THE FUNCTION OF HUMAN BEINGS AND THE RATIONALITY OF THE UNIVERSE: ARISTOTLE AND ZENO ON PARTS AND WHOLES

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IN *NICOMACHEAN ETHICS* 1.7 we find a brief passage in which Aristotle justifies his claim that human beings have a function or ἔργον (1097b28–33). While that claim is an important one for Aristotle's ethics, the passage that justifies it is problematic. It consists of two rhetorical questions, and there is considerable disagreement about what, if any, argument lies behind the rhetoric. I shall argue that a particular conception of the relation of part to whole, rooted in Aristotelian metaphysics and biology, licenses Aristotle's inference from the fact that bodily organs and craftsmen have a function to the claim that human beings as such do. While there are traces of the interpretation I shall propose in some earlier writers, it has not (so far as I know) been systematically defended, nor has it figured in recent discussions of *Eth. Nic.* 1.7, even in contributions by authors disposed to see a metaphysical basis for Aristotle's claim that human beings have a function.

After having outlined the relation between part and whole that allows Aristotle to infer that human beings have a function (section I), I shall devote the bulk of my essay (section II) to a discussion of a number of cosmological arguments of Zeno of Citium, the founder of the Stoa. These arguments infer the sentience and rationality of the universe from the sentience and rationality of some of its parts. They thus have a structure similar to the Aristotelian argument that humans have a function. There is, however, a crucial difference in the conclusions drawn in the two cases: whereas Aristotle argues that the parts' possession of a function entails that the whole has a function distinct from the functions of its subordinate parts, Zeno argues that the function of the whole is the same as the functions of the parts. This difference in the conclusion of the argument points to a difference in the Aristotelian and Stoic conceptions of the relation of parts to whole that figure in these arguments, and in particular, to a difference in their conception of the unity of biological organisms. Highlighting this difference in the conception of biological unity is one of the chief philosophical payoffs of comparing these Aristotelian and Stoic arguments. The Stoic conception, I go on to show, is in an important respect less powerful than the Aristotelian, so that, for Zeno's arguments to work, they must be supplemented by an additional argument for the claim that the universe is the sort of whole which allows an inference from the activities of the parts to that of the whole. I shall present and discuss the evidence that Zeno provided such an argument in the context of his proof of the rationality of the universe.

Lastly I shall turn to the eleventh-century commentary of Eustratius of Nicaea on the Aristotelian passage with which I started (section III). Eustratius recognizes

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that if Aristotle's mention of bodily parts and craftsmen is to support the claim that humans as such have a function, Aristotle must be relying on some conception of the relation of parts to whole. Eustratius, however, supplies something very much like the Stoic conception of the relation of parts to whole. His commentary provides a tantalizing hint of the fruitful syntheses of Stoic and Aristotelian ideas in Byzantine times.

I

Nicomachean Ethics 1.7, after arguing that "for all things that have a function and activity, the good and the 'well' is thought to reside in the function," Aristotle continues:

> Have the carpenter, then, and the tanner certain functions or activities, and the human being none, but is instead by nature an idle thing (ἀργόν)? Or as eye, hand, foot, and in general each of the parts evidently has a function, may one lay it down that similarly the human being, too, has a function apart from all these (παρὰ πάντα ταῦτα)? (1097b28–33, tr. in Barnes 1984, modified)

What argument, if any, do these lines provide for the claim that human beings have a function? Burnet (1900: 34) comments, "Another ἐπαγωγή. We see that (1) every class of men has an ἔργον, (2) that every part of man has an ἔργον. It is therefore εὔλογον that Man as such should have an ἔργον." One man's εὔλογον, however, is another's ἄτοπον. Hardie (1980: 24) formulates a typical objection:

> [I]t is not natural to speak as if the fact that the eye can be thought of as having a function, or the fact that a cobbler has one, creates a presumption that the whole man is not functionless. On the contrary, it is only the fact that a cobbler is an abstraction that makes it possible to think of him as a means. It is only the fact that the eye and hand are parts of the body that makes it possible to think of them as tools. My whole body is not like a tool; still less my soul.

More recent writers have tended to find Aristotle's analogies more persuasive;[1] many have defended the Aristotelian claim on general Aristotelian metaphysical and biological grounds.[2] I also believe that there is strong support in Aristotle's metaphysics for the claim that human beings have a function,[3] but I agree with Hardie and other critics that the passage quoted above, if construed as an argument by induction or by analogy, itself provides extremely weak support for the claim.

It is sometimes thought that a passage in Plato's *Republic* (352d–354a) which is a clear ancestor to our passage may shed some light on its logic; such a hope,

[1] So Broadie 1991: 34–35; Irwin 1980: *passim*; Kraut 1991: 313, 319.

[2] So Irwin 1980: *passim*; Whiting 1988: 36–40. Roche (1988: 49–62), who denies that Aristotle's ethics is in need of metaphysical support, does not discuss our passage, nor why Aristotle thinks himself justified in supposing that human beings as such have an ἔργον.

[3] This is, of course, compatible with the fact that Aristotle appeals to our deep, and deeply shared, ethical intuitions to help determine what the function of human beings is. For a treatment of the human function argument as a whole along these lines, see Nussbaum 1995.

however, proves illusory.[4] In the *Republic* Socrates argues for the general principle that a thing's ἔργον is what it alone can do, or what it can do better than anything else. He supports this principle inductively, by citing bodily parts and garden tools as examples. Socrates then applies this general principle to the soul, which has a number of things that it alone can do. Although Aristotle uses something like this principle to determine *what* the ἔργον of human beings is (1097b33–1098a4), it does not seem to figure among the considerations he adduces to show *that* human beings have one.

One might suppose that Aristotle does not have any specific argument in mind when he mentions bodily parts and artisans; perhaps the force of the passage is merely rhetorical. Indeed, such a suspicion may seem corroborated by the fact that nothing like this passage appears in the parallel arguments concerning the good for human beings in the *Protrepticus* (fr. 6 in Ross 1955) or the *Eudemian Ethics* (2.1).[5] I would like to suggest, however, that there is a natural way of taking Aristotle's argument, according to which it is much easier to see why Aristotle thought it led to the conclusion that human beings have a function. My suggestion is that the relation of part to whole is crucial in Aristotle's argument in a very particular way: the function of a bodily part, or of a trade, is only fully intelligible when its role in a larger, complex functional whole is understood.

We may take the case of bodily parts first. It is true that bodily parts cannot be fully understood without understanding their defining activity. But it is equally true, as many commentators have pointed out, that these defining activities themselves cannot be fully understood without understanding their role in some larger whole.[6] Aristotle does not argue that human beings are similar to bodily parts in having a function within some larger whole. Rather, the human being is the whole that provides the necessary context for the functions of the individual subordinate bodily parts. Furthermore (and this is the crux of the argument), the whole that makes these functions intelligible is itself a *functional* whole, that is, one that itself has a function distinct from that of its subordinate parts.[7]

That the function of a subordinate organ is dependent on the function of the whole is clear in Aristotle's frequent assertion that an organ ceases to be the sort

[4] Many older commentators think that Aristotle's argument is substantially the same as Plato's. So Grant 1885, Stewart 1892, Dirlmeier 1956.

[5] Aristotle does not "argue by induction from the functions of artifacts to the function of the soul in the Eudemian version (*Eth. Eud.* 1219a1–5)" (so Whiting 1988: 46, n. 4). The induction there concerns the claim that the best state for a thing that has an ἔργον is ἀρετή; Aristotle simply asserts that the soul has an ἔργον (1219a5).

[6] See, for example, Clark (1975: 52): "An eye is not a real whole, for it can only be an eye if it is a part of an organic and living body"; and Nussbaum (1978: 81): "The first thing to notice about [Aristotle's] functional accounts [of bodily parts] is that they are always given with reference to a containing system."

[7] As will become clear below, for Aristotle the function of the whole is also the function of some one pre-eminent part, which is therefore prior to the other, subordinate parts of the organism.

of thing it is (and therefore ceases to be) when it ceases to be part of a functioning whole.[8] The relation between the functions of the organs and the function of the whole is indicated in a passage at the end of the *Parts of Animals* that bears more than a superficial resemblance to our passage in *Eth. Nic.* 1.7:

> Since every instrument is for the sake of something, and each bodily part is for the sake of something, and what they are for the sake of is an activity (πρᾶξίς τις), it is plain that the body too as a whole is composed for the sake of a full (πλήρους) activity. (645b15–20, tr. Balme 1972)

Balme is, I think, quite right to hold that Aristotle refers here to "the co-ordinated activity of the animal as a whole organism, not merely the aggregation of the activities of the parts" (p. 124).[9] If so, however, it would appear that we are left with the same implausible analogy as in our passage in *Eth. Nic.* 1.7: since the parts have an activity, the body, too, must have an activity.

In what follows this passage from the *Parts of Animals*, however, Aristotle makes a comment that reveals the logic that stands behind his inference from the parts' having activities to the body as a whole having one:

> Now where activities are for the sake of other activities, clearly the things of which they are the activities stand to each other in the same way as the activities do. (645b28–30, tr. Balme 1972, modified)

Here we have a teleological structure that mirrors the structure of human activity outlined in the first two chapters of the *Nicomachean Ethics*; the only difference is that here, as the context shows, the structure is limited to the activities of the different bodily organs. This teleological structure is a hierarchy in which some activities are for the sake of others, and which must culminate in either one activity or several. If the latter, then the only sense in which the body as a whole could be said to have a single function is in a conjunctive, "inclusivist" sense. If the former, then there is some one activity that is the "for-the-sake-of-which" of all the others, and the bodily part of which it is the activity is the "for-the-sake-of-which" of all the other bodily parts. There is such a bodily part, namely, in blooded animals,

[8] Cf. *Met.* 1035b23, 1036b30, *De an.* 412b21–23, *Part. an.* 641a3–4, *Mete.* 4.12. The passage in which the dependence of part on whole is most clearly expressed is *Politics* 1253a20–25: "It is necessary that the whole be prior to the part; for should the whole be destroyed, there will not be a foot nor a hand, except homonymously, just as one could call one made of stone [a foot or hand homonymously]—for when it [the whole] is destroyed [the part] will be like that. Everything is defined by its function and its capacity, so that when things are no longer such they should not be said to be the same, except homonymously."

[9] Balme 1972: 124. I think that Balme's interpretation can stand even if we adopt the alternate reading πολυμεροῦς (complex, multi-partite) for πλήρους. To suppose that Aristotle is saying here merely that the parts of the body taken together are for the sake of their individual activities taken together is to introduce a new, un-Aristotelian, and ultimately vacuous sense of the locution "for the sake of." The inadmissibility of the parallel move in the "inclusivist" interpretation of Aristotelian εὐδαιμονία has been abundantly shown by Kraut 1991: chapter 5 and *passim*.

the heart;[10] its activity, sensation, as the defining principle of animals, is the "for the sake of which" of the activities of the other bodily parts. This activity, then, is the single activity that gives point to the activities of the other bodily organs. Without understanding their role in subserving this activity, the other bodily organs, and their activities, are not fully intelligible.

I suggest, then, that in our passage in *Eth. Nic.* 1.7, the reference to the functions of "eye, hand, foot, and in general each of the parts" (1097b30–31) supports the claim that human beings as such have a function because the functions of the parts are not fully intelligible independently of the single function they subserve.[11] Furthermore, I suggest that the reference to the "functions and activities of a carpenter and a shoemaker" (1097b28–29) is meant to support the claim about human beings as such in somewhat the same way: the functions of the various craftsmen are not fully intelligible independently of the one activity to which they contribute and which they subserve. They are not fully intelligible on their own for much the same reason that the activities of the bodily parts are not: they get their point from something outside of them which is their "for-the-sake-of-which."

The various procedures of a craftsman are to some degree intelligible by reference to the products he is making; but these products themselves are not fully intelligible independently of their purpose. As Aristotle says at *Eth. Nic.* 1139b1–3: "Every producer engages in production for the sake of something, and the thing produced (τὸ ποιητόν)[12] is not an end without qualification (rather it is so with regard to something [πρός τι], and for a particular person) . . . ." Just as the bodily parts stand in the same teleological relation as do their activities, so the crafts, and all rational human endeavors, stand in the same teleological relation as their ends (cf. *Eth. Nic.* 1094a9–16). The first two chapters of the *Nicomachean Ethics* put forward the idea that the crafts form part of a teleological hierarchy culminating in a single apex, the ἔργον of which gives point and intelligibility to all subordinate crafts. This apex is not itself a craft in Aristotle's strict sense

[10] At *Part. an.* 653b30–33 Aristotle indicates that all other homoeomerous bodily parts are for the sake of flesh, which, as the medium of the primary sense of touch, is for the sake of its organ, namely the heart.

[11] Something similar to this interpretation of Aristotle's bodily-parts examples has been put forward by Joachim (1951: 48), who writes: "Eyes and ears—even, in a sense, the soul—are instruments (ὄργανα) in so far as their τέλη or ends, and therefore their functions, are determined by the end and function of the whole man . . . ." So, too, Léonard (1948: 29): "L'homme est, pour Aristote, autre chose et davantage que la somme de ses parties: il est une οὐσία, un ensemble, et donc une totalité unifiée, et en tant qu'ensemble, en tant qu'homme, il a une fonction propre, en vue de laquelle les autres opèrent" (29).

Suits (1979: 23–40) canvasses the different ways the part/whole relation might figure in Aristotle's argument from bodily parts, but does not think there is any plausible candidate for the function of the whole other than the aggregate of the parts' functions. He does not see the priority of the function of the whole to that of the subordinate parts.

[12] It is impossible to understand τὸ ποιητόν as "the process of production," as Burnet (1900: *ad loc.*) does, apparently alone among commentators. See the discussion by Greenwood (1909: 177–178), with whom I disagree, however, about the interpretation of πρός τι and τινός.

of the word, but is rather the practical discipline devoted to the highest human good, which discipline Aristotle calls πολιτική. The end of this discipline is the excellent exercise of the rational part of the soul.[13] This is the single activity which, as the "for-the-sake-of-which" of all other disciplines practiced in the city, including the crafts, must be taken into account if the crafts are to be completely understood. Thus the existence of the end-directed activity of the crafts, insofar as it has a claim to intelligibility, shows that there is some other single activity that gives them that intelligibility, and which is the end of human beings as such.

Aristotle is fond of the argument that the apparent end-directed nature of a particular activity points to a larger whole the end of which gives point and full intelligibility to that activity. An example particularly relevant to our concerns occurs in *Politics* 3:

> Like the sailor, the citizen is a member of a community. Now sailors are unlike with respect to their jobs (τὴν δύναμιν)—for one is a rower, another a pilot, a third a look-out, and a fourth has some other title—and while the precise definition of each individual's excellence applies exclusively to him, there is, at the same time, a common definition applicable to them all. For the safety of the voyage is the common function (ἔργον) of them all; for each of the sailors desires this. Similarly then, although citizens are unlike, they have a function (ἔργον), the preservation of the community, and the community is the constitution. (1276b20–29, tr. in Barnes 1984, modified)

Rower, pilot, and look-out have distinct functions; nonetheless, they only have the functions they do because they are parts of a larger whole which has its own ἔργον, and to which their specific ἔργα contribute. So, too, the citizens holding different offices in the city (magistrate, assemblyman, dicast)[14] have specific ἔργα as such, but these ἔργα are derived from the larger ἔργον to which they contribute, the preservation of the constitution.

We can now understand the arguments implicit in Aristotle's reference to (subordinate) bodily organs and craftsmen at *Eth. Nic.* 1097b28–33. Both sorts of things have functions; but these functions are not fully intelligible independently of some further function to which they contribute. This further function can be seen to occupy the apex of a teleological structure, which it thereby unifies. Now the teleological structure in which the bodily organs stand is a different one from that in which the crafts stand; nonetheless, the function that unifies them is the same in both cases: the function of human beings as such. This is true as much for the hierarchy of crafts as for the structure of bodily parts. For the crafts exist to supply the products that either help make possible or are used as instruments in the function of human beings. πολιτική organizes the crafts and other disciplines with an eye towards promoting that activity which gives these disciplines point, the function of human beings.

[13] I ignore, for the purposes of this discussion, the question of the relation between the practical and the theoretical exercise of reason.

[14] See *Politics* 1275b23–33 for this conception of the different ἔργα that are involved in the πολιτεία of a city.

II

Aristotle's argument that human beings have a function depends, then, on the inference from the partially intelligible function of a part to the function of the whole which gives it point. The inference from part to whole is in some ways similar to the kind of argument used by Zeno of Citium for the claim that the universe is sentient and rational. The Stoics took very seriously their claim that the universe is an animal.[15] Because they did so, they could argue from the parts of the universe, e.g., human beings, to the whole, in somewhat the way Aristotle does in the case of animals. Their manner of proceeding, however, is different in one crucial respect. For Aristotle, as we have seen, it is crucial that the function of the whole should be *different* from that of the subordinate part. If it is to contribute to the intelligibility of the function of the part, it must be different from that function and situate it in some context that is itself fully intelligible in itself. The arguments of Zeno that we are about to consider, however, do not argue that the function of the whole is something different from that of the subordinate parts. Rather, they argue that the very same capacity that characterizes the part characterizes the whole. As I shall show, this difference in the argument reflects a difference between the Aristotelian and the Stoic conception of the relation of part to whole in teleological systems. This change makes the Stoic argument from activity of part to activity of whole in an important respect weaker than the Aristotelian. The Stoics cannot argue from a supposed partial unintelligibility of an organ or craft to the existence of a larger whole whose activity gives the organ or craft point, for the activity of the whole, being the same as that of the parts, contributes nothing to our understanding of the nature of that activity. Therefore the Stoic argument from activity of the part to that of the whole must assume that the part really is a part of the whole; there is nothing about the activity of the part itself that requires the larger whole to make it intelligible. To put it another way, the Stoics must provide a separate argument that the cosmos constitutes a whole of such a sort as to justify the attribution of the activities of the part to the whole. In what follows I shall discuss the evidence that the early Stoa did provide such an argument.

A string of Zeno's arguments from the parts of the cosmos to the whole are preserved by Cicero in *Nat. d.* 2.22:

Zeno also argued as follows:

(I) "Nothing lacking sensation can have a sentient part. But the world has sentient parts. Therefore the world does not lack sensation."

He then proceeds to a tighter argument:

[15] See, for example, Lapidge (1978: 161–185): "Other philosophers, such as Plato in the *Timaeus* (30b), had described the universe as a ζῷον; but none had applied the analogy as extensively as the Stoics" (163); and Hahm 1977: chapter 5, "Cosmobiology."

(II) "Nothing without a share in soul[16] and reason can produce from itself (*generare ex se*) something animate and endowed with reason. But the world produces (*generat*) things animate and endowed with reason. Therefore the world is animate and endowed with reason."

He also, as often, argued by analogy, as follows:

(III) "If from an olive tree there were born (*nascerentur*) flutes playing in tune, you would surely not doubt that there was in the tree some knowledge of flute-playing (*tibicini quaedam scientia*). Or if plane trees bore lyres sounding in rhythm, no doubt you would also suppose that there was some musicianship (*musicam*) in the plane trees. Why then should the world not be judged animate and wise (*sapiens*), when it produces from itself (*ex se procreet*) animate and wise things?" (*SVF* 1.112–114 = Long and Sedley 54G).

These arguments form a coherent series.[17] The first establishes the sentience of the world, using the Stoic version of the part/whole principle discussed above. The second establishes the rationality of the world, using a version of the causal principle, familiar from Aristotle, that the cause must possess the properties which it causes other things to possess. The third establishes the wisdom of the world, in a way that combines both the part/whole principle and the causal principle:[18] the limbs of a tree are both parts of, and generated from, that tree.

These three arguments ascribe progressively higher psychic functions to the universe; more importantly, the logic of the first two arguments does not become clear until the third is given. For though human beings are clearly in some sense parts of the universe, it is not clear that they are parts in a sense that would justify attributing the activities of human beings to the universe itself.[19] Similarly, though it is plausible to suggest that what gives birth to a rational creature must itself be rational, and it is plausible to suggest that in some sense the universe produces human beings, it is far from clear that the universe gives birth to humans

[16] Long and Sedley (1987) have "mind" here. But *animus* can sometimes be equivalent to *anima*, and the use of forms of *animans* later in the argument shows that such is the case here.

[17] On these arguments see Schofield 1983: 44–48. I agree with the main outlines of Schofield's analysis: "For Zeno's ... syllogism to win conviction he needs to get us to take 'produce' (as applied to the universe) in a strong and interesting sense akin to 'produce botanically.' To persuade us to take it so he has to get us to think of the universe as a giant plant (and so as the sort of whole of which the first premiss of the whole-part syllogism is true). Hence the tree analogy" (47).

[18] It has sometimes been thought that this passage shows that Zeno did not clearly distinguish the two principles I suggest are operative here (so Long and Sedley 1987: 2.325). I think, rather, that Zeno carefully combines the two principles in the third argument after having employed them separately in the first two. The part/whole principle must apply to a single entity, whereas the causal principle normally applies to discrete entitities; Zeno wants to say that particular organisms in the world are both parts of the world and, in some sense, its offspring. The relation of limbs to a tree in the third argument provides a good analogy for such a conception. Chrysippus used the relation between a tree (trunk) and its branches as an analogy for the relation between the commanding faculty and the other parts of the soul in plants and animals; see *SVF* 2.879 (= Long and Sedley 53G).

[19] Lactantius makes this criticism: "Man is not part of the world as a limb is of a body. For the world can exist without man, just as a city and a house can ..." (*Div. inst.* 2.5.31).

in the required sense.[20] The analogy Zeno deploys in the third argument specifies the sense in which human beings are both parts and products of the universe: they are so in the way that branches of a tree are parts and offspring of it. That is, the universe is a biological organism of which human beings are as it were bodily parts. Two questions are raised by Zeno's specifying the relation between human beings and the universe as that of bodily part to organism: (a) what conception of the unity of biological organisms does Zeno have, which would justify the inference that the function of a part is in fact the function of the whole and (b) what argument, if any, does Zeno have for the claim that the universe as a whole is such a biological organism?

Sextus Empiricus preserves a Stoic account of the unity of biological organisms which justifies the attribution of the functions of a part to the organism as a whole. This account is part of a commentary on an argument of Zeno for the rationality of the universe that is virtually identical with the second of the two arguments in the Cicero passage discussed above; the commentary may well itself be Zenonian. Sextus writes:

> And Zeno of Citium, taking Xenophon as his starting point, argues thus: "That which projects the seed of the rational is itself rational; but the world projects the seed of the rational; therefore the world is rational. And thereby the existence thereof is also concluded." The plausibility of this argument is obvious. For the origin of motion in every nature and soul (φύσεως καὶ ψυχῆς) seems to come from the commanding faculty (ἀφ' ἡγεμονικοῦ), and all the powers that are sent forth into the parts of the whole are sent forth from the commanding faculty as from a spring (πηγῆς), so that *every power which exists in the part exists also in the whole owing to its being distributed from its commanding faculty.* Hence, what the part is in point of power, that the whole must certainly be first. (*Math.* 9.101–102; 101 = *SVF* I 113; tr. Bury 1926, modified)

The key notion here is that of the "commanding faculty." It is conceived as the source of all the capacities of the organism. Like a fountain or spring, it sends forth from itself to each of the parts the particular power which that part possesses; thus any power present in a part must exist first in the commanding faculty.[21] The Stoic notion that the soul has some center which is the source of the psychic powers in the rest of the body, and is located in the heart, has its Aristotelian antecedents;[22] in Aristotle this idea is arguably in tension[23] with the view that, for example, the powers of sensation are the actualities of the relevant

[20] So too Schofield 1983: 47.

[21] On the relation of the ἡγεμονικόν to the other parts of the soul in the Stoics, see Bonhöffer 1890: 105, who concludes: "In Wahrheit aber sind die 'Seelenteile' nichts anderes als die an ein eigentümliches Organ des Körpers geknüpften eigentümlichen Funktionen des Hegemonikon."

[22] See *Part. an.* 665a12, 678b2–3; *De somno* 456a5; *De juv.* 469a7, 469b15–18; *Metaph.* Z 1035b25–27.

[23] On this tension, see Nuyens 1948; Block 1961; Kahn 1966; and Lefèvre 1972. For the comparison with the Stoics, see Couloubaritsis 1986.

sense organs.[24] In the Stoics the tension between center and periphery has been decisively resolved in favor of the center.[25] While, e.g., seeing requires the physical organ (eye), the power of seeing in the eye is nothing but an extension of the ἡγεμονικόν into that region of the body (*SVF* 2.836 = Long and Sedley 53L). Now the present passage makes it clear that we can assume the existence of such a central commanding faculty only in things that have a nature (φύσις) or a soul (ψυχή). Typical Stoic examples of things that have a nature (in the strict sense) are plants; of things with a soul, animals. Thus for any biological whole the Stoics can legitimately infer that any power possessed by a part is in fact a power of the whole, as such: if the ἡγεμονικόν of the whole did not have that power, the part could not.[26]

But what grounds did the Stoics have for thinking that the world was a biological organism? Unlike Aristotle, the Stoics cannot argue that a given entity is a teleological whole because of the partial intelligibility of the functions of its parts; for the Stoics do not recognize any function of the whole different in kind from the functions of the parts. The Stoics need a non-teleological argument for the organic unity of the cosmos. The early Stoics did indeed provide such an argument, which may well be Zeno's own. Cicero preserves an adumbration of the argument (*Nat. d.* 2.29–30),[27] which is more fully preserved by Sextus Empiricus (*Math.* 9.78–85).[28]

The Ciceronian passage reads as follows:

Every nature which is not isolated and simple but conjoined and composite must have within itself some commanding faculty, such as intelligence in man, and something resembling intelligence in beasts, from which desires for things arise; trees too and plants

[24] Kahn (1966) gives a good description of the division of labor between sense organ and heart in Aristotle's theory of sensation: "The psychic power of vision is the realization of the specific possibilities offered by the eye, although the possibility of *sensation as such* is not offered by the eye alone, but only by the central organ with which it is connected" (21; emphasis in original).

[25] Couloubaritsis (1986) gives a subtle account, in terms of the "tonic movement" of a thing's unifying πνεῦμα, of the reasons why increasing unity requires an increasingly sophisticated internal "command center."

[26] In later Stoicism the commanding faculty (τὸ ἡγεμονικόν) is usually limited to animals, and is often, as Adorno (1959) points out, synonymous with "mind." Adorno argues that in Zeno the expression does not yet have this meaning, but rather has, as its technical Stoic meaning, "la consapevolezza che l'anima ha di sé" (37). This, however, does not account for the ascription of the commanding faculty to plants. The pre-Stoic meaning of ἡγεμονικόν, which Adorno gives as "ciò mediante cui si costituisce una certa unità, ciò che coordina qualificando" (30–31), and which he sees as still operative in Zeno, fits our argument perfectly.

[27] Solmsen (1965: 1.436–440) has persuasively argued that *Nat. d.* 2.23–28, 30(*atque* . . .)–32 derives ultimately from Cleanthes; Reinhardt (1921: 224–239 and 1926: 61–92) had previously argued that they were Posidonian. Both recognize that 2.29–30(. . . *contineri*) do not fit into the argument of its surrounding context, and may have a different origin (Solmsen 1965: 443, n. 25; Reinhardt 1921: 226). The passage may well be Zenonian.

[28] *SVF* 2.1013; not in Long and Sedley.

are thought to have a commanding faculty in their roots .... Now we see that there is sensation and reason in the parts of the world .... Therefore they must be in that part which contains the world's commanding faculty, and certainly they must be sharper and greater. So the world must be wise .... (*Nat. d.* 2.29–30 = Long and Sedley 47C [5–6])

Here we have the outlines of an argument for the claim that the world has a commanding faculty, followed by a reprise of the argument that we saw implicitly relied on this claim. But Cicero does not here indicate what he means by a nature that is "conjoined and composite," why such a nature must have a commanding faculty, nor why we should believe that the world is of such a nature. Elucidation of these points is found in the more elaborate argument in Sextus Empiricus.[29]

In the Sextus passage bodies are first divided into (a) the unified (ἡνωμένα), (b) those constituted by elements conjoined together (ἐκ συναπτομένων), and (c) those constituted by separate elements (ἐκ διεστώτων). Examples of the three classes are: (a) plants, animals; (b) cables, towers, ships; (c) armies, flocks, choruses. Only bodies in the first class manifest "sympathies" with themselves; since the world offers many examples of such "sympathy" (the tides are in accordance with the waxing and waning of the moon, etc.), it is clearly a unified body.[30] We need not here investigate what the Stoics may have meant by "sympathy" in this sense, since, despite Sextus' initial examples and Cicero's apparent claim, it is not the case that everything that manifests "sympathies" with itself has a commanding faculty. For such things as stones evidently count as unified, and so must manifest such sympathies with themselves; yet they are held together neither by φύσις (like plants) nor by ψυχή (like animals), but by mere ἕξις ("attraction") (*Math.* 9.81). But the world manifests a type of unity stronger than that which could be provided by mere attraction, the argument in Sextus continues. The stronger the unity, the greater the changes a thing may undergo while remaining unified. While inanimate things such as sticks and stones are capable of only a small range of changes without falling apart, the world is capable of much greater changes (82–83). Items like sticks and stones are held together by mere attraction; since the world has a higher degree of unity than they do, it must be held together, at

[29] We may note that immediately before the passage we are to consider, at *Math.* 9.77, Sextus gives an argument that we discussed above and which both he elsewhere (*Math.* 9.101) and Cicero (*Nat. d.* 2.22) explicitly attribute to Zeno. Sextus writes: "Moreover, that which generates what is rational and wise (τὸ γεννητικὸν λογικοῦ καὶ φρονίμου) is certainly both rational and wise; but the aforementioned power is of such a nature as to construct men; therefore it will be rational and wise, and this is the mark of divine nature."

[30] The notion of "cosmic sympathy" is sometimes thought to be a late, Posidonian contribution to Stoicism (cf. Reinhardt 1926: 50–54). Even if it is, we may note that Sextus' argument that the world has a φύσις does not in itself make use of this notion. Reinhardt himself (1921: 346–347; 1926: 34–45) suggests that the distinction between τὰ ἐκ διεστώτων, τὰ ἐκ συναπτομένων, and τὰ ἡνωμένα, in which the notion of sympathy figures, is a Posidonian addition to the earlier ἕξις/φύσις/ψυχή distinction.

the very least, by φύσις (84).[31] But as our earlier discussion of *Math.* 9.101–102 shows, everything with a φύσις (or stronger principle) has a commanding faculty,[32] which licenses inferences from the powers of the parts to those of the whole.[33] And although Sextus does not here mention the commanding faculty, the crucial step in the argument he reports is an application of the Stoic part/whole principle, a step which is pointedly not taken until the existence of at least φύσις in the cosmos has been demonstrated: "But that which contains the natures of all things contains also such as are rational; and moreover, that which contains the rational natures is certainly rational; *for it is not possible for the whole to be inferior to the part*" (85).

III

I have argued that Aristotle's brief argument for the claim that human beings have an ἔργον involves an inference from the partial intelligibility of some teleological activity to the existence of a teleological activity which makes it more fully intelligible. The explanatory teleological activity is the activity of something that stands in the relation of whole to part to that thing whose activity it explains. Aristotle appeals to two kinds of teleological activity in his argument: that of certain bodily organs and that of craftsmen. The teleological activity that makes sense of both of these kinds of activity is the function of human beings as such, which organizes both the organs of the individual, and the disciplines exercised in the state, into wholes. I have also argued that certain Stoic arguments, traceable to Zeno, for the claim that the world is sentient and rational involve a similar inference. Zeno infers from the fact that the parts of the cosmos engage in certain activities that the cosmos itself engages in those very activities. For both Aristotle and Zeno, the inference from part to whole is warranted only when the whole is of a certain sort: for Aristotle, it must be teleologically structured; for Zeno, it must be unified by the presence of a commanding faculty. Because the activity of the whole does not, for Zeno, contribute to the intelligibility of the function of the part, he must supply a separate argument for the unity that only a commanding faculty can effect, an argument that makes no appeal to teleology.

[31] The validity of this argument naturally depends on there being no unifying principle intermediate between ἕξις and φύσις and on the claim that everything unified by φύσις or some stronger principle has a commanding faculty. (For some discussion of the latter claim, see Couloubaritsis 1986). Given the importance of the class of things unified by either φύσις or ψυχή, it is tempting to follow Long (1983: 38), who, relying on Plutarch *Praecepta coniugalia* 34 (= *SVF* 2.336), suggests that the Stoics had a technical name for this class: τὰ συμφυῆ.

[32] For another argument that the universe has a ruling faculty (τὸ κυριεῦον, equivalent here to τὸ ἡγεμονικόν), an argument which also relies on the presence of φύσις (ὁ κόσμος κατὰ φύσιν διοικεῖται), see *Math.* 9.119–120.

[33] The Stoics do not wish to impute what might be called the accidental powers of a part to the whole; compare the *reductio ad absurdum* of their view in n. 39 below. But it is not clear to me that they can make the requisite distinction among the powers of the part in a principled and non-question-begging way.

The passage from Aristotle with which I started has often been misunderstood; the relevance of the whole which gives the bodily parts and the crafts their functions has seldom been appreciated. One commentator who does seem to grasp the importance of the whole in explaining the functions of the parts is Eustratius of Nicaea.[34] Eustratius is a philosophically sophisticated commentator, and his commentary on our passage is astute. Yet the way Eustratius understands the relation between part and whole has decidedly Stoic overtones.[35] For this reason a discussion of his interpretation of the Aristotelian passage makes a fitting coda to this essay.

The bulk of Eustratius' commentary on *Eth. Nic.* 1097b28–33 concerns Aristotle's mention of the practitioners of the crafts. Instead of viewing the crafts as themselves only partially intelligible parts of a whole that must have a function distinct from them, as I have done, Eustratius supposes that Aristotle's argument is one from the crafts as things caused to human reason which is their cause (ἐκ τῶν αἰτιατῶν [πρὸς] τὰ αἴτια, 66.12): human reason is said to be "generative and causative (γεννητικὸς καὶ αἴτιος) of the crafts" (66.14). Eustratius then invokes a Neo-Platonic version of the causality principle[36] discussed above: the cause must be *greater* than its effect (66.23–67.4). Reason must, therefore, have a function greater than, and so different from, those of the arts. Eustratius thinks that a similar argument can be run on the functions of the bodily parts of human beings (66.25–27).

All this is neither especially Aristotelian nor especially Stoic. But Eustratius does give another interpretation of Aristotle's argument in our passage, one that seems to reflect a Stoic way of looking at the relation between parts and wholes. Commenting on the beginning of Aristotle's attempt to determine what the ἔργον of human beings is, Eustratius writes:

> And since, when these things have been set aside, no other power or activity remains to him [i.e., a human being] except life alone, *from which both the powers and activities of the parts and those of the arts proceed*[37] *as from some root or spring* (πηγῆς), he [Aristotle] inquires about it .... (67.21–24)

The idea that the powers of the bodily parts and of the crafts flow from some central source or spring is precisely the idea that is operative in the Stoic arguments we have considered above. It makes no reference to a larger complex functional unity that renders intelligible the functions of the various parts; strictly speaking, it licenses no other inference than that the functions of the parts are also present in this central source. Eustratius, of course, is too good a commentator not to

[34] Heylbut 1892. On Eustratius, see Mercken 1990 and the works there cited.

[35] A study of the influence of Stoicism on Byzantine philosophy is a scholarly desideratum; cf. Colish 1985: 2.7: "The scholarly investigation of the Stoic tradition in Byzantium and Islam is still in its infancy."

[36] On this Neo-Platonic version of the relation between cause and effect, see Lloyd 1976.

[37] Reading προβαίνουσι for Heylbut's προβαίνουσαι.

see that Aristotle wishes to infer that the whole has some function over and above those of the subordinate parts and of the crafts, and he is able to get the appropriate conclusion by relying on the Neo-Platonic arguments mentioned above. While Eustratius' discussion shows no understanding of the Aristotelian view of the relation of parts to whole, the passage just quoted shows the influence of the Stoic view of that relation. It should therefore serve as a stimulus to further investigation into the survival of Stoic ideas in Byzantine philosophy.

APPENDIX: MUSICAL BRANCHES

The Aristotelian argument discussed above uses the functions of two sorts of things in its inference to the existence of a function of human beings: namely, bodily parts and craftsmen. In the Stoic arguments, since the activities that are inferred to belong to the universe are the same as those belonging to the part, only the activity of organic parts—particularly, human beings—grounds the inference; Zeno does not want to conclude that the universe makes shoes or processes leather.[38] Nonetheless, certain crafts play an interesting role in the Zenonian analogy in Cicero's *Nat. d.* 2.22 (discussed above, 153–154). The choice of crafts Zeno uses in the analogy reflects the difference between the logic of his and Aristotle's arguments from part to whole.

In the passage in question, Zeno likens the rational parts of the cosmos, including presumably human beings, to flutes or lyres sprouting from a tree. Just as the presence of musical knowledge in the limbs of a tree justifies the ascription of musical knowledge to the tree itself, the argument goes, so the presence of rationality in human beings justifies the ascription of rationality to the cosmos. If we ask why Zeno chooses musical crafts to make his point, an obvious answer is that they of all crafts seem to be self-contained and fully intelligible in themselves. The playing of a tune may seem to be in no need of supplementary explanation by reference to some further activity to which it contributes.[39] Since Zeno's argument involves attributing to the whole the same activity that the part engages in, the latter cannot gain in intelligibility in the process. It had better be perfectly intelligible in itself; hence Zeno's avoidance of such crafts as shipbuilding,[40] which, for all their intelligible structure, remain partially unintelligible until the

[38] Ancient critics thought the Stoics could not avoid such absurdities, however. See Cic. *Nat. d.* 3.23: "Should I concede not only that the world is alive and wise, but also that it is a lyre-player and a flutist, since men endowed with these arts are produced from it, too"? See also Sextus Empiricus *Math.* 11.108.

[39] The author of the *Magna Moralia* uses flute-playing as an example of an activity that has no end other than itself (1211b27–30). Aristotle's own position on music in *Politics* 8 is, I think, less clear; on the whole he seems to locate the primary purpose of music in the formation of good character. See esp. *Pol.* 8.5.

[40] Aristotle imagines the presence of ship-building in wood at *Physics* 199b26–30, a passage that is often compared with the passage under discussion.

role of ships in human life in general is understood. The apparently self-contained musical arts fit his requirements perfectly.

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