The Role of UnCritically Examined Presuppositions (UCEP's) in SBS

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Science involves an interplay amongst evidence, theory, and prediction which has as its goals the improvement of understanding and perhaps the explication of "truth." When theory and evidence combine to allow for successful prediction, we find confirmation in the soundness of the scientific method and in the general concept of the "progress" of scientific understanding. But, predictions are not always successful and emergence all too often rears as an unexpected variable. Scientists have many tools at their disposal for limiting the occurrence of such failures – chief amongst these is the assertion of a set of assumptions which serve to bracket away ambiguity and its likely sources – including multiple meanings, the role of the observer or interpreter, emergence and more. This paper argues that the unarticulated deployment of these ambiguity reducing tools limits the value of any scientific inquiry to the intelligence community. Instead, it is critical that these tools be rendered explicit, and that consideration be given to what happens when the values employed in the tools as deployed are altered.

Assertions of assumptions to bracket ambiguity function as what cybernetics calls "enabling constraints" - narrowing the degrees of freedom of the subject items to match or be below that of the suggested controller - the proclaimed rule or law or heuristic which supposedly allows the underlying ambiguity to be dealt with. Ashby's [2] law of requisite variety suggests that the enabling constraints function to allow science to make predictions and to offer explanations. (c.f. [9], [10], [16]) The use of these enabling constraints amounts to what Lakatos [12] called a protective belt, blocking inquiry into fundamental questions of how the constraints are chosen and what happens when they are altered. This dynamic - that of ignoring ambiguity in the interest of efficiency and greater predictive reliability -- is captured in the seeming omnipresence in both scientific practice and the intelligence community of "model-dependent realism." This kind of realism has become the basis for applied science, in which each situation is afforded its own efficient, reliably predictive model:

"The only meaningful thing is the usefulness of the model…. [Model-dependent realism] is based on the idea that our brains interpret the input from our sensory organs by making a model of the world. When such a model is successful at explaining events, we tend to attribute to it, and to the elements and concepts that constitute it, the quality of reality or absolute truth." (Hawking and Mlodinow, [8]*)*

While such model dependency is useful for scientific practice, it raises serious concerns re the intelligence community. Predictions and explanations predicated on ceteris paribus demand interpretation, if they are to have meaning once the ceteris paribus constraint is relaxed. Often the real world's implementation of declared inputs and variables differs from the narrow ceteris paribus conditions assumed by the scientists' rigorous models. As such, the protections (if any) offered by Lakatos' suggestive belt become counterproductive. The rigorous models may indeed result in successful predictions – but only within the narrow sphere or domain in which the ceteris paribus constraints hold. The scientist may then assert that the results of the model so derived describe the "essence" of the issue at hand, such that ambiguities do not matter. (c.f. [27]) But, the very situations which intelligence is attempting to deal with, and inform decision makers, about is explicitly concerned with such ambiguities and their resolution.

Second order science (c.f. [13], [14], [20], [21]) is the science which examines what happens to scientific query and results when ceteris paribus constraints are relaxed. Lissack [13] identified nine categories of such constraints and labelled them "**uceps**" -- UnCritically Examined Presuppositions. These nine are:

Context Dependence: The extent to which observations/data/interpretations are dependent upon the context in which they occur. Attention (the notion that data points are attended to by actors/system/observers) may also be context dependent. (c.f. [1], [3], [18])

Fundierung Dependence: The extent to which observations, data, and interpretations are dependent upon the belief set and habitus of the observer. Fundierung is the "taken for grantedness" of that belief set and habitus. The key insight here is that the observations are not objective but instead are dependent upon the prior beliefs, engrained models, and heuristics available to the observer. (c.f. [7], [19], [22], [25], [26])

Quantitative Indexicality: The quality of having the essential questions or properties being examined reduced to a set of numbers or quantitative formulae. Those numbers or formulae are treated as indexicals–items which stand for the problem as a whole. Quantitative indexicality is the extent to which numbers are used to represent the objects of study. (c.f. [23]

Holonification: The extent to which the items being examined are discussed as both parts and wholes and the relative roles of each. Holons are items which are both parts and holes. A holon is an identified part/whole relation with regard to a specific item. It is the skin that integrates both the environment of the holon for its parts, and the parts for the environment. (c.f. [4], [24])

Graining: The size of the items being examined as parts of the system being examined. Graining questions are often discussed in the social sciences as the choice of "unit of analysis". Graining questions are often obscured in data analysis by the application of "normalization" routines.

Clustering: The extent to which the units being examined are afforded the status of being clustered together as sub-systems, where the resulting sub-system in then ascribed "item" status in terms of graining.

Communication/Attention: The extent to which the items in the system are afforded the ability to exchange information (both within and outside the system). This can be further modified by the extent to which that information exchanged is afforded the ability to be attended to (on a scale which might include being ignored).

Anticipation: The extent to which either individual items or the system as a whole is afforded the ability to anticipate what a not yet incurred interaction might do with regard to a stated variable or condition which is explicitly examined with regard to any of the other eight hidden uceps

Memory: The extent to which a prior state of an item, the system, or a data point treated as information by either an item or the system is preserved for access and afforded some ontic status. In turn, that "memory" is allowed to be recalled, labelled, or brought forth as a current input.

Looking at the list of uceps above, it seems clear that the values assumed for some of them will play a major role in the reliability asserted with regard to predictions, especially causal predictions. Both context and fundierung can be significant determinants in describing cause. If an action is dependent upon its environment having an appropriate affordance (indirect causality), how is that causal relation described once it is noted that unattended-to affordances do not exist to the relevant actor? Outside of science itself, actions by the public, or governments, or significant actors may pre-suppose that the predictions made are reliable and that the expected causal consequences are clear. As Lissack and Roos [17] noted, "Interpretations can be considered as having made sense out of a situation. Having made sense out of it means that ambiguities have been removed, and so action is possible. By contrast, when there is a lack of sense making, when multiple interpretations are flourishing, ambiguity prevails and action avoidance is the normal result." But, and this is an important but, if the predicted causal consequences do not occur (perhaps due to exigencies, perhaps due to context, or perhaps due to insignificant attention being paid to the role of indirect causation), intelligence will be deemed "faulty" by the relevant decision makers. They will further tend to question the underlying theory. This is not a problem of the science per se, but rather a consequence of the SBS work failing to consider exigencies, paying insufficient attention to the role of indirect causation, or ignorance of hidden constraints such as context.

Intelligence is often concerned with discovering paths for indirect causality. The sciences tend to resist such approaches. Yet, indirect causality can be looked at as the existence or creation of an environment where the conditions (including embodiment of the assumed values for the hidden uceps) afford/allow direct causality. Causality is also not just a "truth" statement, but also an acceptance of belief by the relevant community of practice. Lack of theory at one level of graining or of clustering or communication had much to do with the decades long gap between the observation that Helicobacter pylori "caused" ulcers and the acceptance of that observation as an explanatory theory. Intelligence cannot afford a similar decades long gap.

The second order scientist would examine how the assumed values for the uceps affect the claims made regarding causality. For example, it is common to assert that “addiction" is the product of direct causality - a craving for some brain chemical which is "relieved" by the supply of the addicted to substance. Yet, nicotine patches work less than 20% of the time and most medical patients given addictive narcotics do not end up as addicts. Recent research has suggested that addiction has multifactor causality where the conditions in the environment (indirect causality) play a far greater role than brain chemical cravings. (c.f. [6]) Second order science would approach this issue by carefully explicating the ucep assumptions and then attempting variations. While assertions of causality are difficult to overcome with a study of subtleties, it is the role of second order science to examine those very subtleties.

By failing to make the assumptions which go with the hidden uceps explicit, SBS in practice leaves itself open to errors in attributing cause. Here second order science has the potential role of revealing a hidden dependency on one of the uceps themselves. By making assumptions (and in so doing restricting ourselves to a set of labels and a model) we predetermine what might be learned, which will limit the options that appear to be open to us. "We often fail to allow for the possibility that evidence that should be critical to our judgment is missing. What we see is all there is." (Kahneman, [11])

Meaningful intelligence demands explicit consideration of uceps. Second order science inquiries must be viewed as a prerequisite for the successful integration of SBS work into intelligence assessments. SBS without such consideration is belief, not science, hidden inside a model.

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