IS THE HISTORICITY OF THE SCIENTIFIC OBJECT A THREAT TO ITS IDEALITY? FOUCAULT COMPLEMENTS HUSSERL

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Are mathematical objects affected by their historicity? Do they simply lose their identity and their validity in the course of history? If not, how can they always be accessible in their ideality regardless of their transmission in the course of time? Husserl and Foucault have raised this question and offered accounts, both of which, albeit different in their originality, are equally provocative. Both acknowledge that a scientific object like a geometrical theorem or a chemical equation has a history because it is only constituted in and transmitted through history. But they see that history as a part of its ideality, so that, although historical, a scientific object retains its identity as one and the same object.

Their account of history thus entails a significant reformulation of what an ideality is. While Husserl appeals to the possibility of reactivating an ideality, thereby repossessing, as it were, its genesis, Foucault emphasizes the role of what he calls a "statement" and which he considers to be a material unity. While these two approaches may seem irreconcilable, I try to show through a careful analysis of Husserl's and Foucault's methodologies that they complement each other. In the case of Husserl, I will focus on how he understands the transfer of idealities across time in the *Origin of Geometry*,[1] and in the case of Foucault, I will appeal to his notion of "statement" as explained in *The Archaeology of Knowledge*.[2] My main interest is the contrast between the two approaches and I will lay aside the many other aspects of their thought as well as their rather different ontological commitments.

The first part of this essay will deal with Husserl's analysis in the *Origin of Geometry*, in which I will lay out his understanding of the ideality of a scientific object as a reactivatable sense, and distinguish the two modes by which he claims it can be transmitted through history. In the second part of this essay, I will delineate what Foucault understands by a statement. In his *Archaeology of Knowledge*, he argues that the scientific object is a repeatable materiality constituted by statements and part of a discursive formation. In the final part of the essay, I will contrast the methodological frameworks of phenomenology and archaeology with respect to the question concerning the constitution and transmission of scientific objects and show that there is a way in which we can see these methodological frameworks as complementing each other, despite their divergent responses to the question concerning the nature of idealities.

Husserl's Phenomenological Analyses of the Historicity of the Sciences

In the *Origin of Geometry*, Husserl accepts that idealities are historical entities, in the sense that they are constituted in history or in the course of history. While he avoids the problem of how we have access to them, he still has to explain how idealities can retain their identity and validity in the course of history. This will require that he radically reformulate the notion of ideality which, I believe, is precisely what he attempts in the essay on the origin of geometry.

In general, Husserl understands tradition as the inheriting of a store of idealities handed down from generation to generation, so that new ideal objects are added to the previously existing store and some older ones are modified. Science in general and mathematics in particular (of which geometry is considered to be a part) is one such ideal product, which we acquire as a tradition through history.[3] Husserl explains that geometry has sustained itself as a discipline, and moved ahead at the same time, because the idealities that have been forged at every stage in its history have never lost their validity as such, and newer idealities have always been acquired only on the basis of all the former acquisitions. At every point in the history of geometry, geometers have always found themselves to be a part of a tradition, even if they have not been explicitly aware of all the particular contributions of the past still at work in the present. And they have attempted to take their discipline forward to-

wards a more developed state that they see as its future. This constitutes the horizon of all their activities. Thus James Dodd explains that "tradition is an acquisition, which means that it is an accomplishment of subjectivity that remains a permanent feature of the communal world."[4] The validity of the geometers' achievements presupposes the validity of the achievements of those who came before them, just as the validity of the conclusion presupposes the validity of its premises. This is the style in which geometry and every other science moves forward.

However, this preliminary account of the historicity of geometry can be substantiated only if we have an answer to the following questions: How do idealities come into being? Are they merely discovered? And how can idealities be transmitted from one individual to another without losing their identity?[5] Husserl spends a significant portion of *The Origin of Geometry* explaining how idealities are formed, transmitted and preserved over the course of time, and this explanation has been the subject of intricate discussions among commentators. Husserl offers two ways to understand the manner in which the geometric tradition operates. The first way is based on reactivation of the achievements of the previous geometers and those of one's peers, in order to contribute something new to their achievements or transform their achievements in novel ways. The second way is based on a logical explication (*Verdeutlichung*) of the achievements of the geometers of the past and those of one's peers, in order to take their work forward.

The first way can be said to be characterized by four stages as described by Vandevelde.[6] In the first stage, the first geometer is able to conceive of something in her mind that is unstable and fades away with time. But it does not completely disappear.

In the second stage, the first geometer is able to recall it initially with some difficulty. This recollection has an active and a passive element. It is passive because it is a recalling of what is past. But it is also active, since there is an active realization of the past and present as being the same. This co-incidence is what constitutes the self-evidence of identity. At the intra-subjective stage, the subject has articulated something for herself. And every successful re-articulation is accompanied by the self-evidence that it is one and the same thing being re-articulated. We must realize here that the initial experience is not just an event in the psychological confines of the geometer.[7] Rather, it is an activity that the geometer becomes capable "of repeat[ing] at will" ("Origin of Geometry," 360) and over which she gains mastery by such repeated performances. Because it is an activity that she can redo implies that any human being given the same capacity can redo that activity just as well as her.

So, when she next linguistically communicates her accomplishment to her companions they are in turn able to actively re-perform the act expressed by her linguistic articulation. They are re-enacting the same act as the one expressed by the first geometer. This can also be explained by resorting to James Dodd's distinction between phenomenological meaning and linguistic meaning. While the phenomenological meaning of the original act of the geometer lends itself to expression in a linguistic meaning, it is not the same as linguistic meaning. From the linguistic meaning of the speaker's words, the listeners are able to go back to the phenomenological meaning by reperforming the act expressed by her words. This is accompanied by the consciousness of self-evidence at the intersubjective level and marks the third stage.

In the final stage, verbal articulation leads to documentation in writing, whereby these idealities come to be preserved for future generations, who can in turn discover new idealities on the basis of what they have inherited. Writing allows for a virtual communication with interlocutors who are not or no longer physically present. Despite the distance in time and the absence of physical interaction, readers by reading the signs on the page can reactivate the act that is expressed by the signs, just as if they were listening to the first geometer speaking.[8] In this context, Husserl distinguishes ideal objects from prototypes or exemplars such as tools and artifacts. We can find many instances of a single prototype but each of them is still a unique instantiation of the prototype. Thus, each instance of a chair is a unique way in which the prototype "chair" is exemplified. But this is not so in the case of an ideal object, which comes into being only once

and is so for all time, so that the individual instances of such an ideality are all one and the same ideal object. The theorem of Pythagoras is the same whether it is articulated in the original Greek or translated into Sanskrit. As Husserl says:

> The Pythagorean Theorem, [indeed] all of geometry, exists only once, no matter how often or even in what language it may be expressed. It is identically the same in the "original language" of Euclid and in all "translations"; and within each language it is again the same, no matter how many times it has been sensibly uttered, from the original expression and writing-down to the innumerable oral utterances or written and other documentations. ("Origin of Geometry," 357)[9]

When geometry is still a relatively meagre storehouse of idealities, it is possible for the community of geometers to build upon the work of their predecessors by actually reactivating these idealities. At this stage, geometry is a cultural activity in which a tightly knit community of geometers participate. But as the storehouse of idealities grows larger and larger, reactivating each and every past result to obtain new results becomes impossible for the finite cognitive capacity of the geometer. How then does geometry continue to thrive and produce new results without reactivation? Here is where the second way of historical motion that, according to Husserl, characterizes modern geometry comes into the picture. This is the way of logical explication.

Logical explication has to be distinguished from reactivation. While reactivation involves redoing the act that constitutes the ideality, logical explication involves "extracting one by one, in separation from what has been vaguely, passively received as a unity, the elements of meaning" ("Origin of Geometry," 364). A logical explication of the theorem of Pythagoras, for instance, would mean being able to understand all the parts of the theorem, namely, the meaning of the hypotenuse, the meaning of the two sides forming the right angle, the operation of squaring and equality. This could be done by drawing the figure of a right angled triangle and explaining the relations between the sides. But logical explication is completely dependent upon the givenness of the theorem, as a unity of signs written down in a language and handed down from generation to generation. It is an activity based upon the passive understanding of the theorem that is simply received as a unity. The validity and the meaning of the theorem are already taken for granted. Even going through the proof of the theorem does not require reactivation. It can be logically deduced on the basis of some axioms whose self-evidence is passively taken for granted.

Although logical explication through deduction and inference can be undertaken independently of reactivation, Husserl still claims that the former can be considered a meaningful activity only if the latter is in principle still possible.[10] This is the crucial point: that logical meaning is not the fundamental level of meaning but is possible only on the basis of a level anterior to it. Husserl's aim is to reveal this anterior level, which he calls truth meaning, and which derives from the cultural-historical activity of constituting geometric idealities by human beings immersed in a tradition of physical measurement. What he wants to do is reveal to us the inner structure of the tradition, upon which the logical structure of geometry in particular and science in general is based.

Since Husserl is interested in discovering the grounds for the validity of geometry, and he considers that neither the logical coherence of geometry in its deductive structure nor its immense practical benefit is enough to grant such validity, only the cultural-historical conditions under which geometry originates and develops can truly validate geometry. But cultural-historical conditions for Husserl do not denote contingent facts. The origin of geometry is not just a psychological event undergone by the first geometer that we are called upon to remember. Geometry originates with the constitution of an ideality. This is an act that can be redone ad infinitum by any human being who possesses the capacity to do so. Husserl's methodology thus depends upon bracketing out the factuality of the events surrounding the origin and the development of geometry as a science to focus upon the cultural-historical style in which geometry has originated and developed. This allows him to discover an inner rational structure in the way the geometrical tradition operates and only on the basis of this does he believe he can legitimize the discipline of geometry.[11]

However, as we have seen above, Husserl does not understand univocity of meaning as a simple repetition of the same. Rather, he argues that history moves through the development of new idealities on the basis of pre-existing idealities that are gathered together under a tradition. So historical development always results in the formations of new idealities through new acts of meaning, which are, however, built upon an edifice of pre-existing acts of meaning that have come to consolidate a tradition. There is a new development in geometry when Riemannian geometry is conceived. However, this can be conceived as a new development within geometry only if we accept a weak or minimal notion of univocity, wherein Riemann sees himself as providing an alternative geometry and not an alternate physics or chemistry or biology. He does not, after all, see himself as the originator of a new science like psychopathology but only as the originator of a new geometry. This certainly does not mean that Riemannian geometry is reducible to Euclidean geometry or simply an iteration or repetition of Euclidean geometry. That would imply a very strong sense of univocity, which is how Derrida understands it. There is, I believe, nothing in Husserl that suggests that we have to accept this strong sense of univocity. By giving no space whatsoever to this weak sense of univocity that we have outlined, Derrida, I think, presents us with something of a false choice between this strong sense of univocity or pure equivocity.

We can conceive of a leap into something new, where the new development would be simply unrelatable to anything that had gone before, so that even the weak sense of univocity would not hold and distinguish it from reiteration that would require the strong sense of univocity. But, rejecting these two extremes, Husserl adopts a third sense of historical development, where this weak sense of univocity holds. Husserl's view of history thus excludes leaps into the new as well as simple reiterations. And therein lies the strength and the weakness of his account. For Heidegger, on the contrary, history is essentially constituted by leaps. Far from paralyzing history and rendering it into a sterile repetition of the same, it is univocity of the meaning of geometrical terms that allows geometers to understand themselves as heirs to a practice to which fellow geometers in the past and present have contributed; it is also univocity that allows geometers to go beyond what their predecessors are doing, by coming up with new meanings for existing terms or developing new terms. It is in this sense that we can say that Riemannian geometry belongs to the same tradition as Euclidean geometry and yet goes beyond it.

Derrida's reading of Husserl's work ends up being far too ontological, when he suggests that Husserl's phenomenological explorations are motivated by a need to make a sharp distinction between "the pure sense of historicity" and "empirical history." (Or to isolate the pure sense of historicity from the dregs of empirical history.) He thus completely nullifies the methodological impetus of phenomenological reflection. Burt Hopkins makes a similar point.[12] It seems that Husserl is more interested in giving us a phenomenological description of history, so that the distinction between "pure historicity" and "empirical history" is a methodological one made to describe the style in which history operates. Derrida's reading seems to reify unnecessarily the terms of the distinction.

Foucault's Archaeological Analyses of the Historicity of the Sciences

In some sense parallel to Husserl's introduction of the role of language in the formation of an ideality, Foucault sees geometry, to the extent that it is a branch of science, as a discursive practice. However, different from Husserl, this semiotic mediation allows him to deemphasize the role of the geometer and his activities, so that mathematics, which includes geometry, becomes a very unique science possessing features not possessed by any other science. According to Foucault, the rules that govern geometry as a practice are not transcendent, as imposed upon geometry from the outside, but immanent to the very practice of doing geometry. Foucault shows how the statements of geometry relate to one another and form an interconnected and interdependent set. Opposed to Husserl, this focus on statements allows him to bracket out meaning itself, bypassing the level of logical propositions and grammatical sentences.[13] What is revealed is the set of rules that allow a discipline

to exist, a dimension overlooked by the history of ideas. A statement is thus not reducible to a logical proposition or a grammatical sentence or a speech act.

While explaining what statements are and how they exist, Foucault explicitly contrasts their mode of existence to that of sentences in a language and propositions of logic. If we want to know whether a group of signs is a sentence or a logical proposition, we check whether the signs are arranged in accordance to certain rules—the rules of language or logic, whatever the case may be. But if we want to know whether a group of signs is a statement, we cannot confine our gaze to certain internal properties that the group of signs may possess. We must look at external properties, namely the other groups of signs—a domain of statements to which this particular group of signs may belong. The criteria for the existence of a statement include the kind of objects that the statement brings into existence, the distinctions that it brings into play, the position and status it prescribes for subjects who can articulate it. The statement is thus not a unity like a sentence or a logical proposition. The existence of a statement is the existence of several domains of subjects, objects and relations that it brings into play.[14] Statements thus are not individuals that can exist independently of one another expressing some state of affairs. They can never be isolated. Take the theorem of Pythagoras: in one respect, it can be seen as a sentence that is formulated in accordance to the rules of grammar of the language in which it is expressed. In another respect, it can also be seen as a logical proposition and analysed into its components. But the theorem of Pythagoras is also a statement, and this means the following: It is correlated to a domain in which figures can have just two dimensions in a mathematical space (different from a physical space); it belongs to a domain where the veracity of the statements is governed by formal rules and not perceptual evidence; it can be uttered only by a subject who is immersed in and adept at using the technical language of geometry.

Since statements are not to be understood as isolatable autonomous entities, they cannot be described by focusing on the criteria of individuality and other such conditions of identification. To describe a statement is, in fact, to describe a specific mode of the existence of signs.[15] Such a description involves a description of the objects these groups of signs bring into existence, the kind of distinctions they support, the material substance of the signs, positions that the subject must take in order to articulate them. Every statement has a correlate, which is not a group of objects but rather the principles according to which objects are differentiated. What the correlate is are the principles according to which objects can be distinguished and placed in different domains. In fact, it is these principles that decide whether a logical proposition makes sense or a grammatical statement has meaning.[16]

As Foucault explains: "A statement is not confronted (fact to face, as it were) by a *correlate*—or the absence of a *correlate*—as a proposition has (or has not) a referent, or as a proper noun designates someone (or no one). It is linked rather to a 'referential' that is not made up of 'things', 'facts', 'realities', or 'beings', but of laws of possibility, rules of existence for the objects that are named, designated, or described within it, and for the relations that are affirmed or denied in it" (*Archaeology of Knowledge*, 91).

Let us summarize some of the features of the statement: It always belongs to a domain; it is always bounded by other statements; a statement is thus never isolated; the statements to which every statement is always related form the associated field to which the statement belongs. Now, the relation between a statement and its associated field is neither one of context nor one of psychological association. This is due to the fact that this associated field is anterior to context and psychological association, for it is precisely the associated field of the statement that decides what should be included in the context of a sentence or a proposition, or in the psychological background of a sentence. This implies that the relationship between the statement and the statements that make up its associated field is not necessarily deductive, inductive or psychological. The statement can be related to its associated field in many ways—it can repeat what its associated field says, it can modify what it says, it can comment on it or oppose it.[17]

As we recall, for Husserl, tradition has a deductive structure, where the past acquisitions act like a premise for the present. The present

is thus the conclusion of the past but it is at same time a premise for what is be acquired in the future. By contrast, Foucault's discursive formations exhibit no such deductive structure. Against Derrida's views, they are not governed by equivocity alone. In fact, as we can see, the statement can very well comment on other statements, even repeat them.

Regarding the subject who articulates the statement, Foucault warns against the temptation to reduce such a subject to the author of the statement. Rather, the subject of the statement is a place, a site, a position that can be occupied by any individual, provided he satisfies certain requirements prescribed by the statement itself. For example, medical prescriptions can be made by an individual provided he has satisfied the institutional requirements that constitute the domain of the medical prescription. Thus, the subject of the statement is not strictly speaking the physician, but the institution of which the physician is only a representative. Now, the relationship of the subject to the statement is itself a function of the statement and varies from statement to statement and cannot be reduced to the author-work relationship.

> To describe a formulation qua statement does not consist in analysing the relations between the author and what he says (or wanted to say, or said without wanting to); but in determining what position can and must be occupied by any individual if he is to be the subject of it. (*Archaeology of Knowledge*, 95–96)

By comparison we could say that, in Husserl, we have a view of the subject from the first person perspective as an agent of productive activities that result in the formation of idealities; what Foucault offers us is a view of the subject from the third-person perspective as a parameter of the discursive practice itself.

As mentioned above, a statement can only exist if it has a material existence. Thus the description of a statement necessarily involves a description of its materiality. However, this materiality is not simply a contingent property of the statement from which it can be divorced; it is thus not a bodily guise that a spiritual content (logical, psychological) would need in order to exist. As Foucault says, the statement is not an ideal form that floats free above the material plane and that could be reactivated ad infinitum. Still, this does not mean that the statement is an event that happens only once, never to be repeated again. The statement can be repeated but under strict conditions. It has what Foucault calls a "repeatable materiality" (*Archaeology of Knowledge*, 102). So the materiality of a statement cannot be understood as a material substratum, which embodies the statement and makes it occupy a definite space and come into being at a certain point in time. It is not its spatiotemporal co-ordinates. It is, rather, the institution that determines its status as an object. For example, if the statement is published in a book, it is the institution of publishing that determines its status as a book. And the sentence repeated in all the copies of a single book constitutes the same statement despite its multiple instances.[18] Different from an event, a statement can be repeated, but different from Husserl's ideal object, it cannot be reactivated, but only repeated under strict conditions.

By introducing this notion of the statement, Foucault avails himself of a new avenue of description that allows him to analyse bodies of knowledge like mathematics, economics, biology, etc. historically as discursive formations. In contrast to Husserl, for whom the objects of a tradition are necessarily ideal and produced once and for all, for Foucault the statements of a discourse are not necessarily produced once and for all. They have strict conditions of repeatability that can be discovered when we analyse these disciplines as discursive practices.

To treat geometry as a discursive practice then means to focus upon the statements of geometry and describe the rules according to which statements succeed one another and form a series, which Foucault calls their "principle of dispersion and redistribution" (*Archaeology of Knowledge*, 107). One will then find that the statements of geometry "belong to a single system of formation" (ibid.). The discursive practice is the law of such a series.[19] When we perform a discursive analysis of geometry, we are thus interested in the rules according to which geometric discourse can give rise to a set of distinctions that would help us distinguish between different objects, determine the different positions from which individuals can make geometric sentences, estab-

lish the ways in which statements can relate to each other to form concepts and strategies. To repeat, to describe a discursive formation is not to describe a totality centered on an object, a concept or an author, but rather to try to discover the rules according to which objects succeed one another, concepts succeed one another, and how the qualifications required for uttering or writing a particular sentence or proposition undergo transformation.[20]

Foucault can then define knowledge itself (*savoir*) as a discursive formation. Such a characterization of knowledge does not rely on terms involving individual human subjectivity such as consciousness, belief, desire, etc. A science is formed when a set of statements coalesces under a specific law of construction. Science is now a specific transformation within the discursive formation.[21] It does not include all the statements of the discursive formation, and does not render as invalid and erroneous those statements of the discursive formation that it does not include. Even more striking: discursive formations do not exhibit an overarching rational order and hence they cannot be seen as expressions or products of a universal reason.

What the analysis of discursive practices does is to open up a new line of attack by revealing to us this existential dimension of scientific disciplines. When we focus on statements, we have in view a dimension that is not co-extensive with the scientific disciplines but constitutes the field of objects, distinctions, concepts, strategies, and positions for the subject in which they are formed, transformed and play a role.[22]

As a discursive formation, mathematics (which for Husserl and Foucault includes geometry) is the most unique of all the sciences and not easily amenable to historical analysis.[23] In mathematics, the origin acts as a starting point as well as the foundation of mathematics. Thus, we have at the very origin of mathematics the formation of an ideality which can be endlessly repeated and progressively built upon.[24] Thus, in the case of mathematics, we can see Foucault's archaeological account converging with that of Husserl's phenomenological one.

The Meta-Scientific Approaches of Husserl and Foucault and Their Epistemological Implications

What is striking in the methodologies that Husserl and Foucault resort to in their respective descriptions of the historicity of the sciences is that both the phenomenologist and the archaeologist take a meta-scientific standpoint by reflecting on what scientists do, but from two opposite and maybe irreconcilable perspectives: Husserl's analyses are conducted from the meta-scientific standpoint, analogous in part to a historian of science, but with the crucial difference that the phenomenologist, although at the meta-scientific level, still claims to take a first person perspective, by putting himself in the position of the scientist at the moment this scientist thinks as a scientist. By contrast, the archaeologist, although taking a similar meta-scientific standpoint, thus analogous to the historian of science, adopts a third person perspective: it is different from the phenomenologist, because the archaeologist does not want to find out what the scientist under investigation thinks or thought; and it is also different from the historian of science, because the historian wants to know how ideas gave rise to other ideas. Taking his leave of questions of meaning, the archaeologist focuses on the conditions of possibility for particular views to be held at the times they were held, regardless of what scientists may know about these conditions of possibility (phenomenology), but also regardless of the questions of precedence, antecedence, and even validity of these ideas (history of science). Let me explain.

In the case of phenomenology, it is a meta-scientific standpoint analogous to a historian of science, but a first person account (or it is the first person perspective of the historicity of the sciences, which turns a science into a living link in a process of traditionalization). In fact, in the very first sentence of his essay, Husserl remarks that the reflections in which he is going to indulge did not occur to Galileo. They should have occurred to him but they did not, and if they had occurred to him, we would not be facing the crisis of meaning in the sciences Husserl believes we face. Husserl's question is as follows: What is it for a scientist to be a scientist? And this can be answered only if we can

find what it means for a scientist to be doing science. As we have seen, Husserl's answer is that for a scientist to do science is to be immersed in the tradition of the sciences which is a reserve of idealities that are transmitted from generation to generation, so that the next generation can improve upon the successes of the previous generation. The question of the historicity of the sciences can be meaningfully asked only from the standpoint of the scientist to whose consciousness science is given as an object. We see him analyze science as a tradition which moves forward and yet remains the same. The scientist is conscious that he is a part of this tradition and knows himself to be contributing to its progress. In this regard, Husserl starts out his analysis by inquiring into the origin and the development of geometric idealities, which would act as a model for understanding the way scientific traditions develop.[25]

With regard to Foucault, his analyses are directed not towards the meaning of a science but towards the existence of the sciences. That is the reason why his analyses are conducted from the third person perspective of someone who is not actually doing the science. Foucault is interested in finding out how science comes to be, how it functions and what kind of transformations it undergoes over time. In order to do this, Foucault uncovers a new perspective – that of the archaeologist. In fact, the bulk of the work in his *Archaeology* is devoted to showing the plausibility of such a perspective. From the standpoint of the archaeologist, looking at the sciences from the perspective of the science is not going to give us an accurate account of the historicity of the science. The reason for this is that by inquiring into how science is given to the consciousness of the scientist, we overlook those aspects of a science that escape his consciousness; we can only account for these aspects if we treat the sciences as discursive practices. The archaeologist thus occupies a unique position: on the one hand, he is not a participant in the science investigated, different from the phenomenologist, and on the other hand, he is not an observer contemporaneous to what he describes, like a historian of science is, who tries to make alive again how new ideas arose on the basis of old ones and helped in preparing transformations. By contrast with the contemporaneous spectator (the historian of science), the archaeologist is rather a trans-temporal spectator. Trans-temporal because, different from the phenomenologist, he does not re-enact the same acts as those under investigation and thus does not share the same re-created "temporal" intentional framework; and, different from the historian of sciences, he is not interested in how the inner temporal framework under investigation is linked to what preceded or followed. Freed from issues of meanings, the archaeologist is also freed from the temporal framework of these meanings, and can reject the phenomenological non-participating spectator for a radically a-intentional position: the indifferent spectator. In his analysis, geometry comes to occupy a unique position among the sciences. It is an exception that proves the rule, so to speak.

To elaborate upon the above point even further, Husserl does make a distinction between descriptive sciences and a deductive science like geometry. In the case of the descriptive sciences, self-evidence is grounded in sense-intuition. So a new proposition in such a science would have to be made evident through sense-intuition. But in geometry and its fellow mathematical sciences, Husserl tells us, this is not the case. Here the proposition can be made self-evident not by taking recourse to sense-intuition but by reactivating all the idealities upon which the new proposition is grounded. This is because idealities are constituted by an original act on the part of the geometer and this act can be redone adinfinitum. So idealities expressed by geometric propositions can be made self-evident only by redoing the act contained in these idealities in a chain, right down to the very first ideality.

But despite the different modes of arriving at self-evidence, namely, sense-intuition and reactivation, Husserl still does not see any fundamental difference in the structure of historicity of these two types of sciences. The reason for this is that, for Husserl, every science, be it descriptive or deductive, has a meaning that has to be constituted by human activity. To uncover this meaning is to uncover the style in which sciences develop historically. This style is the process of traditionalization, which is a continuous and constant building upon the achievements of the past. Thus the develop-

ment of all the sciences exhibits an overarching rationality.[26]

To this, Foucault does not respond that the historicity of the sciences is irrational and random, but he shows that a science manifests an adherence to certain rules, which can be brought to the light of day. With regard to the historicity of the sciences, he also shows that it does not exhibit a deductive structure, except for mathematics. His aim as an archaeologist of knowledge is to reveal the sudden transformations that punctuate the development of the sciences and the rules that these transformations obey.[27] While Foucault gives an account of mathematics that relies upon its formal nature, in the case of Husserl, we saw that he wants to move away from a formal account of geometry based on logical explication and instead reveal its truth meaning by tying it to the act of the geometer performing idealizations. But for Foucault, it is because mathematics is a formal science at its very origin that it can form a domain of its own, and hermetically seal itself off from external influences and simply keep working on its past results and developing new results. And in doing so, remains unaffected by the discursive practice of which it is part. It has no need to play a role in this surrounding world to which it belongs.[28]

Archaeology aims to understand the historicity of the sciences by analyzing disciplines at their statement level and putting out of play the dimension of meaning and validity. It seems that this exercise is a lot easier for the distant past and becomes increasingly difficult as we approach the present.[29] Phenomenology does not have this problem. It tries to understand historicity as traditionalization, by analyzing the development of a science as an intentional object that can be given to consciousness. Phenomenology, therefore, starts out with the present because it is only the present that is directly given to consciousness. The past can then only give itself indirectly to consciousness by way of the present.[30]

We can thus say that phenomenology is incapable of understanding the past in its own terms and archaeology is incapable of understanding the present in its own terms. This is because, as we have already seen, phenomenology tries to understand the past only in terms of the present, by showing the similarities in the way the past and the present are structured. And archaeology tries to understand the present only in terms of the past, by distinguishing it from the past. Since the phenomenologist gives precedence to the present, he is able to illuminate what is available to the practitioner of a scientific discipline taken as a historical subject. The archaeologist, on the other hand, since he gives precedence to the past, is able to illuminate what eludes the practitioner of a scientific discipline by taking the latter as a historical object.[31]

Now, is there any possibility of complementarity between the two approaches? Archaeology has been mainly seen to be in conflict with phenomenology. Foucault's own remark to the effect that, with archaeology, he aims to free history from the clutches of phenomenology is seen as a confirmation of this claim. But is his remark really a testimony of the conflict between phenomenology and archaeology, rendering the two enterprises mutually exclusive? Can we not take Foucault's remark to mean that archaeology brings in a perspective on history that challenges phenomenology's claims to provide an exclusive account of history? As we have seen above, when we consider the perspectives taken by the phenomenologist and the archaeologist, we find that they approach history from two opposing and seemingly irreconcilable perspectives—the meta-scientific first person of the scientist and the meta-scientific third person perspective of a trans-temporal spectator. But when we consider the object of these two enterprises from the historical standpoint, then we find that while phenomenology has its proper object in the present, archaeology has its proper object in the past. But if we have to account for the historicity of the scientific object, then we have to do justice to the past as well as the present without privileging one over the other. Thus neither phenomenology nor archaeology can supersede the other. While phenomenology cannot account for those structures of the historicity of the sciences that elude consciousness, archaeology cannot account for the intentional structures of historicity that are given to consciousness. In this way, they can be seen as providing complementary rather than mutually exclusive accounts of the historicity of the sciences. Thus, only by incorporating these two perspectives can we arrive at a comprehensive solution to

the problem of the constitution and transmission of idealities and thereby the historicity of the sciences. And this is the challenge for anyone who wishes to make any further headway into this rather knotty philosophical problem.

ENDNOTES

1. Edmund Husserl, "Origin of Geometry," in *The Crisis of the European Sciences and Transcendental Phenomenology*, trans. David Carr (Evanston: Northwestern University Press, 1970).
2. Michel Foucault, *Archaeology of Knowledge*, trans. A. M. Sheridan Smith (New York: Pantheon Books, 1972).
3. By focusing on the historicity of geometry, Husserl believes he can uncover the historicity of the sciences and thereby the basic unchanging structures of human historicity in general. For him, it is thus a matter of understanding how we are able to immerse ourselves in a tradition like geometry and transform it at the same time. He thereby aims to arrive at the essence of tradition by uncovering geometry's style of operation.
4. James Dodd, *Crisis and Reflection: An Essay on Husserl's Crisis of the European Sciences* (Dordrecht: Kluwer Academic Publishers, 2004), 121.
5. "Clearly, then, geometry must have arisen out of a *first* acquisition, out of first creative activities . . . it is not only a mobile forward process from one set of acquisitions to another but a continuous synthesis in which all acquisitions maintain their validity, all make up a totality such that, at every present stage, the total acquisition is, so to speak, the total premise for the acquisitions of the new level. Geometry necessarily has this mobility and has a horizon of geometrical future in precisely this style; this is its meaning for every geometer who has the consciousness (the constant implicit knowledge) of existing within a forward development understood as the progress of knowledge being built into the horizon. The same thing is true of every science" ("Origin of Geometry," 355).
6. I am indebted to Pol Vandevelde, who helped me understand Husserl's first way in this manner by dividing it into four stages. His analysis can be found in his article "Intersubjectivity and the Instability of the Transcendental Ego in Husserl," *Josephinum: Journal of Theology* 11 (2004): 269–302.
7. We must note the significance of this distinction between a subjective psychic process and an ideal mental act which can be re-identified and transmitted. So even if the subject were undergoing different experiences every time she is still performing the same mental act which can be replicated any number of times and expressed in words to fellow geometers. Husserl's notion of ideality hinges on this difference between subjective mental processes and ideal mental acts.
8. Husserl makes no difference between imagined objects like works of art and literature, and so *Hamlet* and the Pythagorean theorem would both be ideal in his sense of the term. Husserl suggests that it is possible for a geometrical object to "proceed from its primary intrapersonal origin, where it is a structure within the conscious space of the first inventor's soul, to its ideal objectivity" ("Origin of Geometry," 357–58) by means of language. In language, we can distinguish the assertion from what is said in the assertion—its meaning. So the meaning of the word *Löwe* in German comes into being once and for all and is thus something ideal despite the many instances of its use in speech and writing. But while the meaning of the word *Löwe* has yet to be cashed out in perceptual intuitions of a lion, geometrical terms cannot be cashed out in this manner. Their meaning is fulfilled by the ideal objects of geometry. Although Husserl does not discuss the relationship between ideality and language in greater detail in his essay, he allows us to conceive of a stage prior to linguistic articulation in which the subject entertains a sense which can be reactivated by the same subject. This sense is not a clear and distinct idea to which linguistic articulation is merely extrinsic. The relationship between linguistic articulation and sense is thus not one of simple correspondence. Far from it, this sense is inchoate and it invites linguistic articulation. Husserl can thus be interpreted as suggesting that the constitution of an ideality does not happen at the level of the sign but at the level of the sense which can be reactivated. But this sense requires material support in signs which are not extrinsic to the sense. At the same time, because sense has a standing apart from the linguistic articulation, the signs alone do not determine the content of the sense but collaborate with and anchor the sense.

   Let us take Shakespeare's *Hamlet*. We can think of Shakespeare having a sense of *Hamlet* prior to writing it down in the English language. This sense is an ideality which he can reactivate. But this sense of Hamlet is not a clear and distinct idea which has no need for linguistic articulation. Rather it calls for linguistic articulation. Again, with a complex literary

object like *Hamlet* the sense maybe understood as what guides or leads Shakespeare towards writing it but *Hamlet* as we know it is not fully present at the level of sense. It appears gradually through a complex process, whereby the sense that Shakespeare entertains initially in an inchoate way, which he can reactivate, is anchored in signs and this anchoring helps him discover new senses which are again anchored in signs. Husserl, by allowing for a stage prior to linguistic articulation, thus makes room for a more sophisticated understanding of the constitution of idealities, whereby idealites, albeit constituted at the stage prior to linguistic articulation as a reactivatable yet inchoate sense, are still in need of language but are not determined entirely by language.

9. Commentators have rightly grappled with the question of when a geometric ideality becomes truly available, with the aim of illuminating the conditions necessary for the constitution of an ideality. Some commentators—notably, Jacques Derrida, *Edmund Husserl's Origin of Geometry: An Introduction*, trans. John P. Leavey (New York: Nicolas Hays, Ltd., 1978), and Maurice Merleau-Ponty, *Husserl at the Limits of Phenomenology*, ed. Leonard Lawlor with Bettina Largo, trans. Leonard Lawlor (Evanston: Northwestern University Press, 2002)—interpret Husserl to be saying that an ideality becomes available only with the accomplishment of writing. Both Derrida and Merleau-Ponty see him as suggesting that speech and writing are essential for the very constitution of an ideality. Many others have followed their lead in interpreting Husserl this way. See, for example, Alfons Grieder, "Husserl and the Origin of Geometry," *Journal of the British Society for Phenomenology* 20 (1989): 277–89, and Robert D'Amico, "Husserl on the Foundational Structures of Natural and Cultural Sciences," *Philosophy and Phenomenological Research* 42 (1981): 5–22. However, as we have seen earlier, this is certainly not obvious from Husserl's descriptions. In fact, as Vandevelde and Dodd argue, we could very well say that an ideality is available to the first geometer at the intra-subjective level because of the geometer's capacity to redo the act constituting the ideality. Speech and writing would then only make the ideality that is already available to the first geometer accessible to everyone else, thereby granting it more objectivity.
10. For Husserl, logical explication is in itself an irrational enterprise and the crisis of the sciences is manifest when this activity takes centre stage and no effort is made to ask how this activity can be rational in itself. Logical explication can be deemed rational only if it is grounded upon the possibility of the more original rational activity of reactivation.
11. Reflecting on this, Derrida, in his commentary on the *Origin of Geometry* focuses on two issues: (1) the role of language and writing in the historicity of geometry and (2) the distinction between inner historicity and outer history. In his reading of this essay, he claims that, for Husserl, geometric idealities require language and ideality for their very constitution. The paradox he sees here is that while language and writing constitute idealities, they are factual entities made up of signs. The question then is whether something so factual can constitute something that is devoid of all factuality—the geometric ideality. So the univocity of sense that Husserl wants to preserve by grounding it upon idealities is doomed, given that he has to resort to material signs and sounds for their constitution, which are susceptible to equivocity every step of the way. It is in this context that Derrida contrasts Husserl's exercises with those of James Joyce. While the former is bent on distilling and preserving the univocity that underlies all our utterances; the latter, according to Derrida, is interested in doing exactly the opposite, namely, exposing the equivocity that lies at the basis of all our utterances. This impinges directly upon the second issue. Can Husserl isolate an inner historicity of geometry from the warp and the woof of factual history, when the transmission of idealities which manifests this inner historicity is itself dependent upon factual entities like the marks, signs and tones of writing and speech?

    Derrida claims that, for Husserl, mathematical idealities are constituted by the written signs of natural language. According to Derrida, "words and language in general are not and can never be absolute objects. They do not possess any resistant and permanent identity that is absolutely their own. They have their linguistic being from an intention which traverses them as mediations. The "same" word is always "other" according to the always different intentional acts which thereby make a word significative [*signifiant*]. There is a sort of pure equivocity here, which grows in the very rhythm of science" (*Edmund Husserl's Origin of Geometry*, 104). So history would simply remain static if there was no equivocity of meaning. Derrida expresses this very poignantly when he says, "absolute univocity would itself have no other consequence than to sterilize or paralyse history in the indigence of an indefinite iteration" (ibid., 102).
12. Burt Hopkins, "Husserl, Derrida and the Origin of Geometry," in *Derrida and Phenomenology*, ed. William R. Mckenna and J. Claude Evans (Dordrecht, Boston, London: Kluwer Academic Publishers, 1995), 61–93.
13. In my reading, Foucault suspends meaning itself and, thus, distances himself from questions of univocity and equivocity of discourses, since they concern the level of meaning. My interpretation thus differs from

that of Andrew Cutrofello, who in his article "The Completeness of Foucault's Table of the Classical Episteme," *Philosophy Today* 47 (2003): 56–62, characterizes Foucault's archaeological analyses of statements as an attempt to "maximize equivocity."

14. While logical and linguistic analysis of signs is always concerned with the meaning and reference of signs and never concerned with their existence, an analysis of statements, by contrast, concerns itself only with the existence of signs and not with their meaning or reference.
15. We must be very careful not to conflate the existence of the statement with the existence of the group of signs. A statement for Foucault is not simply a collection of signs. It is much more than that. We can understand this more clearly if we contrast the manner in which a collection of signs relates to a sentence, or a proposition to the manner in which it relates to a statement. Given a collection of signs, if we can specify a set of rules according to which this collection could have been generated and other possible collections of signs could be generated, we would call that collection of signs a proposition or a sentence. In the case of the sentence such a set of rules would be called the rules of grammar, and in the case of the proposition such a set of rules would be called the system of axioms. We would call the collection of signs a sentence or a proposition, even if such a set of rules did not actually exist. That is to say, they need not have been articulated prior to the existence of the collection of signs. This is simply not the case when it comes to the statement. A collection of signs cannot be called a statement unless there is an associated field in which the collection of signs is embedded and we could specify the relations between it and the associated field. It is only the existence of the associated field that brings the statement into existence. Were there to be a collection of signs and nothing else, it is possible for the collection to be either a sentence or a proposition but it can certainly not be a statement. Hence we can say that the statement specifies the mode of existence of a collection of signs and this mode of existence varies depending upon the way the collection of signs is related to the associated field. Hence the mode of existence of the mathematical statement varies from the mode of existence of the biological statement because of the different manner in which the former and latter relate to the associated field.
16. The sentence 'Colourless green ideas sleep furiously' (Noam Chomsky's example which Foucault makes use of) makes no sense, even excepting the combination of colorless and green, because the corresponding statement is correlated to a principle that distinguishes between the domain of physical objects to whom the qualities color and sleep could apply, and a domain of non-physical objects like ideas to whom those qualities do not. The sentence defining the theorem of Pythagoras makes sense because the correlate of the statement corresponding to it is a domain of two-dimensional objects belonging to a non-physical space.
17. As Foucault clarifies: "there is no statement in general, no free, neutral, independent statement; but a statement always belongs to a series or a whole, always plays a role among other statements, deriving support from them and distinguishing itself from them: it is always part of a network of statements, in which it has a role, however minimal it may be, to play. . . . There is no statement that does not presuppose others; there is no statement that is not surrounded by a field of coexistences, effects of series and succession, a distribution of functions and roles" (*Archaeology of Knowledge*, 99).
18. Let us note that the statement need not be spoken or written. It need not belong to a natural language at all. Even the raising of an index finger or a gesture of one's hands would constitute a statement if it satisfied the conditions prescribed above.
19. We must, however, note that discursive analysis is certainly only one of the ways of analysing verbal performances but not the only way. Although Foucault is keen to distance himself from any characterization of discursive practices as a foundation of logical and grammatical meaning, it is hard to see logical and grammatical meaning as not dependent in some way upon discursive practices. Of course, we can agree with him that discursive practices do not contain the ultimate meaning of logic and language. Linguistic and logical analysis is perfectly meaningful even if one never does an archaeology of discourse. So discursive practices are not foundational in a meaning-giving sense but they do seem to be foundational in an existential sense. As he admits, logical and grammatical analysis depend upon the existence of statements or what he calls an "enunciative datum."
20. Because inference and deductive rules of logic as well as the syntax of language bear upon the meaning of discourse, they cannot govern the succession of discursive objects, concepts, and qualifications when they are envisaged in their material existence.
21. It is significant to note here that this new understanding of the relationship between science and knowledge challenges the traditional belief that science is one of the main sources of knowledge and produces it in its purest form. Rather, within Foucault's archaeological framework, science is simply a transformation within the already existing field of knowledge.

22. It is the task of archaeology to understand the relationship between science and the field of knowledge in which it is formed. And depending upon the discursive formations, this relationship between science and knowledge varies. So knowledge as a discursive formation is no longer confined to the boundaries of a science. Every discursive formation, Foucault observes, can undergo four kinds of transformation, each of which is marked by a corresponding threshold, namely, the threshold of positivity, epistemologization, scientificity, and formalization. The first threshold is the threshold of positivity, and it is the emergence of a discursive formation whereby a single system is put into play for the emergence of several statements. The second threshold is called the threshold of epistemologization. It is crossed when a few statements become the criteria of success for all the other statements within the same discursive formation. This happens when these statements acquire the role of a "model, a critique, or a verification" (*Archaeology of Knowledge*, 186–87) of knowledge (*savoir*) within the discursive formation. The third threshold is called the threshold of scientificity. This is crossed when the statements of the discursive formation are not subject just to the archaeological rules of the discursive practice but also to "certain laws for the construction of propositions" (ibid., 187). The last threshold, the threshold of formalization is crossed when the science achieves the capacity to develop an axiomatic structure, by which it can take some propositions as its starting point and show how other propositions can be developed out of them. At this point, the particular science is able to elucidate the kind of propositions and the kind of transformations that these propositions can legitimately be subjected to. Foucault notes that the temporal span between these thresholds is not fixed like the seasons of the year. Sciences do not cross these thresholds at the same point in time. It is also not necessary for these thresholds to be distinct from one another. They can coincide, so that a discursive practice could cross two or three or all the thresholds at the same time. Thus the sciences, far from having a fixed form of development, which could be seen as the manifestation of an overarching rationality, each have their own unique form of development. Every science has its own unique form of historicity which cannot be conflated with others and which can be explored by archaeology.
23. This is because mathematics crosses the thresholds of positivity, epistemologization, scientificity, and formalization all at once at its very origin.
24. It is instructive to see Foucault's remarks on this subject: "The very possibility of its [mathematics'] existence implied that which, in all other sciences remains dispersed throughout history, should be given at the outset: its original positivity was to constitute an already formalized discursive practice (even if other formalizations were to be used later). Hence the fact that in the first gesture of the first mathematician one saw the constitution of an ideality that has been deployed throughout history, and has been questioned only to be repeated and purified; hence the fact that the beginning of mathematics is questioned not so much as a historical event as for its validity as a principle of history" (*Archaeology of Knowledge*, 188–89).
25. This is a crucial point that we cannot overlook. Husserl is resorting to a meta-scientific first person perspective. So we should try not to conflate this perspective with a third person perspective because it is only from the third person perspective that questions concerning the kind of productive processes occurring in the psyche of the first geometer make sense. So we cannot justifiably demand that Husserl provide an answer to these questions in the analyses he sets himself to conduct. Alfons Grieder, for instance, concludes that Husserl commits himself to the idea that the first geometer intuits the first concepts of geometry. From what we read in *the Origin of Geometry*, I think there is no reason why he must commit himself to such a position. Within the scope of his analyses, the productive moment (*Erzeugung*) that Husserl refers to need not be characterized as invention or intuition. All Husserl is doing is acknowledging the presence of something new being introduced into history with the advent of geometry, for which the original activity of a human being—first geometer—has to be responsible and whose activities were emulated by other individuals and they continue to be emulated to this day.
26. "If one thinks over our expositions . . . what they make obvious is precisely that what we know—namely, that the presently vital cultural configuration 'geometry' is a tradition and is still being handed down. . . . [To] understand geometry or any given cultural fact is to be conscious of its historicity, albeit "implicitly." This, however, is not an empty claim; for quite generally, it is true for every fact given under the heading of "culture," whether it is a matter of the lowliest culture of necessities or the highest culture (science, state, church, economic organization, etc.), that every straightforward understanding of it as an experiential fact involves the "coconsciousness" that it is something constructed through human activity. No matter how hidden, no matter how merely "implicitly" coimplied this meaning is, there belongs to it the self-evident possibility of explication, of "making it explicit" and clarifying it ("Origin of Geometry," 370).
27. Foucault does make a distinction between the pure sciences like physics and mathematics and the im-

pure sciences like medicine, psychiatry, linguistics, biology and economics. Instead of being a model for the historicity of science in general, mathematics becomes a unique case whose uniqueness must be accounted for.

28. What it [mathematics] possesses at a given moment (its domain, its methods, the objects that it defines, the language that it employs) is never thrown back into the external field of non-scientificity, but is constantly undergoing redefinition (if only as an area that has fallen into disuse or temporary sterility) in the formal structure that mathematics constitutes; this past is revealed as a particular case, a naïve model, a partial and insufficiently generalized sketch, of a more abstract, or more powerful theory, or one existing at a higher level; mathematics retranscribes its real historical trajectory into the vocabulary of vicinities, dependences, subordinations, progressive formalizations, and self-enveloping generalities (*Archaeology of Knowledge*, 189).
29. See Michel Foucault, "On the Ways of Writing History," in *Aesthetics, Method and Epistemology*, ed. James D. Faubion (New York: The New Press, 1998), 293, where Foucault himself acknowledges this in the following long remark: "I can, in fact, define the Classical age in its particular configuration by the twofold difference that contrasts it with the sixteenth century, on the one hand, with the nineteenth century, on the other. But I can define the modern age in its singularity only by contrasting it with the seventeenth century, on the one hand, and with us, on the other hand; so, in order to effect this transition, it is necessary to bring out in all our statements the difference that separates us from it. It is a matter of pulling oneself free of that modern age which begins around 1790 to 1810 and goes up to about 1950, whereas for the Classical age it's only a matter of describing it. . . . Through gentle digging one can uncover the old latent configurations, but when it comes to determining the system of discourse on the basis of which we still live, as soon as we are obliged to question the words that still resonate in our ears, that are mingled with those we are trying to speak, then archaeology, like Nietzschean philosophy, is forced to work with hammer blows."
30. "What is historically primary in itself is our present. We always already know of our present world and that we live in it, always surrounded by an openly endless horizon of unknown actualities. This knowing, as horizon-certainty, is not something learned, not knowledge which was once actual and has merely sunk back to become part of the background; the horizon-certainty had to be already there in order to be capable of being laid out thematically; it is already presupposed in order that we can seek to know what we do not know. All not-knowing concerns the unknown world, which yet exists in advance for us as world, as the horizon of all questions of the present and thus also all questions which are specifically historical. Do we not know further . . . that this historical present has its historical pasts behind it, that it has developed out of them, that historical past is a continuity of pasts which proceed from one another, each, as a past present, being a tradition producing tradition out of itself?" (Husserl, "Origin of Geometry," 373–74).
31. Husserl's phenomenological approach sees mathematics as the exemplar of all the sciences and scientific knowledge as a conscious act on the part of the scientist. However, Foucault's archaeological approach sees mathematics as the exception among the sciences and provides us a fascinating account of knowledge as a discursive formation that is independent of the sciences but on which the sciences depend for their very existence. Moreover, in Foucault, knowledge is, contra Husserl, not a conscious act. His account of knowledge shows no reliance on the structures of human subjectivity. According to his account, there is in knowledge a stratum that cannot be explained solely on the basis of individual human consciousness. What this contrast between Foucault and Husserl shows us is that any attempt to take seriously the historicity of the sciences has radical implications for the most basic questions of epistemology. These attempts, as is evident in Foucault's archaeological analyses, have the potential to shake the very foundations of epistemology by allowing for questions that exceed the traditional framework for discussing epistemological matters.

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