

Aristotle and the Problem of Relations

Ligerz workshop on Aristotle's *Physics*

Philipp Blum, January 28, 2018

The Problem of Structure

Relations have (at least) two essential features properties are lacking: direction and order. If aRb we may both ask whether R holds from a to b or in the other direction and whether R holds of a and b in this or the opposite order. The two questions are different, but correlated. We may choose, without loss of generality, a binary relation $R(x, y)$ as our example. Suppose it holds between a and b , in this order. It follows:

- that the relational fact $R(a, b)$ is *ordered*; it has an internal structure and consists of (at least) two parts, a and b , distinguished by *how* they stand in the relation R : a is R -ing while b is R -ed;
- that, within the relation fact $R(a, b)$, R not simply holds, but holds *in a certain direction*: it holds from a to b , and is thereby different from its converse which would hold from b to a .

The most important specificity of relations, in cases where we have at least a *prima facie* reason to believe in their existence, is their multiple adicity, the fact that they ‘involve’ more than one particular. This gives rise to what I will call “the problem of converses”. The converse of a binary relation is normally taken to be the unique relation that holds between the same particulars in the other direction. There are two roads to its acceptance: the first one starts from the given binary relation R and defines the converse as the unique relation that holds in the other direction – this is the route chosen by Russell and Whitehead in the *Principia*: the converse of R is defined as the unique relation \check{R} which holds between x and y iff R holds between y and x (Russell 1901c: 316, §1.7).¹ This operational conception of converses leaves it open whether the operation $X \mapsto \check{X}$ is total. It may, for example, not be defined for relations without sense or direction.²

A different route starts from the relational fact itself, identifies by analysis the relational properties exemplified and asks about their status. In the same way, it is then argued, the property of being R -related to b is derived from and posterior to the relation R , the property of being such that a is R -related to it is derived from and posterior to the relation \check{R} . Sensible questions may then be asked about the relations R and \check{R} , which may or may not be identical, but are assured to exist in all cases.³

The problem of converses has three aspects:

Problem 1 : ontological profligacy.

“If a book is on a table, *on the table* is a relational character truly predicable of the book.
But this is inseparable from another relational character predicable not of the book but of

1. Cf. also Schröder (1895: 30), and (Whitehead & Russell 1910: 32). Given the definition of the *Principia*, it can be proved that every relation has a converse (1925: 238–239, *31.13). The same definition of converse was given by 1892: 246.

2. Russell (1901a: 48/307) says that distance is a symmetrical relation without sense.

3. I think this may plausibly be taken to be Russell’s position in the *Principles*: That every relation has a converse is taken by Russell (1903: 25, §28) to be a primitive proposition, where he defines symmetrical relations as those identical to their converses. Russell (1903: 44, §48) uses the same language, saying that in a relational proposition we may regard either one of the terms as the logical subject. It may also be Maccoll’s conception, who calls converse relations ‘reciprocal’ and claims that relations are synonymous with their converses (1902: 359).

the table. How are these two relational characters connected with each other? We may be tempted to say that the difference between them is purely verbal, so that, whether we say the *book is on the table* or the *table is under the book*, we are merely expressing the same fact in different language. But this cannot be true; for *being on* is different from *being under*; killing from being killed; loving from being loved. Yet it is plain that a single indivisible fact is referred to whether we say that the book is on the table or that the table is under the book.” (Stout 1940: 121)

“...it is hard to see how the state *s* might consist *both* of the relation *on top of* in combination with the given relata and of the relation *beneath* in combination with those relata. Surely if the state is a genuine relational complex, there must be a *single* relation that can be correctly said to figure in the complex in combination with the given relata.” (Fine 2000: 4)

Problem 2 : indeterminacy. How can it be, asked Ramsey (1925: 14, 406), that $(\lambda x(aRx))b$, $(\lambda y(yRb))a$ and $(\lambda x,y(xRy))(a,b)$ represent (are logical forms of) the same proposition, given that they have different components? If they represent the same proposition, and stand for the same fact, however, what are their constituents? If relations are different from their converses, what could give us a reason to take one, but not the other, to be a constituent of a relational fact?

It is not just multiplication of entities that is at stake. Another problem is indeterminacy, both ontological and semantical. Armstrong (1997: 91), e.g., claims that \check{R} is not an increase in being, for every state of affairs containing it is identical with one containing just R . He does not tell us, however, which of the two relations is a constituent of this state of affairs. Williamson (1985) asks us to imagine two languages L' and L'' , both differing from our language L only by inverting the order of arguments following R and by replacing R by its converse \check{R} respectively. By hypothesis, we cannot distinguish between L' and L'' . If relations were different from their converses, we could never distinguish our language from either L' or L'' – we would never be able to know what our relational expressions are standing for. In both cases, the natural reaction is to say that there is no real question because for any relation R , R and \check{R} are identical.⁴ But how can they be identical, if they apply to the same relata only if these are respectively taken to be in different orders?

Problem 3 : regress.

“...when we analyze them, *greater* obviously differs from *less*; thus the two propositions [“*A* is greater than *B*” and “*B* is less than *A*”] seem to be composed of different constituents, and therefore to be necessarily distinct. To deny that they are distinct, it would be necessary to hold that both *greater* and *less* enter into each proposition, which seems obviously false, or else to hold that what really occurs is neither of the two, but that third abstract relation of which Leibniz speaks [...]. In this case, the difference between *greater* and *less* would be one involving reference to the terms *A* and *B*. But this view cannot be maintained without circularity: for neither the greater nor the less is inherently the antecedent, and we can only say that, when the greater is the antecedent, the relation is *greater*, when the less, *less*.” (Russell 1901a: 41/300)

Suppose that Othello (*a*) loves Desdemona (*b*), a fact we may equally well describe as Desdemona’s being loved by Othello. Suppose furthermore that Desdemona does not love Othello, or, what comes to the same thing, that Othello is not loved by Desdemona. Without prejudging questions of identity, we can see these states as ‘arising’ out of the first by inversions of direction (*D*) or of order (*O*).

4. Cf. Williamson (1985: 249) and Armstrong (1978: 42). Williamson’s argument presupposes that relations are individuated by the semantical roles of expressions standing for them.

$$\begin{array}{ccc}
R(a,b) & \xrightarrow{D} & \check{R}(a,b) \\
o \downarrow & & \downarrow o \\
R(b,a) & \xrightarrow{D} & \check{R}(b,a)
\end{array}$$

Because, in this case, love is unrequited, we have non-identities holding on all four sides of the square: Order forces us to distinguish Rab and Rba . Direction forces us to distinguish Rba and $\check{R}ba$. But their interplay forces us to identify Rab and $\check{R}ba$: we have identities along the two diagonals. This diagram thus ‘commutes’, i.e. $O(D(a \rightarrow b)) = D(O(a \rightarrow b))$. I submit that this is explained by the fact that one operation is the converse of the other, ie. only one of order or direction is fundamental. But which one is it? I argue that it is order that explains direction, not direction that explains order.

What conception of R allows us to say that

- = “ Rab ” and “ $\check{R}(ba)$ ” denote the same relational fact;
- pos R holds, but \check{R} does not hold, between a and b (in this order);
- neg \check{R} holds, but R does not hold, between a and b (in this order).

To solve the problem of converses – to explain differential applicability (**pos** and **neg**) without intrinsic directions (\equiv) –, we need to loosen the connection between direction and order.

We may, and must, if the argument from the problem of converses is sound, hold that both “loving” and “being loved” stand for the same relation, even though they apply to their relata in a different order. To do this, we must loosen the connection between relations and direction: even though the ‘directions’ of R and \check{R} are different, this does not distinguish them as relations. The relation, equally well denoted by “ R ” or “ \check{R} ”, is not intrinsically, but only extrinsically directed. In this sense, it is “undirected”, or “neutral” (with respect to direction).

“Neutral relations”, [Fine \(2000: 3\)](#) says, do not hold of their arguments in any specifiable order. Fine’s starting point, as [Castañeda’s](#), is the apparent absurdity of the claim that the fact of a ’s being to the right of b is different from the fact of b ’s being to the left of a . Fine’s conclusion is similar to [Williamson’s](#): we cannot, in general, speak of the “first” and the “second” argument of some relation, identifying these in terms of closeness to the relational expression or their spatial position with respect to it. Similarly, [Fine \(2000: 6\)](#) concludes that “[neutral] relations should [...] be taken to apply to their objects without regard to the order in which they might be given”.

If we give up on the idea, as both [Williamson](#) and [Fine](#) urge, that relations relate their terms in some specific order, how can we then account for their differential applicability, i.e. the fact that the loving relation may hold between [Don José](#) and [Carmen](#) but fail to hold between [Carmen](#) and [Don José](#)? [Fine](#) presents us with two options: positionalism, which reifies argument places and includes them as constituents into relational facts, and anti-positionalism, which takes it to be a brute fact that (some) relations may, when applied to some given terms, yield more than one relational complex.

[Fine \(2000: 9\)](#) construes both these positions as introducing further relata, “for if there were not [any further relata] and if the notion [of exemplification] were indeed order-insensitive, then we would be left with something like the attenuated form of exemplification described above and there would be no way to account for differential application”. This does not follow, however. Positionalism, while committed to argument-places or ‘positions’, can incorporate them into the relation: they can contribute to the ontology of the relational fact not by being further relata related by the relation, but rather by being essential parts of the relation itself. Similarly, anti-positionalism can hold that the similarity between co-mannered

completions (relational facts in which, as a directionalist would say, the relation applies to its arguments in the same order) is extrinsic, but non-relational.

Even amended in this way, Fine's menu of options, however, is not exhaustive: it does not follow from the fact that relations do not exhibit *intrinsic* directionality that they are not directed at all. One and the same relation, $R = \check{R}$, could be extrinsically directed one way when exemplified by Othello and Desdemona in this order and be extrinsically directed another way when exemplified by Desdemona and Othello in this order.

Leibniz

Famously, Leibniz argued in his correspondence with Clarke that relations, if they existed, would be “in two subjects, with one leg in one, and the other in the other, which is contrary to the notion of accidents”⁵

Take, again, Othello's loving Desdemona. The fundamental fact making true the relational predication is the exemplification, by the mereological sum of Othello and Desdemona, of the structural property of loving. Because the mereological sum is not simple, the structure imposed on the whole, i.e. what Russell calls the ‘form’ of the complex, is further analysable as the exemplification, by Othello and Desdemona respectively, of the two relational properties I have called “rôles” of *loving Desdemona* and *being loved by Othello*. The exemplification of these two properties is grounded in the exemplification of the metaphysically prior structural property of loving.

We may, following Leibniz, describe the relational complex on this non-fundamental level of analysis by “Othello loves in so far as Desdemona is loved” or “Othello loves and eo ipso Desdemona is loved”. This analysis has three parts:

- (i) it ascribes to Othello the relational property of loving Desdemona and the non-relational property of loving (i.e. loving someone, being a lover);
- (ii) it ascribes to Desdemona the relational property of being loved by Othello and the non-relational property of being loved (i.e. being loved by someone, being someone beloved);
- (iii) it ascribes to the facts stated by (i) and (ii) the relation making true claims such as “ p in so far as q ” or “ p and eo ipso q ”.

This three-pronged analysis allows us to keep what is right in the alternative accounts:

- In this sense of (i) and (ii), we may say, with Fine, that the asymmetric relation R distinguishes between two parts of the sum that exemplifies it by coordinating them with different things, e.g. lovers and beloved ones. This allows us to say that Othello, Don José and Abelard, say, have something in common: they are lover parts of fusions exemplifying the neutral amatory relation.
- In this sense of (i) and (ii), we may say, with the positionalist, that this difference between Othello and Desdemona, as parts of the relational complex, is due to their playing different rôles, i.e. entering into this complex in different ways – as lover and as beloved respectively.
- The “ p in so far as q ” and “ p and eo ipso q ” locutions express that “ p ” and “ q ” have the same fundamental truthmaker.⁶

5. “...en deux sujets, qui auroit une jambe dans l'un, et l'autre dans l'autre, ce qui est contre la notion des accidents.” (Leibniz's fifth letter to Clarke, 1890: 401 (translations: 1956: 71 and 1989: 339)).

6. Mates (1986: 216) is right about this, though wrong in taking truthmaking to be implication (or rather: entailment): “[Paris is a lover, and eo ipso Helen is a loved one]” tells us that those “facts” or individuals-cum-accidents that make “Paris is a lover” true also make “Helen is a loved one” true; presumably, if those facts were more narrowly described, the resulting propositions [...] would actually imply that Paris loves Helen.”

Plato

47 years ago, Hector-Neri Castañeda discovered an interesting theory of relations in Plato's *Phaedo*, 102b7-c4, which a year later and in English, he characterises it as follows:

The sentence 'Simmiias is taller than Socrates' does not reveal the truth it expresses perspicuously, because this sentence mentions only one Form, tallness, whereas the truth or fact in question involves two Forms, tallness and shortness. This is in a nutshell my exegesis of the passage. [...] *Phaedo* 102C1-D1 iterates the previous points and adds a third one: Tallness and Shortness are structured ($\Pi\rho\theta\varsigma$) by a law of joint instantiation: a simple relational fact involving taller-than is a two-pronged fact. (Castañeda 1972: 469, 470)

The multi-pronged fact ascribes to several particulars a 'chain of universals'. Because it ascribes it to them together and just once, Castañeda may feel "confident that Plato considered the fact that Simmiias is taller than Socrates to be identical with the fact that Socrates is shorter than Simmiias." (Castañeda 1972: 474).

If we reduce a 's having R to b to a 's having the property *having R to b* and b 's having the property *having \check{R} to a* , we have reduced the relation to two *different* properties, which are bound together by a "law of joint exemplification" (Castañeda 1972: 470). What is the ontological ground of such a necessary connection between distinct (non-overlapping) entities (cf. Grossmann 1983: 161)?

The category of the *pros ti*

So-called relatives (*pros ti* items) are introduced in the *Categories* as things that seem quantities, but are not – the examples given are "many" / "few" and "large" / "small". They are relatives because "nothing is called large and small just in itself, but by reference to something else. For example, a mountain is called small yet a grain of millet large – because one is larger than other things of its kind while the other is smaller than other things of its kind" (*Cat.* 5b16-18). Aristotle explains the extrinsicness of these characteristics by their perspectival character: "the large and the small are looked at in relation to something else" (5b28-29).

The introduction by example is then followed by something like an official definition at the beginning of chapter 7:

We call *relatives* all such things as are said to be just what they are, *of* or *than* other things, or in some other way *in relation to* something else. For example, what is larger is called what it is *than* something else (it is called larger than something); and what is double is called what it is *of* something else (it is called double of something); similarly with all other such cases. The following, too, and their like, are among relatives: state, condition, perception, knowledge, position. For each of these is called what it is (and not something different) *of* something else. (*Cat.*, 6a36-b4, 2014: 41)

This is Aristotle's so-called 'Platonic' definition of relations, or rather of what it is for things to stand in a relation.⁷ Relatives, however, are not just generically extrinsic, but have specific "correlatives" that "reciprocate":

For example, the slave is called slave of a master and the master is called master of a slave; the double double of a half, and the half half of a double; the larger larger than a smaller, and the smaller smaller than a larger; and so for the rest too. Sometimes, however, there will be

7. Duns Scotus translates as: "Ad aliquid dicuntur quaecumque hoc ipsum quod sunt, aliorum dicuntur, vel quomodolibet aliter ad aliud" (Sup. Praed. q 26, n. 2; 1, 497b), Beckmann (1967: 35) as "In einer Beziehung stehend' heisst dasjenige, dessen Sein darin besteht, ein zu einem anderen gehörendes Sein genannt zu werden."

a verbal difference, of ending. Thus knowledge is called knowledge of what is knowable, and what is knowable knowable by knowledge; perception perception of the perceptible, and the perceptible perceptible by perception. (6b26-35, 2014: 42)

Aristotle explains that the reciprocation is automatic, grammatical almost, though not always apparent from surface grammar:

Sometimes, indeed, [relatives] will not seem to reciprocate – if a mistake is made and that in relation to which something is spoken of is not given properly. For example, if a wing is given as *of a bird*, *bird of a wing* does not reciprocate; for it has not been given properly in the first place as wing of a bird. For it is not as being a bird that a wing is said to be of it, but as being a winged, since many things that are not birds have wings. Thus if it is given properly there is reciprocation; for example, a wing is wing of a winged and a winged is winged with a wing. (6b35-7a4, 2014: 42-43)

The explanation of why *bird* is not the correlative of *wing* – that not all wings are had by birds – spells out a universality requirement: if *F* is the correlative of *G*, then necessarily, if something is *F* then something is *G* and *F* is of the *G* while the *G* is of the *F*:

Again, if that in relation to which a thing is spoken of is properly given, then, when all the other things that are accidental are stripped off and that alone is left to which it was properly given as related, it will always be spoken of in relation to that. For example, if a slave is spoken of in relation to a master, then, when everything accidental to a master is stripped off – like being a biped, capable of knowledge, a man – and there is left only being a master, a slave will always be spoken of in relation to that. For a slave is called slave of a master. (7a31-38, 2014: 44)

The construction “accidental to a master” is very interesting, for it is implicitly qualified as “accidental to a master *as a master*”: it is not accidental to the person who is a master, e.g. Socrates, to be biped, capable of knowledge, a man, but only to his being a master: while he could exist, we hope, without owning any slaves, he could not be a master: each correlative “carries the other to destruction” (7b20).

It is with respect to such ‘predicative’ essences that simultaneous correlatives ontologically depend on each other.⁸ But not all correlatives are simultaneous: the knowable, e.g., is prior to knowledge, which only unilaterally depends on it (7b28-30); the perceptible is prior to perception and carries it to destruction, though not vice versa (7b35-39).

After having noted that with respect to some secondary substances, there is room for dispute as to whether or not they are relatives (*head* may be *someone’s head*, *hand* may be *someone’s hand*), Aristotle gives another definition of relatives:

Now if the definition of relatives given above was adequate, it is either exceedingly difficult or impossible to reach the solution that no substance is spoken of as a relative. But if it was not adequate, and if those things are relatives for which *being is the same as being somehow related to something*, then perhaps some answer may be found. The previous definition does, indeed, apply to all relatives, yet this – their being called what they are, of other things – is not what their being relatives is. (8a28-35, 2014: 47)

8. Aristotle characterises such counterfactual ontological dependence in terms of “stripping off”: “if there is no master there is no slave either” (7b7), “if there is nothing winged neither will there be a wing of anything” (7b9).

I think it is clear that Aristotle thinks that this second definition⁹ is better than the first: while the first may be true of all relatives, it is perhaps true of some non-relative secondary substances as well; even more importantly, it does not settle questions which a definition should settle, e.g. whether *head* is a relative. Every head is the head of a headed, and every headed is what has a head, but this alone does not show that *head* and *headed* are relatives. They are relatives only if *being a head* is the same thing as *being the head of a headed*. If this were the case, it would not be possible to know what a head is without “knowing definitely that in relation to which it is spoken of”, i.e. what a headed thing is. It seems (Aristotle is cautious about this point), however, that this is the case, i.e. that we can know what *head* is without knowing what *headed* is – so secondary substances are not relatives.

The reciprocation of relatives is thus *not* just a necessary connection between different things,¹⁰ but an intrinsic and essential feature.

The road from Thebes to Athens

In line with this (it seems to me), Aristotle introduces correlative potentialities in *Physics* III.3 in terms of having an identical actualisation:

ἀλλ' ἄλογον δύο ἐτέρων τῷ εἶδει τὴν αὐτὴν καὶ μίαν εἶναι ἐνέργειαν· καὶ ἔσται, εἴπερ ἡ διδασκαλία καὶ ἡ μάθησις τὸ αὐτὸ καὶ ἡ ποίησις καὶ ἡ πάθησις, καὶ τὸ διδάσκειν τῷ μανθάνειν τὸ αὐτὸ καὶ τὸ ποιεῖν τῷ πάσχειν, ὥστε τὸν διδάσκοντα ἀνάγκη ἔσται πάντα μανθάνειν καὶ τὸν ποιῶντα πάσχειν.

ἢ οὔτε τὸ τὴν ἄλλου ἐνέργειαν ἐν ἐτέρῳ εἶναι ἄτοπον (ἔστι γὰρ ἡ διδασκαλία ἐνέργεια τοῦ διδασκαλικοῦ, ἐν τινι μέντοι, καὶ οὐκ ἀποτεταγμένη, ἀλλὰ τοῦδε ἐν τῷδε), οὔτε μίαν δυοῖν κωλύει οὐδὲν τὴν αὐτὴν εἶναι (μὴ ὡς τῷ εἶναι τὸ αὐτό, ἀλλ' ὡς ὑπάρχει τὸ δυνάμει ἢ πρὸς τὸ ἐνεργεῖν), οὔτ' ἀνάγκη τὸν διδάσκοντα μανθάνειν, οὐδ' εἰ τὸ ποιεῖν καὶ πάσχειν τὸ αὐτό ἐστίν, μὴ μέντοι ὥστε τὸν λόγον εἶναι ἓνα τὸν <τὸ> τί ἦν εἶναι λέγοντα, οἷον ὡς λώπιον καὶ ἱμάτιον, ἀλλ' ὡς ἡ ὁδὸς ἡ Θήβηθεν Ἀθήναζε καὶ ἡ Ἀθήνηθεν εἰς Θήβας, ὥσπερ εἴρηται καὶ πρότερον; οὐ γὰρ ταῦτά πάντα ὑπάρχει τοῖς ὀπισθοῦσι τοῖς αὐτοῖς, ἀλλὰ μόνον οἷς τὸ εἶναι τὸ αὐτό.

But (someone will say) it is contrary to reason to suppose that there should be one identical actualization of two things which are different in kind. Yet there will be, if teaching and learning are the same, and agency and patiency. To teach will be the same as to learn, and to act the same as to be acted on – the teacher will necessarily be learning everything that he teaches, and the agent will be acted on.

It is not absurd that the actualization of one thing should be in another. Teaching is the activity of a person who can teach, yet the operation is performed in something – it is not cut adrift from a subject, but is of one thing in another. There is nothing to prevent two things having one and the same actualization (not the same in being, but related as the potential is to the actual). Nor is it necessary that the teacher should learn, even if to act and to be acted on are one and the same, provided they are not the same in respect of the account which states their essence (as raiment and dress), but are the same in the sense in which the road from Thebes to Athens and the road from Athens to Thebes are the same, as has been explained above. For it is not things which are in any way the same that have all their attributes the same, but only those to be which is the same.

But it is unreasonable that there should be one and the same operation of two things different in form. And if teaching and learning are the same thing, and acting-upon and being-acted-upon, then to teach will be the same thing as to learn, and to act upon as to be acted upon, so that it will be necessary that every teacher learns and everyone that acts upon is acted upon.

Or can it be that: (a) it is *not* absurd that the operation of one thing should be in another (for teaching is the operation of that which is disposed to teach, but it is *on* something, and not cut off, but is of this on this); and (b) there is, also, nothing to prevent the operation of two things being one and the same, not as the same in being, but in the way that what potentially is is related to what is operating, and (c) it is also not necessary that the teacher learns, even if to act upon and to be acted upon are the same thing, provided they are not the same in the sense that the definition that gives the ‘what it was to be’ is one (as with ‘raiment’ and ‘clothing’), but in the sense in which the road from Thebes to Athens is the same as the road from Athens to Thebes, as was said earlier? For it is not the case that all the same things are present in things that are the same in any sense whatever, but only of those of which the being is the same.

The difference in definition of two reciprocal potentialities is then in turn explained by their direction, their unity by their being aspects of the same *kinēsis*:

9. Duns Scotus translates as: “Ad aliquid sunt quorum hoc ipsum esse est ad aliud se habere” (Sup. Praed. q 26, n. 2; 1, 497b), Beckmann (1967: 35) as “‘In einer Beziehung stehend’ ist das, dessen Sein darin besteht, sich zu etwas anderem zu verhalten”.

10. Cf. Marmodoro (2014: 29): “*Pros ti* properties are monadic properties such that their manifestation or activation depends counterfactually on the activation of their correlatives.”

οὐ μὴν ἄλλ' οὐδ' εἰ ἡ διδασκίτις τῆ μαθήσει τὸ αὐτό, καὶ τὸ μανθάνειν τῷ διδάσκειν, ὡσπερ οὐδ' εἰ ἡ διάστασις μία τῶν διεστηγῶτων, καὶ τὸ διάστασθαι ἐνθίνθε ἐκεῖσε κακείθεν δεῦρο ἐν καὶ τὸ αὐτό. ἄλλω δ' εἰπεῖν οὐδ' ἡ διδασκίτις τῆ μαθήσει οὐδ' ἡ ποιήσις τῆ παθήσει τὸ αὐτὸ κυρίως, ἀλλ' ὅ ὑπάρχει ταῦτα, ἡ κίνησις, τὸ γὰρ τοῦδε ἐν τῷδε καὶ τὸ τοῦδε ὑπὸ τοῦδε ἐνέργειαν εἶναι ἔτερον τῷ λόγῳ. (202a3b-b2z)

But indeed it by no means follows from the fact that teaching is the same as learning, that to learn is the same as to teach, any more than it follows from the fact that there is one distance between two things which are at a distance from each other, that being here at a distance from there and being there at a distance from here are one and the same. To generalize, teaching is not the same as learning, or agency as patiency, in the full sense, though they belong to the same subject, the motion; for the actualization of this in that and the actualization of that through the action of this differ in definition. (Aristotle 2014: 763)

And, in any case, even if teaching is the same thing as learning, to learn is not [therefore] the same thing as to teach, just as, even if two things separated by an interval have one interval between them, to be distant in the direction from *A* to *B* is not one and the same things as to be distant in the direction from *B* to *A*. But speaking generally, the teaching is not the same, in the primary sense, as the learning, nor the acting-upon as the being-acted-upon, but that in which these things are present, namely the change, [is the same as being acted upon]; for to be the operation of *A* in *B*, and to be the operation of *B* by the agency of *A*, are different in definition. (Aristotle 1993: 5-6)

We also find this sameness-in-number/difference-in-account account of correlative powers in the *Metaphysics*. In *Met.* Θ.1, Aristotle asserts that the active capacity to ϕ and the passive capacity to be ϕ -ed are in a way a single capacity (1046a19-20) and in a way distinct capacities (1046a22). They are the same because (i) their exercise is the same and (ii) they produce the same change, i.e. produce the same change (ii) in the same way (i). The change is in the patient; both the active and the passive powers are powers for that change. They are also different, and thus distinct capacities, for they are in different locations: this in turn is itself explained in terms of what the powers can explain: the passive power is in the thing that undergoes the change and can help explain why it undergoes the change, but cannot explain why the active thing also undergoes a change (though it does, to some extent, explain what change it undergoes).

This, I think, may also explain why natural things both have an inner principle of change but are not self-changing in the sense in which *Phys.* VIII says that nothing changes itself. In *De An.* II 417b1-16, Aristotle makes the claim that a man who passes from (i) having knowledge (of what a dog is) but not exercising it to (ii) exercising this knowledge (encountering a dog, she knows that this is a dog) does not *thereby* undergo change. The lack of opportunity for the exercise of the knowledge, i.e. the fact that the perceptual situation of the knower does not present her with a dog, is an impediment, and the impediment is an impediment for the *manifestation* of the change, not for the change itself.

That the change is already ongoing when the reciprocal power is activated is built into its very definition. Why is change the actuality of a potentiality *as* potentiality and why is it not the actuality of a potentiality *as* actuality? Aristotle illustrates the importance of the qualification with an example:

ὅτι δὲ τοῦτο ἔστιν ἡ κίνησις, ἐντεῦθεν δὴ-
λον. ὅταν γὰρ τὸ οἰκοδομητόν, ἢ τοιοῦ-
τον αὐτὸ λέγομεν εἶναι, ἐντελεχείᾳ ἢ, οἰ-
κοδομεῖται, καὶ ἔστιν τοῦτο οἰκοδόμησις.
(201a15-18)

That this is what motion is, is clear from what follows: when what is buildable, in so far as we call it such, is in fulfilment, it is being built, and that is building. (Aristotle 2014: 758)

That this is change is clear from the following: when that which is buildable is in actuality, in the respect in which we call it such, it is being built, and this is the process of building... (Aristotle 1993: 2)

The buildable is the house we plan to build today on this site here out of these bricks. Its becoming actual is the process of its being built; but it is only the buildable as such which already *is* actual in this process; the bricks lying around on the construction site were actual even before the process started and the house – the buildable as actual – will be actual only when the process is finished. During the process, however, we have something in between: not only is the buildable in potentiality (that was before the process), but it is now in actuality as well; it is in actuality as potentiality, as the buildable, and not yet as actuality, as the house, because we have not yet finished building it.

With respect to the metaphysics of powers, we thus have a very interesting three-fold distinction:

potentiality only The house is buildable (the materials are there, the plan has been made), but we have not yet started.

potentiality and actuality The house is buildable and is being built; its potentiality is activated but the actualisation of the house is still *qua* buildable, not yet *qua* built.

actuality only The house is built, the potentiality realised: while it was buildable, it is no longer buildable; rather it is built.

As I understand Aristotle, he identifies change with the process, the actuality of the potentiality as potentiality, the being activated but not yet having been realised of the potentiality. He gives another example:

...ἡ δὲ τοῦ δυνάμει ὄντος <ἐντελέχεια>, ὅταν ἐντελέχεια ἢ ἐνεργεῖ οὐχ ἢ αὐτὸ ἀλλ' ἢ κίνητόν, κίνησις ἐστίν. λέγω δὲ τὸ ἢ ὡδί. ἔστι γὰρ ὁ χαλκὸς δυνάμει ἀνδριάς, ἀλλ' ἄμωσ οὐχ ἢ τοῦ χαλκοῦ ἐντελέχεια, ἢ χαλκός, κίνησις ἐστίν. οὐ γὰρ τὸ αὐτὸ τὸ χαλκῶ εἶναι καὶ δυνάμει τινί [κίνητῳ], ἐπεὶ εἰ ταῦτόν ἦν ἀπλῶς καὶ κατὰ τὸν λόγον, ἦν ἂν ἢ τοῦ χαλκοῦ, ἢ χαλκός, ἐντελέχεια κίνησις. οὐκ ἔστιν δὲ ταῦτόν, ὡς εἴρηται (201a27-34)

It is the fulfilment of what is potential when it is already fulfilled and operates not as itself but as movable, that is motion. What I mean by 'as' is this: bronze is potentially a statue. But it is not the fulfilment of bronze as bronze which is motion. For to be bronze and to be a certain potentiality are not the same. If they were identical without qualification, i.e. in definition, the fulfilment of bronze as bronze would be motion. But they are not the same, as has been said. (Aristotle 2014)

The actuality, then, of what is potentially – when being in actuality it is operating, not *qua* itself but *qua* changeable – is change. I mean 'qua' thus: the bronze is potentially a statue, but yet it is not the actuality of bronze *qua* bronze that is change. For it is not the same thing to be bronze and to be potentially something: if indeed it were, without qualification and by definition, the same thing, then the actuality of the bronze, *qua* bronze, would be change, but, as has been said, it is not the same thing. (Aristote 1993: 2-3)

We are, I believe, given the following picture: when the sculptor buys the bronze, there is, in front of him, a statue-in-potentiality in the following sense: there is something, i.e. a bronze, that is potentially a statue. The bronze-in-actuality and the statue-in-potentiality are 'one in number' and 'one in reality', but they are 'two in account': for being actually a bronze and being potentially a statue are two things. When the change, the sculpting, occurs, it is the statue-in-potentiality that undergoes it, not the bronze-in-actuality; for the change is nothing but what undergoes it and it cannot be the bronze-in-actuality, because what the bronze is in actuality is independent of what it will become: what it is to be this bronze includes having been bought by the sculptor, having put here in his work-place, but – because the sculptor could change his mind, or accidents could happen – does not yet include its being sculpted into a statue.

Aristotle even gives two other examples:

(δῆλον δ' ἐπὶ τῶν ἐναντίων. τὸ μὲν γὰρ δύνασθαι ὑγιαίνειν καὶ δύνασθαι κάμνειν ἕτερον — καὶ γὰρ ἂν τὸ κάμνειν καὶ τὸ ὑγιαίνειν ταῦτόν ἦν — τὸ δὲ ὑποκείμενον καὶ τὸ ὑγιαίνειν καὶ τὸ νοσοῦν, εἴθ' ὑγρότης εἴθ' αἷμα, ταῦτόν καὶ ἔν). ἐπεὶ δ' οὐ ταῦτόν, ὡσπερ οὐδὲ χρώμα ταῦτόν καὶ ὄρατόν, ἢ τοῦ δυνατοῦ, ἢ δυνατόν, ἐντελέχεια φανερόν ὅτι κίνησις ἐστίν. (201a34-201b5)

(This is obvious in contraries. To be capable of health and to be capable of illness are not the same; for if they were there would be no difference between being ill and being well. Yet the subject both of health and of sickness – whether it is humour or blood – is one and the same.) We can distinguish, then, between the two – just as colour and visible are different – and clearly it is the fulfilment of what is potential as potential that is motion. (Aristotle 2014: 759)

The case is clear with opposites: to be capable of being healthy and to be capable of being sick are different – otherwise being sick and being healthy would be the same thing – but the underlying subject, that which is healthy and that which is diseased, be it moisture or blood, is one and the same. Since then it is not the same thing, just as colour is not the same as visible thing, it is manifest that the actuality of the potential, *qua* potential, is change. (Aristote 1993: 3)

Blood is both potentially healthy and potentially sick, but it cannot be both actually healthy and actually sick. When it is actually sick and becomes healthy, what undergoes (and hence *is*) the change is the blood-as-potentially-healthy, not the blood-as-actually-sick, even though these two are the same in number.

Motion, the actuality of the mover as mover, is in what is moved, but its being moved is in the moved only potentially – even while it is moved!

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