What is “Formal” Analysis?

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Abstract
There are two main traditions in Western philosophy: a line of dualistic arguments resting on the form-matter dichotomy and the long historical accumulation of ideas related to it, and a line of skeptical arguments resting on an expanding idea of experience and an accumulation of ways to produce and reproduce it. The idea of “formal analysis” has mainly been associated with the former, in which formal analysis is substantially the same thing as imposing the conceptual framework of the analyst. The argument here is that it can be much fruitfully framed in the latter. Form is not something that one must of necessity impose. It can be found.

1 The problem
The idea of “formal” analysis in the social sciences is primarily associated with philosophical positivism and Hegelianism, from Durkheim’s conception of society as a “mental being” and Weber’s conceptions of formal theory and formal law through Parsons’ idea of general theory to componential analysis, certain allied kinds of ethnosemantics, and Levi-Strauss’s structuralism. In all these variations, it has demonstrated numerous recurrent difficulties and perplexities which spring from and directly reflect its philosophical roots. The question here is whether it is possible to have a kind of formal analysis that does not rest on such assumptions and does not repeat these difficulties. The answer is that is. Form exists in fact and can be found by methods that are wholly empirical.

2 Its history
The history of the idea of formal analysis begins with Plato’s radical dichotomy between form and substance. The related idea of a hierarchy of forms was adopted and transformed by Aristotle into his idea of logic and a hierarchy of logical classes, and Plato and Aristotle together provided both the prototype and the supposed poles of what turned out to be the reigning mode of political and religious argument in the West for the next 2200 years: “metaphysics.” Literally, metaphysics means only “above physics.” But since Plato equated the physical world with the world of “appearances,” metaphysical schemes in the tradition that builds upon him do not describe just what lays beyond actual physical objects (in the way chemistry explains fire, for example), but also what is supposed to lay beyond our experience of them.

Metaphysical explanations in this tradition are explanations by so-so-story. One hypothesizes a universe beyond experience based on supposed first principles, and one holds it to be true on the ground that the characteristics of the world we experience are consistent with it. Other such theories are always possible, however, and because they are theories about what lies beyond experience, no actual experience can ever be decisively relevant and there can never be a way to subject them to a decisive test.

The idea is fundamentally irrational and there has never been a time when this was not recognized—beginning with Plato himself, as in his exposition of what is called the “third man” problem in the Timaeus. Nevertheless, in part because of its intimate involvement with theology in organized Christianity, Islam, and Judaism (in that order of importance), it was not discredited as a core of elite education and a major mode of scholarly writing until the critiques of Hume and then Kant in the late 18th century.

Most fundamentally, what Hume and Kant made clear was that the idea of a world beyond experience made no sense and what one really needs to explain the world of appearances must be found within that world rather than beyond it. The key to how to do this was that where Plato and Aristotle represented the problem of knowledge as essentially that of a passive individual in isolation, Hume and Kant saw that it required always involved individuals in interaction.

The most important response to Kant among his metaphysical contemporaries and those who came just afterward was not so much to attack him as to misunderstand him, recasting his analysis in their own terms as a new form of absolute idealism. These included Hegel, Fichte, Schelling, and the philosopher-historian Wilhelm Windelband. Among empiricists, however, the reaction was to galvanize an enormous array of entirely new kinds of research. Its leaders were Kant’s true successors and include almost all of those we now recognize as the founders of truly modern, and experimentally sound, social and behavioral
science: Helmoltz and Wundt in experimental psychology, Bastian and Wundt in ethnology (Volkerkunde), Herder, Helmoltz, and Grimm in linguistics, the historical and then sociological jurisprudence, and eventually American pragmatism.

Positivism was not part of this empirical explosion but a further step in the anti-Kantian and anti-empirical reaction, mainly through Hegel. Its founders—Comte, Mill, and then Spencer—were self-advertising autodidacts with no sense of the kind of cooperative endeavor that empirical scholarship was rapidly becoming in the new research universities. Their model of knowledge was still the grand scheme based on first principles. Their argumentative trope was to shift the blame for the failure metaphysics from the form-matter distinction and allied notions that made the metaphysical schemes inherently paradoxical to metaphysics as a type of defective explanation that went along with a specific stage in the development of society. The rationale was in Comte’s oft-quoted “law of three stages.” In primitive society reasoning is theological: the actions of things are attributed to gods or spirits. In more advanced but still not modern society, reasoning is metaphysical: actions are attributed to reified abstract principles—opium makes one sleepy because it has a soporific principle. In industrial society, however, explanation is positive. “We” recognize science and science deals only with correlations. This is not what metaphysics actually was, nor what science is. Nor does society control what people accept as an explanatory principle, but people who realized this did not become positivists.

Sociological positivists applied the idea by framing their analyses of society in terms of the evolution of progressively greater rationality. Logical positivists applied it in a program to complete process of replacing metaphysics with “science” by rationalizing and unifying the latter. Ending the “present isolation of the sciences” by logically integrating “the most important doctrines of each science” with the other sciences and general knowledge was a central promise of Comte’s Positive Philosophy (1851; 35). Mill’s variation replaced “doctrines” with the idea that science was a body of statements. The meaning of a statement was either logical or referential, a revision of Locke’s distinction between relations of ideas and matters of fact. They were true or false either in virtue of how they were defined or what they denoted. The idea that such statements had to be integrated “logically” or “rationally,” rather than substantively, went directly back to Hegel’s 1817 Encyclopedia of the Philosophical Sciences.

Of course one does not do science conceived in this way, but that did not matter because doing science was not what Comte or Mill or their allies were really aiming it. What they wanted was a license to recreate the kind of speculative vision of what lies beyond experience that the Kantian critiques had discredited. If science is a set of statements and not a set of results, and if the separations among the various bodies of scientific knowledge are only artifacts of language, then one does not need to be scientist to integrate it. The trick is simply to devise an appropriately general language with sufficient logical operations and appropriate arrangements of denotative categories and say how the rewriting would be done.

While the Vienna Circle and its American successors in the Unity of Science Movement were the positivists most explicitly focused on turning the idea of rewriting science into a practical project, to result in the International Encyclopedia of Unified Science, the broader idea that one could to provide explanations of everything from within the protective folds of one or another version of the form-matter distinction and related realities beyond experience by claiming to be providing a philosophical analysis of the foundations of science or language attracted broad participation. Between the late 19th century and the mid-20th a wide range of arguments were developed focussing on such notions as logic, mathematics, the relation between logic and mathematics, meaning, denotation, inference, perception, the meanings of words like “perception,” truth, science, and scientific reasoning that substantially replicated all the major variations of pre-Kantian metaphysics: idealist and materialist, realist and nominalist under various labels, including “philosophy of logical analysis” (Russell 1945:828), “analytical empiricism” (p.834), “mathematical philosophy,” and “logical empiricism.” Metaphysics was reborn, only it was called anti-metaphysics.

“Formal analysis” in ethnology draws on this background. For its more conspicuous proponents at least, it was never only a method to analyse any one specific type cultural system like kinship terminologies or garden taxonomies, or even to analyse culture in general. It was always, also, an argument for a view of scientific theory and a program for constructing or reconstructing social theory according to this view: arbitrary but true logical rules linking arbitrary definitions that grouped denotata that were objectively real but at the same also beyond experience.

The positivists’ program has now collapsed. In philosophy it was probably defunct by the late 1970s, although this was not widely recognized at the time. There were many reasons, some very general and some very technical and specific. Those that had the most effect on the positivists themselves were articulated in three main arguments. One was Goedel’s 1931 demonstration that Russell and Whitehead’s supposed demonstration of the unity of mathematics with logic was either inconsistent if complete or incomplete if consistent. The second was Wittgenstein’s repudiation of the arguments in his Tractatus Logico-Philosophicus, which had been taken as demonstrating the unity of natural language, and hence its utility as a basis for unifying scientific languages. In its place the blue and brown books and Philosophical Investigations (1953), argued for the clearly prag-
matic idea that meanings are only made clear through what he calls the “language game.” The third was W. V. O. Quine’s 1951 “The Two Dogmas of Empiricism” (reprinted in Quine, 1953).

The two dogmas were reductionism and the analytic-synthetic distinction. Quine rejected both. Reductionism, corresponding to Mill’s denotation, was the notion that every factual statement could be reduced to a posit or construction upon experience, understood as some concatenation of “sensations” or “sense impressions.” The analytic-synthetic distinction was their claim that propositions were of two kinds: either analytic or synthetic, true by meaning alone or true in virtue of what they refer to.

Quine’s main argument concerning the analytic-synthetic distinction was that if we operationalize it in a reasonable way by asking how we are to judge synonymy (that is, when two words have the same meaning) and how propositions are to be verified, what we find is that we cannot make sense of it. We cannot find analytic propositions and we cannot find synthetic propositions. His alternative was to replace the idea that verifiability inhered in individual statements with the idea that it could be found by taking “total science” as the “unit of empirical significance.” He described total science, in turn, as a network of interconnected statements touching on experience only at some points but remote at others (1953: 42). Exactly what those points were at any given moment was a matter of “posits.” Quine did not explain what a posit was beyond saying that they were conceptual entities which “contain” sense experience, (p. 43) but since they are changeable and contingent the ways in which they are constructed or selected clearly involve more than simply connecting an arbitrary symbol to some recurrent package of sensations.

The critique was considered devastating. The most common response that while the authors could not show what was wrong with Quine’s objections, they would continue to use the distinctions anyway because their entire enterprise depended on them (cf. Ebersole, 1956; Pasche 1956; Grice and Strawson 1956; Epstein 1958). In fact, however, what has happened is that the distinction has quietly been abandoned as philosophers have shifted more to analyzing meaning in what they like to see as “natural language” in the manner of the “Oxford” school and analyzing logic it appears in more realistic types of arguments—and while these have their own closely related difficulties (Gellner 1959), they cannot concern us here.

In sum, the philosophical authority that has been claimed for positivistic conceptions of formal analysis in the social sciences does not hold up to scrutiny. The underlying radical distinctions between form and matter and logic and description, and the idea that we can gain knowledge by the arbitrary imposition of our own preconceptions is familiar nonsense, nothing more.

3 The empirical alternative

If we look at reasoning empirically and not dogmatically, we observe only one rule of logic that is any way uniformly firm and context free. This is, as Kant among many others had noted, simply that you should avoid self-contradiction. Being logical is being self-consistent. Exactly which specific forms of argument do this in any particular context depends on what one is dealing with. It is self-contradictory to say I gave him my apple and then we both had my apple but it is not self-contradictory to say I gave him my idea and we both had my idea, even though the “form” of the statements is the same. It is a self-contradiction to say that space is curved in Newton’s physics, but not in Einstein’s. It is a self-contradiction to say that a person is my friend but in an opposed political party in India, but not in America.

We can apply the idea of self-consistency to conceptual systems as well as to individual statements or to arguments. Without self-consistency, concepts cannot form systems, and the degree of self-consistency is the degree or extent of its systematic integrity. The “form” of a such a system would, then, be what makes for this self-consistency. It is, most basically, that aspect which seems to us to hold it together, what provides for the relations of its parts one to another.

Recognizing form as what holds systems together goes a long way to explaining why philosophical efforts to define form apart from or in contrast to substance have never held up. We cannot find detached form because we cannot find detached unifying characteristics, and we cannot find detached unifying characteristics because what holds a thing or system together is contingent, depending on both the aspects of the system that concern us and the perspective from which we need to understand it.

To determine how the parts of a system hang together, the most general method has to be that you trace them out, step by step and part to part. Wherever you find constant links between two things, they are part of one system. Where you find links or connections only to some degree or some of the time or under some circumstances, they are not.

I have argued elsewhere that every human community has multiple distinct types of organizations and that such organizations are framed by distinct systems of cultural ideas. There are also systems of cultural ideas that define technical subject matters, such as bodies of agricultural knowledge, the knowledge of trades, and the sciences (Leaf, 1972; 1984). In every community, a small number of such ideas will be held in substantially universal consensus and provide what the members recognize as the organizations and values that provide their most basic recognizable unity: common ideas of such as those that define political and legal systems or ideas that define tribal societies or religious communities. Many more will be held in consensus among more limited sets of people—ideas that define specific professions or
trades, religious or philosophical traditions, traditions of folklore, and the like.

Such systems can be elicited by tracing out the connections between their elements. The elicitation process is in itself a formal analysis in a strict sense, because it shows the connections. In addition, further kinds of formal analyses can serve to characterize the principles that these connections are built upon. Componential analysis notwithstanding, neither step requires us to impose a preconceived idea of what the form will be and there is no clear line between the two steps but rather a matter of degree. The analysis does depend on an initial set of working assumptions, of course, but all of these assumptions are verifiable or falsifiable by the analysis itself and there is no need or use for assumptions that are not so verifiable.

For present purposes I will concentrate on just one kind of cultural system. This is the set of ideas that define kinship relations. Within these, I will further mainly concentrate on the particular sets of concepts that define what ethnologists call the kinship terminology. There are four reasons for this. The terminologies are central to the other ideas of kinship, they occur in some recognizable form all societies, they are reasonably complex, and they are very well documented.

My first working assumption is that kinship terminologies (like probably all other systems of cultural ideas) can be visualized diagrammatically. The second assumption is that kin positions are defined with a limited number of characteristics, each of which can be graphically symbolized. And the third assumption is that there is always a distinction between “direct” and “indirect” relations. Direct were those with no intervening links to ego. Indirect are those with intervening links.

This particular system of definitions is American. The basic set of graphic symbols arranged as the direct kin around an ego are given in figure 1.

This core serves as an eliciting frame to obtain all the additional definitions. Since we know, for example, that father is also an ego, we can ask what is the father of father to the original ego, what is the mother of father, what is the sister of father, and so on. Some of the answers will involve identifying new positions, others will simply add aspects to the definitions already obtained. We do the same again for each of the other direct positions and then for all of the new positions that this procedure leads to, until we come to what are reported as ends or rules that show us how to go on indefinitely. When the results of this process for English are gathered and simplified so that each conceptual position is represented by one and only one graphic figure and the graphic links between each position and all the other positions represent all the other possible definitions, we arrive at figure 2.

Unlike elicitation methods that rely on a list of supposed universal or central terms that is used to obtain translation equivalencies, this kind of diagrammatic elicitation immediately tests the idea that all such positions are interconnected and shows what the interconnections are. If the diagram is coherent, then what it represents must be a system of definitions in which each position is defined by its relations to all the other positions.

Rule 1, 2, and 3 are rules for infinite further extension, and also limits. Ascendant and descendant relations go on forever according to the rule, but there is nothing beyond the rule. Rule 1 is that for each succeeding ancestor beyond great grandfather one simply adds a great, and the same is true for the reciprocal—each successively more remote descendant beyond great grandson or great granddaughter.

Rule 2 the comparable rule for collaterals, the uncle and aunt positions and their nephew and niece reciprocals. And rule 3 is that any descendant of a cousin is a cousin. With these rules, the system is complete and logically closed, with every term defined in relation to every other term.
This is a primary level formal analysis, in the sense that it shows that the positions designated by the terms are in fact a system and it does have a form. I call this form a "kinship map" because it literally lets us "get to" what any relative would be to any ego through any set of links, however such links are defined, and by reversing whatever links we traverse to get to that position we can also get to the reciprocal. That is, if we have person up one consanguinal link from ego, that is ego's father. Reversing the link we get the position one consanguinal link down from ego and if ego is male that is son. If we go up two and over one to a male that is uncle. If we reverse this and go over one and down two and ego is a male, then ego is nephew, and so on.

But the model is not only a set of instructions for terminological usage. It also shows systematically how all such instructions are interconnected, and, more basically it lets us see how the parts maintain the logical continuity of their respective definitions. A line through one node to another is not just a way of saying a son of a nephew is a grand-nephew but also a way of showing that all the ideas that are constituents of the idea of a son (maleness, descent, etc.) are consistently employed in all the other positions that make up that sequence, maintaining their same sense throughout each application.

The next step is to ask what this model tells us about such elicited, indigenous, formal models in general. The first thing to note is it does not exhaust the material it represents or encapsulates and when you think about no formal model should, for two reasons. First, formal models can always be extended or expanded. Secondly, as with mathematics and other such formal systems, it is always possible to formally analyze a formal analysis. Unifying features or principles are inherently capable of being stated in different ways. These may sound like the same thing said two different ways, but they are not. I will illustrate.

The most obvious, although trivial, illustration of the possibility of extension is that we could have carried the ascending and descending lines farther out before ending them in Rules 1, 2, and 3. But the more important kind of illustration is that while this structure has a strongly "linear" look to it, Americans also often speak more bilaterally. They talk of relatives on their mother's or father's "side." If asked to draw such sides they will do so, usually trying to produce a diagram that looks a good deal more like a butterfly than the present Christmas tree. Such a bilateral model will violate the assumption that each named position have one and only one graphic representation, and if you ask the informants if an aunt on one side is really different from an aunt on the other they will say no, but clearly the two sided model is drawn from the more linear model in that they use the same basic concepts and the users of the system will recognize them both as models for the same basic thing: relationships. Other models, like that of a clan or of generations, can be obtained by stressing or relaxing other central ideas. Fundamentally, the form of the main system lets us see not only its own characteristics but the characteristics of a whole family of related models that it at once provides the conceptual basis for and provides an overriding conceptual unity to.

The second point is that we can test the formality of this diagrammatic structure to say more precisely what it consists in. This is what Dwight Read has done.

Read has tested this same diagrammatic analysis. His method was to rewrite the relationships mathematically and use the results to program a computer. The computer's task is to produce a somewhat similar diagram. The aim of the test was to see if the nodes of the computer's diagram would correspond to the nodes of figure 2. They did.

Read's rewrite method replaces the core configuration of the graphic representation with a set of what he describes as "structural equations" translating the logic of the definitional core into algebraic mapping relations. For the American system there are six such equations, plus a rule for sex marking and rule for cousin terminology. The first three of the six are, for example, parent of child = self, spouse of spouse = self, and spouse of parent = parent. This has two important features. The first is that Read can use the equations to demonstrate that all other definitions are consistent with the definitions of the core. The second is that they always also define what Read calls a "focal term." A focal term may be recognized by the users of the terminology as a formal kinship term contrasting with other such terms, or like "self" or "my" or ego for English and Punjabi it may be considered to be a position they imply or assume. Either way, however, like the ego in the diagrammatic representations, it is a central position from which relations to all other positions can be mapped by kin term product definitions. The systems of cultural ideas that define relations other than kinship often lack such a concept. That is, the "idea" or "sense" of kinship is in fact closely related to this particular "shape" of kinship.

Read has used the method on kinship systems from a wide range of Old-world and New-world cultures, from industrial states to Amazonian swidden farmers, beginning with the American as represented here and including Punjabi. So far, all have proved consistent (Read 1984; Read and Behrens 1990; personal communications). This means that they have all proved to be logical structures in their own right in the clearest and most definite possible sense. They are also, however, cultural structures, which is to say that what this is all getting at is the logical organization of culture and, conversely, the cultural bases of organizational form. This is an extremely important conceptual breakthrough, exposing nothing less than the generative nexus of cultural conceptualization and social interaction.

Neither my analysis nor Read's depends upon finding, stipulating, or knowing what the terms "refer" to. We are finding only how their definitions are mutually interrelated, and to provide a conceptual framework for this purpose the very simple and
highly abstract concepts he draws from abstract algebras are both appropriate and adequate. They make it easier to see what is there without imposing limitations on what it must be. On Read’s analysis, the relations among the definitions have the distinctive mathematical properties of certain specific kinds of algebraic structures known as semigroups. They do not have to have it; it is not an artifact of the analysis. They just do have this structure in fact. The structure is in the definitions and it is real. It is not external and imposed.

The componential analysts’ assumption that meaning lay in denotation and denotations were somehow “objective” led them to the position of saying that some aspects of kinship—in effect genealogy—were more real than others. There is no reason to become entangled in this question. Systems of social positions always include ideas or definitions for recruitment to such positions. One might be assigned a position from birth, by election, by meeting some criteria of merit, by being a certain sex and age, by being the eldest in clan or community, and so on. Since we would not recognize a given system of social positions as a kinship position, and since birth, descent, and marriage are principles of recruitment in our system, then we would expect and will find something like them in similar systems. But there is no reason to impose any of our ideas on what these recruitment principles would have to be any more than there is to impose an idea of any given position must. They are simply further aspects of the system, defined by the other elements and serving as part of their definitions in turn. It is a formal system and they re part of the form. They are part of what holds it together.

4 Conclusion

The way to think about the formal analysis of systems of cultural ideas and what they refer to is not in terms of the positivist conceptions of classifying some set of actual objects or sensations but in terms of the pragmatic idea of formalizing an intuition. We recognize that there is a “something there” but also recognize that there are many different ways to articulate it and that it each it can actually take a somewhat different shape. The structure is in the definitions and it is real. It is not external to them and it cannot be imposed by us.

References


