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The Pythagorean Comma: Weber's Anticipation of Sociology in a New Key

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Throughout its history the Game was closely allied with music, and usually proceeded according to musical or mathematical rules. One theme, two themes, or three themes were stated, elaborated, varied, and underwent a development quite similar to that of the theme in a Bach fugue or a concerto movement. . . . Experts and Masters of the Game freely wove the initial theme into unlimited combinations [p. 30].

(Hermann Hesse. *Magister Ludi*, 1970).

The problem at the heart of any theory is epistemic, and the enduring cogency of Weber's treatment of the problem can be found particularly in his discussion of ideal types. It will be shown that, to Weber, the ideal-type method involved the notion of a disciplined scientific mind at play with symbols. This was not seen as some frivolous puff of dilettantism, a kind of Castalian retreat, but rather a serious response to the fundamental condition under which man labored to achieve meaning while struggling with the concrete imperatives of life.

In this sense, Weber's work might be seen as an adumbration of a "sociology in a new key" (Malhotra-Hammond, 1975), participating, as it were, in the general swing toward the study of symbols heralded in 1957 by Susanne Langer's *Philosophy in a New Key*. For Weber, the epistemic importance of what we can now call the "symbolist" approach to scientific inquiry (cf. for instance, Brown, 1978) is succinctly captured in a concept generated by the Pythagorean school of philosophy in its attempt to rationalize the mystery of musical harmony.

THE "COMMA" OF PYTHAGORAS

The concept of the *pythagorean comma* appears at the very beginning of Weber's (1958a) treatise on the "rational and social foundations" of Western music, and it is here that he rather cryptically indicates its central importance for an understanding of the dynamics of the development of varying musical styles. To begin with, Weber (1958a) remarks that:

All rationalized harmonic music rests upon the octave (vibration ration of 1:2) and its division into the fifth (2:3) and fourth (3:4) and the successive subdivisions in terms of the formula $n/(n + 1)$ for all intervals smaller than the fifth [p. 3].

Expressing this in terms of the length of a vibrating string, what this statement says is that a succession of perfectly harmonious adjacent tones can be generated by subdividing a string of length L according to the series, $n/(n + 1)$. If L were a unit, this harmonic series would be $1/2$, $2/3$, $3/4$, etc. The Pythagoreans recognized this, and sought to generate a scale of tones which would be based on the mathematical relationship involved. According to this scheme, a scale should result in which all the tones were perfectly harmonious. The Pythagoreans soon came to realize they could not achieve such a goal by a strict application of this mathematical algorithm. As Weber (1958a) explains:

If one ascends or descends from a tonic [a given tone or length of a string] in circles first in the octave followed by fifths, fourths, or other successively determined relations, the powers of these divisions can never meet on one and the same tone no matter how long the procedure be continued. The twelfth perfect fifth $(2/3)^{12}$ is larger by the pythagorean comma than the seventh octave equalling $(1/2)^7$ [p. 3].

What is being compared is the twelfth fifth: the length of string, for instance, that one would end up with after successively dividing its original length by two thirds ($2/3$ of the original length, then $2/3$ of the result, then $2/3$ of that result, etc.; a process repeated twelve times), and the seventh octave: dividing a string in half successively seven times. If octaves form a harmoniously recursive system, these two processes should yield the same tone—or length of string. Instead, there is a discrepancy in the ratios, mathematically expressed as the difference between $(2/3)^{12}$ and $(1/2)^7$, which comes to the value .001232. Yasser (1932) put it thus: “no number of consecutively arranged natural Fifths can exactly coincide, in general acoustic dimension, with some number of consecutively arranged Octaves.” [p. 118]. This discrepancy, small as it is, does happen to be aurally distinguishable. Within a given octave it amounts to the difference between $A\#$ and B_b in a natural, or “untempered,” scale.

Perhaps a feeling for the problem can be captured by noting that it is, in one sense, a Zeno’s paradox of music. Just as the subsequent continuing reduction of a distance by halves never actually eliminates it completely, the subsequent division of a string of length L by ratios of $n/(n + 1)$, that is, $(1/2)L$, $(2/3)L$, etc.; never brings you back to the original length L , despite the fact that the limit of $n/(n + 1)$ as n approaches infinity is one (i.e., unity).

The importance of this discrepancy lies in the unavoidable fact that a fully rational structure of tonality could never produce a completely harmonious scale of tones. Now, this fact becomes particularly acute when one attempts to develop a range of harmonies encompassing several octaves. As Wood (1962) states:

... notes which stand to one another in a simple frequency ratio form a concord when sounded together. The rise of harmony has therefore enhanced the demand for pairs of notes satisfying this condition [pp. 186–187].

Since this was impossible on a purely rational basis, it became necessary that the rational division of notes be adjusted (or “tempered”) to the ear.

The limited “temper” of musical instruments involved just this quest for an aurally pleasing harmony, which required, in turn, a departure from purely rational partitions. On this point, Weber notes that Chinese music favored rationality at the expense of musicality in the construction of instruments. Concerning one instrument, the *king*, he says (Weber, 1958a):

The main instrument of the Eastern-Asiatic orchestra, the king... had very obviously not been determined in its tuning by musical consideration, but by requirements of mechanical symmetry. It is evident how strongly such antimusical arbitrariness could alter musical sensitivity and divert it from an understanding of harmonic relations [p. 96].

When musicality was the object, it was found that not all musical instruments could lend themselves to the flexibility required to modulate tonal qualities and thereby achieve harmonies across instruments. The violin might easily submit to instantaneous, fine adjustments in tone, while the piano and many wind instruments were much less flexible. Indeed, the piano is completely inflexible during a performance.

These facts lay behind the search, going back as far as the Sixteenth Century, for a single most harmonious temperament that would encompass a wide range of octaves. A “mean-tone” temperament was devised, but eventually gave way to an “equal-” or “well-tempered” scale. The latter temperament simply spread the “irrational” difference between ideal and harmonious tone relationships, represented by the pythagorean comma, within each of the seven octaves of the piano (cf. Wood, 1962, pp. 188–196). Effectively, what this did was bring sharps and flats into coincidence. Thus, the A# and B_b of the “natural” scale, mentioned above as separated by the pythagorean comma, became identical notes in the “well-tempered” scale (for an excellent description of this cf. Yasser, 1932, p. 117). The well-tempered scale, therefore, represented a compromise between rationality and reality. It did not get rid of the irrationality of the comma, but rather minimized its presence by tonal dilution.

In their introduction to *The Rational and Social Foundations of Music*, Martindale and Riedel (1958) comment that Weber appeared to give this lack of fit between the requirements of the ear and those of the mind an immense significance. Weber’s belief that the two realms—of ideas and of actuality—are immiscible can be found in several forms. It lies at the heart of his concept of “elective affinity.”

Elective Affinities is the title of a novel by Goethe. In his introduction to the Gateway edition of the novel, (1966) Victor Lange notes that Goethe borrowed the term from an Eighteenth-century treatise on chemistry (*De*

Attractionibus Electivus, by Torben Bergman). He then cites Goethe (1966, p. ix) as stating, in respect to this motif, that he was “reducing”¹ a chemical analogy to its “essential spiritual meaning.” For Goethe, his novel was an illustration of the fact that “even the clear realm of rational choice is inevitably shot through with those traces of the confusing compulsion of passion” [p. ix].

Weber’s reference to “elective affinities” comes through with a striking significance when we consider the possibility that he was directly influenced by Goethe on this matter: rational choice commingled with compulsion; the irrational ineluctably linked to the rational. The picture that emerges is that of rational action continuously asserting itself in both human motives and understanding, and just as continuously being thwarted by the ineluctable intrusion of the irrational, but compelling, demand of the moment. In short, the picture is that of a pythagorean comma manifested in the gaps between the rational and the irrational in history, in society.²

That Weber did indeed invest the comma discovered by the Pythagoreans with a deep sociological significance is directly gleaned from his discussion of religion and rationality. In “The Social Psychology of World Religions” he (Weber, 1958b) says:

In music, the Pythagorean ‘comma’ resisted complete rationalization oriented to tonal physics. The various great systems of music of all peoples and ages have differed in the manner in which they have either covered up or bypassed this inescapable irrationality or, on the other hand, put irrationality into the service of the richness of tonalities. *The same has seemed to happen to the theoretical conception of the world, only far more so* [p. 281, Emphasis mine].

The pythagorean comma has a central place in Weber’s conception of the ideal type, which in turn, has a great import for the perspective that sees all of scientific work as essentially the analysis and contemplation of symbols. I want to explore Weber’s clearly announced belief that the human mind, in its mode of knowing, must employ concepts which, when constructed into systemic sets, *can never truly capture reality*. Our “intellectual articulation of an image world,” as Weber (1958b, p. 281) expresses it, is unavoidably a *utopia*. To discover just what Weber meant by this will be our next task.

¹One ought not to be misled by Goethe’s use of the term *reduce* here. As it does for Husserl (cf. Schutz, 1970, pp. 56–60; Heap & Roth, 1973, pp. 356–357), it can be taken to mean “lead back,” back to the origins.

²A rather thorough discussion of the notion of elective affinity, as it relates to Weber’s usage, can be found in Howe (1978). There he states:

... the actor’s choice of ultimate values is beyond the ken of social science. Therefore, Weber denies necessity in the relationships constituting the conceptual constructs of his science. ... Accordingly, ... social science could never be anything more than a systematic art based on a divorce of the empirical from the rational. That yields the locus of elective affinity in the order of Max Weber’s thought [p. 381].

THE IDEAL TYPE

As is not surprising for any central, important concept in science, there is no unanimity concerning the proper meaning, or definition, of ideal type. Weber's own studies have given rise to divergent views of what he was up to. It is not unusual for common sources to be quoted at cross-purposes. Borrowing Weber's own imagery, Oakes (1975, p. 13–14) calls this spew of controversy, this Weberstreiten, a "plague of frogs."

Schutz (1972, pp. 243–245; esp p. 244n) claims that Weber changed his conception of ideal types in his later writings. In Weber's earlier view, Schutz avers, ideal types were applicable only to historical data. It is only when he generalized his notion of ideal types as a tool for sociology proper, that it had application to all the social sciences (indeed, *all* the sciences, cf. Schutz, 1972, p. 187, p. 246). A perusal of the passage Schutz cites in confirmation of his thesis (Weber, 1968, pp. 19–20) can only leave the reader in doubt. The earlier (Weber, 1949, p. 90) and the later statements appear to say the same thing. Indeed, Burger (1976) argues that Weber was largely consistent throughout. This is my belief.

For the purposes of this paper, it will be sufficient if we confine ourselves to a few illustrative examples to show how Weber's discussion of the ideal type has given rise to contrasting interpretations.

Upon noting that Weber's account of the Protestant Ethic is admittedly one-sided, Luethy (1970) makes the following remark:

His great and questioning mind was never particularly interested in the facts of history, nor even in social and economic systems, but rather in the detection of the ultimate impulses behind man's attitude and behavior. What he analysed was not the hybrid and wretched forms of an historically realised society (in which such ultimate impulses are never embodied in their purity), but rather the abstract and chemically pure "ideal types" which should provide the essences of a civilisation stripped of all the adulterations and accidents of actual history [p. 125].

Now, the problem with this interpretation is that, not only is it debatable whether Weber was seeking to determine "essences" (cf., e.g. Aron, 1970, p. 81, and Burger, 1976, p. 132), but also that, contrary to Luethy's reading, Weber could very well be said to have deep interest in the "historically realised society."

Consider the view of Weber's "interests" given by Loewith. He finds that Weber was *particularly* interested in the "historical individual," in making this "historical individual" intelligible (Loewith, 1970, p. 102). In fact, Weber himself (1949) states, "We seek knowledge of an historical phenomenon, meaning by historical: significant in its individuality." [p. 78].

Loewith's perception that Weber was striving after the intelligibility of history is, I think, the key to an understanding of his "interests." These "interests" could be seen as two-fold: a desire to understand both historical and contemporary social events as they actually unfold, and a keen interest in

the best epistemic methods available for making these intelligible (cf. Oakes, 1975, p. 12–13). In *Economy and Society* (Weber, 1968) he writes:

A correct causal interpretation of a concrete course of action is arrived at when the overt action and the motives have both been correctly apprehended *and at the same time* the interpretation is to some degree causally adequate [p. 12. Emphasis mine].

Weber's description of the method he recommends, the ideal-type method, is well known, but will bear repeating here. "An ideal type," he (Weber, 1949) states:

... is formed by the one-sided *accentuation* of one or more points of view and by the synthesis of a great many diffuse, discrete, more or less present and occasionally absent *concrete individual* phenomena, which are arranged according to those one-sidedly emphasized viewpoints into a unified *analytical* construct (Gedankenbild) [p. 90].

"This construct," he continues, "in itself is like a *utopia*." In a later passage on the same page he is more definite: *It is a utopia*.

Now, Weber is not using *utopia* in the ideological sense commonly found today. Rather, it is being employed in the original sense of *ou-topos*, Greek for "no-place." What Weber is saying then—and Burger (1976, pp. 123–124) confirms this—is that the ideal type is, by its very nature, *incapable of describing reality, nor is it intended to do so*.

Weber must be taken quite seriously on this point. He repeated it again in *Economy and Society* (1968), where he specifically eschews the ideal type as having an "objectively 'correct' meaning or one which is 'true' in some metaphysical sense" [p. 4].

A conceptualization that may never have set out to define "reality" to begin with should not be faulted on account of its "falsity." The problem can be illustrated by reference to Gellner's criticism of functionalist theories. We find in his article on "Concepts and Society" (Gellner, 1973, chapter 2) the admittedly no-nonsense complaint that the "extreme form" of a functionalist view of society is *plainly false*. For it is obviously absurd to state that *everything* in society functions. The ideal type, Weber would agree, is "plainly false," but far from absurd. In fact, Gellner's emphasis on "truth"—in the empirical sense in which he identifies it—would serve to encourage the emergence of trivia. This is because the only protection against triviality is meaning. It is through meaning that we determine what is relevant and what is not.

Yet, it must also be acknowledged, a concentration on the acquisition of meaning puts us in danger of losing our grip on "truth" in the empirical sense. Weber saw this quite clearly, and, when confronted with the alternative, he opted for meaning, fully realizing that meaning could only be bought at the expense of empirical validity. Weber considered this trade-off to be a fundamental condition of human knowing. The effect of irrationality—the pythagorean comma—elective affinities—might be minimized by conceptual strategies, but never eliminated. It was not that we had a choice of accepting

or rejecting the ideal type method in our quest for understanding, but rather that there was virtue in clarifying and perfecting the method.

Taking Weber seriously, then, when he refers to our inability to attain an ultimate, complete, intellectual grasp of the empirical, objective world, we come to suspect that Luethy is misreading Weber's "intention" entirely. If Weber gave scant attention to the detailed "facts" of history, it may not have been for lack of interest, but rather because he knew very well that this approach to the pursuit of historical understanding was chimerical.

Another departure from Weber is found among those commentators who conceive of the ideal types as a temporary construct, a liaison that will get us on our way to reality. Thus, Cahnman (1965) emphasizes the use of the ideal type as a comparison against which our grasp of reality gropes gradually towards completion, somewhat like Yeats' "rough beast." The same attitude can be found in Martindale's (1959, pp. 81–88) critique of the ideal type method. Theories based on ideal types, Martindale avers, will give way in time to what Hempel (1970, pp. 111–113) calls "interpreted theory" (cf. especially Martindale, 1959, p. 87). Here again Weber's own comments lend credence to the conclusion reached by those who see in the ideal type a temporary, or provisional, "sensitizing" conceptualization of reality, a conceptualization which is expected, through a self-corrective process, gradually to lead to a precise and totally concrete grasp of reality. In his treatise on the method (1949), Weber did say:

Whether the empirical–historical course of development was actually identical with the constructed one, can be investigated . . . by using this construct as a heuristic device for the comparison of the ideal-type and the 'facts' [pp. 101–102].

Yet there can be no arguing Weber's description of the ideal type as *fundamentally* a *utopia*. The ideal type simply could not be expected to describe reality. So, why even *bother* to compare it with the "facts"? Could Weber ultimately have justified his method, "plainly false" though it was, on the grounds that it was "useful for purposes of comparison and measurement"?

The reluctance to accept *utopias* as the central methodological and epistemological devices of an empirical science is understandable. What hope would any science have which employed a method of thought that confessedly could never describe real empirical events? Nevertheless, to write off ideal types as "patently false" is not essentially different from discarding Boyle's Law, Newton's law of thermodynamics and gravity, Einstein's mass–energy equation, most of mechanics, and all of statistics, because, obviously, nature does not make smooth curves.

We would perhaps be at an impasse in exploring this epistemic relationship were it not for the deeper insight into Weber's struggle afforded by a cluster of works dealing with the symbolic nature of human understanding, particularly Susanne Langer's (1957) superb *Philosophy in a New Key*. The convergence

of Weber's ideas with those found in the symbolist tradition lends weight to the belief that Weber's manner of attacking the epistemic problems of the social sciences adumbrated the symbolist treatment of the relationship between the structure of mind and the structure of experience.

SYMBOLIC SYSTEMS

To begin with, it is important to recognize the implications of Langer's announcement that philosophy, in turning to the investigation of symbols, had found a "new key" for the analysis of its traditional problems, as well as the generation of new and important problems for investigation. Just as musical keynotes establish the aural perspective that clarifies and indicates the direction in which to resolve the structural relations of other notes in a musical system, so also the symbolic perspective in philosophy begins to clarify and point out directions in which the resolution of age-old philosophical problems lie.

The fundamental place of symbolization of human life is asserted by Langer in a remarkable passage in which she postulates the act of symbolizing as an innate and insistent function of the human mind. Referring to it as a "basic need," she (Langer, 1957) goes on to say:

The symbol-making function is one of man's primary activities, like eating, looking, or moving about. It is the fundamental process of his mind, and goes on all the time [pp. 40-41].

Dreaming, she explains, is a manifestation of this ebullience of symbols. Its emergence in children had been long considered a trial-and-error attempt to grasp the empirical world. This Langer rejects. By its very nature, she contends, symbols are used by humans "to bring things *into their minds*, not *into their hands*" [Langer, 1957, p. 121]. Symbols are not simply substitutes for their objects, she (Langer, 1957) explains, but rather they:

are *vehicles for the conception of objects*. . . . In talking *about* things we have conceptions of them, not the things themselves; and *it is the conceptions, not the things, that symbols directly "mean"* [pp. 60-61].

Geertz (1973), borrowing from Langer, defines symbol thus:

. . . any object, act, event, quality, or relation which serves as a vehicle for a conception—the conception is the symbol's "meaning."

. . . the Cross, talked about, visualized, shaped . . . , the expanse of painted canvas called "Guernica" or the bit of painted stone called a churinga, the word "reality," or even the morpheme -ing. They are all symbols, or at least symbolic elements, because they are tangible formulations of notions, abstractions from experience fixed in perceptible forms, concrete embodiments of ideas, attitudes, judgments, longings, or beliefs. [p. 91].

The importance of this view of symbols is in its implications for those who would study human cultures. For example, Geertz argues that to study a religious system is to study a system of symbols, since a religious system is,

like any other cultural entity, “a cluster of symbols, woven into some ordered whole” (Geertz, 1973, p. 129).

Now, sociology in a new key is a sociology which sees symbols as the most important characteristic of human social systems. This is, to be sure, nothing new. Langer (1957, p. 51) points out that Freud could be credited with discovering the “symbolic function of the mind.” Lacan (1970, p. 103) notes, in respect of psychoanalysis in general, that “what the psychoanalytic experience discovers in the unconscious is the whole structure of language.” The implications of this insight into the symbolic foundations of human action have gradually emerged as fundamental strategies of inquiry. From Blumer’s (1969) “symbolic interactionism,” through Burke’s (1968; 1970) “logology” and Geertz’ (1973) “thick description,” to Cicourel’s (1973) “cognitive sociology,” and Brown’s (1978) “symbolic realism,” the range of perspectives based on a systematic utilization of the symbolist framework has become a widespread phenomenon in sociology and anthropology.

In Weber, we find an anticipation of all this. What lies at the heart of his discussions of the ideal type is the idea that symbolic structures are the key to an understanding of human societies. The ideal type is first and foremost a symbolic structure. In elevating it to a method, Weber was attempting to make this ineluctable model of human knowing accessible to conscious manipulation. To paraphrase Langer, the ideal type presented historical and social action to our *minds*. In doing so, it made such actions *meaningful*, *causally adequate*, and *objective*. We will examine these functions of ideal types more closely.

MEANING

Langer (1957, pp. 53–56) argues that meaning is not a *property* of terms, but rather a *function* residing in the relations between terms. Noting the misguided search for the nature of meaning in the terms themselves—for example, by looking for embedded features common to all terms—Langer (1957) observes that this search was, from the beginning, doomed to failure, because “there is in fact no quality of meaning; its essence lies in the realm of logic, where one does not deal with qualities, but only with relations” [p. 55].

In other words, meaning is contextual. But what is implied by “context” should not be confused with what is ordinarily denoted by “context of situation.” For example, although they aver that “meaning is a relationship, not an essence,” Lindesmith, Strauss, and Denzin (1975, p. 104d) identify this relationship as the responses people make to objects or words. Nor should it be identified with Winch’s (1958, pp. 24–29) Wittgensteinian notion of meaning as socially contextual: the idea that meaning is a form of sociality. That is not the idea embraced here, nor the one Langer intends. It should be clear that the context she implies is a purely symbolic (conceptual) one; it constitutes a structure of relationships among constituent symbols. To arrive

at Langer's conceptualization, we would push Wittgenstein's back a step further: granted that meaning is social, *the social, itself, is a form of symbolic structuring*. All cultural acts, as Geertz (1973) observes, constitute "the construction, apprehension, and utilization of symbolic forms" [p. 91].

Any term embedded in this structure has a differing meaning according to the different points of view within the structure taken in reference to it. Langer (1957, pp. 55–56) illustrates this by referring to the change in musical "meaning" one derives by changing the key in which the given notes are to be considered.

Meaning, therefore, is not to be found by correlating symbols with "facts," but rather internally, by exploring the relations to be found in the symbolic domain itself. This position, of course, flies in the face of the received opinion found in all the sciences. Bridgman (1961, pp. 83–84) perhaps expresses the dominant position when he stresses that logic ("deduction") is not the only way of arriving at "truth." Some cultures "manage to get into effective enough contact with the environment, so they must have some method of getting at 'truth' not formally logical."

This empiricist sense of "truth," already mentioned in connection with Gellner's criticism that functionalism verges on the "plainly false," is quite generally identified as the central contribution that science makes to human knowledge. This, naturally enough, leads to the requirement that theories, if they are to be specific, must be "interpreted"—or "interpretable." Which means that they must lead to sense experiences that constitute both a test and a foundation of their validity.

There is a strong current of thought that perceives a fully "interpreted" theory—a one-to-one unambiguous correlation between facts and terms—as the ultimate goal of any science.³ For example, in his analysis of sociological theories, Lachenmeyer (1971) perceives sociology as essentially in need of empirically purifying its language, since it fairly reeks of vagueness, ambiguity, opacity, and contradiction.

Weber would not disagree with the desirability of avoiding the smell of vagueness, ambiguity, opacity, and contradiction, but he would quarrel with Lachenmeyer's claim that one can achieve genuinely meaningful theories, which will be both clean of these infections and, at the same time, fully "interpreted."

The struggle against ambiguity, vagueness, and the rest, while at the same time striving to maintain a connection with the empirical world, is not confined to the social sciences, however. The precise empirical connection of

³Even Blumer (1969, pp. 27–47), in his methodological program for symbolic interactionism, subscribes to the philosophy of complete description as the ultimate goal in the quest for scientific truth. What is at issue is more than a precious distinction between two kinds of "truth." The whole argument concerning the relevance for symbolists of Weber's ideal type might be said to rest on the distinction.

some key concepts in the physical sciences eludes specification. Terms such as *time* and *space* do not yield to complete empirical interpretation. Einstein's treatment of these concepts in his little book on relativity theory is especially useful in illustrating the point. For example, his definition of simultaneity (Einstein, 1961, p. 23) as a function of the time it takes light to travel from one place to another is not dependent on divining the "physical nature of light," but rather "a *stipulation* which I can make of my own freewill in order to arrive at a definition of simultaneity."⁴

In developing his "method of fluxions," Newton quite explicitly proposed the "infinitesimal" as a hybrid entity hovering between existence and nonexistence. Thus, ydx represented an infinitesimal area which, when added infinitely under a given curve, could yield a *finite* total result!

The logical flaw in Newton's reasoning here was pointed out by the philosopher, Bishop Berkeley (1956), a contemporary of Newton's. He very clearly showed that at the center of Newton's method was an absurdity: a nothing/something, which Berkeley amusingly characterized as "the ghosts of departed quantities."

It took a hundred years before the absurdity Berkeley pointed out was resolved. The solution was generated internally—from within the structure of mathematical ideas. The solution is known as the method of limits: a convergence on a certain value as one *approaches infinity* (cf. Newman, 1956, p. 287).

Now, this process is perfectly valid in the logic of mathematics, but it gets us nowhere near the real world, for the idea of a finite being "approaching infinity" is no less absurd than the idea of an infinitesimal. This problem is, of course, the problem of the pythagorean comma; it is the problem of infinite regress that awaits us when we attempt to bridge the world of symbols with the world of empirical experience.

So long as experiments remain imaginary, absurdity can be avoided. It is when we leave the imaginary world that we court the danger of unruly irrationalities.

This is precisely the import of Burke's (1945, p. xx) observation that such absurdities constitute unavoidable difficulties generated by the very nature of symbol systems. He found such a condition especially manifested in what he calls the "paradox of the negative." After reading Bergson's *Creative Evolution*, it became clear to Burke (1968, chapters 1 and 7) that the negative

⁴Cf. also the discussions of concepts like "body," "force," and "straight line" in Lindsay and Margenau (1957, pp. 85–89). After exploring the difficulty of determining just what "force" is, they comment: "There is, however, certainly one further attitude one can take toward Newton's first law and escape the embarrassments just outlined. This is the now rather common view that the law is really a definition of force" [p. 88]. Note that such a solution is, not to establish the meaning through some empirical referent, but rather, to find it embedded in a system of symbols (viz., a definition).

was not an item to be found in nature; it was rather an artifact of language—that is, of a symbol-system. Simply because a system generates a definitive and logically coherent concept or relationship, we are not thereby guaranteed its ontological existence, *even if its basic terms and conceptions are fully interpreted*. Burke feels that we have often been gravely mistaken in reifying the relationships generated by our conceptual systems, empirical or otherwise. On this point he remarks (Burke, 1970; also Langer, 1957, p. 85 on a similar point):

It is somewhat as though a mathematician were to say: We can solve certain problems in mathematics by using the square root of minus one. Our solutions of such problems can be applied to the needs of engineering and the like. So students of nature should undertake a search for the square root of minus one in nature itself. However, as useful as the square root of minus one may be in solving certain kinds of problems, it is purely and simply an expression internal to a specific symbol-system, and not a thing discoverable in nature, insofar as we use nature in the sense of the less-than-symbolic, the sort of things that there would be if all symbol-using animals and their symbol-systems were obliterated [p. 18].

“Imaginary” numbers like the square root of minus one, as well as “surds,” like *pi* and that bane of the Pythagoreans, the ineffable square root of two, are not absurdities within the system comprising the set of integers and their canonical operations. They are eminently rational within this system. The sense of absurdity arises when one attempts to connect such “surds” with the empirical world.

One important reason why this slippage exists between symbolic systems and systems in the real world is that the former are *emic* while the latter are *etic* (Pike, 1954; 1964).⁵

The way in which human communities pluck their phonemes out of the phonetic continuum of human sounds is a readily discerned instance of a larger *emic* process of consensual selection from the *etic* plenum of the world.

The importance of this *emic* “chunking” (as Miller, 1956, pp. 92–97 might say) is that it supplies us with the units with which symbolic structurization can take place. It constitutes the basic building material of symbolic structures.

⁵Pike (1964) gives the following description of what he means by “emic”:

... when people react to human behavior in their own culture they react to it as if it were a sequence of separate particles of activity. . . . For this reason, a purely physical analysis of human behavior may analyse it as comprised of waves, but a cultural analysis of human behavior must treat it as comprised of particles. . . . The label we shall apply to any such particle of activity is “eme” or “emic unit” (deriving the terms from the latter part of the word phoneme. . . .). Emes occur not only in speech but in nonverbal activity of all kinds. . . . [p. 55].

The contrasting “wave” or purely “physical” characteristic of such behavior is identified as “etic,” from the linguistic term, “phonetic.”

The “psychological reality” of the phoneme (Sapir, 1949, pp. 46–60) and its significant role in the construction of linguistic meaning is fairly well known (cf., e.g. Brown, 1968). However, it is much less widely known that precisely the same *emic* process is to be found in musical structure. What we call *music* requires the very same “chunking,” or “emicization,” of sound as is required by speech. This emerges most clearly from the following passage by Wood (1962):

In the process of the development of music the first step was to select from the infinite variety of notes available the limited series to be used. The series of notes so selected is called a scale. The smallest interval in our own scale is a semitone. Between the two notes forming the interval lie at least twenty-five other distinguishable notes, none of which is used. Nor is this limitation a mechanical one due to difficulties of the design of keyed instruments, for the use of a limited scale occurs where music has been developed by human voice without any such hindrances. It is due to a necessity in the nature of music itself—the necessity that the movement in pitch which constitutes melody should proceed by definite and appreciable steps, and not by indeterminate gliding ... [p. 171].

As Wood explains it, then, we can conclude that the notes of a scale are to a melody what the phoneme is to the word (or morpheme). What this implies is that music everywhere has a *tonemic* structure. This does not gainsay the tendency to shade off the toneme in actual performances. But these events may not be different in nature from the phenomenon of allophones in linguistics (cf. Weber, 1958, p. 33, on Patagonian music).

The *emic* is an ideational datum. It retains a sense of constancy despite the *etic*, empirical, variations that are at play under its rubric. Holloway (1969) refers to this as an “imposition of arbitrary form,” which he identifies as the *sine qua non* of culture. Again, the example of music is instructive. Although the tonic progression we call “melody” requires that there be a font of *emic* tonalities from which it may be constructed, no actual (*etic*) performance of it would constitute that melody. In fact, any actual performance of the melody, despite variations from one performance to another, would be considered a playing of that melody (cf. Geertz, 1973, p. 11).

Meaning, then, requires structure, and structure requires *emic* units of “arbitrary form,” or, as Langer (1957, pp. 204–212) expresses it, “significant form.”⁶

Nevertheless, this very *emic* “chunking” is responsible for the emergence of the pythagorean comma. The notes of a scale, once established (and the precise frequencies are of no relevance), inevitably produce the comma. Thus, a device central to the creation of meaning is also responsible for the emergence of an absurdity. Shadings and veerings from the established tonality exist as departures from the norm, and are evaluated as such:

⁶On what could be called the “emicization” of the continuous flow of time, cf. Zerubavel (1977, p. 872).

abhorred or valued, as the case may be, depending on how one responds to the irrational, the unpredictable, the unique.

CAUSE

There is some difficulty in untangling the sense in which Weber uses the notion of "causal adequacy." On the one hand, he identified it with a statistical expectation, while on the other, as Schutz (1972, p. 233) says of Weber's "second concept of causal adequacy," he can be seen as saying that causal adequacy is "based on principles of meaning-adequacy." Schutz (1972, p. 234) concludes that "causal adequacy . . . insofar as it is a concept applying to human behavior, is only a special case of meaning-adequacy." It is helpful to conceive of the relationship between cause and meaning as similar to that between species and genera. Cause is one of the kinds of meanings we have available to our minds.

It is well known that the idea of cause can be divided into *necessary* and *sufficient* modalities (cf., esp. Francis, 1961, chapter 3). This distinction is clearly at play in Weber's criterion of "causal adequacy." As Schutz' (1972, pp. 229–234) discussion shows, Weber's requirement that the ideal type be "adequate on the level of cause" is a criterion whereby we understand how a particular event *could* happen, without knowing whether it necessarily (or ontologically) *would* happen. In *Roscher and Knies* (1975) Weber states:

A historical interpretive inquiry into motives is *causal* explanation in absolutely the same logical sense as the causal interpretation of any concrete natural process. This is because its goal is the discovery of a *sufficient* ground. . . . Such an inquiry cannot make knowledge of the *necessity* of action (in the nomological sense) its theoretical goal. . . . Both human and non-human (living or dead) *entities*, conceived as finite aspects of the totality of cosmic events, can never be exhaustively deduced from exclusively nomological knowledge [p. 194; also cf. Weber, 1930, p. 27].

So, the causal component of ideal types yields *sufficient* causes (implication, in Francis' terminology), but not *necessary* ones (subimplication). For example, the quest for *certitudo salutis*, in the Protestant Ethic (cf. Tenbruck, 1974), through obedience to one's calling (Weber, 1930, pp. 166–170; cf. especially note p. 58: "... loveless fulfillment of duty stands higher ethically than sentimental philanthropy") leads logically (sufficiently) to the acquisition of capital (Weber, 1930, pp. 172–173).

This idea of cause puts it entirely in the realm of symbolic contexts. For example, Francis (1961, p. 54) does not say that cause is a relation between *things*, but between "data statements." Hempel (1970, p. 249) makes similar assertions about scientific laws. They do not refer to reality, but to *statements* about reality.

A view of cause as an aspect of symbolic relationships takes us directly into our epistemological problem, i.e., what is the empirical connection that

would enable us to claim that we are doing science? One answer is through the observation that we engage in definitive predictions of events in the empirical world. As Francis (1961, p. 58) mentions, once we set up our syllogism, deductions “are made and tested. If the behavior is that which was expected, one verifies the assertion of causal relations.” But this way out is not entirely satisfactory.

The difficulty hinges on the idea of verification. Popper (1965, pp. 33–59) has convincingly shown that verification is not a practical possibility. The problem is, again, our finite condition compared to the plenitude of nature. That Popper should opt for a more tentative kind of verification, which he calls “corroboration”⁷ is in keeping with the present mood of science, a mood which has led directly to the rejection of cause.

The movement away from causation has generally been in favor of probability as the mode of explanation.⁸ This state of affairs led Max Planck to make the following observation. In a critique of the acausal implications of the new indeterminism that gained adherents with Heisenberg’s discovery, Planck (1963) states:

For them [indeterminists] nature is entirely a matter of statistics and it is their aim to build up physics on a calculus of probability.

In fact, however, physics has hitherto developed on the opposite assumption. . . . [Therefore, it will now be found that,] *in order to be preserved intact, the principle of causality . . . has been slightly modified.* What has been done is to change the sense in which the term event is employed. Theoretical physics does not consider an individual measurement as an event, because such a measurement always contains accidental and unessential elements. *By an event physics means a certain merely intellectual process.* It substitutes a new world in place of that given to us by the senses or by the measuring instruments which are used in order to aid the senses. This other world is the so-called physical world image; *it is merely an intellectual structure.* To a certain extent it is arbitrary. It is a kind of model idealization created in order to avoid the inaccuracy inherent in every measurement and to facilitate exact definition [p. 53. Emphasis mine].

Planck, in promoting a causal approach to physical science, parallels Weber’s own position, that causal explanation is desirable—particularly over purely statistical analysis (cf. Weber, 1949, pp. 90, 101; 1968, p. 12). Furthermore, the resolution of the problem underlined by Planck—saving the sense of causation by recasting the objects of explanation on a purely

⁷Actually, Popper specifically eschews the terms “verification” and “confirmation.” He would perhaps object to my referring to his idea of corroboration as a form of verification, however tentative.

⁸It is interesting to note that Popper, though rejecting verification (through an argument against induction), does not feel that probabilistic interpretations are a suitable alternative. The “degree of corroboration,” he asserts, is not a probability. Cf. Popper (1965, p. 58n). Curiously, one of Weber’s two concepts of “causal adequacy” entails the use of probabilities and frequency ratios, according to Schutz (1972, pp. 229–233). However, cf. Weber’s reference to J. S. Mill’s causal interpretation of the probability ratio as an “anthropomorphism” (Weber, 1949, p. 186).

intellectual, or imaginary, plane—is strongly reminiscent of the ideal-type method.⁹

Admittedly, Planck saw this maneuver as a means of attaining accuracy of “prediction,” while, for Weber, his method was a means of achieving meaning in general and causal adequacy in particular. But a moment’s reflection on just *what* Planck’s method can predict, with whatever accuracy, will reveal that his position is not essentially different from Weber’s.

If we are to distinguish prediction from prophecy—that is, distinguish foretelling which is based on rational understanding from that which has no such basis—then, again, the place of symbolic play in the act of prediction emerges as a central theme. Prediction is generated by manipulations purely internal to the symbol system employed (a conceptualization, a theory, etc.). This would, of course, guide both the construction of experiments and the perception of phenomena, and in this way open the system to (but not guarantee) empirical content. However, the *causality* in what is observed is a logical property of the descriptions by which the observed is identified, for cause can be considered a type of logical necessity or, to express it more accurately, *sufficiency*.

In his attempt to clarify the problem of historical necessity, Weber (1949, pp. 113–188) discusses Meyer’s distinction between the strategy of *being* and *becoming*. Meyer, Weber points out, correctly asserts that any given historical event, inasmuch as it had already occurred, is, for us, absolutely necessary. Therefore, no other possibility is admissible. Only what is conceived of as *becoming*, Meyer argued, can be looked at from the point of view of a range of possible outcomes. Weber then notes that Meyer, in his own method, was not strictly faithful to this perception.

Weber exploits this fact to make his own point. It is the contrast between what actually happened and what could have happened that contributes to

⁹Kant’s influence is clearly evident in the criterion of causal necessity. For Kant (1909), “it is a clear contradiction to try to extract necessity from a principle of experience.” [p. 97] While thus agreeing with Hume, he transcends Hume’s scepticism by arguing that necessity is a rational product. Abbott (1909), in his “memoir of Kant,” states: “As to testing maxims by consequences, Kant does so in the same sense in which Euclid in indirect demonstrations tests a hypothesis by its consequences, . . . i.e., by the logical consequences, not the practical.” [p.iii]. Also consider the following observation by Beck (1963) in his explication of Kant’s *Critique of Practical Reason*:

No empirical generalization can do anything but surrender in the face of a well-authenticated exception. An apriori principle of law, on the other hand, can condemn an apparent exception, and it does so even in natural science. A body that does not fall according to Galileo’s law—none does—is simply not a freely falling body. We do not revise the law when we find an exception to it; we reclassify the object. The law which can be held in spite of apparent exceptions is accordingly not a mere summary of experience; it is prescriptive, not merely descriptive, even though experience may have suggested its form and may, in fact, corroborate it. there are such laws in science; there seem to be such laws for men’s practical conduct [p. 83].

historical understanding. It is precisely this technique that is found in Meyer's own practice as an historian (cf. Weber, 1949, p. 127–178, et passim.; also the discussion of the objectively “correct” and the “incorrect” in history, 1949, pp. 40–43). This is done, Weber argues, when the researcher projects himself back into the circumstances prior to and during the event in question, and, in this hypothetical, purely imaginary sense, creates a world of “becoming” in which a range of possibilities—alternative outcomes—can be contemplated.¹⁰

If history is determined insofar as it has already happened, this fact does not mean that it is thereby intelligible. For Weber (cf., e.g., 1949, pp. 77–78), intelligibility is to be achieved through an analysis of causal necessity, sufficiency—adequacy. And this, as Bunge (1963, p. 52) observes, requires the “utopian” process of selecting causal strands from the complex of factual determination. That Bunge's utopian sense of causation is very close to Weber's ideal type notion of causation is particularly apparent in Bunge's reply to critics, which appears in the Appendix of the paperback edition of *Causation*. An objection is made that, *if strict and pure causation works never and nowhere, how is it possible to confirm causal hypotheses?* Bunge's (1963) reply (in a phrasing that would be familiar to Planck):

If we say that the Galileo–Newton equations of ballistics have been verified many times, we do not thereby mean that the *phenomena* they partially and approximately describe are entirely mechanical. . . . Every law, whether the physics or of sociology, is valid exactly only with respect to the corresponding theoretical model, which disregards complications [p. 366].

OBJECTIVITY

The concept of “objective possibility” is given a lengthy treatment by Weber (1949, pp. 164–188). He sees it as an “imaginative construct” involving “adequate causes.” Such constructs, as he describes them, are “logical structures” (Weber, 1949, p. 176). Now, from Martindale's (1959, p. 70) description of the concept, there is the danger of coming away with the impression that “objective possibility” is, for Weber, an *empirical* possibility, that Weber meant to give an empirical meaning to objectivity.

Even Aron's (1970) generally cogent explication of Weber's methodological ideas leaves one with this impression. After noting the influence of Rickert's discussion of objectivity in Weber's work, Aron goes on to imply that Weber solved Rickert's problem of empirically objective explanation by showing that only *selected* aspects of reality are empirically interpretable—a selection guided by values. In other words, Weber is characterized as having solved the problem of empirical validation through a reduction of

¹⁰Cf. Schutz' (1972, p. 227) discussion along the same lines in his explication of the difference between the meaning-context appropriate to a state of emergence and that appropriate to a state of completion—i.e., things in the process of unfolding versus things already produced.

explanatory ambition. If the empirical explanation of *everything* is doomed to failure, the explanation of only selected parts of events is, by contrast, eminently capable of “objective” empirical accomplishment.

The whole tenor of Weber’s treatment opposes such an interpretation. The meaning of objectivity he espouses is definitely *not* empirical. Besides the citations already noted in referring to Weber’s own argument, the following cannot help but reinforce the assertion that “objectivity,” to Weber, is a form of *rationality*, and that he remained faithful to Rickert’s postulate that objectivity is “empirically transcendent,” rooted, not in “facts,” but ideas (Weber, 1949), values—reason:¹¹

The objectivity of the social sciences depends rather on the fact that the empirical data are always related to those evaluative ideas which alone make them worth knowing and the significance of the empirical data is derived from these evaluative ideas. But these data can never become the foundation for the empirically impossible proof of the validity of the evaluative ideas [p. 111].

This interpretation of objectivity as a rational entity, a *ratio cognoscendi*, emerges most clearly in Michael Polyanyi’s *Personal Knowledge* (1958). After pointing out the curious fact that the Copernican theory recommends itself to our minds despite the violence it affords our sense-perceptions, he proceeds to describe the reason for its wide acceptance. “When we claim greater objectivity for the Copernican theory,” he explains, (Polyanyi, 1958):

... we do imply that its excellence is, not a matter of personal taste on our part, but an inherent quality deserving universal acceptance by rational creatures. We abandon the cruder anthropocentrism of our senses—but only in favour of a more ambitious anthropocentrism of our reason. In doing so, we claim the capacity to formulate ideas which command respect in their own right, by their very rationality, and which have in this sense an objective standing [pp. 4–5].

¹¹Burger (1976), in describing both Rickert’s and Weber’s notions of objectivity, does not draw out the symbolist nature of their perceptions very clearly. Objectivity is, for Rickert, a consensual phenomenon, in the sense that it is based on a common interest, “what everybody wants to know.” In this sense, it is not absolute. Weber seems to abstract this further by identifying objectivity as a function of any given value-orientation, orientations which are “ever subject to change,” and which the researcher need not subscribe to personally. Once a position is taken, objectivity is the result of a rational/ logical consistency in reference to that position (cf. Burger, 1976, pp. 87–89). Again, we see here the influence of Kant for whom necessity (causation) is a rational product, and *thereby* attains the status of objectivity. Cf. Kant (1909, p. 97) as well as his discussion of Hume’s “scepticism,” (1909, pp. 140–147). Finally, the notion of “objectivity” being attributed here to Weber is not the same as that which Schutz (1972, pp. 132–138) describes in his distinction between subjective and objective meaning-contexts. For Schutz, the distinction is that between the meaning of an entity in the process of being produced (subjective) and the meaning of the product itself, detached from any notion of how, or why, it was produced (objective.) *Both* can be “objective” in the sense discussed above.

APPRECIATION

Thus far I have tried to indicate the essentially symbolist kernel at the heart of Weber's ideal type method and the ways in which later symbolist studies bear out the profundity of Weber's insight into the core problem of the sciences: the problem of epistemic knowledge. Yet Weber's approach does have a weakness. It favors the rational idea, the "clear and distinct" idea as the preferred means—possibly the only means—of achieving a genuine human understanding (cf., e.g., Schutz, 1972, p. 239 on interpretive sociology's "preference" for rational action types). The goods that rationality can deliver *are* formidable; the general pressures leading to ever greater rationalization in human organization attest to that. But rationality emphasizes the discursive, in contrast to what Langer (1957, pp. 79–102) calls the "presentational" in symbolic experience. In fact, her view of "rationality" is much more general than Weber's. "Rationality is the essence of mind," she says, "and symbolic transformation its elementary process. It is a fundamental error, therefore, to recognize it only in the phenomenon of systematic, explicit reasoning. That is a mature and precarious product" [Langer, 1957, p. 99].

The ordinary sense of causation is derived from the lineality of the discursive mode, Langer asserts. The question is whether *presentational* symbols can admit of causally adequate, meaningful formulations. This matter is dealt with more fully in a separate paper. Here it may be sufficient to note that Langer (1957, pp. 204–210) sees meaning in the presentational mode as contained in "significant form." This draws attention to the neglected question of how we achieve Gestalt experiences, experiences of totalities, of what Michael Polanyi (1966, pp. 18–19) calls "comprehensive entities." A group of philosophers (cf. Grene, 1966; 1969; 1971), inspired by Polanyi's discovery of the "tacit dimension" ("we can know more than we can tell") in human knowing, has begun systematically to explore the wide-ranging ramifications of this question. They assert the importance of "background" knowledge, a knowledge found on the fringe of consciousness, in our apprehension of the world.

In advancing his penetrating insight into the importance of the "tacit dimension," Polanyi (1958, pp. 55–57; 1966; 1969) introduces the important distinction between "focal" and "subsidiary" awareness. His view is that focal awareness is impossible without the necessarily subliminal subsidiary awareness. In order to attend *to* its focus, our mind requires to attend *from* the subsidiary particulars which are gathered for the shaping of the focal form. In a word, the subsidiary materials are the *vehicles* of awareness.

Therefore, a full account of our understanding must include the phenomenon of subsidiary awareness. This perspective is contained in Schutz' (1970, pp. 79–82) conception of the "world of the natural attitude," a

world in which the things taken for granted form the foundation of conscious social life. Cicourel (1973, pp. 59–62) makes a similar observation when he notes that any semantic theory must take into account the backdrop of “fringe” meanings associated with the “kernel” meanings found in a linguistic lexicon.

All of these matters require separate treatment, and, of course, imply a further criticism of Weber’s methodological insights. Nevertheless, the evolution of symbolist studies has made it possible to attain a fuller appreciation of Weber’s probing inquiry into the methodological requirements of social science.

What we can now see in the method of the ideal type—and what Weber himself sought to illuminate in employing this method—is the myriad play of symbolic systems with which humans construct reality. It constitutes an imaginative reconstruction of the imaginative constructs humans use as they make their labyrinthine ways through the world. “Whether we are dealing simply with a conceptual game or with a scientifically fruitful method of conceptualization and theory-construction can never be decided a-priori” [Weber, 1949, p. 92]. It is as though Weber, himself a *Magister Ludi*, were inviting us to join him in The Glass Bead Game, not thereby giving up the search for the real, as did the virtuosos of Castalia, but pressing with ever renewed ambition to capture with our limited faculties the unlimited richness that lies in the nature of things.

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