

Review of: "A brief introduction to the COM-B Model of behaviour and the PRIME Theory of motivation"

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I thought that this was a great little synopsis of the COM-B and PRIME frameworks – for formalizing sentient and motivated behavior. For someone outside the field, it offers a very clear and useful description of the architectures one can deploy to understand (and model) behavioral interventions.

Although beyond the remit of the current paper, it would be interesting to see how the two theories transcribe into the fields of theoretical neuroscience and ethology. In my world, behavior of this sort is generally modelled in terms of "planning as inference" (Attias, 2003; Baker, Saxe, & Tenenbaum, 2009; Botvinick & Toussaint, 2012; Millidge, 2019): specifically, active inference and learning.

I was struck by the number of phrases and constructs that link the two fields. For example, "belief as processes" that underwrite evaluation "by inference of some form". This is exactly how active inference works, where the process of Bayesian belief updating is used to assimilate evidence from the environment (i.e., perception) to form (posterior) beliefs about states of affairs in the world. The same Bayesian principles are then applied to beliefs about policies or plans: e.g., (Schwartenbeck et al., 2019). Evaluation then becomes a problem of inferring 'what is the most likely thing I will do?'. This entails the selection of a particular plan following its evaluation in terms of the things that the COM-B model brings to the table, specifically, prior beliefs about the plausibility of a plan and its outcomes (often described in terms of prior preferences or goals).

I can see that capability and opportunity would shape the policy space (i.e., "dispositions") from which a particular plan is selected and enacted (c.f.: "active beliefs"). In machine learning, this selection is sometimes cast as Bayesian model selection. The evaluation itself is very interesting. In active inference, it inherits from statistical notions of maximizing marginal likelihood (that can be reduced to risk sensitive control in economics or Bayesian decision theory in psychology). I imagine the PRIME theory would specify prior beliefs about the consequences of action and the kinds of actions people originally commit to.

I mention these points of contact because, in principle, it should be possible to implement PRIME theory in silico using partial observed Markov decision processes to simulate agent-based behavior. The second reason is that certain

imperatives for behavior figure prominently in simulations of active inference. I am thinking here about the resolution of uncertainty and epistemic affordances – and indeed epistemic habits: i.e., “where do I usually turn to get this kind of information?”. This links to another field of affordances in ethology; e.g., (Constant, Ramstead, Veissiere, & Friston, 2019; Gibson, 1977, 1979). In the future, it would be nice to see how the authors would articulate (epistemic or Gibsonian) affordances within their frameworks – perhaps they have already.

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