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Comments on Danielle Macbeth's *Realizing Reason: A Narrative of Truth and Knowing*

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Here is *Realizing Reason*'s (henceforth RR) principal claim: reason is a *power of knowing*, but 'only *after* reason is realized as a power of knowing is it possible to recognize the process of its realization as such' (RR 1, my emphasis). What is required for this recognition, according to Macbeth, 'is a narrative of our intellectual maturation and growth, one that, if successful, will change a reader's way of looking at things' (RR vii). I think the book has succeeded: it has certainly changed my way of looking at things. I will try to give a brief summary of the decisive turning points that punctuate its narrative before asking about the nature of the *afterwardness* implied by reason's necessarily retrospective recognition of its own power of knowing.

The process of maturation narrated by Macbeth unfolds through three successive stages of cognitive directedness towards the world, each of which encapsulates a distinct version of the part/whole, mind/world relation. The first stage is the ancient Greek paradigm according to which knowing is a power of *perception* proper to rational animals as distinct forms of life endowed with characteristic powers. Thought is in touch with the things themselves via perception because mind and world form an *essential unity*, 'the parts of which can only be understood relative to the whole' (RR 295). Thus what is puzzling for the Greeks is how perception can *fail* to perceive rightly, not how it can succeed. But this equation of knowledge with perception generates a difficulty when it comes to accounting for mathematical knowledge. Just as it is obvious for Plato that mathematical knowledge involves the perception of supersensible objects, it is equally obvious for Aristotle that mathematical objects do not exist other than as intellectually abstracted from sensible substances. The difficulty is that of accounting for intelligible truth in terms of a model of knowledge modeled on sensory perception. Macbeth puts the difficulty as follows:

> Plato is right: no adequate account of mathematical truth can be achieved unless we recognize that mathematicians in their practice somehow transcend the sensory world of ever-changing things. But so is Aristotle: no adequate account of mathematical knowledge can be achieved by talk of mathematicians transcending, in their practice, the sensory world of becoming. (RR 104)

This problem, Macbeth maintains, will only be resolved with the full realization of reason's power of knowing. The Euclidean diagram is the first decisive step towards this realization, prefiguring the solution that will only emerge fifteen centuries later. Macbeth discerns in Euclid's diagrams a provisional

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attempt to overcome the rift between sensible knowledge and supersensible truth: constructing the intelligible within the sensible, the diagram bridges the gap between the sensible and the supersensible, providing a medium for reasoning that does not picture objects but rather formulates the *content* of concepts. The Euclidean diagram does not present instances of kinds but icons with inherently general, non-natural meanings: it 'does not instantiate content but formulates it' (RR 86).

The second stage of Macbeth's narrative is inaugurated with the early modern paradigm of knowing as a power of *understanding* proper to the mind, now defined by Descartes as a thinking substance. The immediacy of sensory perception is deemed unreliable vis-à-vis the clarity and distinctness of mental representations that are judged to be true through an act of will. Objects are no longer instances of kinds but outward manifestations of underlying intelligible laws:

> The law is independent of the objects it governs, something in its own right that can be expressed, using two or more unknowns, in the symbolic language of algebra; and it is grasped in pure thought. The law in this way both underlies and explains the appearance of, say, circles, their characteristic symmetries. (RR 140)

The new paradigm overturns the ancient conception according to which places make up space. With Descartes, space becomes an 'antecedently given whole of possible positions within which objects, landmarks, may but need not be placed, each independent of all the others' (RR 136). The conceptual understanding of relations between independent magnitudes, now encoded in the purely symbolic language of algebra, supplants the diagrammatic exhibition of intelligible properties. In this new paradigm, at once mechanicist and reductionist, mind and world form a merely *accidental unity*, 'the parts of which are fully intelligible prior to and independent of the whole' (RR 295). This is the beginning of what Macbeth, following McDowell, calls the 'sideways on' view, in which the meaningful interiority of mind, or space of reasons, is juxtaposed against the meaningless exteriority of matter in motion, the realm of causes. While the contrast between inside and outside, reasons and causes, is perfectly intelligible from within this modern paradigm of understanding, it is also (and paradoxically) irreducible since there is no reason from whence to deduce inside from outside, reasons from causes, or vice versa. Here Macbeth diagnoses the inception of an intractable dichotomy that continues to stymie much contemporary philosophizing. As we shall see, the question is whether it can be overcome without regressing to the pre-modern fusion of reasons and causes; a fusion which would require leveling the modern ontological rift between subjective intention and objective causality. Macbeth's stance is modernist (commendably so) precisely insofar as she proposes rationally overcoming the rift between inside and outside without re-infusing objectivity with subjectivity.

Kant is a Janus-faced figure at this second stage of Macbeth's narrative. On the one hand, he completes Descartes' tentative separation of thinking from sensing by firmly distinguishing between sensibility, the source of intuited particularity,

and understanding, the source of conceptual generality, as the two sources of knowledge. Only concepts applied to sensible intuitions yield knowledge of objects. On the other hand, and unlike Descartes, Kant sees that the spontaneity of conceptual understanding is fulfilled by the receptivity of sensible intuition: the understanding's active power of knowing can only be actualized through the passivity of sensibility: 'Spontaneity, the active power of judgment […] is […] a kind of expressive freedom, the power not to make something into something but fully to actualize something that already is, to make manifest what is otherwise latent' (RR 192). But for Macbeth this Kantian insight, straining against Descartes' dualism of thought and extension, is limited because Kant's distinction between transcendental form and empirical content retains something of the 'sideways on' view: since sensory experiences are caused in us by things outside us that we cannot experience, we cannot be directly answerable to the things that cause our experiences, only to our representations of things as they appear to us. As a result, the power of judgment to actualize knowing and to put us in touch with things as they are is hindered by Kant's transcendental idealism. Newton's mathematized nature is nature for us, not in itself. The content of mathematical propositions can be decomposed into an intuitive component deriving from the forms of sensibility, and a universal component deriving from the concepts applied to those intuitions. Mathematical construction is the application of conceptual generality to sensible intuition. Macbeth summarizes Kant's account of mathematical reasoning as follows:

> Reasoning in mathematics, on Kant's account, involves the two-dimensional display of the contents of mathematical concepts, concepts such as that of a triangle or circle in a Euclidean diagram, and that of a sum of squares or a product of sums in Descartes' symbolic language. And because such displays can be combined into larger wholes that can in turn be reconfigured, either perceptually as in Euclid or by rewriting as in Descartes' algebra, new relations among concepts can be discovered in the course of mathematical reasoning in these systems of written signs. Such results are synthetic, that is, ampliative, real extensions of our knowledge, and also a priori, necessary and strictly universal, just as Kant says. (RR 165)

The synthetic or ampliative component of mathematical knowledge ultimately derives from sensibility, while its necessary and universal component comes from the understanding. It is this perceptual constraint on knowledge that reason is compelled to overstep. Kant limits the grasp of the concept to the empirical, barring it from reality in itself. Pure reason, unconstrained by sensibility, is demoted, becoming the source of transcendental illusion. But Macbeth argues that Kant's compromise was shattered in the course of the nineteenth century when both mathematics and physics began to systematically relinquish sensible intuition: the former to become a pure 'thinking in concepts' with Riemann and Dedekind, the latter to transform the relative into a portal onto the absolute with the advent of general relativity and quantum mechanics.

The third stage, and the proper culmination of scientific modernity according to Macbeth, is knowing as a power of *reason* exercised in and through concepts alone. Reason is purged of the recourse to intuition and realizes itself as a pure 'thinking in concepts'. Macbeth credits Frege with forging the resources required to achieve this purification. By making a 'distinction of distinctions' between sense (*Sinn*) and signification (*Beudeutung*) on one hand, and concepts and objects on the other, Frege overcomes Kant's opposition of concept to intuition and of logical form to semantic content as well as his conflation of objects and objectivity. Sense is objective, but not object-bound. Logic is concerned with content, not just form. Thus, on Macbeth's account, Frege's mathematization of logic is not only the mathematization of sense but also its ontologization: 'Fregean sense (*Sinn*) is that through which, as the medium or vehicle of awareness, we are in direct cognitive contact with reality' (RR 448). Since concepts have referents as well as senses, we need to acknowledge their reality and objectivity as well as that of objects. Reason allows us to uncover different dimensions of sense just as perception allows us to uncover different features of objects.

The sense/signification, concept/object pairs of distinctions are put to work in Frege's 'concept-script', a mathematical language that permits the ampliative and discursive elaboration of the content (sense) of concepts, now conceived as intelligible unities. An *intelligible unity*, says Macbeth, is 'something that possesses independently intelligible parts but is also a whole that is not merely reducible to its parts' (RR 291). Frege's concept-script allows us to express 'the inferentially articulated content of concepts in a way that enables deductive proofs' (RR 378). Proofs employing linear and joining inferences are essential unities; they employ the laws of logic alone to move from one proposition to the next. For Macbeth Frege's proof of theorem 133 in his *Begriffschrift* is precisely such an intelligible unity: 'The proof is a whole, a unity, because its steps are necessary, deductively valid. But because some of its steps are not logically necessary, the proof also has real parts' (RR 399). The necessity at issue is not just logical because it involves rules depending on the *definitions* (i.e. the senses) of concepts.

Thus Macbeth's contention is that logic does not just pertain to form; it is a *contentful* science: the science of concepts qua concepts. Moreover, Macbeth suggests, acknowledging the objectivity of sense allows us to understand how mathematics can have cognitive purchase on reality. Thus Frege's logical work reconnects with the Aristotelian model of science as pertaining to domains of being. Indeed, as Macbeth shows, Frege explicitly espouses the Aristotelian model of science, according to which a system of concepts and judgments constitutes a science just in case:

- All those concepts and judgments concern a certain domain of being(s).
- Among the concepts, some are primitive and the rest are defined by appeal to those primitive concepts.
- Among the judgments, some are primitive and the remainder are proven as theorems from those primitive judgments.

- The judgments of the science are true, necessary, and universal.
- The judgments are known to be true, either directly or through proof.
- The concepts are adequately known, either directly or through definitions. (RR 386)

Interestingly however, on Macbeth's account it is precisely this pre-modern Aristotelian model that provides Frege with a criterion of cognitive fallibility consonant with the modern post-Kantian conception of reason as a 'self correcting enterprise'. For Frege, it is

> only by adhering to the [Aristotelian] model and thereby making as explicit as one can just how one understands things to be that one is put in a position to discover that one does not know something one had thought one knew. (RR 375)

Moreover, Macbeth continues,

> we discover those imperfections in our understanding by reasoning on the basis of concepts insofar as we understand them, that is, grasp the senses through which they are disclosed. But such a process of reasoning can reveal imperfections [in Frege's words] 'only . . . if the content is not just indicated but is constructed out of its constituents by means of the same logical signs as are used in the computation.' (RR 377)[1]

Interestingly, this form of logical fallibilism is importantly unlike the brand of skepticism inspired by the 'sideways on' view. The objectivity of concepts is independent of objects. Moreover, because conceptual senses are the condition of access to objects, concepts cannot be held accountable to objects as though these directly indexed non-conceptual reality. Thus, unlike skepticism, fallibilism does not hold concepts accountable to a notion of 'things being otherwise' that is simply a vacuous possibility abstracted from the way we take them to be.

The upshot is that mathematical language is not an empty formalism; yet nor does it derive its content from sensible intuition. It is a priori yet fallible, and it yields 'knowledge of concepts of various sorts of entities; it is most immediately the medium of our cognitive grasp of mathematical concepts' (RR 448). As deployed in fundamental physics, Macbeth insists, those concepts enable us to discover how things are for all rational beings, not just how they appear to us. In general relativity and quantum mechanics, the relative is that *through which* we have access to the absolute. These theories are not mathematical models representing an underlying physical reality: the mathematics are disclosive of the structure of reality as such, 'not what matter is "made of" but what it *is* in its own nature' (RR 442, my emphasis). Thus, 'the mathematics of Einstein's relativity directly discloses to pure thought a fundamental aspect of reality, namely, the space-time field that is the cosmos' (RR 433). Similarly, Macbeth suggests, quantum theory discloses 'evolutionary time' as another fundamental aspect of reality. A process in evolutionary time is such that 'there is no fact of the matter regarding what is now going on except in the light of what will be, how things in fact turn out' (RR 443). To say that quantum processes occur in evolutionary time is to say that

> what state a system is in now is a function not only of the past, including past measurements on it, but also of the future, what measurements will be made, how things will turn out. By measuring we thus can bring it about that something in particular was true in the past in much the way the emergence of some species brings it about that it was the case in the past that the evolution of that species was taking place. (RR 445)

This speculative proposal, coming as it does in the book's final section, forges an extremely suggestive link between natural and historical being. Evolutionary time is the time in which we can determine what has been only once we know how things *will have* turned out. Only once a potential has been realized can the process of its actualization be retroactively traced. It is the book's confidence in the actualization of reason's power of knowing that provides the condition for its reconstruction of the process through which that potential came to be realized. Moreover, although this involves a critical reconstruction of modernity's 'sideways on' perspective on mind and world, it is equally critical of attempts to abandon the project of modernity and recover a more authentic relation to the world by returning to Aristotle:

> We cannot merely turn our backs on the practice of science, directly recover a more Aristotelian conception of our being in the world, because we know as Aristotle did not that we (and other living beings) are not natural in precisely the way that non-living things are natural. (RR 447)

That the book repurposes the critique of Cartesianism to serve the realization of modern reason is among its most striking achievements.

I will conclude with two questions suggested by Macbeth's narrative. The first is about the link between potentiality and nature. In Aristotle, potentiality is circumscribed by essence: what something can become depends upon what it essentially is: this is its nature. But this essential being is its actuality; essence is what substance always already has been. One of the things that Heidegger does in *Being and Time* is propose a notion of potentiality unconstrained by any essence understood as a past actuality: this is Dasein's existence as 'pure potentiality to be' (*Seinkönnen*), which Dasein realizes by relating to its future in a way that transforms both its past and its present. This rearticulation of past, present, and future – transforming what has been into what will have been – is the key to historical being for Heidegger. It is also what distinguishes historical being from natural being: the human potentiality to be is historical precisely because it is unnatural. To exist historically is to exist in a state of perpetual 'afterwardness', in which what has been depends on what will be. Is the account of evolutionary time sketched in *Realizing Reason* one way of reconnecting nature and history? If so, is the afterwardness through which reason retrospectively establishes its own history natural after all? This would mean that science transforms our understanding of history as much as history transforms our understanding of science.

The second question is about concepts and history. Given its rejection of Kantian transcendentalism and its defense of the objectivity and reality of concepts, *Realizing Reason* seems sympathetic to Hegelian rationalism, wherein subject and object are reciprocally articulated to achieve a 'mediated immediacy' (a phrase Macbeth reiterates throughout the book). Some of Macbeth's formulations are certainly redolent of Hegel: 'The radical otherness of the world, its full objectivity, completes the spontaneity of thought, in just this way that the spontaneity of thought and the objectivity of the world form an intelligible unity' (RR 451). However, for Hegel, this unity is never permanent because of the irreducible dissonance between spontaneity and objectivity. Their relation is marked by a negativity which is the source of their difference, but also of their identity. This dissonance fuels history (Hegel's 'highway of despair'). Moreover, Hegel inscribes concepts into history while injecting becoming into concepts, so that while his *Phenomenology* charts the successive shapes of spirit, his *Logic* charts the internal development and transformation of concepts. This stands in stark contrast to Frege's anti-historicism, which Macbeth emphasizes using Frege's own words:

> A logical concept does not develop and it does not have a history . . . If we said instead 'history of attempts to grasp a concept' or 'history of the grasp of the concept', this would seem to me much more to the point; for a concept is something objective: we do not form it, nor does it form itself in us, but we seek to grasp it, and in the end we hope to have grasped it, though we may mistakenly have been looking for something when there was nothing. (Frege, 'On the Law of Inertia', quoted in RR 377)

Although both Hegel and Frege espouse forms of conceptual realism, Frege's anti-historicism about concepts is more Platonic than Hegelian. My question is whether Macbeth's apparent endorsement of Frege's anti-historicism conflicts with her claim that reason becomes, that it needs history to realize its own power. I take Macbeth's fundamental contention to be that the realization of reason is an evolutionary process. Recall that for Macbeth, an evolutionary process is one such that 'there is no fact of the matter regarding what is now going on except in the light of what will be, how things in fact turn out' (RR 443). If reason unfolds in evolutionary time, if its realization *takes time*, then the truth about what concepts *are* and *have been* is indissociable from what they *will be*. More precisely: if reason's self-understanding (or self-consciousness) is decisive for its self-realization, can one cleanly separate the objectivity of concepts, i.e. what concepts are, from the history of the senses through which we grasp them?

Note

1. Macbeth here quotes from Frege's 'Boole's Logical Calculus and the Concept-Script' in *Posthumous Writings*, edited by H. Hermes, F. Kambartel, and F. Kaulbach, translated by P. Long and R. White (Chicago: University of Chicago Press, 1979), pp. 9–46.