

Offprint from
OXFORD STUDIES
IN ANCIENT
PHILOSOPHY

EDITOR: BRAD INWOOD

VOLUME XLVI

SUMMER 2014

OXFORD
UNIVERSITY PRESS

2014

HO POTE ON ESTI AND
COUPLED ENTITIES: A FORM OF
EXPLANATION IN ARISTOTLE'S
NATURAL PHILOSOPHY

HARVEY LEDERMAN

1. Introduction

THE difficult phrase ὃ ποτε ὄν ἐστί (hereafter 'OPO'), which occurs in key passages in Aristotle's discussions of blood and of time, has long vexed interpreters of Aristotle.¹ This paper proposes a new interpretation of OPO, which resolves some textual and interpretative problems about Aristotle's theories of blood and of time. My interpretation will also shed light on more general issues in

© Harvey Lederman 2014

Malcolm Schofield patiently read numerous early drafts of this paper. Nick Denyer gave extremely helpful written comments at a critical stage. Recently, Brad Inwood's probing and detailed comments have pressed me to improvements in substance and style on every page. Discussions with David Charles, Alan Code, and Philomen Probert inspired key arguments. I have enjoyed and benefited from (in some cases, numerous and extensive) conversations with: Peter Fritz, Jeremy Goodman, Luuk Huitink, Tiankai Liu, Jessica Moss, Michail Peramatzis, Daniel Rothschild, Volker Schluë, David Sedley, Stefan Sienkiewicz, Barney Taylor, James Warren, and Jesse Wolfson. I am grateful to all of these teachers and friends for their time, advice, and insight. Any remaining errors are, of course, my own. As the notes testify, I owe an immense intellectual debt to Ursula Coope's superb study of *Physics* 4. 10–14. In the time of writing, I received financial support from the Henry Griffith Keasbey and Anna Griffith Keasbey Memorial Foundation and from the University of Oxford Clarendon Fund. I am grateful to both for their generosity. Thanks, finally, to Rachel Stewart, of King's College Library, and Maureen Jones, of the Christ Church GCR, for cheerful pre-dawn encouragement.

¹ The abbreviation OPO is Remi Brague's (R. Brague, *Du temps chez Platon et Aristote* [*Temps*] (Paris, 1982), 97). The phrase occurs seven times in the extant works of Aristotle: once in *Parts of Animals* (2. 3, 649^b23–4) and six times in the *Physics* (4. 11, 219^a19–21, 219^b13–15, 219^b18–19, 219^b26, 220^a6–8; 4. 14, 223^a25–8). Similar but distinct phrases occur in *PA* 2. 2, 649^a14–16 (see sect. 2.2 below), and *Phys.* 4. 11, 219^b10–11 (see n. 106 below). Another phrase related to OPO occurs at the end of *GC* 1. 3 (319^b3–4). Previous interpreters of OPO have included the phrase from *On Generation and Corruption* as an instance of OPO itself. But that phrase has ὑπόκειται in place of OPO's final ἐστί, and so is not an instance of the phrase. My analysis of OPO does, however, shed light on the passage in *On Generation and Corruption*, as I hope to show in future work.

Aristotle's metaphysics. In the passages I will discuss, Aristotle takes both blood and time to be examples of his peculiar 'coupled entities'.² He then uses OPO to provide explanations which differ from what we might call his 'standard' metaphysical explanations. On the 'standard' approach, Aristotle explains derivative entities—non-substances—by describing their relationship to substances.³ By contrast to this standard form of explanation, when Aristotle uses OPO he explains blood and time by describing their relationship to *non*-substances. This paper thus identifies a new species of metaphysical dependence in Aristotle. In addition, it provides detailed examination of evidence concerning whether Aristotle himself used coupled entities in his own physical and metaphysical theories.

My interpretation of OPO has two main components. The first characterizes the sort of entity to which OPO refers. The referent of OPO is closely related to coupled entities. To fix ideas, a coupled individual such as cultured Coriscus or sitting Socrates is an individual underlier (for example, Coriscus) coupled with an accident (for example, culturedness).⁴ These individuals have peculiar lives: if Coriscus forgets what he has learnt, cultured Coriscus perishes, even if Coriscus survives. OPO is more closely related to coupled *kinds* than to coupled individuals. What I will call the 'kind' of an entity is the distinguished property which answers the

² I use 'coupled entities' (*συνδραζόμενον*, *Metaph. Z* 5, 1030^b14–1031^a14 at 1030^b16 and 1031^a6; *PA* 2, 2, 649^a14–23 at 649^a15) for what others call 'accidental compounds' or 'kooky objects'. Cf. e.g. G. Matthews, 'Accidental Unities', in M. Schofield and M. C. Nussbaum (eds.), *Language and Logos: Studies in Ancient Greek Philosophy Presented to G. E. L. Owen* (Cambridge, 1982), 223–40.; F. A. Lewis, *Substance and Predication in Aristotle [Substance]* (Cambridge, 1991), part II, esp. ch. 3; S. M. Cohen, 'Kooky Objects Revisited: Aristotle's Ontology', *Metaphilosophy*, 39.1 (2008), 3–19. (K. Fine, 'Acts, Events and Things', in W. Leinfellner, E. Kraemer, and J. Schank (eds.), *Proceedings of the 6th International Wittgenstein Symposium* (Vienna, 1982), 97–105, merits more discussion in this context than it has received.) Aristotle does not seem to have had a technical name for these entities. My choice of terminology has been guided by the fact that Aristotle describes coupled entities which are both 'accidental', and '*per se*': 'accidental compounds' covers only one species of this genus. For this point see further n. 73 below, and the main text there. For cultured Coriscus see *SE* 17, 175^b15–27; 22, 178^b36–179^a10. For sitting Socrates see *Metaph. Γ* 2, 1004^b1–4, with *Z* 1, 1028^a22–5. On coupled entities in general see *Metaph. Z* 4–5, 1029^b22–1031^a14.

³ *Cat.* 5, 2^a11–^b6c; *Metaph. Z* 1, 1028^a1–31.

⁴ I use 'underlie' to translate Aristotle's *ὑπόκειμαι* and 'underlier' to translate the substantive participle *τὸ ὑποκείμενον*. These translations have the advantage of preserving some remnant of the relationship between the two words.

question of what that entity is, on a particular resolution of this context-sensitive question.⁵ For example, Coriscus is a member of the kind humanity. Coupled individuals have kinds too. For example, cultured Coriscus is a member of the coupled kind cultured humanity.

Aristotle uses OPO in relation to coupled kinds which differ from cultured humanity in one crucial respect. The members of these coupled kinds—unlike the members of cultured humanity—do *not* have particular substances as their underliers. Since these ‘underliers’ are not substances, they are underliers only in an extended sense: as I will say, they merely ‘play the role of the underlier’. The first main claim of my interpretation of OPO thus holds that: in every instance, OPO refers to the kind of the entities which play the role of the underlier for the members of a coupled kind.

This first claim reinstates a component of the traditional interpretation of OPO. The Greek commentators, perhaps following Eudemus, interpreted OPO as ‘the underlier’ (τὸ υποκείμενον), or ‘the underlier, whatever it is’.⁶ Remi Brague and Ursula Coope rightly reject the claim that the phrase *means* ‘the underlier’ (τὸ

⁵ This use of the term ‘kind’ has an obvious similarity to some of Aristotle’s discussions of what he calls a ‘species’ (εἶδος) (e.g. *Cat.* 5, 2^b29–37), but I do not wish to claim that Aristotle would have used the word ‘species’ to name the properties I will be calling ‘kinds’. Aristotle did use the words ‘species’ and ‘genus’ of entities in categories other than substance (e.g. of changes, in *Phys.* 5. 4, 227^b3–20). In fact, in at least one passage he even speaks of the ‘genus’ of a coupled entity (*Metaph.* Δ 6, 1015^b28–34). But Aristotle’s use of ‘species’ sometimes implies—as my ‘kind’ never does—that the entity whose species is under discussion has an essence in the primary sense (most strikingly in *Metaph.* Z 4, 1030^a11–14; see also *Cat.* 5, 2^a14–19).

⁶ Eudemus appears to have understood OPO to *mean* ‘the underlier (whatever it is)’ (fr. 87 Wehrli, from Simpl. *In Phys.* 723. 36–724. 8 Diels, esp. at 724. 4–5, perhaps elaborated also in 724. 2–3). Simplicius (*In Phys.* 721. 29–36; cf. 712. 16–27), Philoponus (*In Phys.* 720. 26–30 Vitelli; perhaps similarly *In GC* 63. 14–17 Vitelli), and Michael of Ephesus (*In PA* 33. 17–20 Hayduck) appear to agree with Eudemus on this count. (Passages of Alexander (*In Metaph.* 324. 13–16 and 324. 7–10 Hayduck) are more difficult.) Among modern scholars, Adolf Torstrik argues that the phrase indicates the underlier plus certain attributes which are considered irrelevant to the discussion at hand (A. Torstrik, “Ο ποτε ὄν: Ein Beitrag zur Kenntnis des aristotelischen Sprachbrauchs” [‘Beitrag’], *Rheinisches Museum für Philologie*, 12 (1857), 161–73, followed by W. D. Ross (ed. and comm.), *Aristotle’s Physics: A Revised Text with Introduction and Commentary [Physics]* (Oxford, 1936; 2nd edn. 1955), 598 ad *Phys.* 4. 11, 219^a19–21). For Torstrik, Aristotle contrasts a single relevant attribute with the underlier taken together with any irrelevant attributes (‘Beitrag’, 163–4). This position could, of course, be understood to challenge the commentarial tradition, but Torstrik and Ross seem to have viewed it as a development of that interpretation.

ὑποκείμενον).⁷ But Coope goes too far in rejecting *any* systematic connection between OPO and the underlier.⁸ On my interpretation of OPO, Aristotle uses the phrase only to refer to the kind of the entities which play the role of the underlier for the members of a coupled kind. The tradition's insistence that OPO is intimately related to 'the underlier' (*τὸ ὑποκείμενον*) does contain a kernel of truth.

The second main component of my interpretation of OPO characterizes the *explanandum* of the explanation contained in the phrase. According to my interpretation, the verb 'is' (*ἔστω*) in OPO, which is sometimes only implied, should be understood as 'is a being'. This English phrase translates Aristotle's use of the participle *ὄν* as the complement of the copula; the resulting predicate, 'is a being', has a different sense from that of 'exists'. I present a general argument which shows that 'is' (*ἔστω*) in OPO can be interpreted neither as 'is what it is' nor as 'exists'. This argument, which applies in some form to every instance of OPO, refutes what I call the 'essentialist' ('is what it is') and 'existential' ('exists') interpretations of the final 'is' (*ἔστω*) of the phrase. Only my 'ontic interpretation', in which the final 'is' (*ἔστω*) in OPO is interpreted as 'is a being', remains as a viable interpretation.

The ontic interpretation of OPO is of particular interest in the context of recent scholarly analyses of ontological dependence in Aristotle. These analyses have rejected the traditional 'existential-modal' interpretation of Aristotle's expressions for ontological dependence or 'priority in being' ('A cannot exist without B, but B can exist without A').⁹ In its place, some have proposed an essential

⁷ Brague, *Temps*, 99–101; U. C. M. Coope, *Time for Aristotle [Time]* (Oxford, 2005), 173–7.

⁸ 'There is nothing about the meaning of the phrase which suggests that it refers to the *ὑποκείμενον*. If that were all Aristotle meant, it would be unnecessary for him to introduce this unusual expression at all' (Coope, *Time*, 175–6). Coope does allow that OPO refers to the underlier ('the subject') *in some instances* (e.g. *Time*, 135, 139). But in other instances she takes it to refer to something else (esp. *Time*, 66, interpreting *Phys.* 4. 11, 219^a19–21). For discussion of this passage see below, sect. 3.2. I discuss Coope's interpretation of it in detail in n. 80.

⁹ P. Corkum, 'Aristotle on Ontological Dependence' ['Dependence'], *Phronesis*, 53 (2008), 65–92. M. Peramatzis, 'Aristotle's Notion of Priority in Nature and Substance', *Oxford Studies in Ancient Philosophy*, 35 (2008), 187–248, and *Priority in Aristotle's Metaphysics [Priority]* (Oxford, 2011). 'Existential-modal' is taken from K. Fine, 'Essence and Modality' ['Essence'], *Philosophical Perspectives*, 8 (1994), 1–16. Interestingly, Fine himself suggests that Aristotle—at least sometimes—employed an existential-modal model of ontological dependence ('Essence', 4;

or real-definitional interpretation of these expressions ('A cannot be what it is without B being what it is, but B can be what it is without A being what it is').¹⁰ Others, by contrast, have opted for an interpretation in terms of 'being a being' ('A admits of the ontological status of a being independently of standing in some tie to any B whatsoever, but not conversely').¹¹ Priority in being, like ontological dependence, is intimately related to a distinctively metaphysical kind of explanation, often called 'grounding'.¹² When Aristotle uses OPO, he adverts to this relation of metaphysical explanation. The ontic interpretation of OPO reveals that Aristotle, at least when he uses this phrase, takes the *explanandum* of this special kind of metaphysical explanation to be that something *is a being* (and *not* that it is what it is).

The paper falls into two parts. Section 2 argues for my general interpretation of OPO by examining the instance of the phrase in Aristotle's discussion of blood in *PA* 2. 3. Section 3 shows how my interpretation applies to the remainder of the instances of OPO, all six of which occur in Aristotle's discussion of time in *Physics* 4. 11–14.

2. *Parts of Animals* 2. 3

2.1. *Introducing the phrase*

In *PA* 2. 2–3 Aristotle seeks to explain how blood is hot, even though the mixture which composes it is not hot.¹³ He explains

cf. K. Fine, 'Ontological Dependence', *Proceedings of the Aristotelian Society*, 95 (1995), 269–90 at 270).

¹⁰ This formulation is derived from Peramatzis's 'Priority in Being' (*Priority*, 204 et passim).

¹¹ This formulation is derived from Corkum's OI₂ ('Dependence', 78).

¹² e.g. J. Schaffer, 'On What Grounds What', in D. J. Chalmers, D. Manley, and R. Wasserman (eds.), *Metametaphysics* (Oxford, 2009), 347–83; G. Rosen, 'Metaphysical Dependence: Grounding and Reduction', in B. Hale and A. Hoffman (eds.), *Modality: Metaphysics, Logic and Epistemology* (Oxford, 2010) 109–36; K. Fine, 'Guide to Ground' ['Guide'], in F. Correia and B. Schneider (eds.), *Metaphysical Grounding: Understanding the Structure of Reality* (Cambridge, 2012), 37–80.

¹³ The enquiry begins in *PA* 2. 2, 648^a19, and is concluded in *PA* 2. 3, 650^a2. Aristotle's doctrine about the matter of blood is stated in *Meteor.* 4. 7, 384^a25–8; 4. 10, 389^a19–22; 4. 11, 389^b7–15. In the second of these passages Aristotle adds air (which is hot) to his list of the constituents of blood. Düring notes ad loc.: 'Nowhere else does Aristotle say that blood contains Air' (I. Düring, *Aristotle: Meteorologica IV. Critical and Literary Commentaries* (Göteborg, 1944), 100). Perhaps there was so little air in blood that it was insignificant. In any case, the view in *Parts of Animals*

the relationship between blood and this cold mixture by comparing blood to standard examples of coupled entities.¹⁴ His idea is as follows. Call the mixture of earth and water which can compose blood ‘sanguineous fluid’.¹⁵ Blood is the coupled kind composed of sanguineous fluid and heat. To be blood is to be *hot* sanguineous fluid. Blood is, therefore, essentially hot: heat, after all, figures in its (real) definition. But some portions of sanguineous fluid are cold, some tepid, and some hot. So it is not the case that to be sanguineous fluid is (even in part) to be hot (or, for that matter, to be cold, or to be tepid). In describing this complex situation, Aristotle uses OPO—as I will argue—to refer to the kind sanguineous fluid.

[g] φανερόν ὅτι τὸ αἷμα ὡδὶ μὲν ἔστι θερμόν, οἶον ἦν αὐτῷ τὸ αἷματι εἶναι¹⁶ (καθα-

appears to be that water and earth are at least the main constituents of this mixture (cf. e.g. *PA* 2. 4, 650^a16–18).

¹⁴ Aristotle uses the word ‘coupled’ in *PA* 2. 2, 649^a15, where he introduces the examples of hot iron and hot water (649^a16, [b] in sect. 2.2; boiling water appears also in *PA* 2. 3, 649^b22–3, [g] below). ‘Pale man’ (used in 649^b26–7, [j] below) is a standard example of a coupled entity (cf. *Metaph. Z* 4, 1029^b22–1030^a7).

¹⁵ Aristotle does not explicitly name this mixture. In *GC* 1. 5 he says ‘for both the form and the matter are said to be flesh or bone’ (καὶ γὰρ ἡ ὄλη λέγεται καὶ τὸ εἶδος σὰρξ ἢ ὀστούν, 321^b21–2; cf. more generally 321^b16–32). If this remark applies to blood as well (cf. the mention of homoiomeres at 321^b18, 321^b31), then Aristotle may have been willing to call the mixture which can compose blood ‘blood’ as well. But Aristotle may have believed that blood, as the material for the whole body, and thus the other homoiomeres (*PA* 3. 5, 668^a1–4, with 668^a7–9 and 17–19; cf. *PA* 2. 4, 651^a12–14), did not itself have form and matter in the proper sense (see S. Cohen, ‘Aristotle on Heat, Cold, and Teleological Explanation’, *Ancient Philosophy*, 9 (1989), 255–70 at 260–3). In the passages discussed in this section, Aristotle clearly thinks of blood as a coupled entity, and so does not commit to holding that blood has form and matter properly speaking. I will not take a stand here on the complex and difficult question of whether Aristotle’s considered view was that blood is in fact a coupled entity (as opposed to a hylomorphic compound). A suggestion of Nick Denyer’s inspired ‘sanguineous fluid’.

¹⁶ Bekker, Louis (P. Louis (ed. and trans.), *Aristote: Les Parties des animaux [Parties]* (Paris, 1956)), and Lennox (J. Lennox (trans. and comm.), *Aristotle: On the Parts of Animals [Parts]* (Oxford, 2001)) read οἶον τι ἦν αὐτῷ τὸ αἷματι εἶναι with PSUYZ. I follow E and Düring (I. Düring, *Aristotle: De partibus animalium. Critical and Literary Commentaries* (Göteborg, 1943), 137–8) in omitting τι, which (in my view, as in Düring’s) is a corruption deriving from confusion with the more standard τὸ τί ἦν εἶναι. (A. L. Peck (trans.), *Aristotle: Parts of Animals* (Cambridge, Mass., 1955), excises the phrase altogether, apparently without manuscript support.) I cannot see how to construe τι while respecting the dative αἷματι. Furthermore, Aristotle’s views about coupled entities explain why he used the phrase without τι. Coupled entities do not have essences in the primary sense (*Metaph. Z* 4, 1029^b22–1030^a17; *Metaph. Z* 5). Had Aristotle written τὸ τί ἦν εἶναι (or the variant transmitted by PSUYZ), a reader might have taken that phrase to refer to whatever is the essence (in the primary sense) of the thing which also happens to

περὶ ὀνόματι τινι σημαίνουμεν τὸ ζέον ὕδωρ, οὕτω λέγεται [h] τὸ δ' ὑποκείμενον καὶ ὃ ποτε ὄν αἷμά ἐστιν, οὐ θερμόν· [i] καὶ καθ' αὐτό ἐστι μὲν ὡς θερμόν ἐστιν, ἔστι δ' ὡς οὐ· [j] ἐν μὲν γὰρ τῷ λόγῳ ὑπάρξει αὐτοῦ ἡ θερμότης, ὥσπερ ἐν τῷ τοῦ λευκοῦ ἀνθρώπου τὸ λευκόν· [k] ἢ δὲ κατὰ πάθος τὸ αἷμα, οὐ καθ' αὐτὸ θερμόν. (PA 2. 3, 649^b21–7)

[g] It is clear that blood is hot in this way, in so far as its being is the being of blood—just as if we should indicate boiling water by some name, so [blood] is called ['blood']—[h] but the underlier, or¹⁷ whatever is such that, by being that, blood is, is not hot. [i] [Blood] is also intrinsically hot in one sense, and, in another sense, not [intrinsically hot]. [j] For heat will belong [to it] in its definition just as paleness in the definition of 'pale man', [k] but in so far as blood is [blood] in respect of an attribute, it is not intrinsically hot.¹⁸

OPO, which occurs in [h] above, is a 'free' relative clause, a relative clause without an expressed antecedent. Together with *ποτέ*, the definite relative *ὃ* has the same effect here as *ὅτι*, 'whatever', would have in its place (Section 2.3 below). Within the relative clause, the relative pronoun *ὃ* is the complement of the participle *ὄν* (Section 2.4), which shares its subject with *ἐστι*, the main verb of the clause. The participle itself is a causative or explanatory circumstantial participle ('by being' or 'because it is': Section 2.5).¹⁹ In the passage above, the subject of both *ἐστι* and *ὄν* is 'blood', so the

be the coupled entity blood. In an analogous case, one might take the phrase 'the essence of a pale human' to refer to the essence of the human, and not to the essence of the pale human, considered as a coupled entity. The phrase *οἶον ἦν αὐτῷ τὸ αἷματι εἶναι*, by contrast, unambiguously indicates that Aristotle intends to speak of the coupled 'essence' of blood as blood.

¹⁷ Two interpretations of *καί* are possible (I favour the second). First, it might be understood as the copulative 'and'. In this case, Aristotle would hold that neither the underlier of blood nor the kind of the underlier of blood is hot. This interpretation demands a loose understanding of *τὸ ὑποκείμενον* (for example, one on which it can stand for 'the matter'), since the underlier of blood, contrary to what the passage would say, *is* hot. Alternatively, *καί* might be expegetic, so that OPO restates the nature of the underlier in question. (More properly, the 'expegetic' use would be Denniston's sense I.(5) ('appositionally related ideas') or I.(6) ('with a sense of climax'): J. D. Denniston, *The Greek Particles*, 2nd edn., rev. K. J. Dover (Oxford, 1954), 291–2.) Aristotle would suggest the general context for OPO by using the term *τὸ ὑποκείμενον*, but then make his description more precise with the technical term OPO. Aristotle's mention of the underlier, although strictly speaking incorrect, would be intended to help someone who did not appreciate the subtlety of OPO grasp the gist of the passage. The ambiguity of *καί* in this passage may help to explain some of the confusion in the commentarial tradition (see above, n. 6).

¹⁸ All translations are my own. The text of *Parts of Animals* is from Louis, and of the *Physics* from Ross, except where noted.

¹⁹ Up to this point, I am in broad agreement with Brague and Coope. I agree

phrase as a whole runs: ‘by being whatever, blood is’.²⁰ In order for ‘whatever’ to function in the rest of the English sentence (as it does in the Greek), we must introduce an independent clause, which is not present in the original. I therefore translate the phrase as ‘whatever is such that (ὅ ποτε), by being *that* (ὄν), blood is (αἷμα ἐστί)’. On the intended reading, the second ‘that’ is anaphoric on ‘whatever’. Figure 1 depicts the relationship between the Greek and this translation.

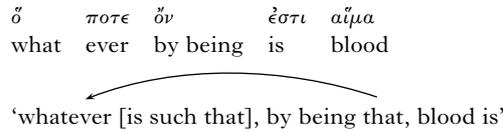


FIGURE 1

I begin with an independent argument that OPO in this passage refers to the kind sanguineous fluid (Section 2.2). Sections 2.3–5 then argue for some details of my linguistic interpretation of OPO. Section 2.6 presents my argument that the final ‘is’ (ἐστί) in OPO must be interpreted as ‘is a being’.

2.2. The parallel with PA 2. 2

Aristotle introduces his doctrine about the heat of blood in an earlier passage, in *PA* 2. 2:

[a] ὃ μὲν γὰρ ποτε τυγχάνει ὄν τὸ ὑποκείμενον²¹ οὐ θερμόν, συνδναζόμενον δὲ θερμόν [b] οἶον εἴ τις θέιτο ὄνομα ὕδατι ἢ σιδήρῳ θερμῷ. τοῦτον γὰρ τὸν τρόπον τὸ αἷμα θερμόν ἐστί. (649^a14–17)

[a] For whatever the underlier happens to be is not hot, but, coupled, it is

also with Charles (D. Charles, ‘Simple Genesis and Prime Matter’, in F. A. J. de Haas and J. Mansfeld (eds.), *Aristotle’s On Generation and Corruption I* (Oxford, 2004), 151–70 at 151 n. 2) on the *referent* of the phrase in this instance, but he sometimes seems to take the relative to be the subject of the participle. For my arguments against this construal see sect. 2.4.

²⁰ In one other instance of OPO (*Phys.* 4. 11, 219^b26) the subject of ἐστί comes before the verb and has no article, as here. When the subject comes after the verb ἐστί, it has an article in both instances (*Phys.* 4. 11, 219^b14–15; 4. 14, 223^b27). It might seem that the nouns without articles (as here) should be taken as the complement of ἐστί and not its subject, but the phrase ὅ ποτε ὄν ἐστί τὸ νῦν (*Phys.* 4. 11, 219^b14–15) is used interchangeably with ὅ ποτε ὄν νῦν ἐστί (219^b26), revealing that the presence or absence of the article is due only to difference in word order, and not to a difference in sense.

²¹ Louis has an unnecessary comma here.

hot²² [b] just as if someone should give a name to hot water or to hot iron. This is how blood is hot.

The syntax of the underlined phrase differs from OPO: the participle *ὅτι* is the complement of ‘happens’ (*τυγχάνει*) and cannot be translated ‘by being’. I therefore render the phrase as ‘whatever the underlier happens to be’.²³ This free relative clause does *not* refer to an individual underlier. We can see this point by assuming that it does, for contradiction. If the relative pronoun referred to an individual, the sentence would be false by Aristotle’s lights. Certain individual underliers for blood (namely, those portions of sanguineous fluid which are blood) are in fact hot. If the underlier were one of those portions, it would be hot. But Aristotle says that whatever the underlier happens to be is not hot. So *ὅτι* does not refer to an individual, but rather to a property. In the context, it is clear that if it refers to a property, it refers to a kind.²⁴

When Aristotle says the kind in question is not hot, he does not mean to say that the relevant property is not hot to the touch (of course it is not). Nor does he mean to say that the kind of the underlier is not identical with heat (once again, of course it is not). Instead, he means that the kind of the underlier does not include heat in its definition, or, more precisely, that: for this *F*, it is not the case that to be *F* is in part to be hot.²⁵ Aristotle’s gloss in [b] confirms

²² Lennox translates this phrase as: ‘For what the subject happens at some time to be may not *be* hot, but *be coupled* with heat’ (*Parts*, 22). I see no word for ‘may’ in the Greek; neither is there a word for ‘heat’. Finally, *ποτέ* does not have the temporal force Lennox attributes to it (see below, next note, and sect. 2.3).

²³ For this construal cf. *Top.* 4. 4, 125^a33–5 and 125^b1–2 (note also the use without *τυγχάνω* in 125^a38). I discuss this use of *ποτέ* at length in the next section (2.3). The standard English translation ‘happens’ exaggerates the extent to which *τυγχάνω* describes a chance occurrence (it need not—cf. e.g. *Theaet.* 160 E 6–7). Unfortunately, without ‘happens’, the presence of a form of *τυγχάνω* in the Greek would go unmarked in the translation.

²⁴ Louis’s comma (which I have deleted) suggests an interpretation of the opening phrase as an unconditional, and not a free relative clause: ‘Whatever the underlier happens to be, it [the underlier] is not hot.’ On this construal, the point would be that the (individual) underlier is not *in itself* hot. But the clause with *τυγχάνει* would still range over kinds, which is enough for my purposes here.

²⁵ In what follows, I will speak of Aristotle’s ‘definitions’ and ‘partial definitions’. I take ‘a human is a rational biped’ as a paradigm of the first, and ‘a human is an animal’ as a paradigm of the second. Throughout, I co-opt the English expression ‘for *a* to be *G* is for *a* to be *F*’ as a translation of Aristotle’s definitions, and ‘for *a* to be *G* is in part for *a* to be *F*’ as a translation of his partial definitions. The ‘real-life’ English expressions may not draw distinctions as finely as Aristotle did in his definitions, but on the intended reading of these sentences (which, to repeat, may well

this interpretation. He cannot be suggesting that one might point at the hot water in a cup and say ‘call it “Thrasymachus”’. Rather, he considers giving a single name to the coupled *kind*, hot water. This kind is not hot to the touch or identical with heat. Instead it is hot in the sense that: to be hot water is in part to be hot. In our passage, Aristotle denies an analogous claim, applied to the kind of the underliers for blood: it is not the case that to be a member of this kind is in part to be hot.

OPO in *PA* 2. 3 should be taken to have the same referent as the similar phrase in *PA* 2. 2. Both phrases describe Aristotle’s theory of the heat of blood, and in both contexts Aristotle uses the same examples to illustrate his point (compare [b] with [g] in Section 2.1). Furthermore, the two phrases exhibit striking lexical similarities, suggesting an intended parallelism.²⁶ So the passage in *PA* 2. 2 provides evidence—independent of my analysis of the syntax of OPO—that OPO refers to the kind sanguineous fluid.

2.3. The word ποτέ²⁷

The Greek ποτέ, which has a core temporal sense (‘at some time’, ‘once’), was also commonly used with a non-temporal sense. The word could be used to emphasize questions introduced by an interrogative pronoun (e.g. τί ποτε . . .;) or an interrogative adverb (e.g. πῶς ποτέ . . .;). In a related use, ποτέ was also commonly used with the indefinite relative pronoun (ὅστις, ἣτις, ὅτι) and also with indefinite adverbs.

ποτέ does not have its temporal sense in OPO. If the conclusion of the previous section (2.2) was correct, this point follows immediately: blood is not sanguineous fluid only ‘at some time’; blood is

be a perversion of their English sense), a definition of Aristotle’s and a definition of this English form are equivalent. (I came to use these expressions after conversations with Jeremy Goodman on topics unrelated to the interpretation of Aristotle.) These partial definitions are well attested in the *Categories*, where Aristotle says (for example) ‘animal is predicated of human’ (*Cat.* 3, 1^b10–15; cf. e.g. *Cat.* 5, 2^a35–^b1; 2^b17–22). For further discussion of this point see below, sect. 2.5, paragraph containing n. 45.

²⁶ Recognizing the similarities of the two phrases does not, however, require the extreme line of Ross (*Physics*, 598), who held that the phrase in *PA* 2. 2 is the full syntactic unit, and that the other instances of OPO (including that in *PA* 2. 3 [h]) are mere abbreviations of the fuller phrase.

²⁷ The view in the main text is much indebted to a suggestion of Philomena Probert’s, although she should not be held responsible for it.

always sanguineous fluid. But the fact that $\pi\omicron\tau\acute{\epsilon}$ does not have its temporal sense in OPO can also be established by an independent argument. OPO occurs in key passages in Aristotle's analyses of time and the now. But then in one passage Aristotle explicitly analyses the temporal $\pi\omicron\tau\acute{\epsilon}$ in terms of the now.²⁸ This passage suggests that Aristotle would have recognized a problem in providing a metaphysical analysis of time and the now in terms of properties these entities have *at some time*. If $\pi\omicron\tau\acute{\epsilon}$ had its temporal sense in OPO, Aristotle would provide precisely the kind of analysis which should be problematic by his own lights.²⁹

In a number of passages, independent of the instances of OPO, Aristotle uses $\pi\omicron\tau\acute{\epsilon}$ with a definite relative pronoun, where $\pi\omicron\tau\acute{\epsilon}$ must not be interpreted temporally. In these passages the phrase $\acute{\omicron}\ \pi\omicron\tau\epsilon$ seems to be equivalent to the indefinite $\acute{\omicron}\tau\iota$.³⁰ This relationship between $\acute{\omicron}\tau\iota$ and $\acute{\omicron}\ \pi\omicron\tau\epsilon$ can be easily explained. When $\pi\omicron\tau\acute{\epsilon}$ is used with the indefinite relative $\acute{\omicron}\sigma\tau\iota\varsigma$, $\acute{\eta}\tau\iota\varsigma$, $\acute{\omicron}\tau\iota$, the word amplifies the force of the indefinite, exaggerating the speaker's ignorance about, or indifference to, the precise referent of the relative pronoun.³¹ But when used with the *definite* relative, $\pi\omicron\tau\acute{\epsilon}$ cannot operate on the ex-

²⁸ *Phys.* 4. 13, 222^a24–7.

²⁹ So too Coope, *Time*, 174.

³⁰ *Cat.* 7, 7^b1–3, 10; *Phys.* 4. 11, 219^b10–11; *Top.* 3. 5, 119^a18; 4. 4, 125^a33, 125^a38, 125^b2; and 6. 8, 146^b7–9 (using the reading of Bekker and Brunschwig, *pace* Ross). With the exception of *Top.* 3. 5, 119^a18, and *Phys.* 4. 11, 219^b10–11 (discussed at n. 106 below), all of these instances occur in discussions of the category of relatives (*πρὸς τι*). (Interestingly, the instances of a phrase related to OPO in Alex. Aphr. *In Metaph.* 324. 13–16 and 324. 7–10 Hayduck also occur in a discussion of relatives.) Three further putative instances of $\pi\omicron\tau\acute{\epsilon}$ with a definite relative in its non-temporal sense (*Cat.* 8, 11^a34–6; *Top.* 3. 3, 118^b19; *NE* 9. 9, 1172^a1–6) may be corrupt. In the first of these passages every manuscript reads $\kappa\alpha\theta'\ \acute{\alpha}\varsigma\ \pi\omicron\tau\epsilon$, but Turner (E. Lobel, C. H. Roberts, E. G. Turner, and J. W. B. Barns (eds.), *The Oxyrhynchus Papyri*, xxiv (London, 1957), 128–9) argued that the $\kappa\alpha\theta'\ \acute{\alpha}\sigma\pi\epsilon\rho$ of P. Oxy. 2403 (fr. 1, l. 21) should be preferred. Bodéüs now follows Turner and the papyrus (R. Bodéüs (ed. and trans.), *Aristote: Catégories* (Paris, 2002), 51). In *Top.* 3. 3, 118^b19, Bekker thought the correct reading was $\acute{\omicron}\pi\omicron\tau\epsilon$, as a single word; Brunschwig (J. Brunschwig (ed. and trans.), *Aristote: Topiques. Livres I–IV* (Paris, 1967), 160 n. 5) now finds the passage to be corrupt. Earlier editors preferred the $\acute{\omicron}\ \tau\iota\ \pi\omicron\tau\epsilon$ of M^b in *NE* 9. 9, 1172^a1 (hence its omission from Bonitz's list of instances of the non-temporal $\pi\omicron\tau\acute{\epsilon}$ with the definite relative), but Bywater and Susemihl reverted to the manuscripts' reading, against M^b, printing simply $\acute{\omicron}\ \pi\omicron\tau\epsilon$. *Pace* Bonitz (H. Bonitz, *Index Aristotelicus [Index]* (Berlin, 1870), 627^b19–25), in *PA* 1. 1, 641^a14, *Metaph.* B 4, 999^b14, and *Metaph.* Z 7, 1032^b24, $\pi\omicron\tau\acute{\epsilon}$ is best interpreted temporally (in categorizing the latter two passages Bonitz may have inherited the error of Torstrik, 'Beitrag', 171).

³¹ Bonitz, too, relates this use of $\pi\omicron\tau\acute{\epsilon}$ to the one with interrogatives: 'eandem τῆς ἀοριστίας notionem, ac pronomibus interrogatiuis, addita particula πῶς tribuit etiam pronomibus demonstratiuis . . . ac praecipue pronomibus relatiuis' (*Index*, 627^b17–21).

isting effect of the indefinite relative pronoun. Instead, the word seems to act directly on the relative pronoun, to generate the effect the indefinite relative would have had in its place.³²

Recently, linguists have converged on a treatment of standard free relative clauses (e.g. ‘what Mary ate’) as roughly analogous to definite descriptions. Like definite descriptions, standard free relative clauses refer to the maximal element (within a contextually salient set of entities) which satisfies the ‘matrix’, the description contained in the relative clause.³³ But controversy still reigns over how to analyse the function of words like ‘whatever’ in *-ever* free relative clauses. In what follows, I will not rely on claims which some linguists contest. Still, it may be helpful to have a concrete

³² If the phrases are equivalent, why did Aristotle consistently write $\delta\ \pi\omicron\tau\epsilon$, and never $\delta\tau\iota$, in OPO? A speculative suggestion is that he did not use $\delta\tau\iota\ \delta\nu$ (or $\delta\tau\iota\ \pi\omicron\tau\epsilon\ \delta\nu$) in OPO because he wished to avoid confusion with the distinct but lexically similar phrase $\delta\pi\epsilon\rho\ \delta\nu\ \tau\iota$ (see e.g. *Phys.* 1. 3, 186^b14–17, 31–5; *Metaph.* Γ 2, 1003^b30–3; *H* 6, 1045^a36–^b7; with Bonitz, *Index*, at 533^b36–534^a23). But this suggestion remains speculative at best.

³³ This ‘maximal’ element is usually defined following the elegant semantics of Link (G. Link, ‘The Logical Analysis of Plurals and Mass Terms: A Lattice-Theoretical Approach’, in R. Bauerle, C. Schwarze, and A. von Stechow (eds.), *Meaning, Use, and Interpretation of Language* (Berlin, 1983), 302–23). The extension of this analysis of definite noun phrases to free relative clauses can be found in P. Jacobson, ‘On the Quantificational Force of English Free Relatives’, in E. Bach, E. Jelinek, A. Kratzer, and B. H. Partee (eds.), *Quantification in Natural Languages* (Dordrecht, 1995), ii. 451–86; H. Rullman, ‘Maximality in the Semantics of Wh-Constructions’ (diss. Ph.D., UMass Amherst, 1995) (<http://www.linguistics.ubc.ca/sites/default/files/dissertation.pdf>) 139–53 [accessed 7 May 2013]; A. Grosu and F. Landman, ‘Strange Relatives of the Third Kind’ [‘Strange Relatives’], *Natural Language Semantics*, 6 (1998), 125–70 at 155–62; A. Grosu, ‘Strange Relatives at the Interface of Two Millennia’, *GLoT International*, 6 (2002), 145–67 at 148–9; and K. Rawlins, ‘(Un)conditionals: An Investigation in the Syntax and Semantics of Conditional Structures’ [‘Unconditionals’] (diss. Ph.D., University of California at Santa Cruz, 2008) (http://mind.cog.jhu.edu/~rawlins/papers/rawlins_dissertation.pdf) 211–16 [accessed 7 May 2013]. I. Caponigro, ‘Free Not to Ask: On the Semantics of Free Relatives and Wh- Words Cross-Linguistically’ (diss. Ph.D., University of California at Los Angeles, 2003) (http://idiom.ucsd.edu/~ivano/Papers/2003_dissertation_revised_7-13-05.pdf) 82–110 [accessed 7 May 2013], considers two classes of counter-examples to semantic treatments of free relative clauses in general as maximalizing: existential (or *irrealis*: Grosu and Landman, ‘Strange Relatives’, 155–8) free relative clauses; and free relative clauses which behave like prepositional phrases. Here, it is enough to observe that OPO falls into neither category, and so may be safely interpreted as maximalizing. The heterodox view of Laurence Horn (‘any and ever(-): Free Choice and Free Relatives’, in *LATL 7: The Proceedings of the Fifteenth Annual Conference, The University of Haifa, 1999* (2000), 71–111 at 101–7) differs only when one considers the felicity of *-ever* free relatives in contexts where no salient entity satisfies the matrix. Since Aristotle never doubts the existence of the referent of OPO, these putative differences are irrelevant here.

hypothesis about the function of ‘-ever’ or $\pi\omicron\tau\acute{\epsilon}$ in view. On one popular hypothesis, free relative clauses of the *-ever* variety include, in addition to the components of standard free relative clauses, a ‘domain-widening’ instruction, which asks the hearer or listener to expand the set of salient entities along some contextually specified axis.³⁴ The resulting referent of the *-ever* free relative clause is then selected from the expanded domain by the same mechanism as the referent of the corresponding standard free relative clause would be. If this hypothesis is right, $\pi\omicron\tau\acute{\epsilon}$ would provide this kind of domain-widening instruction to the reader or listener.

A final uncontroversial feature of *-ever* free relative clauses will be crucial to the arguments of later sections. In general, these relative clauses are felicitous only if the speaker is ignorant of or indifferent to the precise referent of the clause.³⁵ When Aristotle uses δ with $\pi\omicron\tau\acute{\epsilon}$ in both 649^a15 ([a] in Section 2.2) and 649^b24 ([h] in Section 2.1) he may be uncertain about the precise kind of the underlier, or perhaps simply unwilling to provide detailed specification of this mixture of earth and water.³⁶ In these passages he never names what I have been calling ‘sanguineous fluid’. He appears to have been so uncertain of, or so uninterested in, the kind of the entities which play the role of the underlier for portions of blood that he did not give this kind a name.

Aristotle’s ignorance of or unwillingness to elaborate on the referent of OPO will be more difficult to explain in passages in the

³⁴ The notion of domain-widening is found in N. Kadmon and F. Landman, ‘Any’, *Linguistics and Philosophy*, 16 (1993), 353–422. Here I follow Philomen Probert’s discussion of ‘-ever’ Greek relatives (Probert, *Early Greek Relative Clauses [Early Relatives]* (Oxford, forthcoming), ch. 3.3.2). My terminology is intended to be neutral on whether the ‘instruction’ is expressed semantically or pragmatically.

³⁵ For a representative statement, see D. Heller and L. Wolter, ‘Identity and Indiscernibility in *-ever* Free Relatives’, in T. Friedman and S. Ito (eds.), *Proceedings of SALT XVIII* (2009), 394–410 at 394. Rawlins (‘Unconditionals’, 176) provides a more complete catalogue, noting that sentences like ‘John reads whatever books Mary does’ do not presuppose the ignorance of the speaker as to what Mary reads. OPO is not used in sentences like this one, so we need not worry about the exception. Linguists differ on how *-ever* free relatives express the ignorance or indifference of the speaker; all that matters for our purposes is that the phrases *do* express that the speaker is ignorant or indifferent. In his own terminology, Adolf Torstrik already recognized this component of what OPO expresses, arguing that the indefinite ‘aspect’ or ‘moment’ of $\pi\omicron\tau\acute{\epsilon}$ reflects the fact that the referent of the phrase is ‘unknown, irrelevant, or both’ (‘entweder unbekannt oder gleichgültig ist, oder auch beides’: ‘Beitrag’, 171).

³⁶ He may also view air as a constituent of this mixture; see n. 13 above.

Physics. I will defer explaining his use of the *-ever* free relative in these passages until Section 3, where I discuss them in detail.

2.4. *ὅ* is the complement of the participle

I now argue that, in the passage in *PA* 2. 3, *ὅ* is the complement of the participle *ὄν*.³⁷

Suppose, for *reductio*, the only alternative: that the relative pronoun is the subject of the participle. The three main possibilities for the interpretation of *ὄν* are: the predicative interpretation ‘being [*F*]’; the essential interpretation, ‘being what it is’; and the existential interpretation, ‘existing’.³⁸ According to the predicative reading of the participle, the phrase would be interpreted as ‘that which, being [*F*], is blood’. A proponent of this translation might hope that, in the context quoted above, ‘hot’ could be supplied for ‘*F*’.³⁹ On this interpretation, OPO would refer to an entity which, when it is hot, or because it is hot, is blood. This reading is ingenious, but it is not a possible interpretation of the Greek. The focus of the passage is the heat of blood, but the word ‘hot’ is not used in a construction which would make it possible for the reader or hearer to supply it as a complement in our sentence.

In the face of this linguistic fact, the interpreter who holds that *ὅ* is the subject of the participle is left with two readings of the participle itself: ‘exists’; or ‘is what it is’. An interpretation which takes

³⁷ The main argument for taking the pronoun as complement of the participle is that this is both a natural and an unproblematic interpretation of the Greek. Brague’s more sophisticated ‘knock-down’ argument for this construal is based on a false premiss. He claims that if the pronoun were the subject of the participle, the participle would be attracted to the gender of its complement (*Temps*, 102–4). Thus, he writes: ‘c’est la présence même du neutre qui permet d’identifier la construction relative, la copule n’étant attirée que par le prédicat, et non par le sujet’ (104; cf. 103). But the subject of the participle need not attract the participle in order for the two to agree in gender. In Soph. *Ajax* 1094 (ἄνδρα . . . | ὅς μηδὲν ὄν γοναίσω εἶθ’ ἀμαρτάνει) the relative pronoun is the subject of a participial form of the verb ‘to be’, but the participle agrees with its masculine subject and not its neuter complement. *Prob.* 11. 1, 898^b30–1, is an Aristotelian parallel for a similar phenomenon, although with a nominal, not a pronominal, subject.

³⁸ Two further interpretations, as identity and as ‘is a being’, will also fall to the arguments in the main text. See below, n. 41.

³⁹ Coope claims that *ποτέ* could make the (unexpressed) predicate indefinite: ‘that which, by being some *F*, whatever *F* that is, is blood’ (*Time*, 174). But *ποτέ* requires at least a relative or an adverb to have this ‘indefinite’, non-temporal sense. Coope’s putative Platonic parallel, *Theaet.* 160 E 6–7, has the indefinite relative *ὅτι*, and thus does not even support the use of *ποτέ* with a definite relative, never mind the use of it without any relative pronoun at all.

the relative pronoun as the subject of the participle must also take the relative as subject of the verb 'is' (ἐστίν).⁴⁰ So the referent of the relative pronoun would be said to *be* blood. When the participle was supposed to be interpreted as 'is *F*', the consequences of this fact were minimal: it might be that the referent of the relative pronoun is blood because it is *F*, despite not being blood in itself. But when the participle is interpreted as 'is what it is' or 'exists', this line of escape is blocked: if the referent of the pronoun is blood merely by its existing or its being what it is, then it must be that the referent of the relative pronoun is, in itself, blood. In [g], Aristotle says that to be blood is in part to be hot. This claim implies that if something is blood, then it is hot. If the relative pronoun were the grammatical subject of the relative clause, and if the participle were to be interpreted as 'exists' or 'is what it is', the pronoun would have to refer to something hot. But in [h] above, Aristotle says that the referent of OPO is not hot.⁴¹ So the relative pronoun *ὃ* is the complement, and not the subject, of the participle *ὄν*.⁴²

2.5. The participle *ὄν*

But how should we understand the participle itself? The preceding section showed that the relative *ὃ* is the complement of this participle, so the participle cannot be interpreted as 'exists' or as 'is what it is', senses in which 'is' does not take any complement at all.⁴³ The 'is' of identity also fails as an interpretation of this parti-

⁴⁰ Otherwise, one would expect a genitive absolute. In principle, the genitive absolute could be attracted by the accusative of the implied antecedent of the relative pronoun, but this would be tortuous Greek indeed.

⁴¹ This argument also dispatches a reading of 'to be' as identity: if the antecedent of the relative, by being identical to itself (the only complement that could conceivably be supplied), is blood, then it would have to be hot, in contradiction of [h]. Similarly, if the antecedent of the relative, by being a being, is blood, then it would have to be hot, in contradiction of [h].

⁴² In sect. 2.2 I argued that an interpretation which maintains the parallelism between the phrases in *PA* 2. 2 and 2. 3 is to be preferred to one which does not. This conclusion leads to a further argument against a position which takes *ὃ* to be the subject of the participle *ὄν*. In the passage from *PA* 2. 2, the use of the article with 'the underlier' (τὸ ὑποκειμένον) makes it clear that this term is the subject of the phrase with τυγχάνει; the relative *ὃ* is the complement in that passage. We thus have another reason to prefer an interpretation which takes *ὃ* as the complement of *ὄν* (Brague also notes the importance of the article here: *Temps*, 107).

⁴³ In the sense of 'is a being' (see below, sect. 2.6.2), the verb 'to be' also does not take a complement. So this reading of the participle is ruled out by the same consideration.

ciple in the context. Aristotle says (in [h]) that the referent of OPO is not hot. But he believes that blood *is* hot. So anything to which blood is identical is also hot. If $\delta\nu$ is construed as expressing identity, Aristotle's comment in [h] would contradict Leibniz's law.⁴⁴ This argument leaves the predicative reading of the participle as the only possibility.

The subject of this predication is, as I have argued, a kind. But Aristotle does not claim here that the kind blood is *made of* sanguineous fluid. Rather, he uses the verb 'to be' in a way which becomes readily available when one describes (what Aristotle called) 'predication' relations between kinds. Consider the examples Aristotle gives, in the *Categories*, of how genera are predicated of species.⁴⁵ On one reading of the sentence 'a human is an animal', the sentence entails that every human is an animal. Aristotle accordingly may have interpreted the original sentence as synonymous with a partial definition, which we may express by 'to be a human is in part to be an animal', or 'human is a species of animal'. The participle in OPO indicates this type of predication, in which the genus is predicated of the species. To be blood is in part to be sanguineous fluid. In a manner of speaking, blood is a species of the genus sanguineous fluid, namely, hot sanguineous fluid.⁴⁶

The fact that the participle $\delta\nu$ indicates this relation between kinds makes it clear that the participial phrase is best interpreted as causal or explanatory. A concessive reading of the participial phrase ('although it is') would conflict with the partial definition expressed by the participle itself. Since to be blood is in part to be sanguineous fluid, there is no relevant contrast between being blood

⁴⁴ Some think Aristotle had 'a sense of identity' which does not obey Leibniz's law. But the correct terminological decision is to deny that such a 'sense' is a sense of *identity*. What others call a sense of identity, I call a type of predication. See n. 46 for an interpretation related to this 'sense of identity'.

⁴⁵ *Cat.* 3, 1^b10–15. Cf. e.g. *Cat.* 5, 2^a35–^b1, 2^b17–22.

⁴⁶ Aristotle may allow an alternative interpretation of 'is', which would fit the participle in OPO even more exactly. In *Metaph.* Δ 7, 1017^a7–19, he recognizes a sense of 'is' in which it may be said that the cultured thing (the coupled entity) *is* a man. (Cf. also *Post. An.* 1. 22, 83^a4–9, with 83^a14–20.) At the level of individuals, this sense of 'is' is closely related to Aristotle's notion of 'accidental sameness'. (See especially Lewis, *Substance*, 103.) In a different passage Aristotle considers a related notion as applied to coupled *kinds*. He there says that a coupled kind such as cultured human is accidentally one with the kind of the underliers of its instances, namely, human (*Metaph.* Δ 6, 1015^b28–34). The participle $\delta\nu$ may thus indicate the accidental sameness or oneness of the coupled kind with the kind of its underliers, in a precise parallel with the sense of 'is' in which (for Aristotle) the cultured thing is a human.

and being sanguineous fluid. A temporal interpretation of the participial phrase is also unattractive, for reasons described earlier in the discussion of $\pi\omicron\tau\acute{\epsilon}$. The phrase ‘when to be blood is in part to be sanguineous fluid’ carries the bizarre implicature that this relation between the properties holds only at some times and not at others. And, as above, the temporal interpretation as applied to the *Physics* leaves Aristotle providing an analysis of time which would be confused by his own lights.⁴⁷ So the participle $\delta\upsilon\nu$ is best interpreted as ‘by being’ or, equivalently, ‘because it is’.

2.6. The verb $\acute{\epsilon}\sigma\tau\iota$

I now turn to the second form of ‘to be’ ($\acute{\epsilon}\lambda\upsilon\alpha\iota$) in OPO, the final ‘is’ ($\acute{\epsilon}\sigma\tau\iota$). In her analysis of the instances of OPO in the *Physics* Ursula Coope considers three options for the interpretation of this final ‘is’: (1) ‘is [something or other determined by context]’; (2) ‘is what it is’; or (3) ‘exists’.⁴⁸ But Coope’s list is not exhaustive. Aristotle sometimes uses the verb ‘to be’ to indicate what he elsewhere writes as ‘is a being’. In this latter phrase he uses the neuter participle $\delta\upsilon\nu$ as the complement of the copula (which is usually only implied). The expression ‘is a being’, like ‘to be’ when used in this sense, has a different meaning from that of ‘exists’.

The argument of this section proceeds in two stages. First, I argue that none of Coope’s three alternatives is a possible interpretation of the final ‘is’ of OPO. Second, I describe my positive proposal, discussing Aristotle’s use of the expression ‘is a being’.

⁴⁷ A conditional interpretation of the participial phrase (‘if it is . . .’) is not a real option for OPO. Moreover, what the grammars call participial phrases of ‘means’ and of ‘manner’ would be equivalent in this context to some form of causal interpretation.

⁴⁸ Coope, *Time*, 173–5. Some might worry that these distinctions among senses of ‘to be’ are anachronistic. But first, even if Aristotle had not made these distinctions explicitly, he may have been conscious of a difference in ‘feel’ between different uses of the verb. Second, Aristotle *does* distinguish questions with syntactically ‘complete’ uses of the verb from those with syntactically ‘incomplete’ uses of the verb (see *Post. An.* 2. 1, 89^b31–5). This distinction among questions is at least enough to license distinguishing (1) from (2) and (3). (For the distinction between syntactically ‘complete’ and ‘incomplete’ uses see L. Brown, ‘Being in the *Sophist*: A Syntactical Enquiry’, *Oxford Studies in Ancient Philosophy*, 4 (1986), 49–70, and now revised as ‘Being in the *Sophist*’, in G. Fine (ed.), *Plato 1: Metaphysics and Epistemology* (Oxford, 1999), 455–78). Brown herself holds that Aristotle distinguishes between these uses in the passage in the *Posterior Analytics*; see L. Brown, ‘The Verb “To Be” in Greek Philosophy’, in S. Everson (ed.), *Language* (Companions to Ancient Thought), 3; Cambridge, 1994), 212–36 at 233–6.)

2.6.1. *Against the essentialist and existential interpretations* The interpretation of the verb ‘to be’ as the copula ((1) in Coope’s list) requires that a suitable complement can be supplied from context. In the passage in *PA* 2. 3, only ‘blood’ could be supplied in this way. But the sentence ‘blood is blood’ is equivalent, for our purposes, to ‘blood is what it is’. So Coope’s list reduces to two options: ‘is what it is’ and ‘exists’.

What I will call the ‘essentialist interpretation’ of OPO interprets the final ‘is’ ($\epsilon\sigma\tau\iota$) of OPO as ‘is what it is’. The ‘existential interpretation’, by contrast, interprets the final ‘is’ ($\epsilon\sigma\tau\iota$) as ‘exists’. Coope herself adopts the essentialist interpretation, although she admits the possibility of the existential interpretation. In this section I argue against each of these interpretations, in turn.

In the passage from *PA* 2. 3 two points are clear:

- (1) Blood is hot in so far as its being is the being of blood. ([g] above; cf. also [j])
- (2) The referent of OPO is not hot. ([h] above)

Since the proponent of the essentialist interpretation agrees that OPO refers to a kind, we can rewrite (2) equivalently as a partial definition:

- (2*) It is not the case that to be F (where F is the referent of OPO) is in part to be hot.⁴⁹

Once again, the parallel Aristotle draws between blood and boiling water (in [g]) makes it clear that he intends a partial definition of this kind. He is not imagining that we should give a name to the boiling water in some particular pot.⁵⁰

I will now argue that the essentialist interpretation of OPO requires that, in this passage, OPO refers to something hot. Since this requirement contradicts (2), and (2) is evident in the text, the argument shows that this interpretation must be rejected.

On the essentialist interpretation, Aristotle would say: ‘whatever is such that, by being that, blood *is what it is*, is not hot’. To avoid the syntactic contortions of this English translation, I will paraphrase OPO with a definite noun phrase. This simplification will

⁴⁹ The wide-scope negation in (2*) is not required for the relevant reading, but ‘to be F is not in part to be hot’ invites confusion with metalinguistic negation, where the sentence might precede an emphatic ‘to be F *just is* to be hot’.

⁵⁰ The parallel with the passage in *PA* 2. 2 also supports this reading. See again n. 25, and the arguments in the main text there.

not affect the argument, which does not depend on neglecting the fact that Aristotle must be ignorant of or unwilling to elaborate on the referent of the clause, if the *-ever* free relative clause is to be felicitous. Given this paraphrase, the essentialist interpretation can be identified with the Essentialist Thesis:

(*Essentialist Thesis*) OPO refers to that *F*, by being which, blood is what it is.

A version of my argument runs as follows. The most natural understanding of the Essentialist Thesis takes the relative pronoun *ὃ* to refer to blood itself. Blood is that, by being which, blood is what it is. Or, in simpler syntax: blood is what it is because it is blood—no more, no less. But if the Essentialist Thesis implies that OPO refers to blood, the Thesis is false. Blood is hot. But Aristotle says explicitly that the referent of OPO is not hot ([h]).

This argument can be generalized, and made more precise. The key premisses in the more general argument derive from formal constraints governing the kind of explanation Aristotle seeks to provide in this passage. The context makes it clear that he does not aim to provide an explanation by way of the efficient or material causes. The heart is the efficient cause of the heat of blood.⁵¹ But Aristotle cannot mean to say ‘blood, by being the heart, is . . .’, for the simple reason that blood is not the heart. Moreover, the advocate of the Essentialist Thesis cannot hold that Aristotle means to give an explanation by the material cause. As we have seen, since the ingredients of the mixture which composes blood are cold, he does not believe that the ‘matter’ of blood *is* a cause of the heat of blood.⁵²

Aristotle need not have his doctrine of the four causes in mind as he gives this explanation of the heat of blood. But the fact that the efficient and material causes are not in view in this passage strongly suggests that he aims to give something analogous to a formal-causal explanation of the heat of blood. In other words, he aims to explain the heat of blood by explaining what it is for blood to be hot. Recently, philosophers have become increasingly interested in this metaphysical style of explanation, in which ‘*explanans* and *explanandum*’ are connected, not through some sort of causal mecha-

⁵¹ *PA* 3. 5, 667^b19–29; cf. also *PA* 3. 4, 665^b31–666^a8, esp. 666^a2–3.

⁵² On this mixture see n. 13 above. On whether blood has matter see n. 15.

nism, but through some form of constitutive determination'.⁵³ Aristotle's efficient and material causes count as 'causal' in the sense used in this quotation, but the formal and final causes do not. His explanations by way of the formal cause are a paradigm of explanation by way of 'constitutive determination'.

The following schema allows us to translate the explanation by 'constitutive determination', expressed by the participle, into an explicit definition:

(*Translation*) If a is G by being F , then for a to be G is for a to be F .

Premiss (3) is the instance of this schema relevant to assessing the Essentialist Thesis:

(3) If blood is what it is by being F , then for blood to be what it is is for blood to be F .

In motivating Translation and (3), I have so far ignored one possibility. Aristotle might have intended his 'by being' as only a *partial* metaphysical explanation by way of constitutive determination. In that case, we would have:

(3#) If blood is what it is *in part* by being F , then for blood to be what it is is *in part* for blood to be F .

(3#) represents a possible interpretation of the participle *ὅν* on its own. But we are interested in the participle as it occurs in the free relative clause OPO. As in the case of singular definite noun phrases, an assertion containing a free relative clause is felicitous only if the description in the relative clause is satisfied by a *unique* entity within a contextually salient set of entities. If (3#) represented a correct interpretation of OPO here, Aristotle's use of OPO in *PA* 2. 3 would violate this requirement of uniqueness. More than one salient F *partially* explains the fact that blood is, however we should understand this final 'is'. Aristotle is explicit that he views blood as a coupled entity. The Essentialist Thesis, plus (3#), yields an interpretation of OPO as 'what (partially) explains blood's being what it is'. But an utterance containing this clause would cause a failure of the presupposition of uniqueness: blood is what it is in

⁵³ Fine, 'Guide', 37.

part by being sanguineous fluid *and also* in part by being hot. On pain of infelicity, then, the explanatory participle *ὅτι* in OPO cannot be read as indicating a partial explanation.⁵⁴ (3#) is incorrect, and (3) stands.

We need one more premiss to complete the argument:

(Transmission of Parts) If for *a* to be *G* is for *a* to be *F*, and if for *a* to be *G* is in part for *a* to be *H*, then for *a* to be *F* is in part for *a* to be *H*.

This premiss appears complex, but the idea is simple. Suppose that for Socrates to be human is for Socrates to be a rational biped. Then if for Socrates to be human is in part for Socrates to be rational, then to be a rational biped is also in part to be rational. In general, given a definition of this form, the definiens can be substituted, *salva veritate*, in any partial definition of the definiendum.⁵⁵

From these premisses we can derive a contradiction. The Essentialist Thesis and (3) together yield:

- (4) OPO refers to that *F* such that, for blood to be what it is is for blood to be *F*.

But then (4) and (1), together with Transmission of Parts, yield:

- (5) The referent of OPO is an *F* such that to be *F* is in part to be hot.

(5) contradicts (2*), which is equivalent to (2), and thus explicit in the text. (5) follows by a valid argument from the conjunction of the Essentialist Thesis, (3), (1), and Transmission of Parts. (1) is explicit in the text. A defender of the Essentialist Thesis must either deny (3) or Transmission of Parts. I argued for (3) on the basis of the kind of explanation Aristotle gives in this passage: it is neither material nor efficient, and cannot be a partial explanation. The burden rests on a proponent of the Essentialist Thesis to find

⁵⁴ In three *prima facie* similar passages in the *Posterior Analytics* Aristotle may use the participle to give a partial explanation similar to the one proposed in (3#) (*Post. An.* 1. 4, 73^b5–8; 1. 22, 83^a30–2; 83^b17–24; cf. also *Post. An.* 1. 22, 83^a13–15). But in these passages Aristotle does not use a *free* relative clause. So the parallel between the passages is not exact.

⁵⁵ The converse, however, need not hold. Aristotle may have thought that substituting the definiendum in some partial definitions of the definiens did not preserve truth.

an alternative style of explanation which would not lead to premiss (3). Transmission of Parts reflects the natural view that a full definition should capture all partial definitions. Although the premiss may appear complicated, it is difficult to know what the essentialist interpreter could put in its place. Together with these premisses, the Essentialist Thesis leads to an outright contradiction. So the Thesis should be rejected.

An analogous problem arises for the existential interpretation. I will continue to paraphrase the *-ever* free relative clause as a definite noun phrase. This paraphrase of the existential interpretation yields:

(Existential Thesis) OPO refers to that *F*, by being which, blood exists.

According to Aristotle's view that blood is a coupled entity:

(1ex) For blood to exist is in part for blood to be hot.

The same considerations we gave for adopting (3) when 'is' is interpreted as 'is what it is', apply to an interpretation of the word as 'exists':

(3ex) If blood exists by being *F*, then for blood to exist is for blood to be *F*.

The conjunction of the Existential Thesis with (1ex), (3ex), and Transmission of Parts leads, once again, directly to (5), and to contradiction of (2) (or (2*)), which is explicit in the text. This argument is slightly weaker than the previous version of the argument, since (1ex) is not explicit in the text (whereas (1) was explicit). But, given Aristotle's repeated comparisons between blood and standard examples of coupled entities, (1ex) clearly holds in this context.

The two candidate interpretations gleaned from Coope's taxonomy of possible interpretations of 'is' both lead to contradiction when combined with Aristotle's statement that the referent of OPO is not hot. If an alternative interpretation of the word 'is' can avoid this consequence, that interpretation is to be preferred.

2.6.2. *The ontic interpretation of OPO* Aristotle opens *Metaphysics Z I* with the statement that 'being' ($\tau\acute{o} \delta\upsilon$) is said in many ways.⁵⁶ He

⁵⁶ $\tau\acute{o}$ in this sentence has the effect of quotation marks, as often in Aristotle:

contrasts ‘being’ in the sense of substance with the sense in which members of the other categories are called ‘beings’: ‘But the others are said to be beings (λέγεται ὄντα), some because they are quantities of that which is in this way [viz. as a substance], others because they are qualities, still more because they are affections, and the rest in some other way.’⁵⁷ The verb λέγω does not take the participle in indirect statement. Accordingly, in λέγεται ὄντα (‘are said to be beings’), ὄντα (‘beings’) is the complement of an implied εἶναι (‘to be’).⁵⁸ Aristotle seeks to explain in what sense these entities *are beings*; this aim governs the remainder of the passage.

Aristotle provides a schematic explanation, which, as the examples show, is supposed to apply to entities such as goodness. Each member of each category (for example, goodness) is a being because it is (for example) the quality of a substance. In the succeeding sentences Aristotle applies this style of explanation to coupled entities: the walking thing, the seated thing, the thing which is becoming healthier, and the good thing.⁵⁹ He sums up his discussion of these entities with an important conclusion: ‘Therefore it is clear that each of these [e.g. the sitting thing, the good thing] is [a being] [ἔστιν] on account of this [sc. the substance] [διὰ ταύτην].’⁶⁰ Following the train of thought from the earlier part of

Metaph. Z 1, 1028^a31–2; *Z* 10, 1034^b32–5. Also, further afield, e.g. *Metaph. Δ* 18, 1022^a14–17; *Δ* 23, 1023^a8–11; *Δ* 24, 1023^a26–9 (*et plura alia*). The fact that Aristotle introduces the section by focusing on ὄν does not imply that his focus will remain exclusively on the participle. (Compare, for example, *Metaph. Δ* 7, where the participle is never used in a key formulation after the opening sentence.) But Aristotle’s train of thought in *this* passage does focus on an expression which uses the participle. (It is an open and interesting question why Aristotle uses the participle when he says that the verb ‘to be’ is ambiguous (e.g. *Metaph. Γ* 2, 1003^a33–^b6 (cf. *K* 3, 1060^b31–3); *Δ* 10, 1018^a35–8; *E* 2, 1026^a33–^b2), as opposed to his ordinary practice of using the infinitive when indicating that verbs are used ambiguously (cf. e.g. *Pr. An.* 1. 3, 25^a37–40; *Phys.* 1. 7, 190^a31; *Metaph. Δ* 23, 1023^a8–11; *Θ* 1, 1046^a4–6).)

⁵⁷ τὰ δ’ ἄλλα λέγεται ὄντα τῷ τοῦ οὕτως ὄντος τὰ μὲν ποσότητες εἶναι, τὰ δὲ ποιότητες, τὰ δὲ πάθη, τὰ δὲ ἄλλο τι (*Metaph. Z* 1, 1028^a18–20).

⁵⁸ For a precise parallel, *Metaph. Γ* 2, 1003^b6–10. The participle is the complement of an explicit ἔστι in *Metaph. Δ* 7, 1072^b10. The syntax of Aristotle’s ἦ is not well understood, but it is probable that the word invariably introduces a full subordinate clause. If so, the locutions ὄντα ἦ ὄντα and ὄν ἦ ὄν (e.g. *Metaph. Γ* 2, 1003^b15–16, 1005^a2–3, et passim) provide extensive evidence for Aristotle’s use of ὄν as a complement of the copula.

⁵⁹ *Metaph. Z* 1, 1028^a20–9; discussion in A. Code, ‘Aristotle and Existence’ (unpublished MS on file with the author), 10–11. My interpretation of this passage is indebted to Code’s paper.

⁶⁰ δῆλον οὖν ὅτι διὰ ταύτην κακείνων ἕκαστον ἔστιν (*Metaph. Z* 1, 1028^a29–30).

this passage, this ‘is’ (ἐστίν) must be equivalent to ‘is a being’ in the foregoing discussion.⁶¹ A good thing is a being because of the substance it is. More precisely, the good thing is a being because it is the substance it is.

Both of these explanations—of entities such as goodness, and of entities such as the good thing—reveal that Aristotle is not explaining the *existence* of the relevant entities. For goodness to exist is not merely for goodness to be a quality—goodness must also be the quality it is. Perhaps even more clearly, for a good thing to exist is not merely for it to be the substance it is—that substance must also be good.

The final ‘is’ in OPO, like the ‘is’ (ἐστίν) in *Metaph. Z 1*, 1028^a30, is synonymous with Aristotle’s ‘is a being’. In *Metaphysics Z 1* Aristotle suggests that an ordinary coupled individual, for example a walking thing, is a being because it is the substance it is. When Aristotle uses OPO, the relevant coupled entity may not have a particular substance as its underlier. But the explanation contained in OPO is parallel to the one in *Metaphysics Z 1*: the coupled kind is a being because it is the kind of those entities which play the role of the underlier for its instances. This explanation, moreover, meets the stringent requirements on explanation which were the downfall of the essentialist and existential interpretations of OPO. In *Metaphysics Z 1* Aristotle suggests that for walking Socrates to be a being is for walking Socrates to be Socrates. Similarly, for the coupled kind to be a being is for it to be the kind of those entities which play the role of the underlier for its instances. The passage in *Metaphysics Z 1* shows that this ontic interpretation is possible; the verb ‘is’ (ἐστίν, 1028^a30) here has exactly the required sense. The argument of Section 2.6.1 demonstrates that the ontic interpretation is also preferable to the alternatives.

⁶¹ Aristotle refers to *Metaph. Δ 7* at the opening of *Metaph. Z 1* (1028^a1–2); the discussion which follows in *Metaph. Z 1* has parallels with *Δ 7*, 1017^a22–30. In *Δ 7*, 1017^a27–30, Aristotle says that there is no difference between e.g. ‘a man is a walking one’ (ἄνθρωπος βαδίζων ἐστίν) and ‘a man walks’ (ἄνθρωπος βαδίζει). If this translation scheme is wholly general, as it seems intended to be, the result would be that the predicate ‘is a being’ (ἐστίν ὄν) does not differ from the predicate ‘is’ (ἐστί). If this line of thought is correct, Aristotle seems (at least in *Metaph. Z 1*) to take the form with the participle as explanatory of the sense of ‘is’ on its own. In the light of this passage, then, we see that ‘is’ (ἐστί) on its own can mean ‘is a being’, but ὄν used as a complement need not have the sense of ‘exists’.

2.7. Conclusion

In the passages from *PA* 2. 2–3 Aristotle conceives of blood as a coupled entity. This view of blood occupies middle ground between the claim that blood is a compound substance and the claim that the heat of blood is an accident of an underlying substance. In the course of this explanation, in *PA* 2. 3 Aristotle uses OPO to refer to the kind sanguineous fluid. In that passage, OPO should be understood as ‘whatever is such that, by being that, blood is a being’. Blood is the coupled kind hot sanguineous fluid. In so far as its being is the being of blood, blood is hot. But that, by being which, the kind blood is a being—namely, sanguineous fluid—is not hot.

3. *Physics* 4. 11–143.1. Coupled kinds in *Physics* 4. 11–14

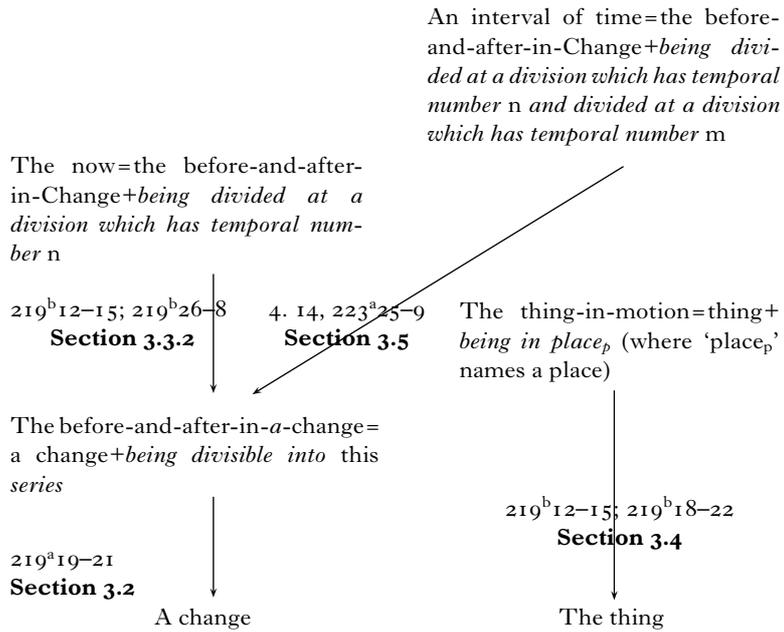
In *Physics* 4. 11–14 Aristotle argues that time and two other entities related to time—the before-and-after-in-change and the now—are properties of changes. Aristotle may have held that these properties of changes could ultimately be reduced to properties of the substances which change.⁶² If he did, the theory of time in *Physics* 4. 11–14 would extend, but not conflict with, his ‘standard’ picture, in which accidents depend directly on substances. Still, at least in *Physics* 4. 11–14, Aristotle does not argue for this kind of reduction. Instead, he describes a layered structure of dependence, in which coupled kinds are coupled with further attributes to form new coupled kinds. This layered structure is depicted in Figure 2.

On my interpretation of *Physics* 4. 11–14, coupled kinds are central to Aristotle’s theory of time. Scholars since Broadie have recognized that Aristotle makes use of coupled entities at least twice in these chapters, in his discussions of Coriscus (4. 11, 219^b18–22), and of the thing-in-motion (4. 11, 219^b16–25 and 219^b33–220^a9; see Section 3.4 below).⁶³ Aristotle uses neither the word ‘coupled’ nor related technical terminology in these passages, but he is clearly

⁶² D. Bostock, *Aristotle’s Metaphysics Z and H* (Oxford, 1994), 101–2, also voices some thoughts along these lines. The view that changes are not substances is expressed even in these chapters: 4. 11, 219^b30–1.

⁶³ S. [Waterlow] Broadie, ‘Aristotle’s Now’ [‘Now’], *Philosophical Quarterly*, 34 (1984), 104–28, esp. 120–2. Cf. Coope, *Time*, 132–9. Coriscus is a standard example of a coupled entity: e.g. *SE* 17, 175^b15–27; 22, 178^b36–179^a10; 24, 179^a35–4;

The '+' indicates that a kind and an accident form a coupled entity. The first term after each '=' is the kind of the entities which play the role of underliers for the members of the coupled kind. Arrows indicate the explanatory relation expressed by OPO. Passages by arrows show where Aristotle uses OPO. References in bold type indicate where I discuss those passages. Phrases in italics name determinates of a determinable which is universal but non-definitional for the kind of the underliers (Section 3.2 ad fin. explains the terminology).^a



^a In Section 2 I named properties by abstract nouns (e.g. 'heat') and not by phrases formed from the predicates which express the properties (e.g. 'being hot'). In Section 3 it becomes difficult to maintain the practice, which would strictly require that I write (for example) 'divided-at-a-division-counted-with-1-ness'. Instead, I have opted to write '*being divided at a division which has temporal number n*'. I will use italics to indicate that the whole phrase should be read as designating one property.

FIG. 2. OPO in Physics 4. 11-14

thinking of coupled entities here. And, furthermore, since he uses Coriscus and the-thing-in-motion as part of his explanation of the nature of the now, these two passages provide strong evidence that Aristotle thought of the now, too, as a coupled entity.

Metaph. E 2, 1026^b15-21; *Phys.* 5. 4, 227^b24-228^a3. Cf. *Simpl. In Phys.* 723. 14-20, 885. 11-21 Diels.

Tony Roark's interpretation of *Physics* 4. 10–14 also places coupled entities at the heart of Aristotle's theory of time. Roark and I differ in many places, but one difference marks a basic distinction between our understandings of coupled entities. Roark attempts to defend the slogan that Aristotle held that change is the matter of time, and perception is its form.⁶⁴ Roark's supposed evidence for the thesis that time is hylomorphic derives from his claim that Aristotle generally understood coupled entities as hylomorphic compounds, which have their underlier as their matter, and their coupled property as their form.⁶⁵ But none of the passages Roark adduces supports an identification of the underlier of a coupled entity with its matter.⁶⁶ And in passages Roark does not cite, Aristotle explicitly denies that the relationship between accident and underlier in a coupled entity is the relationship between form and matter.⁶⁷

In spite of this basic divergence between Roark's interpretation and my own, the account of time which Roark attributes to Aristotle is similar in its structure to the view I believe Aristotle endorsed. Systematically replacing Roark's use of 'matter' and 'form' with 'entity which plays the role of underlier' and 'coupled accident' would yield an interpretation not too dissimilar to my own.

⁶⁴ T. Roark, *Aristotle on Time [On Time]* (Cambridge, 2011), 1 et passim.

⁶⁵ Ibid. 34–5. In the remainder of the book, the view is simply asserted, e.g. 41, 94. Some of Roark's arguments purport to establish the consistency of this assumption with other passages in Aristotle, but, as far as I can see, Roark provides no direct arguments for the claim itself.

⁶⁶ Roark cites *Metaph. Z* 4, 1029^b22–9, and *Γ* 2, 1004^b1–4 (*On Time*, 35, with 34 n. 42), in support of the claim that coupled entities are hylomorphic compounds. In neither passage can I see any indication that Aristotle intended his reader to think of the accident as the form and the underlier as the matter. A more delicate question is whether Aristotle thought that the accident alone was the *being* of the coupled entity, or whether he thought that the being of coupled entities included both components (e.g. paleness and humanity). In some passages (esp. *Metaph. Z* 6, 1031^b19–28; *H* 2, 1043^a4–28) Aristotle does say that the being of the coupled entity is its accident. But this question is tangential to the point in the main text, since the fact that something has 'being' need not imply that it has *matter* in Aristotle's technical sense. Aristotle does often draw an analogy between coupled entities and compound substances in order to illustrate how the latter includes both form and matter in its definition (e.g., once again, *Metaph. H* 2, 1043^a4–28). But analogies are illustrative only if the *comparanda* are different in some respect. In this case, the analogy would be unhelpful if Aristotle believed (which he evidently did not) that the underlier for any of these coupled entities *was* matter for it.

⁶⁷ *Metaph. Θ* 7, 1049^a27–^b3. For brief discussion of this point in relation to blood see above, n. 15.

3.2. *The before and after in change*

At the opening of his positive account of time, Aristotle claims that time ‘follows’ change, and that change ‘follows’ magnitude.⁶⁸ He relates this claim to two further findings: first, that magnitude, change, and time are all continuous; and, second, that ‘the before-and-after’ is ‘in’ magnitude, change, and time.⁶⁹ The passage reveals that, like continuity, the before-and-after is a property. Each of these properties is a property of non-substantial entities, whether of magnitudes, of changes, or of intervals of time.

Aristotle quickly puts the expression ‘the before-and-after’ to use in the form of a further set expression, ‘the before-and-after-in-Change’ (τὸ πρότερον και ὕστερον ἐν τῇ κινήσει, 219^a20). The phrase ‘in the change’ (ἐν τῇ κινήσει) must be translated as ‘in Change’, where the capitalized ‘Change’ refers to the kind, as opposed to the lower-case ‘a change’, which refers to an instance of Change. In the lead-up to this sentence Aristotle uses ‘magnitude’ (μέγεθος), ‘change’ (κίνησις), and ‘time’ (χρόνος) to refer to the relevant kinds.⁷⁰ The article τῇ in 219^a20 continues this practice. Aristotle has not mentioned an example of *a* change, so it would be inappropriate for him to speak of ‘the change’, as if his hearers knew to which change he was referring.

In the expression ‘the before-and-after-in-Change’, the ‘in’ is the ‘in’ of inherence.⁷¹ A close parallel to this use of ‘in’ in the name of a property can be found in Aristotle’s definition of snubness as ‘concavity in a nose’.⁷² In *Metaphysics Z 5* Aristotle uses ‘snub nose’ interchangeably with ‘snubness’ as an example of a *per se* coupled entity.⁷³ Aristotle seems to have held that, since snubness

⁶⁸ 4. 11, 219^a10–12

⁶⁹ 4. 11, 219^a12–19

⁷⁰ The universally quantified statement in 219^a10–12 provides Aristotle’s grounds for introducing discussion of the kinds themselves, and the uses in 219^a12–19 are clear-cut. The point in the main text about the article τῇ in 219^a20 carries over also to τῇ κίνησις in 219^a23 and τῇ κινήσει in 219^a24–5.

⁷¹ Cf. *Cat.* 2, 1^a20–9.

⁷² *Metaph.* Z 5, 1030^b16–20. In other passages, where Aristotle uses the phrase ‘this in this’ (τόδε ἐν τῷδε), it indicates that matter and form must both be included in a definition: *DA* 3. 4, 429^b10–14; *PA* 1. 1, 640^b22–9. But the passage in the *Metaphysics* clearly describes *per se* coupled entities, where these are not taken to include form–matter compounds.

⁷³ The sense of *per se* here is the second sense in *Post. An.* 1. 4 (73^a34–^b5), in which a property is *per se* of an entity if it mentions that entity in its definition. For the remainder of the paper, when I write ‘*per se*’, I mean ‘*per se* in the second sense in *Post. An.* 1. 4’. Aristotle’s view that ‘snubness’ and ‘snub nose’ are interchange-

mentions nose in its definition, the property snubness is identical to the coupled kind snub nose. The name 'the before-and-after-in-Change' thus suggests that its referent is a *per se* property of changes.⁷⁴ Analogously to the case of snubness, this *per se* property can be thought of as a coupled kind, here composed of Change and its *per se* property.

After the introductory lines already discussed, Aristotle says that the soul marks out the before-and-after-in-Change by actualizing at least two divisions in a change, and noting that something has intervened between them.⁷⁵ A division in a change is an interruption which might be made or have been made in the change. So the soul marks out the before-and-after by dividing the change into an interval, and remarking on the 'space' between its endpoints. Together with the name 'the before-and-after-in-Change', this description of how the soul perceives the before-and-after-in-Change suggests that this property is related to changes' *being divisible into an ordered series*. The before-and-after-in-a-change, which the soul perceives when it actualizes at least two divisions in a particular change, is thus a coupled individual composed of that particular change and its property *being divisible into this ordered series of divisions*. The before-and-after-in-Change is the kind of such individual before-and-afters-in-changes:⁷⁶ it is the *per se* coupled kind composed of

able is illustrated by his use of 'coupled', first, to describe snubness in *Metaph. Z 5*, 1030^b14–20, and, second, to describe odd number in *Metaph. Z 5*, 1031^a5–6. Clearly the same sort of coupling is indicated by the two instances of the word. But linguistically 'odd number' is analogous to 'snub nose', not to 'snubness' (which is analogous to 'oddness'). So Aristotle holds that the coupled descriptions are equivalent to the single-word names of properties. He does draw an orthogonal distinction in this passage, between pale human and snubness (*Metaph. Z 5*, 1030^b20–6): paleness is predicated *per accidens* of humans whereas snubness (like femaleness) is predicated *per se* of nose (respectively, animal). But Aristotle's drawing of this distinction does not conflict with the view in the main text, that he thought of snubness as identical to the kind snub nose.

⁷⁴ In 4. 11, 219^a17–18, Aristotle says that the before-and-after is in Change 'by analogy to those there' (*ἀνάλογον τοῖς ἐκεῖ*), referring to the before-and-after-in-place (219^a14–15) and the before-and-after-in-magnitude (219^a16–18). We can understand this comment by contrasting continuity with the before-and-after. Continuity has all continua as its *per se* underliers: continuity-in-Change is the same property as continuity-in-magnitude. The before-and-after-in-Change, by contrast, has only changes as its *per se* underliers; it cannot be instantiated by places or times. Since the before-and-after-in-Change and the before-and-after-in-place have different *per se* underliers, they are different properties, and are the same only *by analogy*.

⁷⁵ *Phys.* 4. 11, 219^a23–9. For the actualization of divisions cf. e.g. *Phys.* 8. 8, 263^a23–^b9.

⁷⁶ To clarify the syntax of these two expressions: the before and after in Socra-

Change and its property *being divisible into some ordered series of divisions*.⁷⁷

Aristotle uses OPO in his description of the relationship between the before-and-after-in-Change and Change:

[a] ἔστι δὲ τὸ πρότερον καὶ ὕστερον ἐν τῇ κινήσει ὃ μὲν ποτε ὄν κίνησις [ἔστω].
[b] τὸ μὲντοι εἶναι αὐτῷ ἕτερον καὶ οὐ κίνησις. (219^a19–21)

[a] And the before-and-after-in-Change, in respect of whatever is such that, by being that, it is, is change, [b] but its being is different, and not change.

With Torstrik and Ross, I delete the final ἔστω of [a] as a scribal insertion ‘due to misunderstanding of the difficult phrase’ OPO.⁷⁸ The ἔστω Ross and Torstrik and I excise seems to have been absent from the texts on which Simplicius and Philoponus based their comments.⁷⁹ The postpositive particle μὲν after ὃ signals the begin-

ters’ walk from Athens to Thebes is *a* before-and-after-in-Change, or the before-and-after-in-*a*-change: these two equivalent complements are to be understood by analogy to ‘a man’. When I wish to refer to a specific before-and-after-in a specific change (but without naming the change), I will write ‘the before-and-after-in-*that*-change’.

⁷⁷ The view in the main text, that the before-and-after-in-Change is a coupled kind, whose instances have changes (or intervals of change) as underliers, is compatible with Coope’s and Inwood’s interpretations of this notion. Thus, Coope writes of an interval-like ‘series of earlier and later stages in the change’ (*Time*, 66, and more generally 65–71; cf. M. Inwood, ‘Aristotle on the Reality of Time’, in L. Judson (ed.), *Aristotle’s Physics: A Collection of Essays* (Oxford, 1991), 151–78 at 173–4). Both of these interpretations are compatible with my claim that the before-and-after-in-Change is a coupled kind, instantiated by intervals of change (=changes). My interpretation is not, however, compatible with views which take the before-and-after-in-Change to be point-like (see E. Hussey, *Aristotle’s Physics Books III and IV [Physics III and IV]* (Oxford, 1983), 148–9 (cf. 153–7), and now Roark (*On Time*, 80–101)). I cannot argue in full here against these interpretations. But *pace* Hussey and Roark, I cannot see how an interpretation of the before-and-after-in-Change as point-like can satisfactorily accommodate the text in *Phys.* 4. 11, 219^a22–30.

⁷⁸ Ross, *Physics*, 598 ad 219^a19–21. The emendation is proposed in Torstrik, ‘Beitrag’. The manuscripts all have ἔστω.

⁷⁹ Simplicius’ lemma does not quote the relevant passage, but in the text (*In Phys.* 712. 24–7 Diels) he quotes the passage without the final ἔστω. Philoponus’ lemma does include the final ἔστω (although it is missing ἐν τῇ κινήσει, which is transmitted in all manuscripts and in Simplicius), but the word does not appear in the version of the text in Philoponus’ comment (*In Phys.* 720. 27–8 Vitelli). Ross’s apparatus is somewhat optimistic to claim that Simplicius certainly omitted ἔστω; Simplicius makes no attempt to quote the passage in full. But Philoponus’ and Simplicius’ comments both give an interpretation which requires syntax similar to the syntax used in my translation. Since this interpretation is possible only if one reads just one instance of the verb ‘to be’, and since the first ἔστι of the sentence is more certain—owing to the δέ which follows it—it seems likely that neither Simplicius nor Philoponus had the final ἔστω in the text on which they based their comments.

ning of a new construction, so I construe the relative δ as an accusative of respect, and translate: ‘And the before-and-after-in-Change, in respect $\mu\acute{\epsilon}\nu$ of whatever is such that, by being that, [the before-and-after-in-Change is], is Change. But its being is different, and not Change’.

The passage fits straightforwardly with the interpretation of OPO proposed in Section 2. The coupled kind, the before-and-after-in-Change, is a being because it is the kind of the entities which play the role of the underlier for its members. In respect of this kind, the before-and-after-in-Change is Change. But its being is not Change, since its being also includes the property *being divisible into some ordered series of divisions*.

This interpretation depends on deleting $\acute{\epsilon}\sigma\tau\omega$ (‘is’) in [a]. But, as the following argument shows, the word does not belong in the text. In general, *-ever* free relative clauses like OPO are felicitous only if the speaker is ignorant of or indifferent about the precise referent of the relative pronoun. But the transmitted text in this passage makes Aristotle’s use of the *-ever* free relative clause OPO infelicitous (if not ungrammatical) according to this rule. Suppose we translate, following Coope: ‘the before and after is that, whatever it is, by being which, Change is’.⁸⁰ As this translation shows, the point of the transmitted sentences is to say that that, by being which, Change is *is* the before-and-after-in-Change. But then Aristotle cannot be ignorant of or unwilling to elaborate on the referent of the phrase, since he explicitly tells us that it is the before-and-after-in-Change. We can make the infelicity of ‘whatever’ even clearer by translating

⁸⁰ Coope, *Time*, 65–6. Roark (*On Time*, 95–6) claims that this sentence states that that, by being which, Change is just is that by being which the before-and-after-in-Change is: the referent of OPO here is thus that, by being which, they both are. Unfortunately, his discussion provides no guidance on how to extract this claim from the Greek. Coope’s interpretation, by contrast, has some linguistic plausibility (although see main text). But it has a strange philosophical consequence. Coope writes: ‘Though this series of earlier and later stages is not identical to the change (“its being is different”), it provides what we might call the *structure* of the change. It is in virtue of having this structure (in virtue of being divisible into this before and after series) that the change is the change it is’ (*Time*, 66). Suppose that, as Socrates walks briskly, he becomes hotter. Socrates’ walking and Socrates’ heating are different changes, but they are marked out by the same series of instantaneous divisions. In the second sentence of the quotation, Coope seems to commit Aristotle to holding that Socrates’ walk is the walk it is in virtue of being this series *and that* Socrates’ heating is the heating it is in virtue of being the *same* series. But this verdict seems odd. Thanks here to Nick Denyer, who first suggested an example of this form to me, though in a different context. Aristotle considers a related example in *Phys.* 5. 4, 227^b24–228^a3.

the transmitted text as: ‘the before-and-after is whatever is such that, by being that, Change is’. This infelicity is comparable to that of the English (?): ‘*Hamlet* is whatever Mary is reading’.⁸¹

We can render Aristotle’s use of the *-ever* free relative clause OPO felicitous only if we follow Torstrik and Ross in excising $\epsilon\sigma\tau\omega$. In the resulting text, Aristotle claims only that *in respect of* the referent of OPO (which he does not specify further), the before-and-after-in-Change is Change. The infelicity disappears. But the corrected text still does not explain *why* Aristotle was uncertain of or indifferent to the referent of OPO in this passage.

Aristotle’s reason, I will suggest, is that the before-and-after-in-Change is a special variety of coupled kind. As we will see, all of the instances of OPO in the *Physics* describe this variety of coupled kind; appropriate modifications of my suggestion will help to explain Aristotle’s uncertainty in those passages as well.

When Aristotle uses OPO in these chapters, he analyses coupled kinds composed from a property which is *universal but non-definitional* for the kind of the entities which play the role of the underlier for the members of the coupled kind. A determinable property is *universal* for a kind if and only if every instance of the kind bears some determinate of this determinable. It is *non-definitional* for a kind if and only if it is not mentioned in the definition of the kind.

In these passages, Aristotle aims to explain what it is for the coupled kind in question to be a being. He does so by conceiving of the kind of the entities which play the role of the underliers for the members of the coupled kind as if it did not possess the relevant universal but non-definitional property. According to my hypothesis, Aristotle then worries that, if a kind were not to possess a universal property, the kind would no longer be the kind it is. Since the relevant property is non-definitional for the kind of the entities which play the role of the underlier, it seems possible to conceive of the kind as if it did not possess the property. But since the relevant property is universal for the kind, Aristotle is uncertain whether the

⁸¹ The infelicity of this sentence is analogous to the infelicity of Dayal’s examples of ‘namely’ with *-ever* free relative clauses (V. Dayal, ‘Free Relatives and *Ever*: Identity and Free Choice Readings’, *Proceedings of SALT VII* (1997), 99–116 at 109):

- (29) a.* Whatever Mary is cooking, namely ratatouille, uses onions.
 b. What Mary is cooking, namely ratatouille, uses onions.

For the same point, applied to ancient Greek, see again Probert, *Early Relatives*, ch. 3.3.2.

kind would still be the kind it is, if its instances did not have some determinate of this determinable.

This hypothesis applies straightforwardly to the before-and-after-in-Change. The property *being divisible into some appropriately ordered series* is a universal property for changes. Every change is infinitely divisible.⁸² Moreover, every change has both a *terminus a quo* and a *terminus ad quem*.⁸³ These termini order the divisions which can be made between them.⁸⁴ So every change will be an instance of the before-and-after-in-Change; the property is universal.

According to my hypothesis, then, Aristotle uses an *-ever* free relative clause in place of an alternative specification of the referent of OPO because he does not wish to take a stand on whether, if the instances of Change did not possess this universal property, Change would still be Change. The relevant property, it is true, does not figure in the definition of Change.⁸⁵ But still, if Change were to lack this property, it might not be Change. So Aristotle hedges his bets: *in respect of* the abstracted kind, whatever *that* is, the before-and-after-in-Change is Change. It does not follow from this claim that Change *is* that, by being which, the before-and-after-in-Change is.

3.3. *The now*

Aristotle says that perceivers grasp the passage of time by ‘marking out’ (*ὀρίζω*) Change.⁸⁶ A perceiver marks out Change by marking out the before-and-after-in-Change. In the course of marking out the before-and-after-in-Change, the perceiver *counts*. Aristotle seems to imagine a perceiver who utters the names of the natural numbers in sequence (‘one, two . . .’) while observing a specific change. The perceiver’s counting has the consequence that divisions in the change are counted. As Aristotle notes later, this count-

⁸² *Phys.* 4. 11, 219^a10–13. As this passage shows, the putative counter-examples discussed in *Phys.* 1. 3, 186^a13–16, and 8. 3, 253^b23–6, are not in view in *Phys.* 4. 11. Cf. Coope, *Time*, 50–5, with Hussey, *Physics III and IV*, 143.

⁸³ Eternal changes are a possible exception, but see n. 109.

⁸⁴ Coope (*Time*, 72–5) shows how Aristotle might have derived this order using only the *terminus a quo* of the change. The use of the *terminus ad quem* in the main text may therefore be superfluous.

⁸⁵ At least not in the definition given in *Phys.* 3. 1–3. In this respect, change differs from magnitude, the definition of which does mention divisibility: *Metaph.* Δ 13, 1020^a10–11.

⁸⁶ For this sentence and the following two sentences see *Phys.* 4. 11, 219^a22–9.

ing of divisions bears an important relationship to the now: ‘it is in so far as the before-and-after-in-Change is countable, that the now is’.⁸⁷

In the course of an explanation of how in one sense each now is the same as every other, and in another sense different from every other, Aristotle uses an example which shows roughly how this counting of the before-and-after-in-Change is related to the now. In the example, Aristotle accepts a sophisticated definition of Coriscus, as the coupled entity formed from Coriscus and *being in a given place*. According to this view of Coriscus, when Coriscus moves, he changes his being (*εἶναι*), because he changes in place (*Phys.* 4. 11, 219^b18–22). The parallel between Coriscus (so defined) and the now is clear.⁸⁸ The before-and-after-in-*this*-change is like Coriscus; its being divided at a counted division is like Coriscus’ *being in a given place*.⁸⁹ The now, like coupled Coriscus, is thus a coupled entity: as this change progresses, the before-and-after-in-*this*-change is divided at a different division, which is, in addition, counted with a different number. As a result of this difference in division and number, each now differs in being from every other.

A later remark confirms this interpretation. ‘Therefore, in so far as the now is a limit, it is not time, but it is accidental to time. But in so far as it counts, it is a number. For limits belong only to that of which they are the limits; but the number of these horses, ten, is also elsewhere.’⁹⁰ Earlier interpreters have struggled with this passage to the point of suggesting its irretrievable corruption. But the transmitted text makes excellent sense when we recognize that Aristotle thinks of the coupled property which helps to compose the now as, at least in part, a number.⁹¹

⁸⁷ ἢ ἀριθμητὸν γὰρ τὸ πρότερον καὶ ὕστερον, τὸ νῦν ἔστιν (*Phys.* 4. 11, 219^b28). This sentence repeats a point which is also made a few lines earlier, at *Phys.* 4. 11, 219^b23–5. Cf., for a similar remark about time itself, 4. 14, 223^a28–9. In all three passages, ἀριθμητὸν may also be translated as ‘counted’.

⁸⁸ Less clear is why the explanation requires this sophisticated definition. I explain why, below, main text at n. 115.

⁸⁹ On ‘the before-and-after-in-*this*-change’ see n. 76.

⁹⁰ ἢ μὲν οὖν πέρασ τὸ νῦν, οὐ χρόνος, ἀλλὰ συμβέβηκεν ἢ δ’ ἀριθμεί, ἀριθμός· τὰ μὲν γὰρ πέρατα ἐκείνου μόνον ἔστιν οὐδ’ ἔστιν πέρατα, ὁ δ’ ἀριθμὸς ὁ τῶνδε τῶν ἵππων, ἢ δεκάς, καὶ ἄλλοι (*Phys.* 4. 11, 220^a21–4). Ross, *Physics*, 603, follows Torstrik in obelizing the first two clauses (ἢ μὲν . . . ἀριθμός). But, *pace* Ross’s complaints, the opening antithesis relates directly—as my interpretation shows—to the second half of the passage. Coope (*Time*, 124) rightly retains the transmitted text, but expresses bafflement (124 n. 8) at why the now should be called a number.

⁹¹ In the course of an extended parallel between motion and time in *Phys.* 4. 11,

According to the picture with which we began, as a perceiver counts a change she observes, she actualizes divisions in the change, and assigns them natural numbers.⁹² Divisions assigned greater natural numbers will be ‘after’, and those with lesser natural numbers will be ‘before’. In this setting, properties of divisions such as *being counted by ‘2’* correspond directly to properties which describe divisions’ positions in temporal order. This picture suggests a simple interpretation of the now. If a perceiver counts a division in a change, he or she actualizes a coupled entity composed of the before-and-after-in-*that*-change and its property *being divided at a division counted with ‘n’*, where ‘n’ is the name of the number assigned to the division. One might leap to the conclusion that the now *is* the before-and-after-in-*that*-change, divided at a division counted with ‘n’.

This simple interpretation is close to the view I believe Aristotle held, but it is not quite right. Different perceivers might utter the names of different numbers at what is intuitively the same time. Moreover, since the before-and-afters in different changes are different, the simple interpretation has the undesirable consequence that different changes cannot share the same now. In the next section (3.3.1) I present an extension of the simple theory which overcomes these difficulties. I believe Aristotle held a theory which was at least very similar to my extension of the simple theory. But the textual evidence is comparatively thin, and what Aristotle says is compatible with different interpretations. My interpretation of OPO, however, requires only the relatively weak claim that Aristotle understood the now as a coupled kind. This weak claim receives strong support from Aristotle’s descriptions of Coriscus and the thing-in-motion, mentioned above, and discussed further in Section 3.4.⁹³ The full theory I sketch in the next section provides

210^b31–220^a3, Aristotle suggests that the now is ‘the number of the thing-in-motion’ (ὁ ἀριθμὸς ὁ τοῦ φερομένου), and says ‘the now, like the thing-in-motion, is like the unit of number’ (τὸ νῦν δὲ ὡς τὸ φερόμενον, οἷον μονὰς ἀριθμοῦ). According to the received view in Aristotle’s day, one—the unit—was, strictly speaking, not a number. But the passage supports the view that the coupled property which helps compose the now is closely related to the number of a division. Cf. *Phys.* 4. 12, 221^a13–16.

⁹² A perceiver, of course, need not actually utter the names of numbers to count divisions. In general, I will say that a division is *counted* if it is actualized by a perceiver who *can* count, whether or not the perceiver actually does so. Still, the model of a perceiver counting out loud will help us to develop the theory, and I continue to use it in the main text.

⁹³ Coope would reject the claim that the now is a coupled entity. In Coope’s

additional support for this claim by showing that Aristotle's disparate remarks fit with a simple, natural way of developing a theory on which the now is a coupled kind.

3.3.1. *Temporal numbers* The key notion of the extended theory will be that of a *temporal number*. All and only actualized divisions in changes have the property of *having a temporal number*. Divisions in changes have this property because of facts about how perceivers do or would count those divisions. The properties of the form *having temporal number n* (the determinates of the determinable *having a temporal number*) differ in structure from the natural numbers; they are not numbers in the sense of 'number' used in the mathematics of Aristotle's day. But since they are properties which divisions have because perceivers count them, they are closely related to numbers. In Aristotle's terminology, they are 'numbers as counted' and not 'numbers by which we count'.⁹⁴

Two principles govern the relationship between perceivers' utterances of the names of natural numbers, as in the simple model, and the property of *having temporal numbers*, or, more specifically, *having temporal number n*. The first principle characterizes what it is for divisions to have the same temporal number.⁹⁵ For two divisions to have the same temporal number is for it to be the case

view, Aristotle holds that the activity of counting nows is irreducible to counting the before-and-after-in-change. Coope's Aristotle believes that the soul's counting of nows—and not of before-and-afters-in-changes—explains temporal order (e.g. *Time*, 86, 125, 129). For Coope, Aristotle takes it as a primitive fact that the now defines simultaneity by dividing all ongoing changes. As a result, Aristotle does not require a story about the role of perception in defining simultaneity (for my version of this story see below, n. 96 and main text there). Coope's interpretation is most strongly supported by *Phys.* 4. 11, 219^a27–8, where Aristotle says 'the soul declares that the nows are two' (*καὶ δύο εἴπη ἡ ψυχὴ τὰ νῦν*). In my view, the soul distinguishes the nows in part *because* it has counted divisions (*ἄκρα*, 219^a27). But this text favours Coope, since Aristotle explicitly only describes the counting of *nows*. Still, this advantage of Coope's interpretation is, I believe, outweighed by other considerations. In particular, my interpretation takes the two sets of passages discussed here at face value in a way Coope's cannot. First, Coope struggles with Aristotle's remarks relating the now to number (4. 11, 220^a21–4 (see above, n. 90); 219^b33–220^a4). Second, in Coope's view, the countability (or: countedness) of the before-and-after-in-Change has at most an oblique relationship to the now. It is thus somewhat obscure why Aristotle says that it is in so far as the before-and-after is countable that the now is (*Phys.* 4. 11, 219^b23–5, 219^b28).

⁹⁴ For this distinction see *Phys.* 4. 11, 219^b5–8.

⁹⁵ More precisely, this principle defines what it is for two divisions to have a property in common, namely, *having temporal number n*. In what follows I will often speak of relations between temporal numbers, where the reader should beware

that, for each division, it is possible that it be counted, and that: if a perceiver (perceiving normally) counted the two divisions, he or she would count them with the same utterance of the name of a number. For a perceiver to count two divisions with the same utterance is for him or her to perceive them as simultaneous.⁹⁶ It follows that two divisions have the same temporal number just in case a perceiver (perceiving normally) would perceive the two divisions as simultaneous. Two divisions may thus have the same temporal number even if various perceivers have in fact used the names of different numbers to count them. Moreover, two actual divisions, for example the ends of two changes in the depths of the sea, may have the same temporal number even if neither has in fact been counted or even perceived.

A second principle characterizes a relation of greater than (and less than) between properties of the form *having temporal number n*. For an arbitrary division *D* to have a greater (respectively, lesser) temporal number than an arbitrary division *E* is for it to be the case that any perceiver (counting correctly, and perceiving normally) who counts *D* and *E*, counts *D* with a greater (respectively, lesser) number than the one with which he or she counts *E*. This relation of *greater than* orders the class of determinate properties of the form *having temporal number n* analogously to the way a similar relation orders the natural numbers. But the relation of 'greater than' on this class of properties differs from the one on the natural numbers in at least one important respect: since Aristotle believed that there was no first time, the class of properties does not have a first or least element.⁹⁷

The soul counts divisions in the before-and-after-in-a-change by mapping the divisions to the natural numbers—in our simple model, by uttering the names of those numbers. In general, when

that a more perspicuous formulation would speak of relations between properties of divisions.

⁹⁶ This definition need not be viciously circular, since the second occurrence of 'simultaneous' occurs within the scope of 'perceive as': to be simultaneous is to be perceived as simultaneous. In my view, Aristotle does not attempt to explain simultaneity in terms of more basic properties of pairs of changes. Instead, he seeks to explain why perceivers tend to perceive divisions as simultaneous if and only if they occur *at the same time*. This phenomenon is explained by the simple fact that, according to Aristotle's theory, temporal simultaneity is perceived simultaneity (or: simultaneity as perceived under normal conditions). This interpretation stands in strong contrast to Coope's (see above, n. 93).

⁹⁷ See e.g. *Phys.* 4. 13, 222^a24–30; 8. 1, 251^b10–28.

we count, we follow a similar practice, mapping the objects before us to the natural numbers by uttering the names of the numbers in sequence, one at a time, as we point at the objects in a group, until we have pointed at each of them exactly once. In the case of counting the before-and-after-in-a-change, these names are chosen according to a further rule: for any pair of divisions, if they belong to the same change, count the division ‘before’ with a name which refers to a lesser number, and the division ‘after’ with a name which refers to a greater number.⁹⁸ Provided that Aristotle did have a way of ordering divisions based on properties of change alone (and recent interpreters agree that he did), this rule for counting divisions need not circularly use features of time to derive temporal order.⁹⁹ The rule for counting divisions appeals to the independent ‘kinetic order’ of divisions.

One final background assumption is required, if these two principles will suffice to determine the temporal number of all actualized divisions in all changes. It must be that any pair of divisions in changes can be related by a series of overlapping changes. To illustrate what I mean by ‘a series of overlapping changes’, consider Figure 3. A and B, like C and D, are divisions in a single change, where the before-and-afters in their respective changes have A as before B, and C as before D. Moreover, B and C are divisions which a perceiver (perceiving normally) perceives as simultaneous.

So far, we have not said how a perceiver will count divisions D and A, since they are not perceived as simultaneous, and do not belong to a single before-and-after-in-Change. But the following reasoning yields the conclusion that D has a greater temporal num-

⁹⁸ There are at least two different ways in which we might count divisions in change. We might count divisions in one change, say, Socrates-in-Athens and Socrates-in-Thebes. But we might also count divisions in different changes, say, Socrates-in-Athens and Cleon-in-Athens, if we were interested in counting how many changes we were witnessing. Aristotle tells us he intends the first kind of counting when he defines time as ‘the number of change [counted] in respect of the before and after’ (219^b1–2, emphasis mine). The Greek for ‘in respect of’ (κατά) could be used to translate ‘by’ in the English ‘count by rows’. Just as we could count a two-dimensional matrix horizontally or vertically, we could count changes in respect of the before-and-after-in-Change, or in some other respect. But the counting which helps to constitute time is counting ‘by’ or in respect of the before-and-after-in-Change.

⁹⁹ Coope, *Time*, 69–75; Roark, *On Time*, 63–79. Coope shows how one might derive the order of any two divisions in change, by reference to the origin of the change. Note that the perceiver need not be able to articulate the rule described in the main text in order to follow it; even one who counts idly follows the rule as a matter of course.

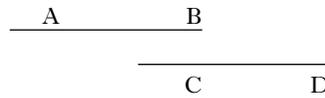


FIGURE 3

ber than A. By the second principle, the number used to count D is greater than the number used to count C. By the first principle, C is counted by the same utterance as B. By another application of the second principle, the number used to count B is greater than the number used to count A. So D has a greater temporal number than A, and, therefore, is temporally later than A—even though D and A stand in no *kinetic* before-and-after relations.

In Aristotle's cosmos, every division in every change is such that a perceiver (perceiving normally) would, if she were interested in the question, perceive it as simultaneous with some division in the (eternal) rotation of the first heaven.¹⁰⁰ By reference to the first heaven, then, every pair of divisions in change can be related to one another by an overlapping series of changes, as A and D are related in the example just given. This fact ensures that what are intuitively temporally later (respectively, earlier) divisions in changes will invariably have greater (respectively, lesser) temporal numbers. With the eternal rotation of the first heaven in the background, Aristotle could conclude that temporal order is given by the ordering of properties of the form *having temporal number n*. Divisions in changes possess these ordered properties *because of* the way perceivers (perceiving normally, and counting in accordance with the two principles) do or would count them.

This extended theory replaces the natural numbers of the simple theory of the now with the class of properties of the form *having temporal number n*. This substitution allows the extension to avoid the problems of the simple theory. If a perceiver counts a division in a change, he or she actualizes a coupled entity composed of the before-and-after-in-that-change and its property *being divided at a division which has temporal number n*. Aristotle does not name the coupled *individual* composed of an individual change and the property *being divided at a division which has temporal number n*. His 'the now' ($\tau\acute{o} \nu\acute{\omega}\nu$) refers to a *kind* of such entities.¹⁰¹ The now

¹⁰⁰ See e.g. *Metaph. A 7*, 1072^a19–23; *GC 2. 10*, 336^a14–17. The claim is intended as an 'in principle' possibility, so we need not fiddle with putative counter-examples about cloud cover or other obstructions of actual perceivers' view of the first heaven.

¹⁰¹ In particular, the expression $\tau\acute{o} \nu\acute{\omega}\nu$ refers to the kind of the counted divisions

is a coupled kind composed of the before-and-after-in-Change (the kind) and a distinctive property *being divided at a division which has temporal number n*. Each such kind has many counted-and-divided-before-and-afters-in-changes as its members. If Cleon's talk and Socrates' walk are divided at divisions which have the same temporal number, then, in spite of being the before-and-afters-in-different-changes, the before-and-after-in-Cleon's-talk and the before-and-after-in-Socrates'-walk will belong to the same now. They both belong to the coupled kind, the before-and-after-in-Change, divided at a division which has temporal number *n*.¹⁰²

3.3.2. *Two passages* Two instances of OPO describe the relationship of the now to the before-and-after-in-Change. In both of these passages Aristotle seeks to explain how 'the now is in one sense the same, in another sense not the same'.¹⁰³ His verdict is as follows. The now (*now*) differs from the entity which was the now (at some earlier time) in respect of its *being* ($\tau\acute{o}$ $\epsilon\lambda\upsilon\alpha\iota$). The members of each now are divided at a division which has a different temporal number from the temporal number which marks the members of every other now. So this now is different in being from previous nows. But in another sense, each now is the same as every other now:

in changes happening *now*. What Aristotle says about the now, however, is supposed to apply more generally to every kind which either will play the role of the now in the future, or has played that role in the past.

¹⁰² The view that the now is a kind makes sense of Aristotle's obscure explanations of the idea that 'time is everywhere the same' (*Phys.* 4. 11, 219^b10–12; 4. 12, 220^b5–12; 4. 14, 223^b8–12). Early on, Aristotle explains this idea (4. 12, 220^b10–12) by analogy to the way in which the number of a hundred horses and the number of a hundred people is different and yet the same. As Coope notes (*Time*, 118–20), he glosses this notion of sameness of number at the end of *Phys.* 4. 14 (224^a2–15) by observing that two triangles may be different triangles, while nevertheless being the same shape, as compared with a circle. Sameness of kind suffices for two things to be the same if the speaker's interest lies in the relevant kind. Similarly, Socrates' walk and Cleon's talk are different *changes*, but they may be members of the same now (a kind). (The point applies also to *Phys.* 4. 11, 220^a21–4, quoted above in n. 90, where Aristotle says that the now, in so far as it is a number, can belong not only to one thing, but to many.) The interpretation of the now as a kind allows us to take these remarks about sameness of differentia ($\delta\iota\alpha\phi\omicron\rho\acute{\alpha}$) at face value. The interpretation also remains faithful to what Aristotle actually says, while achieving an effect similar to the anachronistic set-theoretic machinery of some interpreters (M. J. White, 'Aristotle on "Time" and "A Time"', *Apeiron*, 22.3 (1989), 207–24 at 211–13; Roark, *On Time*, ch. 11, esp. 183–4).

¹⁰³ *Phys.* 4. 11, 219^b12–13. Aristotle is sketching a solution to the problem posed in *Phys.* 4. 10, 218^a8–25.

[c] καὶ ὡσπερ ἡ κίνησις αἰεὶ ἄλλη καὶ ἄλλη, καὶ ὁ χρόνος [d] (ὁ δ' ἅμα πᾶς χρόνος ὁ αὐτός· τὸ γὰρ νῦν τὸ αὐτὸ ὁ ποτ' ἦν—τὸ δ' εἶναι αὐτῶ ἕτερον—[e] τὸ δὲ νῦν τὸν χρόνον μετρεῖ,¹⁰⁴ ἢ πρότερον καὶ ὕστερον). [f] τὸ δὲ νῦν ἔστι μὲν ὡς τὸ αὐτό, ἔστι δ' ὡς οὐ τὸ αὐτό· [g] ἢ μὲν γὰρ ἐν ἄλλῳ καὶ ἄλλῳ, ἕτερον (τοῦτο δ' ἦν αὐτῶ τὸ νῦν¹⁰⁵) [h] ὁ δὲ ποτε ὄν ἔστι τὸ νῦν, τὸ αὐτό. (219^b9–15)

[c] And just as Change is always different, also time [is always different] [d] (but all simultaneous time is the same: for the now, whichever it was, is the same—but its being is different—[e] and the now measures time, in so far as [it measures] before and after).¹⁰⁶ [f] But the now is the same in one respect, and different in another. [g] For in so far as it [the now] is in one [position] and another,¹⁰⁷ it is different (for *this* was now for it) [h] but whatever is such that, by being that, the now is, is the same.

The reasoning in this passage is straightforward. [c] Any two distinct divisions in the same change will have different temporal numbers: just as Change is different because changes would be divided at different divisions, so too time is different because those different divisions would have different numbers. [f] But the difference between any two instants of time does not preclude a sense in which any two instants are the same. For [h] each now is the same as every other in respect of whatever is such that, by being that, the now is a being.

What is the referent of OPO in this passage? A few lines later, Aristotle indicates that whatever is such that, being that, the now is, has a close relationship to the before-and-after-in-Change:

[i] ὥστε καὶ ἐν τούτοις ὁ μὲν ποτε ὄν νῦν ἔστι, τὸ αὐτό (τὸ πρότερον γὰρ καὶ

¹⁰⁴ I retain the reading of the manuscripts, against Torstrik's emendation to *δρίζει* and Ross's *μερίζει*. The problem is a difficult one. E alone reads the verb after *ἦ*, which may reflect the fact that it is natural to take a second instance of the verb as implied after *ἦ*, as in my translation. In conversation, Malcolm Schofield suggested excising the whole of my [e], on the grounds that it violates the train of thought in the passage and can easily be understood to be a gloss, referring to what Aristotle says at greater length elsewhere, in particular *Phys.* 4. 11, 219^a22–^b2 and 220^a18–26.

¹⁰⁵ Rejecting Bekker's *εἶναι* after *νῦν*.

¹⁰⁶ For the text see above, n. 104. The phrase *ὁ ποτ' ἦν* is not an instance of OPO, in spite of the lexical similarity of the two expressions. Aristotle observes here that 'the now, whichever it was [*ὁ ποτ' ἦν*]' (that is, irrespective of its position in the order of nows), was the same for all the before-and-afters-in-Change which were its instances. This phrase generalizes over different nows without referring (as OPO would) to the kind of the underliers of instances of the now.

¹⁰⁷ Since 'the now' is supposed to be what differentiates temporal instants, it does not make sense to say that different nows are different by being at different times. My 'position' should thus be understood as 'position in the ordered series of divisions which might be made in Change'.

ὑστερόν ἐστι τὸ ἐν κινήσει [j] τὸ δ' εἶναι ἕτερον (ἢ ἀριθμητὸν γὰρ τὸ πρότερον καὶ ὑστερον, τὸ νῦν ἕστω). (219^b26–8)

[i] So that also in these cases [viz. of the now and the before-and-after] whatever is such that, by being that, the now is, is the same (for the before-and-after is the before-and-after-in-Change) [j] but its being is different (for in so far as the before-and-after is countable, the now is).¹⁰⁸

Every member of the now—the kind—is an instance of the before-and-after-in-Change, divided at a division which has temporal number n . The now is a being because it is the kind of the entities which play the role of underliers for its members, that is, roughly, because it is the before-and-after-in-Change. In [j] Aristotle says that the now is a being ‘in so far as the before-and-after is countable’. This statement holds for every now. But the fact that one can count the before-and-after also explains how each now differs from every other in being (τὸ εἶναι): each now is the before-and-after-in-Change coupled with the property *being divided at a division which has temporal number n*. If the members of two nows exhibit distinct temporal numbers (say, n and m), the nows differ in being (τὸ εἶναι).

Aristotle takes the before-and-after-in-Change to be intimately related to that, by being which, the now is a being. He does not, however, claim that the two kinds are identical. Aristotle’s retreat to the *–ever* free relative clause OPO in this passage fits with the general hypothesis described in Section 3.2. The property *being divided at a division which has some temporal number or other* is a universal but non-definitional property for the before-and-after-in-Change. Every before-and-after-in-*a*-change has one endpoint, bearing some property of the form ‘divided at q ’, where q is its *terminus ad quem*. So every before-and-after-in-*a*-change is divided at least once.¹⁰⁹ Moreover, every such division has a temporal num-

¹⁰⁸ My translation of the final phrase follows Coope (*Time*, 128 with n. 9), against the Oxford Translation. Bostock also allows this translation as a possibility (D. Bostock, ‘Aristotle’s Account of Time’, *Phronesis*, 25 (1980) 148–69; repr. in id., *Space, Time Matter, and Form: Essays on Aristotle’s Physics* (Oxford, 2006), 135–57 at 145).

¹⁰⁹ Eternal changes, of course, do not have natural termini (see Coope, *Time*, 75–7). But one could extend the notion of the before-and-after to these changes, too. If a perceiver perceives eternal changes, he or she divides them conceptually into finite sections. These finite sections are divisible into ordered before-and-after series just as other finite changes are. Whether or not Aristotle would accept this extension, in the context of *Phys.* 4. 11, he seems to accept that the property applies to *all changes he is considering*; after all, he begins this section by stating that what changes changes *from something into something* (*Phys.* 4. 11, 219^a10–11).

ber. For a division to have a temporal number is for it to be the case that it is possible for it to be counted, and that: if a soul did count the division, it would count it in a given way. Aristotle believed that necessarily, there are souls which can count. So every before-and-after-in-a-change is divided at a division such that it is possible for a perceiver to count it, and such that it is determined how the perceiver would count it if he or she did. Thus, *being divided at a division which has some temporal number or other* is a universal property for the before-and-afters-in-changes. But even so, the property is not mentioned in the definition of the before-and-after-in-Change.

Aristotle, I suggest, worries that if the before-and-after-in-Change did not possess this universal property, it would not be the before-and-after-in-Change. On my hypothesis, he uses the *-ever* free relative clause OPO precisely because of this concern. The referent of OPO is what would remain of the before-and-after-in-Change if the latter were stripped of the property *being divided at a division which has some temporal number or other*.

3.4. The thing-in-motion

In two instances of OPO from *Physics* 4. 11, Aristotle uses the phrase to refer to the underlier of a *φερόμενον*, a moving thing.¹¹⁰ Here Sarah Broadie has argued compellingly that ‘a moving thing’ is ‘a thing-in-motion’, a coupled entity.¹¹¹ This thing-in-motion is best understood as a coupled entity composed of a movable thing and a property of the form *being in p_i*, where ‘p_i’ is the name of a place. When the coupled thing-in-motion changes place, it changes in being, because it changes its place.

In the first discussion of the thing-in-motion, Aristotle makes reference to a sophistic puzzle:

τοῦτο δὲ ὁ μὲν ποτε ὄν τὸ αὐτό (ἢ στιγμή γὰρ ἢ λίθος ἢ τι ἄλλο τοιοῦτόν ἐστι), τῷ λόγῳ δὲ ἄλλο, ὥσπερ οἱ σοφισταὶ λαμβάνουσιν ἕτερον τὸ Κορίσκον ἐν Λυκείῳ εἶναι καὶ τὸ Κορίσκον ἐν ἀγορᾷ. καὶ τοῦτο δὴ τῷ ἄλλοθι καὶ ἄλλοθι εἶναι ἕτερον. (219^b18–22)

And this [the thing-in-motion] is the same in respect of whatever is such that, by being that [it is] (for it [the thing-in-motion] is either a point, or

¹¹⁰ 4. 11, 219^b18–22, 220^a6–8.

¹¹¹ Broadie, ‘Now’, 120–2. Cf. Coope, *Time*, 132–9. I borrow the expression ‘thing-in-motion’ from Coope. My interpretation of this entity differs from Broadie’s and Coope’s. See below, n. 119, for a statement of the difference, and defence of my interpretation.

a stone, or some other such thing) but it is different in definition, just as the sophists take Coriscus-in-the-Lyceum to be different from Coriscus-in-the-agera. This, too, is different by being now here, now there.¹¹²

The sophists included an accidental attribute (place) in the definition of Coriscus, and claimed that the difference in definition between Coriscus-in-the-Lyceum and Coriscus-in-the-agera entails that Coriscus is different from himself (as standardly defined).¹¹³ Aristotle here accepts—for present purposes—the sophistic definition of Coriscus as (say) Coriscus-in- p_1 , where ' p_1 ' is the name of a place. As Coriscus moves, Coriscus-in- p_1 will change in definition to Coriscus-in- p_2 (where p_1 and p_2 are distinct places). As the underlier changes place, the coupled entity changes in being.¹¹⁴

Aristotle accepts this sophistic definition because he wishes to explain the way in which each now is the same as every other in one respect, and different from every other in another respect.¹¹⁵ If Coriscus is to help explain the now, Aristotle must somehow erase a crucial disanalogy between the two entities. When Coriscus moves, Coriscus—a 'this such' (τόδε τι)—remains Coriscus throughout the change.¹¹⁶ Coriscus-in- p_1 and Coriscus-in- p_2 have the *same individual* as their underlier, and not just an underlier of the same kind. Different nows, by contrast, will not in general have the same individuals (before-and-afters-in-changes) as the entities which play the role of underliers for their instances. So if Coriscus is to provide a parallel with the now, Aristotle must not allow himself

¹¹² Owen suggested ἡ στιγμὴ in 219^b19 instead of ἡ στιγμή, as if Aristotle were pointing to a whiteboard on which the point represented the moving object (G. E. L. Owen, 'Aristotle on Time', in P. Machamer and R. Turnbull (eds.), *Motion and Time, Space and Matter* (Columbus, Ohio, 1976), 3–27 at 22 n. 32; followed by Miller (F. D. Miller, 'Aristotle on the Reality of Time', *Archiv für Geschichte der Philosophie*, 56 (1974), 132–55), who had heard Owen's paper in draft). If Owen's suggestion is *not* accepted, it would be of some interest that Aristotle uses the point here as an example of the 'thing-in-motion'. He would perhaps be describing the typically Greek (but un-Aristotelian) generation of the line from a moving point (see e.g. *Simpl. In Phys.* 722. 27–30 Diels: ἡ γραμμὴ ῥύσις στιγμῆς, 722. 28). Coope makes a related point (*Time*, 136 n. 30).

¹¹³ On Coriscus see n. 63 above. Cf. also Brague, *Temps*, 128–9.

¹¹⁴ Coriscus is a particular substance, and so does not merely 'play the role of the underlier'.

¹¹⁵ 4. 11, 219^b12–15, 31–3. This explanation may rely on the claim that the now 'follows' the thing-in-motion (4. 11, 219^b22–3, 219^b33–220^a10).

¹¹⁶ Aristotle contrasts the substantiality of the movable thing with the non-substantiality of Change at 4. 11, 219^b30–1.

to use the fact that a single individual persists throughout Coriscus' motion.¹¹⁷ Aristotle's answer to this problem is to conceive of Coriscus (the individual) as if he were the *kind* of the underliers of the coupled kinds of the form Coriscus-in- p_n .¹¹⁸

Aristotle again uses OPO of a thing-in-motion later in the chapter, in his fullest explanation of the relationship between the now and the thing-in-motion:

καὶ συνεχῆς τε δὴ ὁ χρόνος τῷ νῦν, καὶ διήρηται κατὰ τὸ νῦν· ἀκολουθεῖ γὰρ καὶ τοῦτο τῇ φορᾷ καὶ τῷ φερομένῳ. [k] καὶ γὰρ ἡ κίνησις καὶ ἡ φορὰ μία τῷ φερομένῳ, ὅτι ἔν (καὶ οὐχ ὅ ποτε ὄν—καὶ γὰρ ἂν διαλίποι—ἀλλὰ τῷ λόγῳ)· καὶ ὀρίζει δὲ τὴν πρότερον καὶ ὕστερον κίνησιν τοῦτο. ἀκολουθεῖ δὲ καὶ τοῦτο πῶς τῇ στιγμῇ· καὶ γὰρ ἡ στιγμή καὶ συνέχει τὸ μήκος καὶ ὀρίζει· ἔστι γὰρ τοῦ μὲν ἀρχὴ τοῦ δὲ τελευτῆ· ἀλλ' ὅταν μὲν οὕτω λαμβάνῃ τις ὡς δυσὶ χρώμενος τῇ μιᾷ, ἀνάγκη ἴστασθαι, εἰ ἔσται ἀρχὴ καὶ τελευτῆ ἢ αὐτῇ στιγμῇ· τὸ δὲ νῦν διὰ τὸ κινεῖσθαι τὸ φερόμενον αἰεὶ ἕτερον. (220^a4–14)

And time is continuous because of the now, and it is divided according to the now. For this [the relationship between the now and the thing-in-motion] 'follows' [the relationship between] motion and the thing-in-motion. [k] For change and motion are also one because of the thing-in-motion, because *it* is one (and not in respect of whatever is such that, by being that, [it is]—for [if it only satisfied this condition] then it [the change] might have a gap—but [the thing-in-motion must be the same] in account). And this [the thing-in-motion] divides the earlier and later change. It follows the point in some sense: for the point also joins and divides length. For it [the point] is the beginning of one [length] and the end of another. But whenever someone grasps [the point] in this way, using one point as two, it is necessary that the point stand still, if the same point will be beginning and end. By contrast, because the thing-in-motion changes, the now is always different.

In [k], Aristotle relies on an understanding of the thing-in-motion as a coupled entity. Two things-in-motion which are the same in respect of their underlier may still be different in definition. Since the definition of the thing-in-motion mentions its place, if two things-in-motion are in different places, they differ in definition. As Aristotle says, even if two things-in-motion have the same underlier, there still may be a gap between their respective places. Thus Aris-

¹¹⁷ Aristotle's explanation depends on the conceit that Coriscus (and, later, the thing-in-motion) are coupled kinds. But it bears repeating that he need not have endorsed this doctrine *in propria persona* as the correct metaphysical analysis of substances which change.

¹¹⁸ Each of these kinds will, of course, have only a single member.

total requires a stronger criterion of sameness, in definition, to rule out such gaps. He imposes this stronger criterion by requiring that the thing-in-motion which holds a movement together be the same *both* in the kind of its underlier (say, *being Coriscus*) and in the place it occupies.¹¹⁹

Aristotle's explanatory gambit, which requires that he treat Coriscus as if he were a kind, prevents him from treating Coriscus as the particular substance (*τὸδὲ τι*) he is. In line with this attempt to use Coriscus to explain the now, Aristotle conceives of the coupled Coriscus as if he were a kind formed from a determinable property which is universal to instances of Coriscus, namely, *being in some place*.

This baroque theory of Coriscus creates a problem of abstraction analogous to the one we have encountered before. Every movable thing is in some place,¹²⁰ so *being in some place* is a universal determinable property for movable things. But *being in some place* is not mentioned in the definition of any movable substances. So the relevant determinable property is universal but non-definitional for movable substances. Aristotle then worries whether, if Coriscus (or any thing-in-motion) were in no place at all, he would still be Coriscus. Aristotle uses the *-ever* free relative OPO to refer to what Coriscus would be, if he were in no place at all.

¹¹⁹ Coope and Broadie take the thing-in-motion to be a coupled entity formed from a thing and the property *being in motion of such and such a sort*. On Coope's and Broadie's interpretation, if the thing-in-motion is the same in definition (where its definition includes its motion), its motion will also be the same in definition, so that this passage agrees fully with *Physics* 5. 4 (227^b3–229^a6, esp. 227^b20–228^a2), where Aristotle requires sameness in the definition (*λόγος*) of a *change* if the change is to be continuous. This interpretation is elegant, but three points lead me to prefer the one in the main text. First, when Aristotle explicates the case of Coriscus in the earlier passage, he clearly couples Coriscus with his *being in place_p*, where '*place_p*' names a place. Second, the Broadie–Coope interpretation cannot explain why Aristotle says 'for there might be a gap' (*Phys.* 4. 11, 220^a8). Sharp change of direction suffices to end one change and begin a different one, but it does not suffice to leave a gap between them. Third, and finally, including motion in the definition of the thing-in-motion disrupts the parallel with the now. What differs about successive nows cannot be *how* they are changing (whatever that would mean), but is rather their position in the before-and-after series.

In my view, our passage states necessary conditions for the unity and continuity of a change (sufficient conditions are given later, in *Phys.* 5. 4). The thing-in-motion can ensure the continuity (or at least contiguity) of a motion or two motions *only if* we select the same instantaneous stage of this coupled entity.

¹²⁰ *Phys.* 4. 5, 212^b7–11.

3.5. Time and the soul

Aristotle claims that time is ‘something of change’,¹²¹ in particular, that it ‘is the number of change [counted] in respect of the before and after. Time is not change, but [it is change] in so far as change has a number’.¹²² As Aristotle goes on to say, time is the number *as counted*, and not the number by which we count.¹²³ Thus, time is Change-which-is-numbered. It is not (or: not just) a number which could also be used to number spatial magnitudes or, for that matter, any continua whatsoever. As a coupled entity composed of change and its number, time is the number only of Change; it is a property of no other entity.

These remarks about time fit neatly with the theory of temporal numbers developed earlier. A given *interval* of time, like the now, is a coupled kind: the before-and-after-in-Change coupled with its property, *being divided at a division which has temporal number n and divided at a division which has temporal number m*, where *n* and *m* are distinct. Consider Socrates’ walk, and Cleon’s talk. The before-and-after-in-the-change-divided-at-Socrates-at-the-Metroon-*n*-and-at-Socrates-at-the-Stoa-*m* is different from the-before-and-after-in-the-change-between-Cleon-*proem-n*-and-Cleon-*narratio-m*, where ‘*n*’ and ‘*m*’ name temporal numbers. They are, after all, before-and-afters in *different* changes. But these two coupled individuals belong to the same coupled kind: the before-and-after-in-Change-divided-at-a-division-counted-by-*n*-and-at-a-division-counted-by-*m*. That coupled kind is the interval of time between *n* and *m*. Every interval of time has a unique pair of temporal numbers which all of its members have at their counted *termini*. Time itself is measured by such intervals, which it has as

¹²¹ This ‘of’ is parallel to a definition in *SE* 31, 182^a4–6 (cf. *SE* 13, 173^b9–11), where Aristotle proposes that one should define snubness as ‘concavity of a nose’. The parallel may be more than merely lexical; it may be that just as snubness is concavity of a nose, time is the number of change. If this parallel is the right one, it provides further evidence that time is a *per se* attribute of changes (once again, in the second sense of *per se* described in *Post. An.* 1. 4). As argued in sect. 3.2, this claim, in turn, supports the hypothesis that time can be understood as a coupled kind (roughly) composed of Change and its number.

¹²² τοῦτο γὰρ ἐστὶν ὁ χρόνος, ἀριθμὸς κινήσεως κατὰ τὸ πρότερον καὶ ὕστερον. οὐκ ἄρα κίνησις ὁ χρόνος ἀλλ’ ἢ ἀριθμὸν ἔχει ἢ κίνησις (*Phys.* 4. 11, 219^b1–3).

¹²³ ἐπεὶ δ’ ἀριθμὸς ἐστὶ διχῶς (καὶ γὰρ τὸ ἀριθμούμενον καὶ τὸ ἀριθμητὸν ἀριθμὸν λέγομεν, καὶ ᾧ ἀριθμοῦμεν), ὁ δὲ χρόνος ἐστὶν τὸ ἀριθμούμενον καὶ οὐχ ᾧ ἀριθμοῦμεν. ἐστὶ δ’ ἕτερον ᾧ ἀριθμοῦμεν καὶ τὸ ἀριθμούμενον (*Phys.* 4. 11, 219^b5–9).

parts.¹²⁴ Time is thus the continuum of divisions which could be made and counted in Change.

As we have seen, divisions have temporal numbers because perceivers do or would count them in a specific way. In *Physics* 4. 14, Aristotle turns directly to the relationship between time and the percipient soul, and asks: if soul were not, would time still be? In answer to this question, he uses OPO to explain the relationship between time and the before-and-after-in-Change:

πότερον δὲ μὴ οὐσίας ψυχῆς εἴη ἂν ὁ χρόνος ἢ οὐ, ἀπορήσειεν ἂν τις. ἀδυνάτου γὰρ ὄντος εἶναι τοῦ ἀριθμήσοντος ἀδύνατον καὶ ἀριθμητὸν τι εἶναι [1] ὥστε δῆλον ὅτι οὐδ' ἀριθμός. ἀριθμὸς γὰρ ἢ τὸ ἡριθμημένον ἢ τὸ ἀριθμητὸν. εἰ δὲ μηδὲν ἄλλο πέφυκεν ἀριθμῆν ἢ ψυχὴ καὶ ψυχῆς νοῦς, ἀδύνατον εἶναι χρόνον ψυχῆς μὴ οὐσίας, ἀλλ' ἢ τοῦτο ὃ ποτε ὄν ἔστιν ὁ χρόνος [m] οἷον εἰ ἐνδέχεται κίνησιν εἶναι ἄνευ ψυχῆς. τὸ δὲ πρότερον καὶ ὕστερον ἐν κινήσει ἔστιν· χρόνος δὲ ταῦτ' ἔστιν ἢ ἀριθμητὰ ἔστιν. (223^a21–9)

Someone might question whether, if soul were not, time would or would not be. For since it would be impossible for there to be something which will count, it would also be impossible for there to be something counted, [1] so that it is clear that [in such a situation] neither would there be number. For a number is either the thing counted, or the thing which is able to be counted. But if nothing is by nature able to count other than the soul and the mind of the soul, it is impossible that there be time when the soul is not, except this, whatever is such that, by being that, time is, [m] that is, if it is possible that change be without soul. And the before and after is in change. And time is these [the before and afters in change] in so far as they are countable [or: counted].

In [1], Aristotle expresses a view in the philosophy of mathematics: if there were no intelligent beings which could count, there would be no numbers. Aristotle argues for his view by claiming that numbers are either what is counted or what is countable. The relationship between this remark and Aristotle's earlier distinction between the number by which we count and the number as counted should be understood as follows. Aristotle holds that numbers are not basic entities: they are derivative properties of substances. When clarifying the meaning of his definition of time, he was happy to refer to an independent, abstract number 'by which we count'. But when considering the metaphysical status of numbers, Aristotle takes a more careful view: those 'numbers by which we count' are themselves classified either as what is counted or what is countable.

¹²⁴ Cf. 4. 10, 218^a3–8, with 4. 11, 220^a18–21.

For Aristotle, time is in part a kind of number.¹²⁵ It follows that, if there were no souls, and hence no numbers, there would also be no time. But, as we have seen, temporal numbers also depend in a further way on percipient souls' activity of counting divisions. Divisions in changes have temporal numbers because percipient souls could count them, and, if they did, would count them in a particular way.¹²⁶

Still, Aristotle qualifies this view of the non-existence of time. Even if there were no souls which could count divisions, there would still be a continuum of ordered divisions in changes. Each change would still be divisible into its before and after series, and there would still be the before-and-after-in-Change, the kind of the entities which play the role of underliers for the members of each now.¹²⁷ So in the absence of souls, some entity related to the before-and-after-in-Change is all that would be left of time, if, that is—as Aristotle is quick to add—change itself could be without soul.

This passage provides strong support for my earlier hypothesis, that Aristotle uses the *-ever* free relative clause OPO in the *Physics* because he is uncertain of what an entity would be like in a specific counterfactual situation. Here Aristotle explicitly considers a counterfactual (in fact, a counterpossible) situation in which a universal determinable property (*having a temporal number*) would not exist. He expresses his concern (in [m]) whether, in a counterfactual situation in which there are no numbers, Change would still be Change. This doubt infects his view of the before-and-after-in-Change as well. In accord with the hypothesis discussed in previous sections, Aristotle here does not identify the referent of OPO with the before-and-after-in-Change. He does not assert that the two are identical because he is uncertain whether, if there were no temporal numbers, the before-and-after-in-Change would still be the before-and-after-in-Change.

¹²⁵ Not in my technical sense of 'kind'. For 'a kind of' see *Phys.* 4. 11, 219^b5.

¹²⁶ The scope of 'because' is intended to extend to the end of the sentence.

¹²⁷ In the main text I take the view that the before-and-after-in-Change is more closely related to the referent of OPO here than Change itself is. But the point is not required for my interpretation. Aristotle's official definition of time as the number of change elides the importance of the before-and-after-in-Change, which more proximately plays the role of the underlier for time. But since the before-and-after-in-Change itself is a coupled kind composed in part from a *per se* attribute of Change, time (which is composed from a *per se* attribute of this coupled entity itself) is also *per se* of Change. So either interpretation of this text would fit with my interpretation.

3.6. *The argument against essentialist and existentialist interpretations of OPO*

This concludes my analysis of the passages in which OPO occurs. But I have so far postponed arguing that the second main claim of my interpretation of OPO—that the final ‘is’ ($\epsilon\sigma\tau\iota$) of OPO is to be interpreted as ‘is a being’—applies to the instances of OPO in the *Physics*. As I will now show, an argument similar to the one presented in Section 2.6.1 applies to each of these six instances of OPO. The essentialist and existential interpretations of OPO fail in every instance of the phrase.

The last four sections have aimed to establish that a number of key entities in Aristotle’s theory of time are coupled kinds. My arguments that Aristotle understood the relevant entities as coupled entities did not rely on my interpretation of OPO. The fact that Aristotle viewed these entities as coupled kinds, then, can be used without dialectical unfairness as a premiss in the argument against the essentialist and existential interpretations of OPO:

- (1A) For the before-and-after-in-Change to be what it is is only in part for the before-and-after-in-Change to be Change. For the before-and-after-in-Change to be what it is it must also be *divisible into some ordered series of divisions*. (3.2)
- (1B) For the now to be what it is is only in part for the now to be the before-and-after-in-Change. For the now to be what it is it must also be *divided at a division which has temporal number n*. (3.3)
- (1C) For the thing-in-motion to be what it is is only in part for it to be a stone or Coriscus, or any movable thing. For the thing-in-motion to be what it is, it must also be *in place_p*, where ‘*place_p*’ names a place. (3.4)
- (1D) For time to be what it is is only in part for time to be the before-and-after-in-Change. For time to be what it is it must also be *divided at a division which has temporal number n and divided at a division which has temporal number m*. (3.5)

In all four sets of passages discussed in Section 3 (the before-and-after-in-Change; the now; the thing-in-motion; time), Aristotle explicitly mentions an entity which is intimately related to the referent of OPO. My interpretation of these remarks about the

referent of OPO has also not presupposed my interpretation of the final 'is' in OPO.¹²⁸ Here, too, we can legitimately use the fact that the different instances of OPO have the referents they have in an argument against the essentialist and existential interpretations of the phrase.

- (2A) In *Phys.* 4. 11, 219^a20–1, the referent of OPO is closely related to Change.
- (2B) In *Phys.* 4. 11, 219^b14–15 and 219^b26, the referent of OPO is closely related to the before-and-after-in-Change.
- (2C) In *Phys.* 4. 11, 219^b18 and 220^a8, the referent of OPO is closely related to some arbitrary movable thing.
- (2D) In *Phys.* 4. 14, 223^a27, the referent of OPO is closely related to the before-and-after-in-Change.

The qualification 'is closely related to' is required to account for Aristotle's use of the *-ever* free relative clause. In each of these cases, the referent of OPO is whatever would be left if the entity in question were stripped of a universal but non-definitional property.

Our next premiss is derived from the kind of explanation Aristotle gives by way of the participle:

- (3) If *a* is what it is by being *F*, then for *a* to be what it is is for *a* to be *F*.

The argument for this premiss is the same as the argument given in Section 2.6.1. The explanations we have considered can be neither material nor efficient; the participle indicates an explanation analogous to explanations by the formal cause. For example, Aristotle explains time by describing what time is. And this explanation cannot be merely partial, if Aristotle's use of the free relative clause OPO is not to suffer from a failure of the linguistic presupposition that a unique entity satisfies the description within the clause.

Finally, according to the essentialist interpretation:

(General Essentialist Thesis) The referent of OPO is the *F* such that, by being *F*, *a* is what it is.

The new argument is simpler than the version given earlier. If we remove 'closely related to' from (2A), then (1A), the revised (2A),

¹²⁸ In sect. 3.2 I used the fact that OPO is an *-ever* free relative to argue against the transmitted 'is' (*ἐστίν*), but this component of my interpretation is independent of my interpretation of the final 'is'.

the General Essentialist Thesis, and (3) are inconsistent. We can also derive a contradiction from the other pairs of premisses in (1) and (2) in the same way. For example, the revised (2B) together with the General Essentialist Thesis and (3) yields: for the now to be what it is is for the now to be the before-and-after-in-Change. But this statement contradicts (1B). The qualification ‘is closely related to’ was required to respect Aristotle’s use of the *-ever* free relative clause. But as we have seen, the concern which drove Aristotle to use this form of expression is that the referent is in a sense missing an aspect of Change or the before-and-after-in-Change. Removing the qualification strengthens the case for the essentialist thesis here, since with the qualification removed, the referent of OPO is closer to being the being of the entity to be explained (the now, time). So even if we restore the qualification in (2A) and (2B), but keep in mind the reason for the qualification, a contradiction still follows. The same line of reasoning applies to (1C) and (2C), and (1D) and (2D).

This argument against the essentialist interpretation can also be used against the existential interpretation of OPO. Replace every occurrence of ‘be what it is’ in (1A)–(1D) with ‘exist’, and note that these premisses remain true by Aristotle’s lights. (2A)–(2D) require no alteration. In place of (3) and the General Essentialist Thesis, the revised argument uses the following two premisses:

(3ex) If *a* exists by being *F*, then for *a* to exist is for *a* to be *F*.

(*General Existential Thesis*) The referent of OPO is the *F* such that, by being *F*, *a* exists.

The argument is analogous to the one I have already given.¹²⁹

4. Conclusion

In every instance, OPO refers to the kind of the entities which play the role of the underlier for the members of a coupled kind. Aris-

¹²⁹ The argument I have just given does rely on an interpretation in which, for example, the now is a coupled kind (these interpretations gave us (1A) through (1D)). But a version of the argument could be given even on a variety of alternative interpretations of this notion. In fact, for five of the six passages in which Aristotle uses OPO (the exception is *Phys.* 4. 11, 219^a19–21, where Coope and I print different texts), a version of this argument can be given using Coope’s interpretations of the relevant notions in place of my (1A)–(1D).

totle cites the referent of OPO as part of his explanation of the coupled kind's being a being. For example, the kind sanguineous fluid is that, by being which, the kind blood is a being.

In OPO, the participle *ὅν* ('by being') indicates a specifically metaphysical kind of explanation. Throughout this paper, I have emphasized two features of the explanations Aristotle gives when he uses OPO. First, as I have argued, Aristotle takes the *explanandum* of this explanation to be an entity's being a being (and not its being what it is, or its existing). I hope that this insight into the explanations contained in OPO will be a useful datum for those who seek to understand Aristotle's more common metaphysical explanations, for example those described by 'priority in being'.

Second, in these passages Aristotle explains the relevant entity (say, blood) by describing its relationship to a non-substance. In *Physics* 4. 11–14 in particular, Aristotle considers properties of non-substances at length. In the opening lines of his positive account of time, he discusses properties of magnitude, change, and time. He then focuses on one property of these non-substantial entities: the before-and-after. In fact, the theory of time which Aristotle develops involves layers of coupled entities. For example, the before-and-after-in-Change (which is itself a coupled kind) is coupled with a further property to form the now. For each of these complicated coupled entities, Aristotle follows the same explanatory tactic. He explains the coupled kinds by describing their relationship to the kind of the non-substantial entities which play the role of underlier for their members.

Christ Church, Oxford

BIBLIOGRAPHY

- Bodéüs, R. (ed. and trans.), *Aristote: Catégories* (Paris, 2002).
 Bonitz, H., *Index Aristotelicus [Index]* (Berlin, 1870).
 Bostock, D., 'Aristotle's Account of Time', *Phronesis*, 25 (1980) 148–69;
 repr. in id., *Space, Time Matter, and Form: Essays on Aristotle's Physics*
 (Oxford, 2006), 135–57.
 ——— *Aristotle's Metaphysics Z and H* (Oxford, 1994).
 Bague, R., *Du temps chez Platon et Aristote [Temps]* (Paris, 1982).
 Broadie [Waterlow], S., 'Aristotle's Now' ['Now'], *Philosophical Quarterly*,
 34 (1984), 104–28.

- Brown, L., 'Being in the *Sophist*: A Syntactical Enquiry', *Oxford Studies in Ancient Philosophy*, 4 (1986), 49–70; revised as 'Being in the *Sophist*', in G. Fine (ed.), *Plato I: Metaphysics and Epistemology* (Oxford, 1999), 455–78.
- 'The Verb "To Be" in Greek Philosophy', in S. Everson (ed.), *Language* (Companions to Ancient Thought, 3; Cambridge, 1994), 212–36.
- Brunschwig, J. (ed. and trans.), *Aristote: Topiques. Livres I–IV* (Paris, 1967).
- Caponigro, I., 'Free Not to Ask: On the Semantics of Free Relatives and Wh- Words Cross-Linguistically' (diss. Ph.D., University of California at Los Angeles, 2003) (http://idiom.ucsd.edu/~ivano/Papers/2003_dissertation_revised_7-13-05.pdf).
- Charles, D., 'Simple Genesis and Prime Matter', in F. A. J. de Haas and J. Mansfeld (eds.), *Aristotle's On Generation and Corruption I* (Oxford, 2004), 151–70.
- Code, A., 'Aristotle and Existence' (unpublished MS on file with the author).
- Cohen, S., 'Aristotle on Heat, Cold, and Teleological Explanation', *Ancient Philosophy*, 9 (1989), 255–70.
- Cohen, S. M., 'Kooky Objects Revisited: Aristotle's Ontology', *Metaphilosophy*, 39.1 (2008), 3–19.
- Coope, U. C. M., *Time for Aristotle [Time]* (Oxford, 2005).
- Corkum, P., 'Aristotle on Ontological Dependence' ['Dependence'], *Phronesis*, 53 (2008), 65–92.
- Dayal, V., 'Free Relatives and *Ever*: Identity and Free Choice Readings', *Proceedings of SALT VII* (1997), 99–116.
- Denniston, J. D., *The Greek Particles*, 2nd edn., rev. K. J. Dover (Oxford, 1954).
- Düring, I., *Aristotle: De partibus animalium. Critical and Literary Commentaries* (Göteborg, 1943).
- *Aristotle: Meteorologica IV. Critical and Literary Commentaries* (Göteborg, 1944).
- Fine, K., 'Acts, Events and Things', in W. Leinfellner, E. Kraemer, and J. Schank (eds.), *Proceedings of the 6th International Wittgenstein Symposium* (Vienna, 1982), 97–105.
- 'Essence and Modality' ['Essence'], *Philosophical Perspectives*, 8 (1994), 1–16.
- 'Guide to Ground' ['Guide'], in F. Correia and B. Schneider (eds.), *Metaphysical Grounding: Understanding the Structure of Reality* (Cambridge, 2012), 37–80.
- 'Ontological Dependence', *Proceedings of the Aristotelian Society*, 95 (1995), 269–90.

- Grosu, A., 'Strange Relatives at the Interface of Two Millennia', *GLOT International*, 6 (2002), 145–67.
- and Landman, F., 'Strange Relatives of the Third Kind' ['Strange Relatives'], *Natural Language Semantics*, 6 (1998), 125–70.
- Heller, D., and Wolter, L., 'Identity and Indiscriminability in –ever Free Relatives', in T. Friedman and S. Ito (eds.), *Proceedings of SALT XVIII* (2009), 394–410.
- Horn, L. R., '*any* and *ever(-)*: Free Choice and Free Relatives', in *IATL 7: The Proceedings of the Fifteenth Annual Conference, The University of Haifa, 1999* (2000), 71–111.
- Hussey, E., *Aristotle's Physics Books III and IV [Physics III and IV]* (Oxford, 1983).
- Inwood, M., 'Aristotle on the Reality of Time', in L. Judson (ed.), *Aristotle's Physics: A Collection of Essays* (Oxford, 1991), 151–78.
- Jacobson, P., 'On the Quantificational Force of English Free Relatives', in E. Bach, E. Jelinek, A. Kratzer, and B. H. Partee (eds.), *Quantification in Natural Languages* (Dordrecht, 1995), ii. 451–86.
- Kadmon, N., and Landman, F., 'Any', *Linguistics and Philosophy*, 16 (1993), 353–422.
- Lennox, J. (trans. and comm.), *Aristotle: On the Parts of Animals [Parts]* (Oxford, 2001).
- Lewis, F. A., *Substance and Predication in Aristotle [Substance]* (Cambridge, 1991).
- Link, G., 'The Logical Analysis of Plurals and Mass Terms: A Lattice-Theoretical Approach', in R. Bauerle, C. Schwarze, and A. von Stechow (eds.), *Meaning, Use, and Interpretation of Language* (Berlin, 1983), 302–23.
- Lobel, E., Roberts, C. H., Turner, E. G., and Barns, J. W. B. (eds.), *The Oxyrhynchus Papyri*, xxiv (London, 1957).
- Louis, P. (ed. and trans.), *Aristote: Les Parties des animaux [Parties]* (Paris, 1956).
- Matthews, G., 'Accidental Unities', in M. Schofield and M. C. Nussbaum (eds.), *Language and Logos: Studies in Ancient Greek Philosophy Presented to G. E. L. Owen* (Cambridge, 1982), 223–40.
- Miller, F. D., 'Aristotle on the Reality of Time', *Archiv für Geschichte der Philosophie*, 56 (1974), 132–55.
- Owen, G. E. L., 'Aristotle on Time', in P. Machamer and R. Turnbull (eds.), *Motion and Time, Space and Matter* (Columbus, Ohio, 1976), 3–27.
- Peck, A. L. (trans.), *Aristotle: Parts of Animals* (Cambridge, Mass., 1955).
- Peramatzis, M., 'Aristotle's Notion of Priority in Nature and Substance', *Oxford Studies in Ancient Philosophy*, 35 (2008), 187–248.
- *Priority in Aristotle's Metaphysics [Priority]* (Oxford, 2011).

- Probert, P., *Early Greek Relative Clauses [Early Relatives]* (Oxford, forthcoming).
- Rawlins, K., '(Un)conditionals: An Investigation in the Syntax and Semantics of Conditional Structures' ['Unconditionals'] (diss. Ph.D., University of California at Santa Cruz, 2008) (http://mind.cog.jhu.edu/~rawlins/papers/rawlins_dissertation.pdf).
- Roark, T., *Aristotle on Time [On Time]* (Cambridge, 2011).
- Rosen, G., 'Metaphysical Dependence: Grounding and Reduction', in B. Hale and A. Hoffman (eds.), *Modality: Metaphysics, Logic and Epistemology* (Oxford, 2010), 109–36.
- Ross, W. D. (ed. and comm.), *Aristotle's Physics: A Revised Text with Introduction and Commentary [Physics]* (Oxford, 1936; 2nd edn. 1955).
- Rullman, H., 'Maximality in the Semantics of Wh- Constructions' (diss. Ph.D., UMass Amherst, 1995) (<http://www.linguistics.ubc.ca/sites/default/files/dissertation.pdf>).
- Schaffer, J., 'On What Grounds What', in D. J. Chalmers, D. Manley, and R. Wasserman (eds.), *Metametaphysics* (Oxford, 2009), 347–83.
- Torstrik, A., 'O ποτε ον: Ein Beitrag zur Kenntnis des aristotelischen Sprachbrauchs' ['Beitrag'], *Rheinisches Museum für Philologie*, 12 (1857), 161–73.
- White, M. J., 'Aristotle on "Time" and "A Time"', *Apeiron*, 22.3 (1989), 207–24.