
FREDERICK AMRINE

Goethean Intuitions

MY ESSAY PROPOSES TO MAKE a modest down payment on a much-needed narrative of Goethe's philosophical development that refutes some widely held views. The first kind of account claims that Goethe was philosophically naive, unschooled, and uninterested.¹ A second characterization I would want to counter, which might be called the "condescending neo-Kantian" narrative, is one in which Goethe began as a naive realist, was taken in hand by Schiller, and finally converted grudgingly to a kind of poorly understood Kantianism. Both these accounts are very far from the truth.

Goethe's philosophy and relationship to other philosophers can be characterized generally as "intuitive"—in all the senses of that (intentionally) ambiguous term. As a thinker, Goethe was inspired rather than methodical. Moreover, he was "intuitive" in his ability to size up philosophical issues and individual philosophers quickly, getting to the heart of the matter on surprisingly short acquaintance. And Goethe's philosophical work is focused specifically on the role of the faculty of intuition (Spinoza's *scientia intuitiva*; Kant's "produktive Einbildungskraft" and "intellectus archetypus"; Fichte's "intellektuelle Anschauung") in epistemology, ethics, and scientific discovery.

As a philosopher of science, Goethe progresses through three phases, which one might call Realist, Idealist, and Romantic.² The major influence in the first phase is Spinoza as interpreted by Herder; in the second, Fichte.³ In the third phase, Goethe develops an original epistemology that might be termed a kind of *gesteigerter Spinozismus*. The focus here will be on Goethe's *Metamorphose der Pflanzen* as the culmination of Goethe's first phase; consideration of the second and third phases must be deferred to another occasion. Both Goethe's *Metamorphose der Pflanzen* and the influence of Spinoza on Goethe have been studied extensively, of course, but I will argue that Goethe's study is suffused with Spinoza's epistemology in specific and important ways that have not been sufficiently realized.

Spinoza accompanied Goethe at every moment of his philosophical career. Even in the second phase, when his influence is not so immediately apparent, Spinoza continued to grow inside Goethe, eventually "blossoming" at the end of Goethe's life. Eckermann's characterization of Goethe's evolving relationship to Spinoza is beautiful and precise:

Einen solchen Standpunkt fand Goethe früh in Spinoza, und er erkennt mit Freuden, wie sehr die Ansichten dieses großen Denkers den Bedürfnissen

seiner Jugend gemäß gewesen. Er fand in ihm sich selber, und so konnte er sich auch an ihm auf das schönste befestigen.

Und da nun solche Ansichten nicht subjektiver Art waren, sondern in den Werken und Äußerungen Gottes durch die Welt ein Fundament hatten, so waren es nicht Schalen, die er bei seiner eigenen spätern tiefen Welt- und Naturforschung als unbrauchbar abzuwerfen in den Fall kam, sondern es war das anfängliche Keimen und Wurzeln einer Pflanze, die durch viele Jahre in gleich gesunder Richtung fortwuchs und sich zuletzt zu der Blüte einer reichen Erkenntnis entfaltete. (Eckermann, *Gespräche mit Goethe*, 28 Feb. 1831)

The influence is especially marked in the first phase of Goethe's philosophical development, culminating in Goethe's thoroughly Spinozist treatise, *Die Metamorphose der Pflanzen* (1790). Except for the much less influential Hamann, Spinoza is the only thinker discussed at any length in Goethe's autobiographical account of his first 25 years, *Dichtung und Wahrheit*. And yet, even late in life, Goethe was unable to explain fully why he had been so drawn to Spinoza as a young man, and quickly became his "leidenschaftliche[r] Schüler" and "entschiedenster Verehrer."⁴ Thus Goethe's attraction to Spinoza would be an example of his "intuitive" grasp of philosophical issues: even though he could not explain exactly why, Goethe was one of the first to recognize and rehabilitate a thinker who had been ostracized from both philosophy and theology for over a century, but would prove crucial to the further development of German Idealism.

Moreover, a recurring pattern in Goethe's scattered, intuitive remarks on Spinoza reveals that it was the centrality of the faculty of intuition, *Anschauung*, that attracted him to Spinoza above all. Goethe's letter to Jacobi of 9 June 1785 is the *locus classicus*, as David Bell summarizes:

Writing to Jacobi on 9 June of the following year [1785] he [Goethe] indicates that he derives great encouragement from Spinoza in his scientific studies, enabling him to perceive God in the natural world, in *rebus singularibus* and in *herbis et lapidibus* (WA 4.7:63, 64). The justification for this indebtedness is made clear in his letter of 5 May 1786, where he argues: "When you say we can only *believe* in God, then I tell you, I set great store by *seeing*." He proceeds to quote Spinoza's definition of the highest kind of knowledge, called intuitive, which proceeds from adequate knowledge of God's attributes to adequate knowledge of things, and continues: "These few words give me the courage to devote my life to the contemplation of those things which I can reach and of whose *essentia formali* I can hope to form an adequate idea" (WA 4.7:214). Goethe clearly identifies his "Anschauung" with Spinoza's intuitive knowledge, and like Spinoza is resigned to knowing relatively few things by this kind of knowledge.⁵

Goethe said famously that the three greatest influences on him had been Spinoza, Shakespeare, and Linnaeus—a puzzling remark, until one realizes that Linnaeus had been an entirely *negative* influence. Initially, Goethe had been excited by Linnaeus's project, carrying the Swedish botanist's text with him at all times like a Bible, but as he tried and continually failed to explain specific forms in Linnaean terms, Goethe slid gradually but inexorably into

what would become a full-blown, Kuhnian “crisis” leading to a “scientific revolution.” From Linnaeus, Goethe learned how *not* to do botany. Spinoza’s philosophy both explained clearly how Linnaeus had gone wrong, and offered the antidote.

What had bothered Goethe about Linnaeus was that his “perception” of plants remained at a very low level of cognition, arguably as low as Spinoza’s first: “I. Perception arising from hearsay or from some sign which everyone may name as he pleases.”⁶ Indeed, Linnaeus was very pleased to be able to attach his own names to species—so much so that he adopted the wildly immodest personal motto *Deus creavit, Linnaeus disposuit*, in which it is not God but Linnaeus who does the “disposing.”

In Spinoza’s terms, Linnaeus’s method of classifying plants according to external features mistakes mere attributes for essences, and hence cannot hope to rise to an adequate understanding of the unity of the plant kingdom. In the same way, Spinoza had criticized Descartes’s notion of extension as static and merely passive, hence a totally inadequate idea of the single, dynamic substance underlying all phenomena.⁷ In his treatise on the spirit (if not always the letter) of Spinoza’s philosophy, *Gott: Einige Gespräche*, Herder captures Spinoza’s inherent dynamism perfectly in many passages, such as the following.

THEOPHRON. Gedenken Sie sich nun alle Naturkräfte in dieser rastlosen Arbeit, in dieser Eile zur Verwandlung auf dem Flügel der Zeit. Kein Teilchen eines Blattes kann einen Augenblick müßig sein, oder es wäre Tod in der Schöpfung. Es zieht an, es stößt hinweg und dunstet aus; darum, Theano, ist das Blatt mit seinen beiden Seiten so verschieden gebildet: immer und ewig wechseln die ihm einwohnenden Kräfte ihre organischen Kleider. Leben ist also Bewegung, Wirkung; *Wirkung einer innigen Kraft, mit dem tiefsten Genuß und Bestreben einer Beharrung verbunden*. Und da im Reich der Veränderung nichts unverändert bleiben kann und doch Alles sein Dasein erhalten will und muß: so ist alles in dieser rastlosen Bewegung, in dieser ewigen Palingenesie, damit es immer daure und ewig-jung erscheine.⁸

Linnaeus, in contrast, ignores the dynamic process to focus arbitrarily on certain external forms. Inspired by Spinoza, Goethe seeks to transcend empirical facts by ascending from *natura naturata* to their creative source in *natura naturans*. The latter cannot be grasped discursively; rather, it must be immediately intuited—perceived through the mind’s eye, in a kind of “inner empiricism” (cf. Förster, “Auge des Geistes”).

And yet, however much Spinoza insists that we must develop this higher mode of knowledge, he is able to give only a surprisingly small number of examples, and those he gives are puzzling. Spinoza’s epistemology seems far removed from the practical needs and applications of scientific inquiry. How can Spinoza’s “intuition” be developed into a reliable and repeatable *scientia intuitiva*? Goethe’s first major scientific treatise, *Die Metamorphose der Pflanzen* (1790), completed hard on the heels of an intensive study of Spinoza and the publication of Herder’s *Gott*, offers a paradigmatic model of just such a method.

Spinoza's Fourth Kind of Knowledge

Our first step must be to clarify what Spinoza meant by “intuitive” knowledge. He gives two main accounts of the various “modes” of knowledge, one in Book II (Proposition XL) of the *Ethics*, the other in a shorter, incomplete, but seminal treatise with the title *On the Improvement of the Understanding*. In the *Ethics*, Spinoza divides human cognition into three categories, while in the shorter treatise he distinguishes four modes. In both texts, however, the highest mode of knowledge is described similarly and termed *intuitive*. For multiple reasons that will emerge below, I find Spinoza's account of this highest mode of knowledge in the treatise *On the Improvement of the Understanding* to be the more compelling and revealing, so I will focus on that text.⁹

Spinoza believed that understanding things in light of intuition was “the highest effort of the mind and its highest virtue” (*Ethics* V, Proposition 25). Kant had denied altogether the possibility of intuiting the whole immediately, asserting that such an *intellectus archetypus* (as he termed it) would be a divine, rather than a human, mode of knowledge. Spinoza did not preclude the possibility of such an attainment, but he did place it beyond the ordinary capacities of the untrained mind:

However, human nature cannot attain to [the eternal order and the fixed laws of Nature] in its own thoughts, but meanwhile man conceives a human character much more stable than his own, and sees that there is no reason why he should not himself acquire such a character. Thus he is led to seek for means which will bring him to this peak of perfection, and calls everything which will serve as such a means a true good. The chief good is that he should arrive, together with other individuals if possible, at the possession of the aforesaid character. What that character is we shall show in due time, namely, that it is the knowledge of the union existing between the mind and the whole of Nature. (Spinoza, *Understanding*, 6)

In order to attain the “much more stable” character requisite for the climb to the “peak of perfection,” it is necessary to “amend” the understanding generally, and specifically, to exercise and enhance one's powers of intuition.

Goethe believed fervently in this possibility as well, despite Kant's insistence that the faculty of intellectual intuition transcends human capacities. As we have seen in his letter to Jacobi of 9 June 1785, he declared pursuit of this mode of cognition to be his life's mission: “So geben mir diese wenigen Worte Muth, mein ganzes Leben der Betrachtung der Dinge zu widmen die ich reichen und von deren essentia formali ich mir eine adäquate Idee zu bilden hoffen kann . . .” (WA 4.7:214). At no point and in no way did Goethe ever agree with Kant's attempt to limit human knowledge, despite Schiller's attempts to shake his convictions. Indeed, the most original and profoundest phase of Goethe's philosophical development commenced with the publication of his anti-Kantian manifesto “Anschauende Urteilskraft” in 1817, where he mockingly alludes to Kant as “der Alte vom Königsberge,” and recommits himself to the Spinozist “Abenteuer der Vernunft” (HA 13:31).

Only the fourth mode of knowledge (which, again, corresponds exactly to the third in the condensed account in Book II of the *Ethics*) is adequate to our cognitive goal, which is “the perception arising when a thing is perceived solely through its essence, or through the knowledge of its proximate cause” (Spinoza, *Understanding*, 8). The sequence of thoughts that follows Spinoza’s claim is, however, unexpected and profound.

Lastly, a thing may be perceived solely through its essence: when, from the fact of knowing something, I know what it is to know that thing. . . . By the same kind of knowledge we know that two and three make five, or that two lines parallel to a third are parallel to one another, etc. The things that I have been able to know by this kind of knowledge are as yet very few. (Spinoza, *Understanding*, 9)

Spinoza then proceeds to give a concrete example of such knowledge, which has come to be called by the algebraic term “the fourth proportional”: “In order that the whole matter may be put in a clearer light, I will make use of a single illustration as follows. Three numbers are given—it is required to find a fourth, which shall be to the third as the second is to the first” (Spinoza, *Understanding*, 9). Tradesmen, Spinoza tells us, will solve such problems by simply applying mechanically a formula they have learned by rote “arbitrarily without proof from their masters” (Spinoza, *Understanding*, 9). More sophisticated thinkers will seek a general rule by solving a simple version of the problem, the solution of which is “self-evident, as in the case of 2, 4, 3, 6”; “when they see that by this process the number is produced which they knew beforehand to be the proportional, they infer that the process always holds good for finding a fourth number proportional” (Spinoza, *Understanding*, 9).

But now comes the greatest surprise. Mathematicians, who know and remember the proof in proposition 19 in the seventh book of Euclid’s *Elements*, and thus can solve this problem easily in principle, “still . . . do not see the adequate proportionality of the given numbers [e.g. if they are large or complex] or, if they do see it [as in the self-evident sequence 2, 4, 3, 6], they see it not by virtue of Euclid’s proposition, but intuitively, without going through any process” (Spinoza, *Understanding*, 9; emphasis mine). One can solve this problem logically, but, surprisingly, Spinoza the consummate rationalist shows no interest in this well-known and well-established possibility. Alexandre Matheron has expressed Spinoza’s dissatisfaction succinctly: “What does the inadequacy of this third mode actually consist of? In the fact that the mathematicians who proceed in this way ‘do not see the adequate proportionality of the given numbers.’”¹⁰ Because they cannot see—i.e., intuit—the “adequate proportionality,” they do not attain to an “adequate idea” of the relationship.

What intrigues Spinoza is that it is possible to perceive the solution immediately, “without going through any process.” Most educated people can do this readily enough with small numbers, but a mathematical genius can intuit much more complex relationships among much larger numbers immediately. One recalls, for example, G. H. Hardy’s anecdote about the great Indian mathematician, Ramanujan.¹¹ Hardy had just returned from London in a taxi

numbered 1729. Entering Ramanujan's room, he expressed disappointment that 1729 was "rather a dull number," to which the genius replied immediately that it was not dull at all: 1729 was the smallest number representable in two ways as a sum of two cubes: $1729 = 1^3 + 12^3 = 9^3 + 10^3$.

In the "fourth proportional," we grasp a tiny corner of a vast fabric, which is the tissue and the text of the universe as a whole. What we see here are the first stirrings of a faculty that, if fully developed—"augmented"—can become a genuine *scientia intuitiva*, a non-discursive, synoptic perception of Nature in its entirety, a thinking of wholeness in its immediacy. Such a thinking may presently exceed our normal capacities, but only because our intuitive faculty remains in a rudimentary state of development, and not because such a mode of knowledge is inherently suprahuman. Spinoza even implies a kind of moral imperative to develop this faculty: because we can imagine such a mind, we can and should *strive to become it*. Or, as I shall argue, we can gradually develop it through the kind of practice Goethe exemplifies in his morphological studies. This notion of science as self-development will take us straight into the heart of Goethe's scientific method: as I have argued elsewhere, Goethe's science is ultimately about "the metamorphosis of the *scientist*."¹²

Spinozist Grounds for Key Concepts in Goethe's Alternative Scientific Method

Several principles fundamental to the alternative scientific method Goethe eventually developed, which might seem otherwise unfounded, can be grounded in Spinoza's philosophy. For example, Matheron's discussion of Spinoza on number illuminates a difficult but central aspect of Goethe's epistemology: his reversal of the valences traditionally assigned to primary and secondary qualities. For Galileo, Locke, et al., the quantitative is objective, and hence primary, whereas secondary qualities are dangerously subjective, and must be banished to the realm of the non-scientific. Following Spinoza, Goethe turns the tables: qualities are substantive, whereas number in itself is completely empty. "Hence it is certain that numbers, contrary to geometrical entities, are nothing in things themselves. Whereas a square table really has the property of being square, two tables do not really have the property of being two: it is we who bestow this property on them" (Matheron 146).

Another aspect would be Goethe's supposed "fear of abstraction" ("Vorwort," *Zur Farbenlehre*, HA 13:317), which can be better understood as part of Goethe's Spinozist project of learning to intuit the essence within and through the real. Like Goethe, Spinoza had insisted that adequate knowledge can be developed only by shunning abstraction and cleaving to "real entities":

Thus we can see that it is before all things necessary for us to deduce all our ideas from physical things—that is, from real entities, proceeding, as far as may be, according to the series of causes, from one real entity to another real entity, never passing from universals and abstractions for the purpose of either deducing some real entity from them or deducing them from some real entity. Either

of these processes interrupts the true progress of the understanding. (Spinoza, *Understanding*, 33)

From passages such as this, it is but a short step to some of the most challenging assertions in Goethe's scientific writings:

Das Höchste wäre: zu begreifen, daß alles Faktische schon Theorie ist. Die Bläue des Himmels offenbart uns das Grundgesetz der Chromatik. Man suche nur nichts hinter den Phänomenen: sie selbst sind die Lehre. (Goethe, *Maximen und Reflexionen*, No. 488);

Das Allgemeine und Besondere fallen zusammen: das Besondere ist das Allgemeine, unter verschiedenen Bedingungen erscheinend. (*Maximen und Reflexionen*, No. 491)

And closest of all to Spinoza's vision of cognitive striving and sublimation:

Es gibt eine zarte Empirie, die sich mit dem Gegenstand innigst identisch macht und dadurch zur eigentlichen Theorie wird. Diese Steigerung des geistigen Vermögens aber gehört einer hochgebildeten Zeit an. (*Maximen und Reflexionen*, No. 509)

Moreover, there is a direct line connecting Spinoza and even Goethe's most forward-looking pronouncement, namely: his assertion in the preface to the *Farbenlehre* that "Jedes Ansehen geht über in ein Betrachten, jedes Betrachten in ein Sinnen, jedes Sinnen in ein Verknüpfen, und so kann man sagen, daß wir schon bei jedem aufmerksamen Blick in die Welt theoretisieren" (HA 13:317), anticipating notions of "perceptual readiness" and "theory-ladenness" in science that would arise only late in the twentieth century.¹³

Using a method too complicated to reproduce or even summarize here, Matheron has worked through Spinoza's problem of the "fourth proportional" intuitively, "without using the rule of three." The method is cumbersome and hence impractical (which is why we prefer to solve such problems at the third level of knowledge), but such matters of convenience are beside the point:

[I]f numbers were *real physical entities*, this knowledge would be ontologically more perfect than the former knowledge. And, even in mathematics, if it could be put to work in a pure state, it would be epistemologically quite superior to the application of the rule of three: it would be *intuitive*, in the quite precise sense that it would allow us to reach the *vision of an essence*. . . . (Matheron 136)

I would contend that what Matheron here calls "the *vision of an essence*," is epistemologically equivalent to what Goethe calls an "Erfahrung höherer Art" ("Der Versuch als Vermittler," HA 13:18). Such experiences are never simply given; they must be called forth from the phenomena by the cognitive activity of the knower. Or, to use the language of Goethe's dialogue "Der Sammler und die Seinigen," what is needed in order to attain such a level of experience is to develop an organ capable of producing the phenomenon!¹⁴ It follows that the fourth degree of knowledge can be more or less fully developed: "What now has to be made precise is that there are *degrees of purity* in the fourth mode

of knowledge: it can be more or less intuitive. For it to be *purely* intuitive, all the stages through which it passes must be equally intuitive" (Matheron 137).

In most of us, this faculty has been developed only to a very low degree. This is why we are (typically) able to find the fourth proportional intuitively only when the numbers are very small.

Moreover, Spinoza sheds light on another of Goethe's profoundest and most difficult scientific concepts: the centrality of self-transformation through a kind of artistic *practice*. In seeking to understand and expand Spinoza's example of the "fourth proportional," Matheron discovers this same ideal at the heart of Spinoza's philosophy: "The whole deductive sequence just summarized [a mathematical algorithm for calculating proportions called *anthyphairesis*] can very readily be made 'intuitive' in either the Cartesian or the ordinary sense of the word. *With a little training, anyone can grasp it with a single glance*" (Matheron 131; emphasis mine).

Die Metamorphose der Pflanzen as Spinozist Science

Goethe begins his argument by distinguishing three kinds of metamorphosis, "*regelmäßig, unregelmäßig, und zufällig.*"¹⁵ Of the three, Goethe asserts that the second is the most revealing. Indeed, just as he would later begin his *Farbenlehre* with the "irregular" *physiologische Farben*, Goethe had begun his treatise with a description of a "proliferated" blossom (*gefüllte Blume*):

So verändert sich zum Beispiel meistens die einfache Blume dann in eine gefüllte, wenn sich anstatt der Staubfäden und Staubbeutel Blumenblätter entwickeln, die entweder an Gestalt und Farbe vollkommen den übrigen Blättern der Krone gleich sind oder noch sichtbare Zeichen ihres Ursprungs an sich tragen. (§2:19)

Retrograde metamorphosis can lead to an immediate, intuitive knowing, an "adequate idea" of the *Krone*, because it displays openly "sichtbare Zeichen ihres Ursprungs":

Die *unregelmäßige* Metamorphose könnten wir auch die *rückschreitende* nennen. . . . Durch die Erfahrungen, welche wir an dieser Metamorphose zu machen Gelegenheit haben, werden wir dasjenige enthüllen können, was uns die regelmäßige verheimlicht, deutlich sehen, was wir dort nur schließen dürfen, und auf diese Weise steht zu hoffen, daß wir unsere Absicht am sichersten erreichen. (§7:21)

Retrograde metamorphosis opens a window on the integral dynamic out of which the individual forms are precipitating. These "phenomena of a higher kind" offer us invaluable aid in ascending from Spinoza's third mode ("nur schließen") to the fourth ("deutlich sehen").¹⁶

Goethe's morphology strives for the transparency of geometry. But to accomplish this within the life-world of plants, Goethe had to re-conceive geometry itself dynamically. Not surprisingly, Spinoza the consummate philosophical geometer provides Goethe with key concepts.

As in the case of the “fourth proportional,” Spinoza’s example of a dynamic geometry in the treatise *On the Improvement of the Understanding* is deceptively simple and hence initially puzzling, but, on reflection, deeply revealing and moving. For Spinoza, all our knowledge must attain the transparency and pure disinterestedness of geometry. Thus he again chooses a mathematical example to illustrate his larger epistemological point, in this case the definition of a circle. To our astonishment, Spinoza rejects the obvious, conventional definition of a circle as hopelessly inadequate. If we are to comprehend Nature as dynamically alive (*natura naturans*) rather than static and passive (*natura naturata*), we must understand the circle not by describing its attributes (however rationally), but by *mentally re-enacting its genesis*:

A definition, if it is to be called perfect, must explain the inmost essence of a thing, and must take care not to substitute for this any of its properties. In order to illustrate my meaning, without taking an example which would seem to show a desire to expose other people’s errors, I will choose the case of something abstract, the definition of which is of little moment. Such is a circle. If a circle be defined as a figure, such that all straight lines drawn from the center to the circumference are equal, every one can see that such a definition does not in the least explain the essence of a circle, but only one of its properties. (Spinoza, *Understanding*, 32)

Substituting external accidents for inherent essences can only lead us astray, for to proceed in this way constitutes “a perversion of the succession of ideas which should reflect the succession of nature” (Spinoza, *Understanding*, 32).

The proper definition, even of something as abstract as a circle, must be dynamic. We must be able to see immediately—intuitively—how it is that the particular phenomenon is generated out of its proximal cause. In a move of breathtaking elegance and profundity, Spinoza proceeds to redefine the circle dynamically:

If the thing in question be created, the definition must (as we have said) comprehend the proximate cause. For instance, a circle should, according to this rule, be defined as follows: the figure described by any line whereof one end is fixed and the other free. This definition clearly comprehends the proximate cause. (Spinoza, *Understanding*, 32).

Could one not say that, relative to the circle, the mobile line is less highly developed, and hence, that Spinoza’s “morphological” definition of the circle is by way of a “retrograde metamorphosis”? Likewise, the “proximate cause” of e.g. the sexual organs of the plant in the forms immediately preceding them in “the succession of nature,” the suite of morphological developments. Goethe’s morphology intuits the “essence” of the plant according to the fourth kind of knowledge. His *Metamorphose der Pflanzen* is truly a *scientia intuitiva*.

Understood in this way, Spinoza’s “dynamic” geometry in this passage can even be seen as anticipating János Bolyai’s mathematical breakthrough during the 1820s that allowed him to invent non-Euclidean geometry. Bolyai’s

crucial insight was that the line to be constructed parallel to any given line in Euclid's notoriously unproved eleventh axiom ("the parallel postulate") could be reconceived "asymptotically," as the limiting position of a line rotating dynamically about a point outside the original line.¹⁷ Bolyai's *Science Absolute of Space* (as Halsted translates the Latin title) conjured forth a whole world "out of nothing" (Gray 52), in which Euclidean plane geometry turns out to be really only a special case of a more universal non-Euclidean geometry inscribed on the surface of a sphere—opening the door ultimately to Einstein's notion of a curved space-time. Another, analogous breakthrough foreshadowed by Spinoza's dynamic geometry would be Carl Friedrich Gauß's redefinition of the plane in 1829 as a "surface generated by rotating a straight line around an axis with which it formed right angles" (Gray 109).

Like Spinoza's, Goethe's method is deeply imbued with the spirit of mathematics. Over and over, Goethe emphasizes the need to contemplate the metamorphosis of the plant "forwards and backwards," because only then does the inner identity of the superficially divergent become clear. The plant is "commutative" in the mathematical sense because *natura naturans* is outside of time: from the higher perspective of intuition, the order of operation is merely an attribute, not an essence. "Time is [for Spinoza] simply an abstraction formed by the arbitrary division of duration and is therefore a mode of thought existing in the imagination. Eternity, which is indivisible and time-less is conceivable only through the intellect. It is therefore absurd to attribute time in any sense to God" (Bell, n. 5, 122). When placed within the context of Spinoza's mathematical epistemology, a new and profound meaning emerges from Goethe's otherwise cryptic claim: "Vorwärts und rückwärts ist die Pflanze immer nur Blatt."¹⁸

Although Goethe joins Herder in rejecting argumentation *more geometrico*, his morphology is everywhere imbued with the spirit of such intuitively grounded mathematics, and it should not surprise us to learn that during the period of intense preoccupation with Spinoza leading up to the publication of *Die Metamorphose der Pflanzen*, Goethe was studying algebra intensively under the guidance of a professor at the University of Jena. Hence one of his most surprising analogies, entirely in the spirit of Spinoza, compares morphological transformations to algebraic functions that one needs to master and learn to apply properly:

Wir sind überzeugt, daß mit einiger Übung es nicht schwer sei, sich auf diesem Wege die mannigfaltigen Gestalten der Blumen und Früchte zu erklären; nur wird freilich dazu erfordert, daß mit jenen oben festgestellten Begriffen der Ausdehnung und Zusammenziehung, der Zusammendrückung und Anastomose wie mit algebraischen Formeln bequem zu operieren und sie da, wo sie hingehören, anzuwenden wisse. (§102:68)

What "algebraic formula" could Goethe have in mind here other than the "fourth proportional," Spinoza's prime example of *scientia intuitiva*?

Surely it is no accident that the single most important passage on the *Urpflanze* is to be found in a letter of 17 May 1787 to Herder, the great champion of Spinoza, who had recently published *Gott: Einige Gespräche* and sent it to Goethe:

Ferner muß ich dir vertrauen, daß ich dem Geheimnis der Pflanzenzeugung ganz nahe bin und daß es das einfachste ist, was nur gedacht werden kann. Die Urpflanze wird das wunderlichste Geschöpf von der Welt, um welches mich die Natur selbst beneiden soll. Mit diesem Modell und dem Schlüssel dazu kann man alsdann noch Pflanzen ins unendliche erfinden, die consequent sein müssen, d.h. die, wenn sie auch nicht existieren, doch existieren könnten und nicht etwa malersiche oder dichterische Schatten und Scheine sondern eine innere Wahrheit und Notwendigkeit haben.

The Spinozist resonance of “consequent” and “innere Wahrheit und Notwendigkeit” is unmistakable. And one might have said the same—“das einfachste, was nur gedacht werden kann”—of Spinoza’s “fourth proportional” and his “dynamic” definition of the circle.

Moreover, the claim to be able to invent “properly constructed” plants after having found the *Urpflanze* might well be a direct reflection or recollection of the following passage in the treatise *On the Improvement of the Understanding*:

As regards that which constitutes the reality of truth, it is certain that a true idea is distinguished from a false one, not so much by its extrinsic object as by its intrinsic nature. If an architect conceives a building properly constructed, though such a building never may have existed, and may never exist, nevertheless the idea is true; and the idea remains the same, whether it be put into execution or not. (Spinoza, *Understanding*, 23)

It is a strong metaphor that likely would have struck Goethe and stayed with him. Although the language is different, Spinoza expresses the same idea in Book One of his *Ethics*: “Hence we can have true ideas of non-existent modifications, since, although they may not actually exist outside the intellect, their essence nevertheless is so comprehended in something else that they may be conceived through it” (Spinoza, *Ethics*, 45).

Everywhere Goethe makes it clear that ultimate scientific objective is to make the phenomena as immediately transparent as Spinoza’s simple example of the fourth proportional. What finally persuades us of the inner identity we seek is always the immediate intuition, *Anschaulichkeit, der Augenschein*:

Auf diese Weise wird es uns nun anschaulich sein, wie *die um einen gemeinsamen Blütenstand entwickelten Samen wahre, durch die Wirkung beider Geschlechter ausgebildete und entwickelte Augen seien*. Fassen wir diesen Begriff fest und betrachten in diesem Sinne mehrere Pflanzen, ihren Wachstum und Fruchtstände, so wird der Augenschein bei einer Vergleichung uns am besten überzeugen. (§100:68)

War ich bisher bemüht, die innere Identität der verschiedenen nacheinander entwickelten Pflanzenteile bei der größten Abweichung der äußern Gestalt, soviel es möglich gewesen, anschaulich zu machen . . . (§67:53)

Ferner sehen wir bei mehreren Blumen unveränderte Stengelblätter gleich unter der Krone zu einer Art von Kelch zusammenrückt. Da sie ihre Gestalt noch vollkommen an sich tragen, so dürfen wir uns hier nur auf den Augenschein

und auf die botanische Terminologie berufen, welche sie mit dem Namen *Blütenblätter*, *Folia floria*, bezeichnet hat. (§34:36)

Goethe ends his treatise with apologies for its shortcomings, but expresses the hope, “diese Materie in der Folge genauer und umständlicher abzuhandeln, um diese Vorstellungsart *anschaulicher* zu machen . . .” (§123:80; emphasis mine). Conversely, when Nature hides its secrets on the surface, she “rückt uns . . . diese Blattähnlichkeit *aus den Augen*” (§78:58; emphasis mine). As for Spinoza, the intuitive knowledge Goethe seeks in *Die Metamorphose der Pflanzen* transcends both imagination and rationality: “Alles, was wir bisher nur mit der Einbildungskraft und dem Verstande zu ergreifen gesucht, zeigt uns das Beispiel einer durchgewachsenen Rose auf das deutlichste” (§103:71).

Spinoza’s distinction between *natura naturans* and *natura naturata* is the key to the solution of the Zen-like riddle that has bedeviled literal-minded commentators on *Die Metamorphose der Pflanzen* since its publication, namely Goethe’s repeated insistence that all the diverse organs of the plant are one and the same organ:

Es mag nun die Pflanze sprossen, blühen oder Früchte bringen, so sind es doch nur immer *dieselbigen Organe*, welche in vielfältigen Bestimmungen und unter oft veränderten Gestalten die Vorschrift der Natur erfüllen. Dasselbe Organ, welches am Stengel als Blatt sich ausgedehnt und eine höchst mannigfaltige Gestalt angenommen hat, zieht sich nun im Kelche zusammen, dehnt sich im Blumenblatte wieder aus, zieht sich in den Geschlechtswerkzeugen zusammen, um sich als Frucht zum letztenmal auszudehnen. (§115:78)

A few paragraphs later, Goethe refers to the *Urpflanze* in the same spirit as “dieses in so verschiedene Gestalten metamorphosierte Organ” (§120:79). The plant is, if not the sound of one hand clapping, the various sculptures formed by one hand shaping. The plant is disunified only as *naturata*—only as a sequence of differing organs unfolding through time. But inwardly, *der Idee nach*, the plant is a single, dynamic process. Likewise, Goethe refers to “die innere Identität der verschiedenen Pflanzenteile” (§60:50). If one turns away from mere attributes (the circle as the set of points equidistant from any single point) towards the essence (the circle as generated by a line with one fixed and one mobile point), one can see intuitively how each organ is generated directly out of the previous organ.

Indeed, one of Goethe’s key passages—arguably the climax of his entire argument—is to my mind a direct allusion to Spinoza’s dynamic definition of the circle—the circle *naturans*, as it were:

Die Natur bildet einen *gemeinschaftlichen Kelch* aus *vielen* Blättern, welche sie aufeinander drängt und um *eine* Achse versammelt, mit eben diesem stark- en Triebe des Wachstums entwickelt sie *einen* gleichsam *unendlichen Stengel*, mit *allen seinen Augen in Blütengestalt, auf einmal, in der möglichsten* aneinander gedrängten *Nähe*, und jedes Blümchen befruchtet das unter ihm schon vorbereitete Samengefäß. (§99:67)

Note Goethe’s insistence here that the moment of deepest intuition arises when the phenomena appear “*in der möglichsten* aneinander gedrängten

Näbe." As Spinoza says so clearly in his treatise *On the Improvement of the Understanding*, intuitive knowledge requires immediate experience of the *proximate cause*. One needs proximity, just as one needs a simple, tight, *anschaulich* sequence in order to see immediately the value of the fourth proportional. Where the gaps in the continuous suite of leaves is smallest, the underlying unity of the developmental process is "in die Augen fallend," and thus "außer allem Zweifel gesetzt" (§46:42).

In light of Spinoza's influence, one is struck by Goethe's repeated invocation of the notion of anastomosis. This standard botanical term is usually taken to refer to the (for Goethe mysterious and revealing) process whereby e.g. separate parts of the vascular system of the plant will grow towards each other and eventually join (etymologically, "mouth-up" or "kiss-up"), much as two teams of bridge builders will sometimes begin on opposite banks of the river and meet in the middle. But Goethe reads the process as revealing, intuitively, the inner identity of the plant. For Goethe, anastomosis is enacted, displayed synthesis, *natura naturans* made visible. He goes further, extending the concept from the growth of the plant to its reproduction: "[S]o sind wir nicht abgeneigt, die Verbindung der beiden Geschlechter eine geistige Anastomose zu nennen, und glauben wenigstens einen Augenblick die Begriffe von Wachstum und Zeugung einander näher gerückt zu haben" (§63:51). Again, the inner identity of two seemingly disparate processes, growth and reproduction, is revealed to a Spinozist intellectual intuition.

The fourth proportional is like the streaks of the tulip in Goethe's text. In order for phenomena to become intuitive—in order for us to be able to see, immediately, that the preceding form in a graded series is the proximate cause of the following, and that both are both expressions of a single, underlying essence, the gap needs to be sufficiently small, as in Spinoza's mathematical example. Seeing the relationships between large numbers is like trying to relate acorns to the crowns of oak trees:¹⁹ we can learn abstractly that they are both expressions of a single species, but we cannot see it intuitively unless we follow the suite of intermediate forms dynamically.

Goethe's argumentative strategy in *Die Metamorphose der Pflanzen* is to draw our attention to instances in which the transition is nearly fluid, as e.g. in the transition between corolla and pistil in the iris (*canna iridiflora*), where part of the edge of the blossom petal separates out and gradually rolls itself up into the shape of a filament (§§46–47; see also §§ 40, 42, and 44). The point is not to collect empirical facts, and emphatically not to abstract from observed phenomena: rather, Goethe has given us a kind of primer in which we can learn to read forms. Goethe used the same metaphor of learning to read in describing to Charlotte von Stein his own progress as a botanist: "Wie lesbar mir das Buch der Natur wird, kann ich dir nicht ausdrücken, mein langes Buchstabieren hat mir geholfen, jetzt wirkt's auf einmal und meine stille Freude ist unaussprechlich" (letter of 15 May 1785). Beginners that we are, we must start with elementary problems—our botanical 2:4::3:x—as a way of exercising our synthetic muscles, and gradually becoming strong enough to bridge larger gaps. In his *Metamorphose der Pflanzen*, Goethe has given us neither a school for sensation, nor a school for abstract thinking,

but rather a school for the practice of Spinozist *scientia intuitiva* to the end of enhancing our synthetic faculties as such.

The University of Michigan, Ann Arbor

NOTES

1. It is a misunderstanding to claim that Goethe lacked interest or sophistication in philosophy; but it is true that he was not at all interested in pursuing a certain *kind* of philosophy. "Womit Goethe in der Tat seine Mühe hatte, war die discursive Art des Denkens, welche die Philosophen seiner Zeit pflegten. Sein Interesse galt einem Denken, das er selbst als anschauendes Denken bezeichnete" (Eckart Förster, "Goethe als Philosoph," *Die Drei: Zeitschrift für Anthroposophie in Wissenschaft, Kunst, und sozialem Leben* 6 [2008]: 9-19; here 9).

2. By "Realist" I mean something like the medieval sense of the word: Goethe understands Spinoza's "essences" as creative *universalia ante rem*.

3. See the brief discussion of the parallels with Fichte's epistemology in my article "The Metamorphosis of the Scientist," *Goethe-Yearbook* 5 (1990): 187-212. Rpt. in *Goethe's Way of Science*, ed. and intro. Arthur G. Zajonc, *Dwelling, Seeing and Designing: Toward a Phenomenological Ecology* (Ithaca, NY: SUNY P, 1998). Several excellent studies on the relationship between Goethe and Fichte have been published more recently, notably: Eckart Förster, "Da geht der Mann, dem wir alles verdanken!": Eine Untersuchung zum Verhältnis Goethe-Fichte," *Deutsche Zeitschrift für Philosophie* 45 (1997): 331-44; Wolf von Engelhardt, ed., *Goethes Fichtestudien: Faksimile-Edition von Goethes Handexemplar der Programmschrift Über den Begriff der Wissenschaftslehre* (Weimar: Verlag Hermann Böhlhaus Nachfolger, 2004); and Serenella Iovino, "'Ich ist Nicht-Ich = Alles ist Alles'—Goethe lettore della Wissenschaftslehre," *Studi germanici* 38 (1997): 167-92.

4. "[D]avon wüßte ich keine Rechenschaft zu geben" (*Hamburger Ausgabe* [henceforth "HA"] 10:35).

5. David Bell, *Spinoza in Germany from 1670 to the Age of Goethe*, Bithell Series of Dissertations 7 (London: Institute of Germanic Studies, University of London, 1984) 162.

6. Benedict de Spinoza, *Ethics preceded by On the Improvement of the Understanding*, ed. and intro. James Gutmann, Hafner Library of Classics 11 (New York: Hafner Publishing Co., 1949) 7.

7. David Savan, "Spinoza: Scientist and Theorist of Scientific Method," in *Spinoza and the Sciences*, ed. Marjorie Grene and Debra Nails, Boston Studies in the Philosophy of Science 91 (Dordrecht: D. Reidel, 1986) 95-124; here 103: "A sound physics must study extension as an active and dynamic expression of the free causal power of nature (*natura naturans*)."

8. Johann Gottfried Herder, *Gott: Einige Gespräche*, in his *Schriften zu Philosophie, Literatur, Kunst und Altertum 1774-1787*, ed. Jürgen Brummack and Martin Bollacher, *Werke in zehn Bänden* (Frankfurt am Main: Deutscher Klassiker Verlag, 1994) 4:679-794; here 790).

9. Cf. Eckart Förster's important article, "Goethe and the 'Auge des Geistes'" (*Deutsche Vierteljahrsschrift für Literaturwissenschaft und Geistesgeschichte* 75 [2001] 87-101), which adduces the more familiar discussion in the *Ethics* of the

nineteenth proposition in book seven of Euclid's *Elements* (96) as an explication both of Goethe's attraction to Spinoza and of the epistemology implicit in Goethe's scientific work generally. I agree wholeheartedly with Förster's conclusion that Spinoza's discussion in the *Ethics* is meant to characterize *scientia intuitiva* as simultaneously discursive and intuitive, in that it "derives from one idea (or mathematical proof) what is essential for all cases that fall under it" (96). However, as argued in detail below, I read the passage in Spinoza's treatise *On the Improvement of the Understanding* to mean something quite different, and more directly applicable to Goethe's *Metamorphose der Pflanzen*. I see our readings as complementary rather than contradictory.

10. Alexandre Matheron, "Spinoza and Euclidean Arithmetic: The Example of the Fourth Proportional," in *Spinoza and the Sciences*, ed. Marjorie Grene and Debra Nails, Boston Studies in the Philosophy of Science 91 (Dordrecht: D. Reidel, 1986) 125–50; here 133.

11. G. H. Hardy, *A Mathematician's Apology* (London: Cambridge UP, 1967) 37.

12. Frederick Amrine, "The Metamorphosis of the Scientist," *Goethe Yearbook* 5 (1990): 194.

13. The former concept is from the work of Jerome Bruner; the latter from the seminal study *Patterns of Discovery* by N. R. Hansen, which was a direct and profound influence on Thomas Kuhn's *Structure of Scientific Revolutions*.

14. *Ich.* Zu jeder Erfahrung gehört ein Organ.

Gast. Wohl ein besonderes?

Ich. Kein besonderes, aber eine gewisse Eigenschaft muß es haben.

Gast. Und die wäre?

Ich. Es muß produzieren können.

Gast. Was produzieren?

Ich. Die Erfahrung! Es gibt keine Erfahrung, die nicht produziert, hervorgebracht, erschaffen wird. (HA 12:85)

This text, which was published in 1799, shows clear signs of Fichte's influence in helping Goethe to overcome Schiller's Kantian objections, and gain clarity regarding the role of the subject in cognition. Goethe would not have been able to make such an incisive and forceful statement a decade earlier. But the seeds of this later flowering of German Idealism are clearly latent in Spinoza's philosophy.

15. §5:20. All reference will be to the edition of *Die Metamorphose der Pflanzen* published by Verlag Freies Geistesleben, which is doubly attractive in that it provides both excellent illustrations and the outstanding introduction and notes by Rudolf Steiner. An excellent, new edition was published in 2009 by MIT Press, which reprints Douglas Miller's definitive English translation, and illustrates it with striking color photographs by Gordon L. Miller.

16. Herder makes precisely the same point in his treatise on Spinoza: "Das Dasein eines Wesens kann, wie mich dünkt, nur durch Wesen und durch die Anschauung derselben, nicht durch willkürliche Begriffe und leere Worte erkannt werden, so wenig als es durch diese auch weggeräumt werden mag. . . Wir sind Menschen und als solche, dünkt mich, müssen wir Gott kennen lernen, wie er sich uns wirklich *gegeben* und geoffenbart hat. Durch Begriffe empfangen wir ihn nur als einen Begriff, durch Worte nur also ein Wort; durch Anschauungen der Natur aber, durch den Gebrauch unserer Kräfte, durch den Genuß unsres Lebens genießen wir ihn als wirkliches Dasein voll Kraft und Leben" (Herder [n. 8] 765).

17. Jeremy J. Gray, *János Bolyai, Non-Euclidean Geometry, and the Nature of Space* (Cambridge, Mass: Burndy Library, 2004) 50.
18. Letter from Naples of 17 May 1787; quoted by Rudolf Steiner in his commentary on page 78 of *Die Metamorphose der Pflanzen*.
19. Hegel famously uses just this metaphor in the “Vorrede” to his *Phänomenologie des Geistes* to describe the ultimate goal of philosophy. The influence of Goethe’s *Metamorphose der Pflanzen* on Hegel’s *Phänomenologie* was deep and pervasive.

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