

Table 2: Epistemic Moves toward Better Models, with their Cues (Moves marked by “>” lead to more complex models)

<i>Seeking a Gapless Model</i>	<i>Putting the Model at Risk</i>	<i>Detecting Flawed Evidence</i>	<i>Building from Counterevidence</i>
<p>Missing mechanism with in a surface generalization or token agent Moves: > Articulate a composite or analogical explanation or an underlying mechanism. >Elaborate token agent with an underlying mechanism.</p> <p>Centrist model without an obvious central agent. Moves: >Clearly identify the control mechanism and how it works. >“Decentralize” the model, looking for emergent effects.</p> <p>Convenient assumption begs the question. Moves: Abandon the model. >Add an explanation of the presence of the lucky element.</p> <p>Missing link in causal story. Moves: Reject model. Seek compelling empirical evidence, even if link not understood. >Elaborate link.</p> <p>Effects at a distance, or much delayed. Moves: Reject model. >Elaborate with mechanisms of propagation, persistence.</p> <p>Instantaneous effects. Moves: Accept as within paradigm. >View as brief unanalyzed transient. >Elaborate model to describe what happens in a brief interval.</p>	<p>Counterevidence not possible. As formulated, nondisconfirmable in principle. Moves: Reject model. Revise model and/or expectations to make disconfirmable.</p> <p>Positively biased evidence. Moves: Seek disconfirmatory instances. Formulate rival model and compare evidence.</p> <p>Excusing and patching, excusing through dismissal of counterevidence or patching to accommodate counterevidence, often because model is so intuitively appealing or alternatives unappealing. Moves: Formulate rival model. Resist excuses, evaluate based on evidence and close reasoning, use of extreme cases, etc. Seek completely new model. >Seek reorganized, rather than patched, model.</p> <p>Same account of contrasting cases. The similarity may be suspect. Moves: Critique the similarity, look for crucial differences, revise model.</p> <p>Different accounts of similar cases, e.g. cases that are continuous variants of one another or that simply involve a change of frame of reference. Moves: Discard one model and extend the scope of the other. Try to unify the models.</p>	<p>Apparent sources of noise in observations. Moves: Improve instrumentation, observation conditions. Use many observations, averaging, to filter out random error. >Extend model to include the “noise” as part of the system.</p> <p>Apparent sources of bias, including human bias. Moves: Use ways of detecting bias, filtering out biased data, correcting for it. Hedge claim. Strengthen claim when bias would seem to be <i>against</i> it. >Extend model to include bias as part of system.</p> <p>Very limited sample. Moves: Larger or repeated samples. Wider, deliberately disparate range of cases. Statistical methods to test adequacy of sample, reliability of conclusions.</p> <p>Confounded variables. Moves: Control of variables. Using “natural” experiments. Statistical methods to unconfound.</p> <p>Questionable whether observation predicted by model. Moves: Check logic of prediction and simplifying assumptions. Check that observation falls within scope of model.</p> <p>Correlation taken for causation (post hoc, propter hoc). Moves: Consider coincidence, different direction of causal arrow. >Elaborate strong persuasive mechanism. >Consider more elaborate models, e.g. a common cause for two correlated effects.</p>	<p>Blatant disconfirmation on central cases. Moves: Abandon model. >Elaborate to accommodate additional factors.</p> <p>Minor discrepancies on central cases. Abandon model. Reframe as approximation. >Elaborate model to accommodate additional factors.</p> <p>Central core of cases okay, disconfirmation on other cases. Move: Abandon model. >Narrow scope of model by a systematic criterion. >Elaborate to accommodate problematic cases.</p> <p>Erratic performance in “same” circumstances. Moves: Abandon model. >Develop a systematic criterion for when model applies. >Elaborate model to accommodate previously unrecognized differences in circumstances. >Elaborate model to include probabilistic elements.</p>