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Deconstruction and the Critique of Science

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If we look back on the last hundred years of the history of philosophy, we may be struck by the fact that the philosophical motif of the critique of science has generally been receding or declining to a considerable degree. In the early part of the twentieth century, while there were major currents of positivism and scientism, there were no less significant philosophical approaches with definitely critical viewpoints on science. We can readily recall, for example, Edmund Husserl's later critique of science, which seeks to show how the objectivism of modern mathematical science has led to a forgetting of the "life – world" as the basis of all knowledge. It seems to me, however, that this critical viewpoint of Husserl, as well as Martin Heidegger's no less incisive critique of modern science, has not so much been further developed, but rather diluted or attenuated by subsequent thinkers. Postwar currents of thought such as structuralism and part of poststructuralism have largely taken a more conciliatory, or in some cases an uncritical, attitude toward science. A more or less parallel transition may be found among Marxist – oriented theorists, specifically from those known as the first generation of the Frankfurt School to the second and later generations. In this way, a large part of recent and contemporary philosophy appears to have reduced their critical stance on the dominant form of knowledge called science.

In this paper, I take up recent French philosopher Jacques Derrida's thought and focus on what may be seen as his positive or favorable views on the

practice of science. I particularly wish to examine whether, as Derrida holds, modern scientific practice aligns with his own project of deconstruction, or rather may be reconceived as a part of metaphysics *subject* to deconstruction. In so doing, far from returning to the earlier position of Husserl or Heidegger, I seek the possibility of reorienting Derridean deconstruction in the direction of a radical critique of science. In the first section, after briefly outlining Derrida's philosophical thought, I survey and critically examine his approach to the problem of science. In the second section, I proceed to sketch out a deconstructive critique of modern science as a non—phonocentric form of the metaphysics of presence.

§ 1. Derridean deconstruction and science

I will begin with a brief outline of Jacques Derrida's (1930—2004) project of "deconstruction," and then specifically focus on his approach to the thematic of science. In so doing, I largely restrict myself to his earlier writings from the 1960s and early seventies, which, notwithstanding the importance of the later development of his thought, may still be considered a basic part of his whole philosophical work.

In his major books *Speech and Phenomena* and *Of Grammatology*, both published in 1967, among other early writings, Derrida develops his critical engagement with the Western philosophical tradition from the Ancient Greeks to the present day. He characterizes this philosophical tradition as the "metaphysics of presence," which is based on "the determination of being in general as presence" (VP 83/74; cf. G 23/12). According to Derrida, this metaphysics of presence generally operates with a series of binary oppositions such as inside/outside, self/other, identity/difference, presence/absence, present/non—present, speech/writing, and so on. These binary oppositions are "hierarchical" in that the first of each pair of terms is privileged as the bearer

of a pure, full, and immediate presence, while the second is debased since it supposedly lacks that presence. Among the various forms of presence, of particular importance is the presence of *meaning*, and, for this reason, Derrida characterizes the metaphysics of presence in terms of what he calls "the transcendental signified." The transcendental signified is the notion of meaning conceived "in and of itself," which "in its essence, would refer to no signifier, would exceed the chain of signs, and would no longer itself function as a signifier" (P 30/19f.; cf. G 33/20). The metaphysics of presence is marked by the exigency of, and a systematic desire for, the transcendental signified (see G 71f./49). In some contexts, Derrida also introduces the term "transcendental signifier," as the correlate of the transcendental signified (P 120/86).

In questioning the Western metaphysical tradition, Derrida particularly focuses on the relation of the value of presence to that of *speech*. According to Derrida, the metaphysics of presence is "phonocentric." That is, it privileges the voice or speech over writing, and, within writing, favors phonetic and especially alphabetic over nonphonetic writing. This privileging of speech or the *phōnē* rests on the notion that, in spoken language, what is meant by the speaker is understood immediately and in its full presence within the given context. This is because the voice apparently serves as "the signifying substance given to consciousness as that which is most intimately tied to the thought of the signified concept." This signifier seems to "erase itself or become transparent," thus "allow[ing] the concept to present itself as what it is, referring to nothing other than its presence," thus to appear as the transcendental signified (P 33/22).

Yet another of Derrida's key terms, "logocentrism" is to focus on this supposed unity or "absolute proximity" of meaning and voice (G 23/12). With reference to the wide semantic range of the Greek *logos* — word, speech, thought, reason, and so on — he stresses *logos*'s "essential link to the *phōnē*" (G

21/11; cf. VP 14/15). Thus logocentrism, which "is also a phonocentrism," refers to the philosophical orientation that, by privileging speech over writing, seeks to ensure the presence of meaning or the "determination of the meaning of being in general as *presence*" (G 23/11f.; cf. 12/3; see Bradley, 8). In this logo — and phonocentric system of metaphysics, written language, by contrast to speech, is seen as a threat to presence, particularly to the presence of meaning. For the written sign can be repeatedly read "in the absence of and beyond the presence of the empirically determined subject" and in separation from the original context (MP 377/317). For this reason, writing has traditionally been debased as a mere representation of speech or even excluded from the concept of language.

Let us now proceed to look at the way Derrida seeks to "deconstruct" the metaphysics of presence as outlined thus far. Derrida argues that the above privilege of speech over writing, bound up with the central notion of presence, is "only apparent" (VP 86/77). According to Derrida, the character of writing as repeatable and separable from the given context, which has traditionally been contrasted with speech's privileged access to presence, proves in fact to extend beyond writing in the ordinary sense. Indeed, any linguistic sign, whether spoken or written, can serve as such precisely because and insofar as it "may be indefinitely repeated as the same" (VP 8/9; cf. 55/50). In other words, the identity of a linguistic sign depends entirely on and "is constituted [. . .] by the possibility of being repeated," repeated even, and especially, in the absence of the subject and in separation from the context. Repeatability or "iterability," traditionally held to be characteristic of writing, is thus constitutive of language in general (MP 378/318).

For this reason, Derrida claims that all language is "first, in a sense [. . .], writing" (G 55/37). To be sure, he is in no way attempting to "rehabilitat[e] writing in the narrow sense," or simply to "revers[e] the order of dependence."

Rather, he seeks to introduce a new, generalized concept of writing or "arche-writing" (*archi-écriture*), to which also "oral language already belongs" (G 82f./56, 81/55). In Derrida's account, this arche-writing—or, more or less equivalently, the notion of iterability—may be further extended to any system of signs or marks and even to "all 'experience' in general" (MP 378/318).

Further, as has already been suggested, the repetition of a sign or mark, while constitutive of its ideal identity, is not a simple reproduction of the identical. Rather, emphasizes Derrida, it "always alters [. . .] that which it seems to reproduce" (LI 82/40). In this sense, the structure of repetition or iteration "implies both identity and difference" (LI 105/53). That is to say, while repeatability or iterability enables any element to remain itself, to be identical to itself, it paradoxically "ruins [. . .] the identity" thus rendered possible (LI 144f./76).

Having traced in outline Derrida's basic arguments of deconstruction, I wish, within this context, to take a look at his viewpoint on the problem of science. Derrida's attitude toward science is not altogether positive or negative,⁽¹⁾ but rather is characterized by what he calls a "double register" (P 48/35). On the one hand, in Derrida's view, "*the concept of science* or the scientificity of science" has "always been determined as *logic*," and is thus convergent with the history of metaphysics (G 12/3). He also critically speaks of "the classical notion of science" and its projects, concepts, and norms, which are systematically tied to metaphysics (P 22/13). To this extent, his philosophical project is to "deconstruct everything that ties the concept and norms of scientificity to ontotheology, logocentrism, phonologism" (P 47/35).

On the other hand, Derrida maintains that the use of nonphonetic writing developed in science, especially in modern mathematical science, tends to resist and contest the metaphysical tradition. As he claims, "the practice of science has constantly challenged the imperialism of the logos, by invoking, for

example, from the beginning and ever increasingly, nonphonetic writing" (G 12/3, trans. mod.). That is to say:

Everything that has always linked *logos* to *phonê* has been limited by mathematics, whose progress is in absolute solidarity with the practice of a nonphonetic inscription (P 47/34).

As we can see, while Derrida does not attempt to rehabilitate writing in the ordinary sense, he nevertheless valorizes the role played by writing, especially nonphonetic writing, in mathematical science. Conversely speaking, "the resistance to logical—mathematical notation has always been the signature of logocentrism and phonologism" (P 46/34). To be sure, Derrida admits, "[w]e must also be wary of the 'naive' side of formalism and mathematism," which tends to "complete and confirm [. . .] logocentric theology," as is exemplified by Leibniz's project of a universal characteristic (P 47/35). Yet he emphasizes that mathematics serves as "the place where the practice of scientific language challenges intrinsically [. . .] the ideal of phonetic writing and all its implicit metaphysics" (G 20/10). For this reason, "[t]he effective progress of mathematical notation [. . .] goes along with the deconstruction of metaphysics" and "with the profound renewal of mathematics itself" (P 48/35).

Further, in *Of Grammatology*, Derrida suggests that the notion of writing has also been highlighted by new developments in fields of science such as molecular biology and cybernetics. In his account, "the contemporary biologist speaks of writing and *pro—gram* in relation to the most elementary processes of information within the living cell." As for cybernetics, "the entire field covered by the cybernetic *program* would be the field of writing" (G 19/9; see Johnson 1993, 4). To be sure, as Derrida admits, cybernetics in its current form is not entirely free of metaphysical concepts such as the concepts of soul, life,

value, and so on, "which until recently served to separate the machine from man." While, however, cybernetics is to oust such metaphysical concepts, "it must conserve the notion of writing, trace, *grammè*, or grapheme" (G 19/9).

In this way, while Derrida does not simply hold science to be outside the metaphysical tradition, he highlights the deconstructive character of modern scientific practice, in which writing, especially nonphonetic writing, plays an essential role. It is in this context that he proposes the idea of "grammatology" as a "positive science" of writing (G 109/74).⁽²⁾ In his account, grammatology is characterized by the following dual task: It must "go beyond metaphysical positivism and scientism" and at the same time "accentuate whatever in the effective work of science contributes to freeing it of the metaphysical bonds." While deconstructing the concept of scientificity as tied to the metaphysical tradition, grammatology "must pursue and consolidate whatever, in scientific practice, has always already begun to exceed the logocentric closure" (P 48f./35f.).

Thus, Derrida sees a close affinity between his own project of deconstruction and the practice of modern science, specifically of mathematical science, molecular biology, and other fields. He favorably characterizes the practice of these scientific fields as a deconstructive movement or a movement of self-deconstruction of metaphysics. Here let us recall Derrida's remark above that "[e]verything that has always linked *logos* to *phōnē* has been limited by mathematics." This may, however, give rise to the following questions: Does not this remark suggest the possibility of a *logos* that is *not* necessarily linked to the voice? Is it not the case, then, that there can be—and there perhaps actually is—a non-phonocentric or rather a 'graphocentric'⁽³⁾ metaphysics? Is not precisely modern science such a metaphysics or such a part of the metaphysics of presence?

In connection with this, I wish to take a somewhat closer look at Derrida's

critique of Gottfried Wilhelm Leibniz's project of a universal characteristic, on which I touched above in passing. In the opening passage of his work *Of Grammatology*, Derrida speaks of the history of metaphysics, which has, "not only from Plato to Hegel (even including Leibniz) but also [. . .] from the pre-Socratics to Heidegger, always assigned the origin of truth in general to the logos" (G 11f./3). Why "even (*même*) including Leibniz"? This is because Leibniz developed the idea of a "universal characteristic," that is, a universal language based on a system of nonphonetic signs, and this might lead one to see Leibniz's project as a way of going beyond the metaphysics of presence. As Derrida cites, Leibniz emphasizes that writing "need not be referred back to the voice, as is obvious from the characters of the Chinese script" (G 118/79), and this is why he develops his project on the model of Chinese writing. Derrida contends, however, that even this project of Leibniz cannot be seen as an exception to the Western metaphysical tradition. Leibniz's project rests on the "analytical principle" of "the decomposition into simple ideas," which is "the only way to substitute calculation for reasoning." According to Derrida, Leibniz's concept of the "simple absolute," indispensable to his whole project of a universal language, does not run counter to metaphysics, but rather "leads to an infinitist theology and to the logos or the infinite understanding of God" (G 116f./78). In other words, in Leibniz's thought, "the project of a universal, mathematical, and nonphonetic characteristic is inseparable from a metaphysics of the simple, and hence from the existence of divine understanding, the divine ⁽⁴⁾logos" (P 47f./35). Derrida therefore concludes:

That is why, appearances to the contrary, [. . .] the Leibnizian project of a universal characteristic that is not essentially phonetic does not interrupt logocentrism in any way. On the contrary, universal logic confirms logocentrism, is produced within it and with its help ⁽⁵⁾[. . .] (G 117/78f.).

On this critique of Leibniz by Derrida, we may pose the following set of questions. First, when Derrida claims that Leibniz's project of the universal characteristic is inseparable from an infinitist theology and thus from the metaphysical tradition, does he simply mean that this is actually the case *in Leibniz's thought*, and that the inseparability from metaphysics or logocentrism may be historically or personally contingent? Or otherwise that Leibniz's project in question, for some logical or theoretical reasons, entails a form of the metaphysics of presence? The first alternative could hardly be maintained if Derrida's argument is not to be limited to a reading of Leibniz, but is to be situated in the overall thematic of grammatology or the deconstruction of metaphysics. If the second alternative is the case, this will bear particular relevance to the next question as well.

Second, as we have seen, Derrida maintains that specifically Leibniz's concept of the simple absolute and his principle of the decomposition into simple ideas are metaphysical or lead to a form of metaphysics or logocentrism. Is it specific to Leibniz, however, to proceed with the decomposition into simple ideas so as to be able to substitute calculation for reasoning? While, in Leibniz's thought, the decomposition is theoretically sustained by his ontology of the "monad," the decomposition into simple ideas seems in itself to be a procedure commonly followed in modern natural science, or even one of the key features of modern scientific methodology. If this is so, Derrida's critique of Leibniz's metaphysical involvement will extend far beyond Leibniz's case, and apply not only to some other modern philosophers, but also, and perhaps above all, to a large part of modern science.

Third, Leibniz's project of the universal characteristic is without doubt — as it is so called by Derrida — "nonphonetic." But is it not also *non-phonocentric*? Derrida, himself, does not call it non-phonocentric and, given his view of the essential convergence between phonocentrism and

logocentrism, he cannot. From Derrida's point of view, if Leibniz's project is logocentric, it must also be phonocentric. Yet, insofar as Leibniz does not, or at least not in any obvious sense, privilege speech or the voice over writing, in what sense can his thought or his project of the universal characteristic still be considered phonocentric? If, on the other hand, Leibniz's project is *not* phonocentric, and if, as Derrida contends, it is nevertheless logocentric, then it will follow – contrary to his professed view – that logocentrism is not necessarily phonocentric, that it is dissociable from phonocentrism. This seems to be related to a certain ambiguity of Derrida's term 'logocentrism.' That is, in the term 'logocentrism' he usually and manifestly includes the sense of privileging of speech over writing, which allows it to converge with phonocentrism. However, in speaking of Leibniz, he may be using the term differently, without a sense overlapping with phonocentrism. In this way, Derrida's critique of Leibniz's project of the universal characteristic unwittingly suggests the possibility of dissociating logocentrism and phonocentrism, especially the possibility of a non – phonocentric logocentrism or metaphysics. Taken together with our consideration above, it further suggests the possibility that modern science, whose practice of writing is highly valorized by Derrida, may be reconceived as such a non – phonocentric metaphysics of presence.

Before concluding this section, in connection with our thematic of deconstruction and science, let us take a brief look at Derrida's reading of Husserl. As is well known, Derrida's early project of deconstruction developed in a large measure through his critical engagement with Husserlian phenomenology, which he characterizes as "metaphysics in its most modern, critical, and vigilant form" (P 13/5). As he notes succinctly in *Speech and Phenomena*, Husserlian phenomenology revolves around the notion of the presence of meaning in intuition or, in more specific terms, "the full presence

of sense to a consciousness that is itself self—present in the fullness of its life, its living present" (VP 110/98). He seeks to deconstruct this Husserlian notion of presence along several lines of argument, but here let us limit ourselves to just one of them. Derrida draws attention to a distinction made by Husserl in the *Logical Investigations*, the distinction between "meaning—intention" and "meaning—fulfilment" (*Bedeutungserfüllung*). In Husserl's account, if what is meant or intended is actually present or at least represented, "the relation to an object is realized"; but "[a]lternatively this need not occur: the expression functions significantly [. . .], but it lacks any basic intuition that will give it its object" (Husserl 1901, II—1:37/1:192; see Lawlor 2002, 197⁽⁷⁾). As Derrida comments, this amounts to acknowledging that "[t]he fulfilment of the aim (*visée*) by an intuition is not indispensable." In other words, "[i]t belongs to the original structure of expression to be able to dispense with the full presence of the object aimed at by intuition" (VP 100/90). In this way, Derrida points to an internal tension in Husserl's thought, the tension between "the motif of full 'presence,' the intuitionist imperative" and the possibility of the non—plenitude or lack of intuitive presence (VP 109/97).

To be sure, this move on Derrida's part may be seen to be effective as a strand of his deconstructive reading of Husserl. Needless to say, however, it works deconstructively only to the extent of the intuitionist premises of Husserl's philosophy. Beyond these limits, beyond the Husserlian or other forms of intuitionism—for example, in Leibniz's philosophy with its emphasis on non—intuitive, discursive knowledge—it is no longer the case that the presence of meaning is necessarily that of intuitively fulfilled meaning, but that there may well be the notion of a presence of meaning without intuitive fulfilment. Here we can pose the following question concerning modern science: Is it not the case that science, especially modern mathematical science, revolves around such a notion of present meaning or the transcendental

signified without intuitive fulfilment?

As is well known, Husserl, in his later work *The Crisis of European Sciences and Transcendental Phenomenology*, characterizes modern natural science as "nonintuitable 'logical' substruction" in contrast to the life – world as the universe of what is intuitable in principle (Husserl 1936, 130/127). His critique of modern science focuses on the way in which "the mathematically substructured world of idealities" is substituted for "the only real world, the one that is actually given through perception [. . .] – our everyday life – world" (49/48f.). On Husserl's intuitionist premises, modern science as nonintuitable substruction is devoid of fulfilled meaning and thus the full presence of meaning. Yet, if there may be the notion of presence without intuitive fulfilment, we can ask ourselves whether and how modern science constitutes a system of the nonintuitive presence of meaning, a system that is subject to deconstructive critique. This is the question I wish to investigate in the next and final section.

§ 2. Toward a deconstruction of modern science

Although it may seem rather abrupt, I begin by suggesting that reference to Karl Marx's theory of the commodity, specifically his analysis of the value – form in *Capital* (see Appendix), can provide suitable clues to our problematic of science and deconstruction. This may remind the reader of Jean – Luc Nancy's recent reflections on technology and related themes in terms of "general equivalence." With reference to Marx's analysis of the value – form, especially of money as a "general equivalent," Nancy argues that the regime of general equivalence "virtually absorbs, well beyond the monetary or financial sphere [. . .], all the spheres of existence of humans, and along with them all things that exist." In his view, "[t]his absorption involves a close connection between capitalism and technological development," or, more precisely, "the

connection of an equivalence and a limitless interchangeability of forces, products, agents or actors, meanings or values" (Nancy 2012, 16/5f.). Although Nancy does not specifically address the problem of science, his viewpoint of general equivalence seems to me no less relevant to science than to technology or capitalist economy. Nancy does not, however, closely analyze the system of general equivalence in such specific terms as those developed by Marx. When speaking of general *equivalence*,⁽⁹⁾ he largely disregards the pivotal Marxian distinction between general *equivalent* and general relative value or, more basically, between equivalent and relative value. In my view, without such a distinction concerned with the directionality and asymmetry of value relations, one can hardly proceed with structural analysis of the system in question.

I accordingly wish to investigate the question of modern science, not simply in terms of general equivalence, but by closer analogy with Marx's analysis of the value – form.⁽¹⁰⁾ Marx's analysis focuses on the "equating" (*Gleichsetzung*) of different commodities in exchange, and I will also proceed with this kind of equating, but equating in a broader context of knowledge and experience. As we have seen, Derrida's notion of repetition or iteration does not presuppose the self – identity of what is repeated, but rather it is repetition that first makes possible that self – identity. This being the case, repetition involves equating in meaning or value, an equating of signs, marks, or, more generally, elements of experience, which I here rather provisionally call 'phenomena.'⁽¹¹⁾

Let us first consider two phenomena p_1 and p_2 , say, this cabbage and that cucumber, and suppose they are equated in meaning. Here we suppose as yet *no* meaning common to the two phenomena, such as the meaning of 'vegetable.' This corresponds to what Marx calls the simple form of value, which constitutes the first form in the series of value – forms. In this simple form of value, x commodity A is worth (*wert*) y commodity B (for example, 20 yards of linen are worth 1 coat). By analogy we suppose that p_1 is worth p_2 in

meaning, although this equating does not, or not necessarily, have a quantitative character. Just as in Marx's argument, here we assume that this relation between p_1 and p_2 is unidirectional, which is to say that it does *not* in itself imply the reverse relation in which p_2 is worth p_1 . To make explicit this asymmetry, I wish to denote the above relation by using the symbol \Rightarrow (rather than the ordinary sign of equality used by Marx):

$$p_1 \Rightarrow p_2. \tag{1}$$

As we can see, here p_1 is determined in meaning relatively to p_2 , determined as equal or similar to p_2 in meaning, while p_2 serves as the measure of this determination. By analogy with Marx's terminology, we can say that p_1 stands in the 'relative form of meaning,' while p_2 is in the 'equivalent (or equi-significant) form' or serves as the equivalent.⁽¹²⁾

Next, let us suppose that a third phenomenon p_3 , say, that carrot, appears and is also equated with p_1 . Then p_1 is again, but differently, determined in meaning, and, if the previous relation (1) is retained or reproduced in memory, here it is both p_2 and p_3 that serve as p_1 's equivalents ($p_1 \Rightarrow p_2, p_3$). Like Marx's second form of value, the total or expanded form, this relation may be extended in such a way that p_1 is determined as equal to an indefinitely extended series of phenomena:

$$p_1 \Rightarrow p_2, p_3, \dots \tag{2}$$

Further, also in parallel with Marx's analysis, not only p_1 , but p_2 , p_3 , or any other phenomenon may be determined in meaning as equal to an indefinitely extended series of other phenomena.

Here it is important to note the following two points. First, it is not

determined in advance what phenomenon is each time considered equal to what other phenomenon. Here, where no meaning common to the different phenomena is presupposed, there is no natural or logical ground for equating any phenomena. Rather, each move of equating different phenomena may be called, as it were – to borrow Saul Kripke's phrase in his reading of Wittgenstein – "an unjustified leap in the dark" (Kripke 1982, 15). Second, the transition from (1) to (2) illustrates that the equating of a new phenomenon with p_1 each time newly redetermines the latter in meaning. Since this applies not only to p_1 , but *mutatis mutandis* also to p_2 , p_3 , and other phenomena, it follows that the equating of new phenomena each time redetermines all the previous phenomena with which they are equated, thereby incessantly restructuring the connection of phenomena. The equating of different phenomena, constitutive of an identical meaning, cannot be a pure reproduction of the same, but contains a movement that each time displaces the phenomena in meaning.

Suppose, however, that, from the series of phenomena, one picks out a specific phenomenon p^* , and gives priority to the equating relations having p^* on the right side, namely $p_1 \Rightarrow p^*$, $p_2 \Rightarrow p^*$, and so on. In this case, p^* comes to serve as a sign (e.g. the word 'regetable') that exclusively represents all the other phenomena in question, thus structurally stabilizing the connection of phenomena:

$$p_1, p_2, p_3, \dots \Rightarrow p^*. \quad (3)$$

Again with reference to Marx's analysis, we can say that this structure is analogous to the general form of value (the third form) or the money form (the fourth form). Here p^* corresponds to the "general equivalent" or money, and the meaning common to all phenomena corresponds to the value of

commodities as commensurated by the general equivalent.⁽¹³⁾

To be sure, even with this structural stabilization, phenomena are still redetermined and displaced in meaning every time they are equated. Since sign p^* is in principle nothing more than one phenomenon among others, its introduction does not alter the fact that the equating of phenomena each time redetermines and displaces them in meaning. In fact, in various contexts of life, we are more or less aware of, or at times specifically attend to, such displacement or fluctuation of meaning, particularly of the meaning of words. As regards the above example of the word 'vegetable,' we may note that corn or mushrooms, for instance, are in some cases considered vegetables, but in other cases excluded from vegetables.

Under certain circumstances, however, the meanings of p_1, p_2, p_3, \dots *seem* to be fixed once and for all by the relation (3), without being incessantly redetermined, so that the above displacement of meaning tends to be concealed. This leads to the notion that the series of phenomena shares a purely identical and directly present meaning. Does this not mean that the system instituted here may be considered a 'metaphysics of presence' in the Derridean sense? If this is so, we have thus far traced the process through which a metaphysical system establishes itself as an effect of the development and restructuring of the 'meaning-form.' In my view, this metaphysics is particularly strongly prompted in modern natural science, more strongly than in many other fields of knowledge and experience. This seems to be closely related to modern science's endeavor to disambiguate terms and concepts through quantitative and mathematical procedures. In what follows, I wish to focus on the mode of thought of modern science and examine whether and how it constitutes a form of the metaphysics of presence.

Let us take as an example the principle of the conservation of energy – a general physical principle covering a vast range of natural phenomena, which

was developed by several European scientists around the mid – nineteenth century.⁽¹⁴⁾ Although this principle was originally called that of the conservation of "force" or "*Kraft*," here I will – except for quoted terms or phrases – use the present – day designation 'energy' and speak of the conservation of energy.⁽¹⁵⁾ Historically, this conservation principle has been presented in different forms by different researchers, but their approaches may be broadly divided into two types: the mechanical and the non – mechanical formulations. In the mechanical formulation of energy conservation, represented by Hermann von Helmholtz's 1847 work, different kinds of natural phenomena such as heat, electricity, magnetism, and so on, are in principle accounted for in mechanical terms, and, based on this assumption, the sum of their "forces" or energies is shown to be constant. For Helmholtz, insofar as all natural phenomena may be traced back to "motions of matter under invariable motion forces," specifically "attractive and repulsive forces," the mechanical conservation of "the sum of the *vis viva* and tension forces" – or, in present – day terms, of the kinetic and potential energy – applies to all those phenomena and energy conservation generally holds (Helmholtz 1847, 6/9, 17/16, trans. mod.).⁽¹⁶⁾

Here we can readily see how the connection of phenomena takes the form of the above relation (3). That is, the series of different phenomena p_1 (say, heat), p_2 (electricity), p_3 (magnetism), and so on, are said to be "worth" or equal to a certain amount of mechanical motion p^* and determined relatively to the latter. Mechanical motion thus serves as the general equivalent, and 'energy' is the term given to the common meaning represented by this general equivalent. Unlike the earlier example of ordinary perceptual experiences, but rather like the value relation of commodities as analyzed by Marx, here the relation (3) assumes a quantitative character, expressed by the mechanical equivalent of heat or other natural phenomena.

In about the same period, however, the idea of energy conservation was also

developed from non-mechanical points of view as exemplified by Robert Mayer's work. In an 1842 seminal paper, Mayer presented the idea that various "forces" of nature are nothing other than "different forms of appearance of one and the same object" and therefore quantitatively "indestructible."⁽¹⁷⁾ In later years, however, he reconceived this idea of the indestructibility of "force" as the "invariable quantitative relation (*Größenbeziehung*)" between mechanical and other kinds of phenomena.⁽¹⁸⁾ Based on the view that "it is our task to learn to *know* the phenomena" and that "[o]nce a fact is known on all sides, it is thereby explained and the task of science is concluded," Mayer no longer searches for the intrinsic nature of force, but instead focuses on the invariable relation between different phenomena and its numerical expressions.⁽¹⁹⁾ Since the question is "not what kind of thing a 'force' is, but what thing we will *name* 'force,'" he only nominally introduces the concept of "force" by "combining the common characteristics"⁽²⁰⁾ of different phenomena.

It is noteworthy that the subsequent physicist-philosopher Ernst Mach and Neo-Kantian Ernst Cassirer—despite their wide philosophical differences—both attend to and highly evaluate Mayer's non-mechanical formulation of energy conservation as seen above, especially his later relational formulation thereof.⁽²¹⁾ Let us take a brief look at Cassirer's account, which seems to be particularly relevant to our considerations here. According to Cassirer, as Mayer's approach indicates, energy "is never a new *thing*, but is a unitary *system of reference* on which we base measurement" (Cassirer 1910, 254/191). In other words:

Energy does not appear as a new object—like (*gegenständliches*) something alongside the already known physical contents, such as light and heat, electricity and magnetism; but it signifies an objective (*objektiv*), lawful correlation in which all these contents stand (Cassirer 1910, 255/192, trans.

mod.).

Even though the notion of energy was at first introduced as an "indestructible object," it is "more and more divested of any sensuous *factual content* (*Sachgehalt*) with the advance of knowledge" (263f./198f., trans. mod.). Energy thus proves to be nothing other than what we "posit" (*setzen*) as an expression of the "exact numerical relation" between different phenomena (265/199). In Cassirer's view, this is a typical instance of the general development of thought in which the concept of substance is increasingly replaced by the concept of relation or function. As he explains it, "[t]he more [the physical concept] disclaims every independent perceptible content and everything pictorial, the more clearly its logical and systematic function is shown" (220/166).⁽²²⁾

As we can see, the above non – mechanical formulation of energy conservation also accords with the formula (3) ($p_1, p_2, p_3, \dots \Rightarrow p^*$), in which a series of different phenomena are determined relatively to the general equivalent p^* . This formulation differs markedly, however, from the mechanical formulation in that here neither mechanical motion nor any other particular kind of phenomenon serves as the general equivalent. Specifically, in the later Mayer's approach as seen above, the general equivalent and, correlatively, the common meaning represented by it, are derived from the very *relation* among the series of phenomena p_1, p_2, p_3 , and so on. In other words, here there appears no substantial or self – contained term that exclusively represents all phenomena in meaning. This is not to say that the common meaning of 'energy' purely ideally subsists, but the common meaning (or the general signified) is bound up with the general equivalent (or general signifier) constituted by the numerical or mathematical expression of the relation of different phenomena. Although this general equivalent is nothing other than the signifying side of a phenomenon that in principle stands side by side with

phenomena p_1 , p_2 , p_3 , and so on, it nevertheless appears as if it stood above or beyond those phenomena, transcending the connection of phenomena in general. In this way, the signifying side of numerical—mathematical signs, as it were, phenomenally erases itself, and this gives rise to the notion that the series of phenomena shares a purely and directly present meaning or general signified. Here the general equivalent (or general signifier) p^* appears as what Derrida calls the "transcendental signifier," and the common meaning (or general signified) represented by p^* as the "transcendental signified." This being the case, the system of knowledge instituted here may rightly be called a "metaphysics of presence" in the Derridean sense.

What we have seen in the case of energy conservation, specifically its relational non—mechanical formulation, no doubt applies *mutatis mutandis* to other parts and divisions of modern science as well. Modern natural science increasingly orients itself to formal mathematical connections without content other than functional relations, thus — in Husserlian terms — without intuitive 'meaning fulfilment.' By virtue of this character of mathematical formulation, modern science seeks to achieve the fixity and unambiguity of terms and concepts, and their independence from the speaking or writing subject and the context of utterances. As we have seen earlier, in Derrida's view, while the concept of science or the scientificity of science is tied to the metaphysical tradition, the practice of science has constantly challenged the metaphysics of presence by the use of nonphonetic writing, especially mathematical notation. Our consideration so far suggests, however, that modern science— not only in its concept or norms, but also and even more importantly in its practice of using mathematical language— constitutes a particular form, perhaps one of the most powerful and dominant forms, of the metaphysics of presence. Here we can see a paradoxical role that writing, specifically mathematical notation, plays in modern science. As we have seen, according to Derrida, writing has

traditionally been debased or excluded from the metaphysical system because of its alleged dangerous character, notably its repeatability in the absence of the subject and in separation from the original context. In modern science, however, it is this supposedly negative character of writing that seems to support the notion of unambiguous, purely self-identical and present meaning. For the presence of meaning relevant to modern science is precisely marked by the indifference to, and the apparent independence from, the empirically determined subject and context of utterance. This is also the reason why the relational – functional character of mathematical formulations, devoid of intuitive 'meaning fulfillment,' strongly invokes the metaphysical notion of the presence of meaning or the transcendental signified. In this way, modern science, whose practice Derrida values positively for its challenge to the metaphysical tradition, may be reconceived as a mode of metaphysics that is not phonocentric, but without doubt graphocentric. Conversely speaking, the metaphysics of presence is not entirely phonocentric, but contains a major graphocentric part called science, a part that is no less subject to deconstructive critique than what is targeted by Derrida's project of deconstruction.

Appendix: An outline of Karl Marx's analysis of the value – form (in *Capital*, Vol. 1, Chap. 1, Sec. 3)

(A) The simple form of value (1st form)

"20 yards of linen = 1 coat, or 20 yards of linen are worth 1 coat" (generally, x commodity A = y commodity B).

"The linen expresses its value in the coat; the coat serves as the material in which that value is expressed."

The former is in the "relative form of value" and the latter in the "equivalent form" (*Äquivalentform*) (MEW 23:63/Marx 1976, 139f.).

(B) The total or expanded form of value (2nd form)

20 yards of linen = 1 coat or = 10 lb. tea or = 40 lb. coffee or = etc.

Here the value of the linen is "expressed in terms of innumerable other members of the world of commodities" (77/155).

(C) The general form of value (3rd form)

1 coat	=	} 20 yards of linen
10 lb. of tea	=	
40 lb. coffee	=	
x commodity	=	

Here the linen is in the "general equivalent form" or figures as "general equivalent" (*allgemeines Äquivalent*). All commodities except one (the linen) are "excluded from the equivalent form," while the linen is excluded from the general relative form of value (82f./160f., trans. mod.).

If this exclusion becomes restricted to a specific kind of commodity, gold in particular, we obtain:

(D) The money form (4th form)

This form is structurally the same as the 3rd form, only with gold, instead of linen, on the right side.

References

Abbreviations

Works by Jacques Derrida:

FS *Foi et savoir*. Éditions de Seuil, 2000. Eng. trans. Samuel Weber. "Faith and Knowledge: The Two Sources of 'Religion' at the Limits of Reason Alone." In Derrida and Gianni Vattimo. eds. *Religion*. Cambridge: Polity Press, 1998.

- G *De la grammatologie*. Paris: Les Éditions de Minuit, 1967. Eng. trans. Gayatri Chakravorty Spivak. *Of Grammatology*. Baltimore: Johns Hopkins University Press, 1976.
- LI *Limited Inc.* Paris: Éditions Galilée. 1990. Eng. trans. Samuel Weber and Jeffrey Mehlman. *Limited Inc.* Evanston, Ill.: Northwestern University Press, 1988.
- MP *Marges de la philosophie*. Paris: Les Éditions de Minuit, 1972. Eng. trans. Alan Bass. *Margins of Philosophy*. Chicago: The University of Chicago Press, 1982.
- P *Positions*. Paris: Les Éditions de Minuit, 1972. Eng. trans. Alan Bass. *Positions*. Chicago: The University of Chicago Press, 1987.
- VP *La voix et le phénomène*. Paris: Presses Universitaires de France, 1967. Eng. trans. David B. Allison. *Speech and Phenomena and Other Essays on Husserl's Theory of Signs*. Evanston, Il.: Northwestern University Press, 1973.

Works by other authors:

- HWC 『廣松渉著作集』 [Collected works of Hiromatsu Wataru]. Tokyo: Iwanami Shoten, 1996–1997.
- MEW *Karl Marx/Friedrich Engels Werke*. Berlin: Dietz Verlag.

Bradley, Arthur. 2008. *Derrida's Of Grammatology*. Edinburgh: Edinburgh University Press.

Cassirer, Ernst. 1910. *Substanzbegriff und Funktionsbegriff*. Darmstadt: *Wissenschaftliche Buchgesellschaft*, 1980. Eng. trans. Willian Curtis Swabey and Marie Collins Swabey. "Substance and Function." In *Substance and Function & Einstein's Theory of Relativity*. New York: Dover Publications, 1923.

- Elkana, Yehuda. 1974. *The Discovery of the Conservation of Energy*. Cambridge, Mass.: Harvard University Press.
- Gaston, Sean and Ian Maclachlan. eds. 2011. *Reading Derrida's Of Grammatology*. London: Continuum.
- Helmholtz, Hermann von. 1847. *Über die Erhaltung der Kraft: Eine physikalische Abhandlung*. Included in *Wissenschaftliche Abhandlungen*, Vol. 1. Leipzig: Johann Ambrosius Barth, 1882, 12–75. Eng. trans. R. Bruce Lindsay. "On the Conservation of Energy." In Lindsay, ed. *Applications of Energy: Nineteenth Century*. Stroudsburg, Penn.: Dowden, Hutchinson & Ross, 1976, 7–31.
- Husserl, Edmund. 1901. *Logische Untersuchungen*. 2 vols. Tübingen: Max Niemeyer Verlag, 1968. Eng. trans. J. F. Findley. *Logical Investigations*. 2 vols. London: Routledge, 1970.
- . 1936. *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie*. *Husserliana* 6. The Hague: Martinus Nijhoff, 1976. Eng. trans. David Carr. *The Crisis of European Sciences and Transcendental Phenomenology*. Evanston: Northwestern University Press, 1970.
- Johnson, Christopher. 1993. *System and Writing in the Philosophy of Jacques Derrida*. Cambridge: Cambridge University Press.
- Katsumori Makoto. 2017. "Reading Hiromatsu's Theory of the Fourfold Structure." *European Journal of Japanese Philosophy* 2, 229–262.
- Kripke, Saul A. 1982. *Wittgenstein on Rules and Private Language*. Oxford: Basil Blackwell.
- Lawlor, Leonard. 2002. *Derrida and Husserl: The Basic Problem of Phenomenology*. Bloomington: Indiana University Press.
- Lindsay, Robert Bruce, 1973. *Julius Robert Mayer: Prophet of Energy*. Oxford: Pergamon Press.

- Mach, Ernst. 1872. *Die Geschichte und die Wurzel des Satzes von der Erhaltung der Arbeit*. 2nd ed. Leipzig: Johann Ambrosius Barth, 1909. Eng. trans. Philip E. B. Jourdain. "History and Root of the Principle of the Conservation of Energy." In I. Bernard Cohen, ed. *The Conservation of Energy and the Principle of Least Action*. New York: Times Company, 1981, 1–116.
- . 1883. *Die Mechanik in ihrer Entwicklung historisch – kritisch dargestellt*. 9th ed. 1933. Reprint. Darmstadt: Wissenschaftliche Gesellschaft, 1982. Eng. trans. Thomas J. McCormack. *The Science of Mechanics: A Critical and Historical Account of its Development*. La Salle, IL: Open Court, 1960.
- Marx, Karl. 1976. *Capital: A Critique of Political Economy*, Vol. 1. Trans. by Ben Fowkes. London: Penguin Books.
- Mayer, Robert. 1893. *Die Mechanik der Wärme in gesammelten Schriften*. 3rd ed. Edited by Jacob J. Weyrauch. Stuttgart: J. G. Cotta.
- Naas, Michael. 2012. *Miracle and Machine: Jacques Derrida and the Two Sources of Religion, Science, and the Media*. New York: Fordham University Press.
- Nancy, Jean – Luc. 2012. *L'équivalence des catastrophes (Après Fukushima)*. Paris: Éditions Galilée. Eng. trans. Charlotte Mandell. *After Fukushima: The Equivalence of Catastrophes*. New York: Fordham University Press, 2015.
- Schiemann, Gregor. 1997. *Wahrheitsgewissheitsverlust: Hermann von Helmholtz' Mechanismus im Anbruch der Moderne*. Darmstadt: Wissenschaftliche Buchgesellschaft. Eng. trans. Cynthia Klohr. *Hermann von Helmholtz's Mechanism: The Loss of Certainty*. Dordrecht: Springer, 2009.

- (1) See Christopher Johnson, "Epoch, Event, Context," in Gaston and Maclachlan 2011, 3–5, on 4.
- (2) It is worth noting, that, for Derrida, his work on grammatology is not itself a science of writing, but rather an inquiry into such a science. In his account, "*Of Grammatology* is the title of a question: a question about the necessity of a science of writing, about the conditions that would make it possible [. . .]; but it is also a question about the limits of this science" (P 22/13).
- (3) Derrida at one point uses the term "graphocentrism," saying that "it has never been a question of opposing a graphocentrism to a logocentrism" (P 21/12).
- (4) Derrida quotes Leibniz's remark in a letter to Princess Elisabeth: "the foundation of my characteristic is also the demonstration of the existence of God, for simple thoughts are the elements of the characteristic, and simple forms are the source of things" (G 117/331; cf. P 48/99).
- (5) Derrida thus points to "a profound unity among infinitist theology, logocentrism, and a certain technicism" (G 117/79; cf. 137f./90). He also puts in question what may be called an ahistoricism of Leibniz's project. According to Derrida, Leibniz's project of a universal language encourages seeing in Chinese writing a model of a philosophical language "removed from history." For Leibniz, "what liberates Chinese script from the voice is also that which [. . .] wrenches it from history and gives it to philosophy" (G 113/76). See Sean Gaston, "Even Leibniz," in Gaston and Maclachlan 2011, 10f.
- (6) For a critical reading of Derrida's critique of Leibniz in *Of Grammatology*, see Paul Davies's essay, "Why Leibniz?," in Gaston and Maclachlan 2011, 81–91.
- (7) Husserl also remarks that "[i]f the originally *empty* meaning—intention is now fulfilled, the relation to an object is realized" (Husserl 1901, II—1:38/1:192).
- (8) In his later work, not least in his 1996 essay "Faith and Knowledge" (FS), Derrida reconceived the problem of science with a focus on the relation between faith and knowledge or between, religion and science (see Naas 2012). Here, however, I will not enter into this part of Derrida's work, which could be adequately addressed only in a separate study.
- (9) Nancy claims, for instance, that it is "the law of our civilization" that "the incalculable is calculated as general equivalence" (Nancy 2012, 53/32).
- (10) The following analysis has been adapted from part of Katsumori 2017, 245–248, in which I have developed a similar line of argument regarding Hiromatsu Wataru's philosophy.
- (11) To the term 'phenomenon,' I do *not* give phenomenological or any other sense or connotation associated with a specific philosophical position.
- (12) See Marx's argument in MEW 23:63/Marx 1976, 139f.
- (13) See MEW 23:79–85/Marx 1976, 157–162.
- (14) Here I do not consider the later relativistic revision of the energy conservation principle through the equivalence of mass and energy.

- (15) In the modern scientific tradition, the concept of 'force,' generally understood as the cause of natural phenomena, covered notions corresponding to the present – day concept of energy as well as that of force. This was still the case when the conservation principle was developed during the 1840s, and it is precisely through the establishment of this principle that the two concepts were clearly differentiated, and the conserved force was eventually renamed "energy." For a study of this development in the case of Helmholtz, see Elkana 1974.
- (16) For a detailed analysis of this work by Helmholtz, see Schiemann 1997, 178–218/75–98. (17) Mayer 1893, 24; Eng. trans. Lindsay 1973, 68, trans. mod.
- (18) Mayer 1893, 243; Eng. trans. Lindsay 1973, 204, trans. mod.
- (19) Mayer 1893, 236; Eng. trans. Lindsay 1973, 199, trans. mod. See Cassirer 1910, 184/139.
- (20) Mayer 1893, 260, 264; Eng. trans. Lindsay 1973, 218, 222, trans. mod.
- (21) According to Mach, the energy conservation principle is nothing other than "a special form of the law of causality" (Mach 1872, 46/73), where, by the law of causality, he means "the presupposition of the mutual dependence of phenomena" (35/61, 45/73). Also in his major work *The Science of Mechanics*, Mach states, in support of Mayer's work, that the conservation principle is not the expression of "a *mechanical* process as the basis of all natural phenomena," but rather of "an invariable *connection* between mechanical and other kinds of phenomena" (Mach 1883, 475/601, trans. mod.).
- (22) As Cassirer continues, "[a]ll that the 'thing' of the popular view of the world loses in properties, it gains in relations" (Cassirer 1910, 220/166). It is worth noting that recent Japanese philosopher Hiromatsu Wataru similarly speaks of the historical transition "from substantialism to relationism" in the philosophical worldview in general, and in the field of physical science in particular (HWC 15:xiv).

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