Abstract: "Ockham's Razor and Chimpanzee Mind-Reading"

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In this talk, I'll provide an overview of some of the ideas about the principle of parsimony that I develop in Sober (2015), focusing on material from Chapter 4 of that book that is about the cognitive science problem of figuring out whether chimpanzees are "mind-readers," meaning that they form beliefs about the mental states of others.

I call the book "*Ockham's Razors*" because I think there are at least three "parsimony paradigms" that show how parsimony considerations can be epistemically relevant. Parsimony isn't always a mere aesthetic frill; it often is a guide to deciding what the world is like.

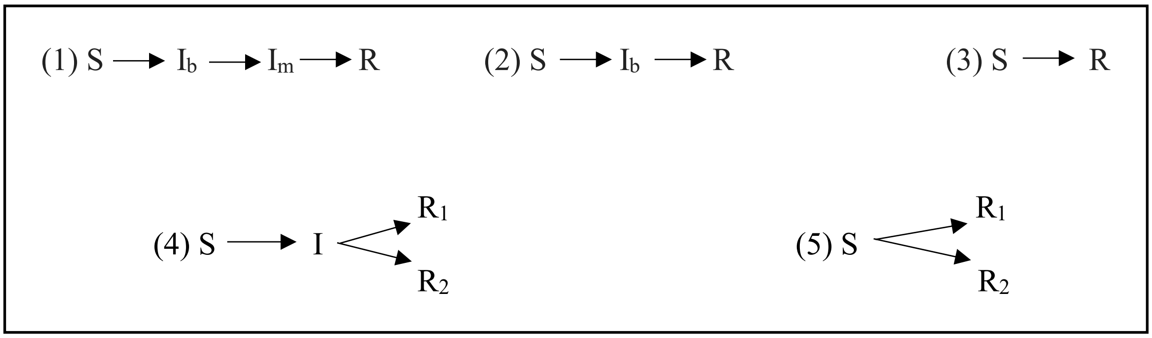
The first paradigm (the "likelihood paradigm") concerns the circumstances in which a more parsimonious theory is better supported by the evidence than a more complex theory is. Here I use the law of likelihood, which says that evidence E favors hypothesis H_1 over hypothesis H_2 precisely when $Pr(E|H_1) > Pr(E|H_2)$. I identify assumptions that suffice for a common cause explanation to have a higher likelihood than a separate cause explanation. I also describe different assumptions that have the opposite implication. Thus, whether the simpler theory (the common cause explanation) has the higher likelihood depends on empirical assumptions.

The second parsimony paradigm (the "model selection paradigm") connects Ockham's razor with an idea from statistics. AIC (the Akaike Information Criterion) is based on a mathematical theorem that shows why the complexity of a model (as measured by the number of adjustable parameters it contains) is relevant to estimating the model's predictive accuracy – that is, its ability to accurately predict new data when fitted to old.

The third parsimony paradigm seeks to show that parsimony is relevant to deciding which hypotheses have higher posterior probabilities and which have lower. If this paradigm is distinct from the first paradigm, the idea must be that simpler theories have higher prior probabilities. I don't think much of this idea; at best, it plays third fiddle to the other two. However, there is a special case in which it uncontroversial. Suppose one theory asserts that A is true, while another asserts that A&B is true. The first is simpler, and it cannot be less probable than the second, no matter what your evidence is. If there is evidence for A but none for B, you may want to apply the "razor of silence," which tells you to be agnostic about whether B is true. This is unproblematic, but the "razor of denial" is not; that version of Ockham's razor tells you to deny that B is true.

De Waal (1991, 1999) argues that anthropomorphic hypotheses about the mental characteristics of chimpanzees are more parsimonious than hypotheses that embrace anthropodenial (his term). He also claims that this difference suffices for the former hypotheses to be more probable than the latter. De Waal is right that anthropomorphism is more parsimonious if parsimony means cladistic parsimony (the idea in evolutionary biology that the best phylogenetic hypothesis is the one that requires the fewest evolutionary changes in characteristics to explain the data). However, when De Waal's claim about probability is viewed through the lens of the law of likelihood, it turns out to be dubious. What is true is something more modest: the fact that humans have trait T raises the probability that chimpanzees do too.

More recent experimental work on whether chimpanzees are mind-readers has also included appeals to parsimony. Tomasello and Call (2006) argue that mind-reading hypotheses are justified because they unify a diverse set of observations. Povinelli and Vonk (2003) argue that mind-reading hypotheses are unparsimonious because the observed correlations of environment to behavior can be explained without postulating beliefs about the mental states of others. If unifying theories are simpler than disunifying theories, then both these articles are using Ockham's razor, though they draw opposite conclusions from that common starting point.



To disentangle these issues, it helps to consider the rationale for postulating intervening variables. The five causal models in the accompanying figure all describe the relationship of a stimulus to one or more responses, but only some of them postulate intervening variables. Model (1) postulates a behavior reading-intervening variable I_b and a mind-reading intervening variable I_m. Model (2) postulates I_b alone. Model (3) postulates no intervening variable at all. If you have frequency data concerning the relation of stimuli of type S and responses of type R, those observations will not discriminate among models (1), (2), and (3). However, if you observe the relationship of stimulus S to two responses (R_1 and R_2), your data may be able to discriminate between models (4) and (5). Causal chains and causal forks are different. Parsimony considerations may lead you to snip away intervening variables in (1)-(3), but the data may or may not endorse this move with respect to (4) and (5). In Chapter 4, I use two experiments from Melis *et al.* (2006) to construct a single experiment and formulate a mind-reading hypothesis corresponding to (4) and a behavior-reading hypothesis corresponding to (5); these hypotheses make different predictions about what you should observe in the frequency relationships of S, R_1, and R_2.

References

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