental" differences in these studies reflect a broader cultural shift? As "social" and "intelligent" technologies become more common and more sophisticated, will reasoning about sentience diverge from judgments of biological animacy, even for adults? How might today's children's flexible reasoning about sentient inanimates affect their future treatment of new kinds of "minds"?

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