

# Aristotle's Theory of Dispositions

## From the Principle of Movement to the Unmoved Mover

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It could well be argued that no one influenced and shaped our thinking about dispositions and causal properties more than Aristotle. What he wrote about power (*dynamis*), nature (*physis*) and habit (*hexis*) has been read, systematised and criticised again and again during the history of philosophy. In what follows I will sketch his thoughts about dispositions and argue that it can still be regarded as a good theory.<sup>1</sup>

## 1. It's all Greek to me

If asked to give an account of the thoughts of some Ancient thinker about some modern concept, the first problem is: Which is the word I have to browse for in the index? The origin of the problems connected to contemporary theories of dispositions – be it of dispositional predicates or of dispositional properties – dates back to the heyday of logical empiricism. The problem of disposition arose from the quest for an intimate bond between experimental observations and the explanatory theoretical language. This is very much a project of the twentieth century and it is thus no trivial matter that any Ancient thinker had any thoughts about this at all.

Now it may give us some hope that the word “disposition” itself has a Latin origin in the word *dispositio* that, in turn has a Greek equivalent, *diathesis*. But taken in this way, “disposition” means something like “orderly arrangement”, be it of things, of speeches, or of soldiers in an attacking army. Aristotle, of course, has a theory about the correct arrangements of the parts of a speech or of a drama, and for this we have to consult his writings on rhetoric and poetics. But this is not at all at stake when we are asked for Aristotle’s theory of dispositions. In this question, “disposition” means rather something like “causal power”. Of course, there is ample material on causal power in the writings of Aristotle, but this material is connected to words like *dynamis* (“capacity”), *physis* (“nature”), or *hexis* (“habit”). In fact, much of the theorising about causal powers routes back, one way or other, to Aristotle’s thoughts about *dynamis*, *physis*, and *hexis*. In my discussion, I will start with presenting what

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<sup>1</sup> This article is a précis of my book on Aristotle’s theory of dispositions (Jansen 2002).

Aristotle says about *dynameis* and will later contrast with this his statements about *physis* and *hexis*.<sup>2</sup>

## 2. From Homer to Aristotle

When expounding his theory of causal powers, the key word for Aristotle is *dynamis*. In Aristotle's time, this word was in common usage, and it can already be found in Homer. Here are four quotes featuring this word:<sup>3</sup>

[Odysseus:] but bring ye healing, my friends, for with you is the *dynamis*. (*Odyssey* X 69; tr. Murray)

[Telemachos to Nestor:] O that the gods would clothe me with such *dynamis*, that I might take vengeance on the wooers for their grievous sin (*Odyssey* III 205 sq.)

[Alexandros to Hector:] we will follow with thee eagerly, nor, methinks, shall we be anywise wanting in valour, so far as we have *dynamis* (*Ilias* XIII 785 sqq.)

[Achilles to Apollo:] Verily I would avenge me on thee, had I but the *dynamis*. (*Ilias* XXII 20)

In Homer, the *dynamis* is something with or within a man, that allows him to fulfil a certain task or to defeat his enemy, and sometimes the *dynamis* is thought to be given by a God. Later, the word is to acquire a wide field of possible meanings. It can even mean the riches of a wealthy man (cf. Plato, *Republic* 423a: *chrêmata te kai dynameis*) or the army of a kingdom (cf. Plato, *Menexenos* 240d: *hê Persôn dynamis*, the army of the Persians), and even the

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<sup>2</sup> That Aristotle's theory of *dynamis* is a theory of dispositional properties has also be seen (among others) by Liske 1996 and Wolf 1979, who (though under the name of "possibility") discusses both Aristotle's theory and modern theories of dispositions in her book.

<sup>3</sup> There are six more occurrences of the word in Homer: *Ilias* VIII 294, XIII 786 and *Odyssey* II 62, XX 237, XXI 202 and XXIII 128. Though the noun is quite rare, there are in all about 140 occurrences of words (including verbs and adjectives) containing the root *dyna-*. It would be worth to check our findings against this much broader basis.

phonetic quality of a letter (cf. Plato, *Cratylus* 412c: *tên tou kappa dynamin*) or the meaning of letters and syllables (cf. Plato, *Hippias maior* 285d).<sup>4</sup>

From the sixth century BC onwards, we find the word *dynamis* in philosophical and medical contexts.<sup>5</sup> For example, Alcmaeon of Croton (ca. 570-500) uses the term to define health (*hygieia*) as the balance of powerful things (*isonomia tôn dynameis*), which means the equal presence “of moist and of dry, of cold and of hot, of bitter and of sweet” (DK 24 B 4). Here it is not clear whether Alcmaeon uses *dynamis* to denote an abstract power or the powerful thing itself, i.e. whether dryness or the dry is the *dynamis*. In a quotation from Democritus (ca. 460-370), it is clear that the *dynamis* to be healthy is not some concrete thing but some property that resides in the human body (DK 68 B 234) – which is the reason why people should rather care for their health by adjusting their diet than pray that health may be given to them by the gods. This ambiguity may be reflected in Anaximenes (ca. 580-520) remark that neither the hot nor the cold are substances, but properties of an underlying matter (DK 13 B 1 = KRS 143: *pathê koina tês hylês epignomena tais metabolais*). For Anaximenes, powers “interpenetrate the elements or bodies” that are their bearers (DK 13 A 10 = KRS 145: *tas endiêkousas tois stoicheiois ê tois sômasi dynameis*).<sup>6</sup>

### 3. Active powers

Thus, when Aristotle started to think about dispositions, there was already ample material he could draw on. There was the usage in language at least since Homeric times, and the word had already entered medical thinking and natural philosophy – and there were also some

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<sup>4</sup> All occurrences of *dynamis* in Plato (and many in earlier authors) are collected and discussed in Souilhé 1919.

<sup>5</sup> For a survey of *dynamis* in the Hippocratic texts cf. Plamböck 1964.

<sup>6</sup> There is also a special use of *dynamis* and *dynaton* in geometry, which Aristotle explicitly mentions as a metaphorical use of the term (*Metaphysics* V 12, 1019b 33-34; IX 1 1046a 6-9). On this cf. Jansen 2002, 58-63 with further references.

beginnings of thinking about *dynamis*, though the first coherent treatise on *dynamis* that we know is the one by Aristotle, i.e. the ninth book of his *Metaphysics*.<sup>7</sup>

Considering the by then quite respectable history of the word, it does not come as a surprise that, in his well-known manner, Aristotle treats *dynamis* as a word with many different meanings, as a *polachôs legomenon*, as something that is spoken of in many ways. Though there are many meanings of the word *dynamis*, Aristotle thinks that nearly all of these different meanings are related to one another, that they make up a sophisticatedly knit web of meanings. In the centre of this web there is a meaning quite close to the Homeric use of the term: It is *dynamis* as an active power. For *dynamis* used in this way, Aristotle gives the following definition:

“*Dynamis* means a source (*archê*) of movement (*kinêsis*) or change (*metabolê*), which is in something else or in itself as something else.” (*Metaphysics* V 12)

The words featuring in this definition are all widely used Greek words, but in Aristotle’s language they function as technical terms that are in want of an explanation. Thus I will, in turn, explain what Aristotle means by the terms “principle”, “change” and “movement”, and what he wants to express by the strange phrase “in something else or in itself as something else”.

To begin with, a principle (an *archê*) is defined by Aristotle as “a first thing [...] from which movement and change take their inception” (*Metaphysics* V 1, 1013a18). In this vein he calls father and mother the principles of the child, because the coming to be of a child takes its start with an interaction between father and mother. “Change and movement” (*kinesis* and *metabolê*) are probably mentioned as a pair in the definition in order to indicate that an active power can be related to any of the different kinds of changes that Aristotle distinguishes at other places (notably at *Categories* 14, *Physics* V 2 and VII 2). According to Aristotle, changes pair off in two main kinds. The first is substantial change, which can be a coming-to-

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<sup>7</sup> Smeets 1952 carves up *Metaphysics* IX 1-9 in many different passages of different hands, distinguishing bits written by Aristotle at different times in his life, his students or even later Aristotelians. Without doubt the text has its history and developed over same time. However, I show in Jansen 2002 that such a dissection of the text is not necessary and that, on the contrary, the whole text can be read as contributing to a single theory.

be or a passing-away of a substance, which is an entity that exists on its own, like a man, a dog or a tree. Thus birth is the beginning of a man's existence and death the end of his existence; both are substantial changes. The other kind is the change of some accident, which can be further differentiated according to the category the changing accident belongs to. Aristotle acknowledges that there are three accidental categories with irreducible changes: quality, quantity and place. A change in quantity can either be growth or diminution.

#### 4. Where is an active power?

The strange phrase “in something else or in itself as something else” is still in want of explanation. I will follow Aristotle's own strategy and explain its meaning through the discussion of two examples. The examples I will discuss are, in turn, architecture and medicine, i.e. the art of building and the art of healing.

Now, *where* is the art of building? It is not in the house to be built, because this does not yet exist and non-existing things cannot be bearers of any properties. Nor is it in the building material: logs and stones know no art. It is, of course, in the builder (*Metaphysics* V 12, 1019a 16f): He has the active disposition to bring about a change “in something else”, i.e. in the building material, from being mere logs and stones to being a new house. Thus the point of the first part of our strange phrase (“in something else”) is that an active power causes changes in something that is distinct from the thing that is the bearer of that power.

The other part of Aristotle's strange phrase can be illuminated by the second example, the art of healing. Where is the art of healing? It is, obviously, in the practitioner, for example in Hippocrates. But what happens if Hippocrates becomes ill himself? In many cases, Hippocrates will be able to heal himself. It is the same ability that allows healing the flu of other people and one's own – there is no necessity for Hippocrates to learn something new. But when he does indeed heal himself, Hippocrates is at the same time the bearer of the art of healing and the object undergoing the change of becoming healthy. This fact notwithstanding, Aristotle wants to classify the art of healing as an active power. For it is true that Hippocrates does not heal someone else, but, or so Aristotle would say, he heals himself “as another”. What he means by this becomes clear in Aristotle's explanation of the difference between accidental and non-accidental happenings:

[...] it may happen that someone becomes his own cause (*aitia*) of health, if he is a healer; but he has the art of healing not insofar as he is being healed, but it just happens

(*symbebêken*), that the same person is a healer and is being healed. Therefore, [being a healer and being healed] are at times separated from each other. (Physics II 1, 192b 23-27)

Hippocrates' ability to heal is independent from his being able to become healthy: His ability to heal is due to his study of medicine, his ability to become healthy is due to his being a human with a certain bodily constitution. There is no intimate connection between these two properties of Hippocrates – he can have the one without the other. Thus it is only by accident that Hippocrates can heal himself, and this is Aristotle's rationale for saying that a practitioner may be able to heal himself, but if he does so, he heals himself *as another*, i.e. not as a practitioner, but as a human being with a certain bodily constitution. Thus even in this case the art of healing is within the healed, but not as healed (*Metaphysics* V 12, 1019a 18).

## 5. Extending the conceptual network

According to Aristotle, the word *dynamis* has many meanings. Most of them, or so Aristotle says, are systematically connected with one another, and active powers are the core of this conceptual network. Intimately connected with them are passive dispositions. To have a passive disposition allows the bearer of this disposition to undergo a change. Thus, a passive disposition is a principle of a change in the bearer of the disposition itself, caused by something else or by itself as something else. For every active power to be realised there needs to be a matching passive disposition.

Next come qualified dispositions, which are principles to do something well or after a decision to do so, as opposed to do something somehow or by accident. Aristotle illustrates this by contrasting a drunkard's ability to walk with the ability to walk of a sober person. It should be clear that both can walk somehow, while only the sober person can walk well, i.e. without staggering and without pausing.

Moreover, Aristotle mentions resistance dispositions, which allow their bearers to resist changes and stay unchanged. If, e.g., a rod is flexible, it can resist breaking when being bent. Thus, a resistance disposition is a principle for not being changed by something else.

All of these different *dynamis* are ultimately related to an active power: Having a passive disposition means to have the disposition to be changed by something with a matching active power, having a resistance disposition means to have the disposition not to be changed by something with a matching active power, and having a qualified disposition means to have

any disposition in a qualified way, where this disposition is itself an active power or, again, related to an active power. This is why Aristotle says that active power is the core concept of *dynamis*, its *kyrios horos* (*Metaphysics* V 12, 1020a4).

So far, the different varieties of *dynamis* are tied together by a so called *pros hen* relation: they all share an (implicit) reference to one and the same core concept of active power. In extending the conceptual network of *dynamis*, Aristotle does not rest with this, but uses his second tool to extend conceptual networks: analogy. By this, he introduces a second family of *dynameis* or dispositions, which no longer are dispositions for change, but dispositions for being something:

Our meaning [...] is as that which is building is to that which is capable of building, and the waking to the sleeping, and that which is seeing to that which has its eyes shut but has sight, and that which has been shaped out of the matter to the matter, and that which has been wrought up to the un-wrought. [...] some [of these] are as movement to *dynamis*, and the others as substance to some sort of matter. (*Metaphysics* IX 6, 1048a35-b9; tr. Ross)

This second family is introduced by a set of examples, and the reader is invited to recognise the similarity between these examples by considering together analogous cases (*tô analogon synhoran*, 1048a 37). Those cases that are “as substances to some sort of matter” are said to stand in an analogy to those cases that are “as movement to *dynamis*”: Aristotle’s claim is that, in a way, a substance relates to its matter like a change relates to the respective *dynamis*. Here we see that Aristotle’s theory of dispositions becomes relevant for the very heart of his ontology, the hylomorphic composition out of substances from form and matter.

## 6. The syntactical structure of a *dynamis* ascription

It is revealing to have a closer look at the Greek phrases that Aristotle uses to ascribe dispositions or *dynameis*.<sup>8</sup> He can, of course, simply say that something has a *dynamis* for something (*echei tēn dynamin tou ...*), but he can also use the verb *dynasthai* and use either a finite form of this verb like *dynatai* or the participle *dynameon*. Or he can thus use the

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<sup>8</sup> For textual references cf. Jansen 2002, 20-26.



adjective *dynaton*, of which Aristotle explicitly says that something is *dynaton* to do something, if it has the *dynamis* to do this (*Metaphysics* IX 1, 1046a20-21). To express that someone has the disposition to walk (*badizein*), we can thus use either of the following Greek phrases: *echei tēn dynamin tou badizein* – *dynatai badizein* – *dynameos badizein estin* – *dynaton esti badizein*. In the context of Aristotle’s metaphysics, there is another phrase that is important here: *dynamei badizontos estin*. This phrase uses the dative case *dynamei* to express a certain respect (i.e. in its function as *dativus respectus*), saying that with respect to his *dynamis*, someone is a walker, traditionally translated as “someone is a potential walker”.

The adjective *dynaton* can, however, also mean as much as “possible” and hence *dynaton estin* as much as “It is possible that” – and thus it is sometimes used synonymously used with *endechestai* which means “It may happen that”. Aristotle himself discusses this use of *dynaton* and he explicitly says that this use of *dynaton* is *ou kata dynamin* (1019b 34), that it is not based on dispositions. It belongs to the talk about possibility, not to the talk about dispositions.<sup>9</sup> To be sure, there are intimate connections between disposition talk and possibility talk. But there are important differences between them and thus they have to be kept apart.<sup>10</sup> There is, first, an intriguing syntactical difference that, or so I will argue, reveals the crucial ontological difference.

Syntactically, “It is possible that ...” is a sentence operator: It combines with a sentence and forms a sentence again. The phrases that are used to ascribe dispositions, on the other hand, are predicate modifiers,<sup>11</sup> both in ancient Greek and in modern languages. Phrases like “... has the disposition to ...” or “... is able to ...” combine with predicates and form new predicates. They combine with, say, actualisation predicates in order to yield disposition predicates.

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<sup>9</sup> Cf. Jansen 2002, 21-24 on the use of *dynaton* in the context of modal logic and van Rijen 1989 on Aristotle’s overall theory of possibility.

<sup>10</sup> I argued for this in Jansen 2000. Buchheim/Kneepkens/Lorenz 2000 is a collection of essays that discuss the contrast between disposition talk and possibility talk from Aristotle through to Heidegger. Cf. also Jacobi 1997.

<sup>11</sup> Cf. Clark 1970. For more references cf. Jansen 2002, 28-34.

## 7. The ontological structure of having a *dynamis*

I do now claim that this syntactical difference mirrors a crucial ontological difference. This will be obvious if we have a look at the usual possible worlds semantics for modal operators like “It is possible that ...”.<sup>12</sup> According to this approach, a sentence of the form ‘It is possible that  $p$ ’ is true in the actual world if and only if there is a possible world  $w$  such that  $w$  is accessible from the actual world and the sentence  $p$  is true in this possible world  $w$ . The truthmaker of such a sentence is thus not anything in the actual world, but something in some possible world.

A *dynamis*, on the other hand, i.e. an ability or disposition, is something that is to be encountered in the actual world. It is me in the actual world that has or has not the ability to speak Chinese. Such an ability is a quality token of which I am the bearer. Thus a disposition ascription of the form ‘ $x$  has the disposition to do (or to be)  $F$ ’ is true if and only if there is a quality token  $d$  such that (1)  $x$  is the bearer of  $d$  and (2)  $d$  allows  $x$  to do (or to be)  $F$ .

An Aristotelian *dynamis* is thus something in the actual world, and *dynamis* ascriptions are about the actual world. They ascribe actual properties to actual things. By no means do they constitute a “ghost world” of mere *possibilia*. We can sum up Aristotle’s stand in this question by formulating two principles, the Bearer Principle and the Principle of Actuality. The Bearer Principle says that, like all properties, dispositions always have a bearer. There cannot be a disposition without a bearer, and a disposition exists, if and only if there is a bearer having that disposition. The Principle of Actuality says that nothing has only potential properties or dispositions. If  $x$  has at  $t$  the disposition to be or to do  $F$ , then there is at least one

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<sup>12</sup> Cf. Weidemann 1984, Hughes/Cresswell 1996.

$G$ , such that  $x$  is at  $t$  actually realising  $G$ .<sup>13</sup> The Principle of Actuality has a somewhat trivial instantiation, because for Aristotle the dichotomy between actuality and potentiality (or between categorical and dispositional properties) does not make up distinct classes of things but is meant to clear up ambiguities in language. One and the same property like mathematical knowledge is both a disposition and a realisation. It is the disposition to solve mathematical problems, but at the same time it is the realisation of the disposition to learn about mathematics (cf. *De anima* II 5, 417a 22-b 2 with *Physics* VIII 4, 255a 33-b 5). Thus a disposition is itself the realisation of another disposition, and a potentiality something that is actual. Thus we get a trivial instantiation for the Principle of Actuality, if we choose “the disposition to be or to do  $F$ ” as an instantiation for  $G$ .

## 8. Hartmann and Hintikka: Two influential interpretations

We are now prepared to review two recent interpretations of Aristotle’s teachings about *dynamis*, which were probably the most influential in the twentieth century: those by Nicolai Hartmann and Jaakko Hintikka.

In his ontology of modality, Hartmann distinguishes between two kinds of possibility: total possibility and mere partial possibility.<sup>14</sup> In Hartmann’s eyes, it is total possibility that is the only serious candidate for a rigorous treatment in an ontology of modality: A state of affairs  $s$  is called totally possible, if and only if all necessary conditions for  $s$  are given. It is a consequence of Hartmann’s own determinism that the necessary conditions are jointly sufficient. For this reason, in Hartmann’s theory there is a collapse of modalities: Contrary to

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<sup>13</sup> Cf. Kosman 1969, 43: “[...] for anything which is potentially A, there is some B which at the same time that thing is actually.” Menn 1994, 94 neglects the principle of actuality, although he seems to be conscious about it (cf. 95 n. 32) and thus ascribes Aristotle a theory of *possibilia*, i.e. a theory about non-being but possible things. Cf. also Stallmach 1959, 79, arguing against Hartmann 1938: “Auch bei Aristoteles kommt keine Möglichkeit vor ohne eine Wirklichkeit, die sie trägt, nur ist diese nicht – wie die Megariker wollen – schon die Wirklichkeit dessen, dessen Möglichkeit sie erst ist.”

<sup>14</sup> Cf. Hartmann 1938. On Hartmann’s modal ontology cf. Hüntelmann 2000, on his interpretation of Aristotle cf. Seel 1982 and Liske 1995.

intuition, there no longer is an extensional difference between the possibility and necessity: All and only totally possible states of affairs are necessary. Hartmann accepts this consequence, while it is a very much unwanted result in my eyes. But more important for his interpretation of Aristotle is Hartmann's concept of partial possibility: A state of affairs *s* is partially possible if and only if at least one necessary condition for *s* is given. Hartmann now accuses Aristotle that he has only dealt with the inferior concept of partial possibility and rejected the Megarian concept of *dynamis* (to be discussed in the next section), which Hartmann sees as a precursor of his own views.<sup>15</sup> But of course there are many different kinds of necessary conditions for *s*, even if we take only those necessary conditions into account for which it is a contingent matter whether they obtain or not.<sup>16</sup> Thus it is clear that Hartmann's interpretation is far too unspecific as an interpretation of *dynamis* – while having a *dynamis* for *F* certainly is a necessary condition to do *F*, we do not do justice to Aristotle's account of *dynamis* if we treat it on a par with the obtaining of just any necessary condition.

While Hartmann interprets Aristotle in terms of his concept of partial possibility, Jaakko Hintikka's interpretation draws on the so called principle of plenitude. In Hintikka's wording, the principle of plenitude says that “[n]o unqualified possibility remains unrealised through an infinity of time”.<sup>17</sup> The principle of plenitude is closely related to a temporal interpretation of the alethic modalities, i.e. of possibility and necessity. According to such a temporal interpretation, a proposition *p* is necessary, if and only if it is always the case that *p*, and it is possible, if and only if it is at least at one time the case that *p*. Now it is normally not disputed that it is always the case that *p* if *p* is necessary and that whatever is the case at some point in

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<sup>15</sup> Cf. Hartmann 1937. Hartmann's interpretation of Aristotle is influenced by the – different – position of Zeller 1882.

<sup>16</sup> As any necessary proposition is implied by any statement, a necessary statement like “ $1 + 1 = 2$ ” may be seen as expressing a condition that is necessary for any other statement. If seen thus, there are no states of affairs that are not partially possible, even impossible states of affairs are partially possible when we take “necessary condition” in the logical sense and allow necessary propositions to be included within the set of conditions.

<sup>17</sup> Hintikka 1973, 96.

time must be possible.<sup>18</sup> It is, however, not that clear that all possibilities will or even could be realised at some point of time. It is both possible that I sit at noon and that I stand at that time, but of course I can realise only one of these possibilities at noon. Even if we skip the reference to a certain time, there remain problems: It is possible that, in the future, my son will marry and found a family, but it is as well possible that he remains a bachelor for all his life. But, of course, not both possibilities can be realised. To discard such obvious counter-examples to the principle of plenitude, Hintikka talks about “unqualified possibilities”: Unqualified possibilities are such possibilities that can, in principle, be realised at any point of a maybe eternal history, like the possibility that something red is round or the possibility that there exists an animal that is able to fly.

It has been a matter of debate whether Aristotle does or does not accept the principle of plenitude. While Lovejoy, in his great study on the principle of plenitude,<sup>19</sup> claimed that Plato accepted the principle but Aristotle did not, Hintikka takes the opposite stand and attributes the principle to Aristotle, but not to Plato. I will not argue for any of these alternatives here, but rather draw attention to two important observations:

(a) If Aristotle subscribed to the principle, it was nothing he took for granted. For in his *De Caelo* I 12 he presents a rather lengthy (and maybe fallacious) proof of this principle for the very special case of eternal entities. The claim he argues for in *De Caelo* is: If it is possible for something to exist eternally, it will exist eternally, which in turn implies that all eternal beings are necessary beings. If the principle of plenitude would be some tacit background assumption of the semantics of *dynaton* or *dynamis*, he would not have needed such an elaborated argument for this claim. Thus, for Aristotle, the principle of plenitude cannot be a trivial element of the semantics of *dynaton*.

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<sup>18</sup> Of course, these two observations correspond to the rules of medieval logic that (a) it is valid to conclude actuality from necessity (*ab necesse ad esse valet consequentia*) and (b) to conclude possibility from actuality (*ab esse ad posse valet consequentia*). It is, however, disputable, what is the range of the rules formulated in the main text. For there are necessary propositions like “1 + 1 = 2” or “At twelve o’clock it is twelve o’clock” which may be said to be true at no point of time but rather in some timeless manner.

<sup>19</sup> Lovejoy 1936.

(b) Even if it were such an element, the “unqualified possibilities“ that feature in the principle of plenitude are not the topic of *Metaphysics IX*, but rather the dispositions of finite things and people. In *Metaphysics IX*, Aristotle talks about architects and people of other arts and sciences, about blind and seeing animals, about sitting and standing men, about fluitplayers, sperms and wooden boxes. These are all finite things having finite dispositions, i.e. dispositions that do not have all of eternity at their disposal for realising themselves. Thus a principle about “unqualified possibilities” would be of no help at all in explaining the teaching of *Metaphysics IX*. Therefore, the principle of plenitude is neither a plausible nor a helpful starting point when we are to make sense of Aristotle’s theory of *dynamis*.

As different as Hartmann’s and Hintikka’s interpretations are, they do have something in common. Both Hartmann and Hintikka analyse Aristotle’ *dynaton* solely in terms of modal operators, i.e. as being the Greek equivalent of something like “It is possible that ...” or, in logical notation, “ $\diamond p$ ”. As I have argued in the last two sections, such a translation is both syntactically and ontologically misleading, if we care about the *dynaton* that is related to a disposition. Who, like me in this paper, cares about Aristotle’s theory of dispositions, has to analyse *dynaton* as a predicate modifier, which is both truer to the Greek syntactical constructions that Aristotle uses to ascribe dispositions and more appropriate for representing the ontological structure underlying these ascriptions.

## 9. The Megarian challenge

Aristotle himself has to defend his theory of dispositions against an alternative position put forward by a group of philosophers called “Megarians” that has some similarities with Hartmann’s account of total possibility.<sup>20</sup> Aristotle describes this position as follows:

There are some who say, as the Megarians do, that a thing can act only when it is acting, and when it is not acting it cannot act, e.g. that he who is not building cannot build, but only he who is building, when he is building [...]. (*Metaphysics IX* 3, 1046a 29-32)

The Megarians, that is, regard the realisation of something both necessary and sufficient for having the disposition for doing this:  $x$  has a disposition to do or to be  $F$  at  $t$  if and only if  $x$  is

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<sup>20</sup> On the attempts to identify these philosophers cf. Jansen 2002, 139-143.

actually  $F$  at  $t$ . Aristotle formulates no less than four arguments against this position, showing which strange conclusions (*atopa*, 1046a 33) such a position would entail:

(1) Learning a craft is different from (and more difficult than) merely switching from non-employing to employing a craft. If the builder would not have any building disposition when not building, there would be no difference between a non-building builder and someone who is not a builder at all.

(2) Also, there would be no difference between a thing being perceivable and that thing being perceived (and Protagoras would be right). For then a thing would be perceivable if and only if it would actually be perceived.

(3) Also, people would many times become blind and deaf when closing their eyes or entering a silent room.

(4) Finally, Megarians do away with change and becoming (and Parmenides rejoices), because if there is no principle of change to become something not yet existing, nothing can ever come into existence that is not yet present.<sup>21</sup>

To be sure, none of the strange consequences makes it necessary for the Megarians to withdraw their claim. They could as well (and maybe they did) embrace the Parmenidean and Protagorean implications. However, any philosopher who, like Aristotle, sees some value in common-sense opinions and rejects positions that are more revisionary than necessary has plenty of reasons to reject the Megarian claim. This is the lesson Aristotle learns from the discussion of the Megarian position. Contrary to the Megarian claim, terms for the possession of a disposition and terms for their respective realisation usually have different extensions. This is possible, because, as a rule, dispositions are “two-sided”: It is possible to have a disposition and not to realise it at the same time.

Therefore it is necessary to distinguish between the time *at which* something has a disposition and the time *for which* this disposition allows a realisation. An owl does already at daytime possess the disposition to realise an enormous visual perception when it is dark at night. Here, daytime is the *at-time*, i.e. the time at which the owl has that disposition, whereas the night is the *for-time*, i.e. the time for which that disposition allows a realisation.

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<sup>21</sup> For a formal account of this last argument cf. Jansen 2002, 146-149.

Disposition ascriptions in natural language contexts normally do not contain any reference to a for-time. Thus it should come as a surprise that some criticise such an analysis because “it does not make sense to speak of a capacity for standing-at- $t$ , but only for standing”.<sup>22</sup> But there is help on the way: We can get rid of the for-time without falling back in the Megarian mess. The syntactical trick that I will employ is to turn the free variable that the reference to the for-time has been in our previous formulations into a bound variable. The ontological idea behind this is that as a relevant causal factor for its realisation, a disposition precedes its effect. Thus, the realisation of a hitherto unrealised disposition could happen at some time in the future, given that the disposition does not get lost in between. Hence if something has at  $t$  a disposition to do or to be  $F$ , this disposition at least allows its bearer to display the realisation of  $F$  at some  $t^*$  immediately after  $t$ . This means that we interpret a *dynamis* as a causal factor that precedes its effect and that may (but need not) be co-present with its realisation.

## 10. Dispositions, realisations, and their conditions

In the Megarian picture, there was an intimate interconnection between having a disposition or *dynamis* and realising it: According to the Megarians, something has a *dynamis* when and only when realising it. In this picture, displaying the realisation is both necessary and sufficient for having the respective *dynamis*. Now Aristotle had struggled hard to argue against the Megarian position, and to establish the possibility of unrealised dispositions. This means that the display of the realisation can no longer be regarded as being a necessary condition for having a disposition. Nor can it be regarded to be a sufficient condition for having a disposition, if co-presence with its realisation is only a contingent and not a necessary feature of a *dynamis*.

As he disposed of with the Megarian position, Aristotle presents a new necessary condition for having a disposition: For  $x$  to have a disposition to do or to be  $F$ , it must be logically consistent to assume that  $x$  actually does or is  $F$ .<sup>23</sup> Such an assumption will lead to

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<sup>22</sup> Waterlow 1982, 40.

<sup>23</sup> On this principle cf. Weidemann 1999.



contradictions if we, e.g., assume that the diagonal of the square has the disposition to be measured with the same unit as the length of one side.<sup>24</sup>

Now, when does a disposition become realised? This question does not arise in the Megarian picture, because there a *dynamis* does not exist at all before it is realised.<sup>25</sup> But as Aristotle allows for unrealised disposition, there is a real question for him. He answers it by referring to the conditions that have to be met in order for a disposition to be realised:

[...] as regards *dynameis* of the latter kind [of the non-rational *dynameis*], when the agent and the patient meet in the way appropriate to the disposition in question, the one must act and the other be acted on [...]. (*Metaphysics* IX 5, 1048a 5-7)

In this passage, Aristotle draws on the contrast between rational and non-rational dispositions. This distinction and its relevance for this passage will be discussed in the next section. Meanwhile it suffices to say that Aristotle here talks about non-rational dispositions only, i.e. such dispositions that can also be had by non-living things, plants or beasts. Such dispositions, or so Aristotle says in this passage, are realised, when the bearer of the active power (the “agent”) and the bearer of the complementary passive disposition (the “patient”) meet in an “appropriate way”, which normally includes a spatial vicinity of the bearers of complementary active and passive dispositions, but may also include further appropriate marginal conditions. Note that these conditions are conditions for the realisation of a disposition, not for having the disposition. Otherwise Aristotle would not have managed to evade the Megarian problems. Moreover, the realisation conditions of a *dynamis* belong to the definition of the *dynamis* in question: If we talk about *dynameis* with different realisation conditions, we talk about different kinds of *dynameis*. For this reason Aristotle does not need to include a “if nothing external interferes” phrase into his account when a *dynamis* gets realised.<sup>26</sup> Two standard realisation conditions are that the *dynamis* does not cease to exist and that no hindrances like

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<sup>24</sup> The proof is to be found in Euclid, *Elements* X 117; it is alluded to in *Analytica Priora* I 23, 41a 26-7 and I 44, 50a 35-38). For the details of the argument cf. e.g. Jansen 2002, 159-162.

<sup>25</sup> Within the Megarian picture it may, however, be asked how and when a *dynamis* or its realisation can come into existence at all. We know of no answer from the Megarian side on these questions, nor do we know whether the Megarians bothered about these questions at all.

<sup>26</sup> On this cf. Moline 1975.

antidotes are present (and thus Aristotle has an answer to some problems of the theory of dispositions).<sup>27</sup>

Finally, we may wonder whether the non-realisation is necessary for having a disposition or not. I.e., are „being F according to the disposition“ and „being F according to the realisation“ compatible or incompatible predicates? There are certainly incompatible cases, like having a disposition for automatic self-destruction: Having such a disposition surely is not compatible with its realisation, for if it is realised, there no longer is a bearer that could be the bearer of this disposition. On the other hand, there are cases where having a disposition clearly is compatible with realising it. A medical practitioner, for example, does not loose his power to heal his patients when he actually does so. Otherwise he would be constantly loosing and re-gaining his power when beginning or ending the treatment of his patients.

## 11. Rational dispositions

A very special variety of dispositions are the so-called rational dispositions (*dynameis meta logou*, cf. *Metaphysics IX 2*, 1046b 2). There are several reasons for calling them rational dispositions. First, Aristotle describes these dispositions by saying that they are present in the rational part of the soul. This means that they cannot be had by non-living things, plants or mere beasts. Second, these dispositions are accompanied by a *logos*, a rational formula like a definition of the realisation. Third, the acts that are realisation of these dispositions come about by means of ratiocination, i.e. by means of practical syllogisms. What this means can be illustrated with the help of the art of medicine, which is Aristotle’s stock example for this kind of dispositions. The “rational formula” that accompanies the art of medicine is the *logos* or definition of health. Starting from such a definition of the form “Health is XYZ” the medical practitioner can deliberate which means he has to choose to heal his patients:

Health is XYZ.

XYZ will come about if I do *F*.

I can do *F*.

Thus I will do *F*.

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<sup>27</sup> On “finkish” (i.e. disappearing) dispositions cf. Martin 1994; on antidotes cf. Bird 1998.

A special feature of rational dispositions is that they can have contrary realisations. Medical knowledge is normally used to heal patients, but an evil doctor can use the very same knowledge to kill people. Thus the art of medicine can have effects as distinct as health and death. Therefore, the realisation of rational dispositions cannot be triggered as simply as the non-rational dispositions discussed in the preceding section. It is clear that spatial vicinity between a medical practitioner and an ill patient does not automatically lead to a realisation of the practitioner's healing disposition. First the practitioner has to decide to activate his medical knowledge. But this is not enough: The practitioner has also to decide on his goal: Does he want his patient healthy or dead? Only then is he able to ratiocinate on possible means to the end chosen by him, which will eventually lead to appropriate actions that may bring about the patient's health or the patient's death.<sup>28</sup>

## 12. Natures and habits

The different kinds of *dynamis* that I discussed up to now are not the only causal properties that Aristotle knows of. Other causal properties are natures and habits, *physeis* and *hexeis*. But what are natures for Aristotle? Aristotle often remarks that a nature, a *physis*, is a principle of movement.<sup>29</sup> *Physis* thus has the same genus as *dynamis*. But what is its specific difference? Aristotle spells this out in the following passage:

And I mean by *dynamis* not only that definite kind which is said to be a principle of change in another thing or in the thing itself regarded as other, but in general every principle of movement or of rest. For nature (*physis*) also is in the same genus as *dynamis*; for it is a principle of movement – not, however, in something else but *in the thing itself qua itself*. (*Metaphysics* IX 8, 1049b 5-10, tr. Ross, italics mine; cf. *De Caelo* III 2, 301b 17-19)

Thus whereas an active power is a principle of change “in another or as another”, a *physis* is a principle of change in a thing “in itself qua itself”. And whereas an active power needs a

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<sup>28</sup> For a more detailed account cf. Jansen 2002, 78-92.

<sup>29</sup> Cf. *Physics* II 1, 193a 28ff; III 1, 200b 12f; *De Anima* II 1, 412b 17; *Metaphysics* V 4, 1015a 15-19; XI 1, 1059b 17f.

complementary passive disposition in order to be realised, there is no such need for a *physis*. If something has a *physis* to do or to be *F*, the realisation is only dependent on the appropriate marginal conditions, but not on the spatial vicinity of the bearers of other causal properties.

Another kind of causal properties goes under the name of *hexis*. Like *dynamis*, *hexis* is a word with many different meanings, to which Aristotle dedicates a chapter in his dictionary of ambiguous philosophical terms (*Metaphysics* V 20). The noun *hexis* derives from the verb *echein*, “to have”. As this etymology indicates, a *hexis* is in general either the having of something or that what is had by something. As a further possible meaning, Aristotle proposes the following definition:

*Hexis* means a disposition (*diathesis*) according to which that which is disposed is either well or ill disposed, and this either in itself (*kath’hauto*) or with reference to something else (*pros allo*). (*Metaphysics* V 20, 1022b 10-12)

What is of particular interest for us, are the *hexeis* of the non-rational faculties of the soul, which determine both our emotional reactions and many of our actions. Traditionally, these *hexeis* are called virtues and vices: Virtues, if they dispose for good acting, vices, if they dispose for bad acting.

On first sight, a virtue like justice has a structure similar to a *dynamis*. At a given time, someone can have the virtue without acting justly, e.g., when sleeping. And when the just person is acting justly, the virtue of justice is thought to have a causal influence. Thus virtues (and vices) are also realisable and causal properties, but Aristotle take great pain in distinguishing non-rational virtues from rational *dynamis*. For we have seen that in the case of a rational *dynamis*, like the art of medicine, one and the same *dynamis* can be the cause of contrary realisations, i.e. of health and death. The art of calculating just prices is such a rational *dynamis* – but like medicine, this art can be used to calculate and to charge just as well as unjust prices (cf. *Nicomachean Ethics* V 1; Plato, *Hippias minor*). He who has the virtue of justice does not only know what is just, he is also inclined to do so. Thus while a rational *dynamis* allows for contrary realisations, a virtue is directed to one realisation only. And while a rational *dynamis* needs an appropriate will and goal in order to be realised, a virtue informs the will by itself and does not need the addition of a goal of action from the outside.

### 13. Does the unmoved mover possess dispositions?

Finally, I want to turn to one of the most prominent elements of Aristotle's metaphysics, the godly unmoved mover, who keeps the heavens in circulation. Now we may ask whether the unmoved mover possesses any dispositions, any *dynamis*. In *Metaphysics* IX 8, where Aristotle argues for the priority of realisations over dispositions, we find contradictory evidence on this matter. There (in 1050b 8-11), Aristotle says the following:

- (Z1) "Every *dynamis* is at the same time [a *dynamis*] for the opposite."
- (Z2) "For, while that which is not capable (*dynaton*) of being present in a subject cannot be present,"
- (Z3) "everything that is capable (*dynaton*) of being may possibly (*endechetai*) not be actual."

Taken together, (Z1) and (Z3) suggest that what is eternal has no *dynamis*, because for him everything that is eternal is necessary and cannot not be (*De Caelo* I 12). But if we accept this, then we are forced to say that whatever eternal things do is not based on a *dynamis* to do this. But in between of (Z1) and (Z3), we find evidence to the contradictory claim. For (Z2) formulates the following principle of enabling:

Everything that happens happens because there have been *dynamis* that enabled this happening. Otherwise it would not have happened.

If this is universally valid, all things eternal entities are or do are based on *dynamis*, too. We are obviously faced with a trilemma:

- (A1) What is eternally *F*, is necessarily *F*.
- (A2) What is eternally *F*, has the *dynamis* to be *F*.
- (A3) All *dynamis* are two-sided.

These three propositions are jointly incompatible. Now (A1) is no topic in *Metaphysics* IX, but is being argued for in *De Caelo* I 12 and Aristotle nowhere presents any doubts. We may thus reject (A2) or (A3). To reject (A2) is to reject the principle of enabling, to reject (A3) is to admit "one-sided" dispositions, i.e. dispositions that are necessarily realised. That we do indeed have these options is confirmed through a passage in *De Interpretatione* 13:

For the term *dynaton* is not said with one meaning only (*ouk haplôs*), but at one time it is true that it is realised, as when someone [is said] to be able (*dynaton*) to walk because he walks, and generally when something is able [to be something] because that which it is said to be able of is already realised; but sometimes because something may be realised, as when a man [is said] to be able to walk because he may walk. The latter belongs only to that which is changeable; the former can also belong to the unchangeable things. [...]. Now, while the one way to be *dynaton* cannot truly be said of things being necessary in the unqualified sense, the other [way to be *dynaton* can be predicated] truly. (*De Interpretatione* 13, 23a7-16; my translation)

The author here clearly distinguishes between an inclusive and an exclusive predication of being *dynaton* to do or to be something. In an inclusive manner, it is said, even unchangeable and necessary things (like the unmoved mover) can be said to be *dynaton* to do or to be something. Thus whoever wants to ascribe *dynamis* to the unmoved mover has to accept that these *dynamis* are never unrealised. Otherwise we should refrain from ascribing *dynamis* to the unmoved mover. This would still not imply that what the unmoved mover does is inexplicable, for, as we have seen, Aristotle knows principles of change and being like natures that go beyond the sphere of *dynamis*.

#### 14. Is it a good theory?

Aristotle's philosophy has often been criticised. Notably Hobbes dismissed Aristotelian thinking as "vain philosophy" and claimed "that scarce any thing can be more absurdly said in naturall philosophy than that which is called Aristotle's Metaphysics".<sup>30</sup> In particular, Aristotle's theory of *dynamis* has been the object of many disputes. There are three standard objections against it: (1) Aristotle's powers, dispositions and potentialities create a ghostly world of *possibilia*, (2) they are explanatory idle (the *virtus dormitiva* objection), and (3) they are empirically inaccessible. I will discuss and reject each of these objections in turn.<sup>31</sup>

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<sup>30</sup> Hobbes, *Leviathan*, ed. Tuck, 461.

<sup>31</sup> Cf. also Jansen 2001, 276-278 and Jansen 2004.

The first objection attacks the purportedly dubious ontological status of *dynameis*. They are said to form a “ghost world” in between being and not-being<sup>32</sup> or to be a kind of “half-being”<sup>33</sup>. In fact, I have already answered this objection when explaining the Bearer Principle and the Principle of Actuality. A power or disposition is nothing ghostly nor something that has only half-being: It is a full-fledged property of a full-fledged thing. It is, however, a full-fledged property with a certain peculiarity: It is related to some action, passion or another property, which it enables or causes, and which thus is called the realisation of the disposition. Now it is possible, that a disposition occurs without being realised, but this does not diminish the ontological status of the disposition itself (but relates only to non-occurring of the realisation at this time).

The second objection says that referring to dispositions does not explain anything, but rephrases in new words the problem in question. Instead, it is claimed, science has rather to explain phenomena by describing the world’s micro structure. This objection is often put forward in connection with Molière’s joke at the expense of the medical profession in his *Le Malade Imaginaire*. There a to-be doctor of medicine answers during his doctoral *viva voce* examination:<sup>34</sup>

I have been asked by the learned Doctor to name cause and reason why opium makes sleepy. To this I answer: Because there is a sleepy making disposition (a *virtus dormitiva*), whose Nature is to lull to sleep.

Though in the play the examination board is full of praise for this answer, it is not apt to raise admiration for the medical profession on behalf of the spectator. Obviously, this answer does indeed only rephrase the problem. It is not informative at all. But this does not imply that science can do without dispositions. First, the answer is not informative because the question already presupposes that it is the opium which is the relevant causal factor. If asked, why someone fell asleep after a dose of opium, it would actually be informative to point out that the job had been done by the opium and not by some other thing around in this situation.

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<sup>32</sup> Hartmann 1938, 5 (“Gespensterdasein”).

<sup>33</sup> Tegtmeier 1997, 36-40 (“Halbexistenz”).

<sup>34</sup> On this scene and its background in the philosophical and theological discussions of Molière’s time cf. Hutchinson 1991.

Second, how could an informative answer to the original question look like? We could point out that opium consists out of 37 alkaloids, among which is morphine. But this would only be a satisfiable explanation if we know that morphine has a *virtus dormitiva*. Of course, we can also ask why morphine has such a dormitive virtue. And we could refer to some molecular structures in our nervous system and to the molecular structure of the morphine. Again, this answer can only be satisfiable, if we know something about the dispositions of the molecular structures in question, e.g., that the morphine molecules have the disposition to bind to and thus to activate certain receptors in our nervous system, and that the respective parts of our nervous system have the matching passive disposition. Again, we do not have totally eliminated the talk about dispositions, but only replaced the talk about one disposition through the talk about another disposition. This shows that we cannot explain anything by referring to properties of microstructures by using categorical property terms only. We always need dispositional property terms, too.

The third objection claims that dispositions are empirically inaccessible, because we perceive realisations only. Therefore, they are a monster of bad metaphysics. Obviously, we should be careful with this kind of argument, for by a similar token of argument the whole 'external world' would be empirically inaccessible and thus a monster of bad metaphysics, because we are acquainted with 'internal' sense data only. The natural reaction to this would be to say that we perceive the world *through* our senses and sense data. In a similar way, dispositions are not only described in terms of their realisations, but also recognised *through* them. Along such lines Aristotle admits the epistemological priority of the realisation, through which the *dynamis* can be recognised (*Metaphysics* IX 8, 1049b 13-17). But although the realisation is prior, the *dynamis* can nevertheless be recognised: By showing his students calculating, a teacher of mathematics can give evidence that his students have acquired the *dynamis* for calculations and thus prove the efficiency of his tuition (1050a 17-19).

Hence Aristotle needs not to be impressed by these three objections. His account of dispositions can still be regarded as a consistent ontology of causal properties with an enormous explanatory appeal.



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