

Abstract
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Are There Universal Principles or Forms of Evidential Inference?
Of Inference Networks and Onto-Epistemology

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Although interest in evidential inference is not new – interest in the topic reaches back into antiquity – during the last two or three decades there has been a veritable explosion of scholarship and research about evidential inference. Furthermore, evidential inference (or “factual inference”) is now an important topic in virtually every field of scholarship and in virtually every kind of “knowledge industry.” Although the models of inference generated in this latest wave of scholarship and research are varied, one thread does run through many of the new models. Many contemporary accounts emphasize the multistage nature of evidential inference; it is now very often argued or assumed that evidential inference is best viewed as a network or web of inferences. Although the proponents of such models of evidential inference often have important disagreements about the properties or structure of multistage evidential inference, it is fair to say that such models generally rest on the compound proposition that real-world evidential inference usually or always consists of propositional “atoms” (granular propositional statements, relatively granular propositional statements) that are linked together (in some way) by “generalizations.” I will refer to such models as NAGs – shorthand for network-and-generalization models of evidential inference.

If a model of this sort – some type of NAG – is a valid representation of evidential inference, the question may arise – indeed, the question has arisen – whether a model of this sort – a NAG – is or is not “universal.” The answer is that this question is unanswerable. What can be said is that when human beings (or other agents) configure problems of evidence in a certain way, inference networks (of some sort) are inevitable and describe the structure of the problem at hand but that when problems of evidence are perceived – i.e., configured – only or primarily in certain other ways, representations of inference as webs of factual hypotheses connected by generalizations are of little or no use – simply because in some situations such web-like patterns of reasoning do not address the problem at hand.

Three situations illustrate the circumstances under which network-and-generalization representations of evidential inference [NAGs] have little to say about the relationship between evidence and hypotheses. First, there are situations in which items of evidence are taken or seen as events and states of the world – rather than as indicators or signs of other possible events – and the investigator, instead of seeking to draw inferences from evidentiary hints at hand, seeks to construct, develop, or uncover a complex of concepts that best explains and thus reconstructs the meaning or significance attached to events and states of the world by the persons who are enmeshed in them. In this type of situation the investigator's focus is on finding, developing, and constructing a conceptual overlay that most satisfyingly grasps, portrays, and reconstructs perceived events and states of the world and the perceived relationships between those events and states. Wilhelm Dilthey referred to this sort of intellectual and interpretive activity as *Verstehen*, as opposed to *Erklären*. *Erklären* ("explanation") mainly seeks to explain nature in terms of causes.

- The ancestor of Dilthey's *Verstehen* is (I suspect) Kant's faculty of *Urteil* (judgment) rather than Kant's notion of *Vernunft* (usually translated as "reason"). This faculty of *Verstehen*, which – following Lonergan's example – I shall sometimes call (the faculty of) "insight," seeks to explain nature in terms of purposes and functions rather than causes. Kant's theory of organisms and functions has affinities with the modern concept of an organism but is really quite different from the contemporary view of organisms and functions. I personally think that Kant attributes too little "causal" potency and ontological reality to purposes and organisms. A well known not-quite-contemporary exemplar of intellectual-cultural-social history that well illustrates *Verstehen* and its workings is Arthur Lovejoy's *The Great Chain of Being: A Study of the History of an Idea* (1936).
- This sort of intellectual effort – the effort to put one's self in another's shoes by portraying the world the way that another person sees the world and portraying the meaning or significance that such another person attaches to the events and world-states that he or she sees or perceives in the world – is a legitimate and genuine intellectual activity, although it is not clear that it is appropriate to call it a "logical" one. Fuzziness is an inevitable concomitant of attempts at imaginative reconstruction of human meaning. However, perhaps constraints do apply to such attempts at reconstruction. The process of *Verstehen* does attempt to describe a reality, i.e., how other minds actually see events in the world and the meaning that other minds actually attach to perceived events in the world. It is probably true that the constraints on such imaginative reconstruction are themselves fuzzy – and they may even verge on having a predominantly aesthetic character. But even aesthetic constraints may be real constraints – to some degree.

The essence of this first type of intellectual activity – the imaginative reconstruction of human meaning – is to portray perceived events and states of the world as

instantiations or exemplars of complexes of meaning-conferring ideas. NAGs do not capture the heart of this sort of intellectual activity.

- However, there is no necessary inconsistency between NAGs and *Verstehen*. And it is likely that many investigators who pursue insight often employ both kinds of processes and perhaps swing back and forth between them.

Second, some types of tacit inference provide another example of a situation in which NAGs may provide little or no enlightenment. Hermann von Helmholtz noticed decades ago that perception is a form of “unconscious inference.” One likely reason we generally refer to perceptual inference with the singleton “perception” rather than with the phrase “perceptual inference” is that we usually have little understanding of the underlying principles that lead biological mechanisms (e.g., perceptual organs such as eyes, ears, and so on) to generate the inferences that they do. Perhaps in the “fullness of time” it will be shown that the underlying logic takes the form of, say, a NAG. Or perhaps not! Or perhaps it will be shown that multiple logics are at work. (This seems more likely.) However things eventually turn out, although in recent decades there have been great advances our understanding of the workings of perception (visual perception, aural perception, etc.), it nevertheless remains true at present that we human beings generally can do little more than marvel at the workings of our perceptual organs and that we have relatively little ability to make healthy sense organs work better than they naturally do. Or perhaps human beings can do just a bit more; for example, perhaps empirical studies can identify some types of situations – generalizable situations – in which error rates of various kinds are comparatively high (or low). However this may be, the simple fact is the logical workings of much subconscious inference remain elusive and cannot yet be explicitly described in a systematic fashion. (The fact that the “intelligence” of some or much human inference is largely impervious to explicit restatement by human beings does not mean that perceptual intelligence and inference do not exist. Quite to the contrary: much unintelligible subconscious inference is extraordinarily intelligent)

Third, to whatever extent a given problem of evidence and inference presents or is thought to present inferential issues that only a special science such as quantum mechanics or genetics can adequately address, the extent to which representations in the form of NAGs illuminate the logic that is deployed to address such a problem of evidence and inference depends on the presuppositions and methods of the special science that is thought to hold the key to the inferential riddle at hand. Not all sciences – not even all “hard” sciences – use logic and methods that NAGs usefully represent.

The root of all three of these “exceptions” to NAGs (and of other “exceptions” that are yet to be identified) is a fundamental onto-epistemological premise or hypothesis. This hypothesis begins with a firm denial that rational inference involves only explicit logic. Although human inference is a rational and logical activity, human inference – i.e., the inferential activity of the human organism – involves not just (let alone only,

or even mainly) explicit ratiocinative processes. Inference is one of the activities of a sentient human organism. (The same is true of non-human organisms.) The human organism, though sentient, is “rational” to its core. (As already noted, even the human organism's sentient activities are fundamentally and deeply logical, and in that sense “rational.”) Logic – a complex logic or set of logics – is embedded in the human organism and regulates its activities. (Indeed, not only does a logic or a collection of logics regulate all human activity. The science of genetics is making it increasingly plain that a logic or logics – the “genetic code” and matters of that sort – drive the development – and thus the very existence – of humanity as a species and of individual human beings.) Such indwelling “tacit” logics are as yet poorly understood. (This is no surprise. To understand them fully we probably have to bring to perfection a vast multiplicity of sciences – sciences such as genetics, physics, electromechanics, signal detection, neural science, game theory, chemistry, biochemistry, quantum mechanics, and who knows what else.) But however imperfectly we understand the logics within us, such logics are nevertheless “there,” they are at work in the human organism. Hence, yes, it is true that human beings are inferential reasoners. But much human inferential reasoning – a vast amount of it – is hidden from human sight.

Since the dawn of modern artificial intelligence – and even before – man (a/k/a his mind, a/k/a his brain, a/k/a his neural system, a/k/a woman etc., etc.) has been analogized to a computer. This analogy (which is often taken very seriously) amounts to an ontological-epistemological revolution; it amounts to a rejection of the dichotomy between mind and body, thought and matter, and it restores, in modern guise, the Aristotelian notion of organism. To think in terms of organisms is to think in terms of purposes and functions. The emerging reversion to an Aristotelian ontology is a lovely revolution; this “new” way of thinking about man goes in the right direction. However, the contemporary turn in fields such as AI towards functional and teleological accounts of man frequently suffers from a serious defect. The ruling image, model, or analogy of man (or human mind) as computer does not sufficiently stress that the “human computer” is a *developing* (biological rather than mechanical) computational creature.

What sort of evolution does the human inferential computer undergo? Common sense, the presuppositions of the study of evidence and inference in legal settings, and a great deal else (e.g., thermostats) suggest or suppose that it is possible, here and there, for tacit human inference to emerge into the light, to become explicit. Such considerations and such examples of the victories of relatively complete explicit ratiocination (i.e., examples of a fairly high degree of inferential automation) suggest, more broadly, that the human organism has some capacity (the full extent of which is as yet necessarily undetermined) to force at least some tacit, or subconscious, logical processes into the light of consciousness and to make previously tacit inference explicit or, in any event, to make relatively tacit inferences *more* explicit and thus more subject to some explicit logical analysis and argument. This latter function is, in my view, frequently (but not always) precisely the central function of mental crutches and representations such as NAGs. (Sometimes – but only sometimes – inbred human

logics will manage to emerge from the human animal and escape from the crutches of their creator. See Isaac Asimov, *I, Robot* (1950). Less dramatically, consider once again the lowly thermostat – or the flying drones now used by the military for surveillance and even for combat operations.)

On this view of things – on my neo-Aristotelian view of the general relationship between logic(s) in man and man's explicit ratiocination about the world (including himself) – an important function of explicit reflection, analysis, argument, and reason is to have the human organism wrest out of itself and its encounters with the “world” (including its encounters with itself) some principles and logics (forms of reasoning) that the organism can hold consciously in mind or, in any event, that can be recorded and stored elsewhere, by means of marks made in the world, as in readable computer scripts and programs. The aim of such explicit expression and formulation is in part to enable the organism to facilitate and, perhaps paradoxically, improve the workings of the logics that are immanent in the human organism (and in its environment).

When such victories of explicit ratiocination (either victories that facilitate inference or those that automate inference) are achieved, they ought to be celebrated. And whenever possible, the human organism should use its emergent logic to improve its immanent logic. But on my view of things, humility about human inferential capacity – humility, that is, about the power of *explicit* inferential calculation – has the status of a virtual first principle. It must not be forgotten that many or most of the logical operations of the human organism remain hidden from the human organism's sight and comprehension. In many situations, therefore, the only reasonable expectation we can have of deliberation about evidence is that such deliberation will bring some shards of our indwelling logical processes to light. But we should remain alert to (i) the possibility that sometimes we will just have to trust our unanalyzed hunches and (ii) the possibility that it will not always be the case that explicit analysis of evidence will improve our inferential performance.

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My view of the nature and foundations of human inference has implications for debates about human freedom, self-regulation, and spontaneity. This is not the appropriate forum for discussion of such important matters. I nevertheless mention the point because I want to suggest that it is not possible to separate “narrow” and “technical” debates about evidence and inference from broader philosophical and spiritual questions. Inference, a facet of epistemology, on the one hand, and ontology, on the other, cannot really be kept apart. It is even possible that debates about inference implicate questions about the existence and nature of good and evil.