

# Aristotle on the Causal Efficacy of Perceptible Qualities

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## I. Introduction

This paper seeks to determine the causal powers ascribed by Aristotle to perceptible qualities, known as ‘the special perceptibles’ (*ta idia aistheta*), such as colours, sounds, odours, flavours, and tangible qualities.

There is a general consensus in the scholarship that Aristotle is a realist about perceptible qualities, meaning that, for him, qualities continue to exist as features residing in material objects, even in the absence of perception.<sup>1</sup> He maintains that qualities like white, noisy, fragrant, sweet, hot, heavy, and soft not just describe how objects in the environment appear to animals in sensory experience but also pick out perception-independent features of the objects themselves. That said, Aristotle appeals to qualities also in causal processes where the qualities are understood as *dispositional* properties, but the literature remains unclear whether, for him, these dispositional properties can be actualised outside perceptual encounters with animals. As it relates to perceptible qualities’ perception-independent actualisation conditions, the clarification of this issue is vital for understanding the qualities’ ontological status.

Aristotle holds that perceptible qualities as dispositional properties can actualise animals’ sensory powers and thereby get perceived; namely, they are ‘causes’ of sense perception. When explaining how animals perceive objects in their surroundings, he takes the objects’ qualities as responsible for this, and uses a good number of causal terms on this score: e.g., that qualities “affect” [*poiein*] animals’ senses or organs (*DA* 416b35), that senses “are acted upon” [*paschein*] by qualities (*DA* 418a5), that qualities “assimilate” [*homoioisthai*] the senses to themselves (*DA* 418a5-6), and that sense perception is an “alteration” [*alloiosis*] of a sense organ by a quality (*DA* 415b24). Perhaps most clearly, he says: “each of these [*sc.* qualities] is *productive* [*poietikon*] of perception; for they are all called ‘perceptible’ because they are capable of bringing about this *movement* [*kinein*]” (*SS* 6, 445b7-8, Miller tr., modified).

One commonplace view, defended, e.g., by Broadie (1993) and Code (2008), recognises the qualities’ efficacy in causing ‘perceptual changes’—or, as its proponents understand them, changes in animals’ consciousness about their surroundings.

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<sup>1</sup> See, e.g., Broadie, “Aristotle’s Perceptual Realism”; Granger, “Aristotle and Perceptual Realism”; Johansen, *Aristotle on the Sense-Organs*; Caston, “Aristotle on the Reality”. Cf. Irwin, *Aristotle’s First Principles* for the minority view that ascribes Aristotle a rejection of realism about qualities.

However, the view suggests that, for Aristotle, apart from producing such changes, qualities are entirely causally idle.

The primary issue with this view is that it renders unperceived qualities as unactualised potentialities, consequently relegating Aristotle's realism about the qualities to a mere realism regarding dispositions. Esfeld (2000), Kalderon (2015), and Caston (2018) attempt to avoid this consequence. By using Aristotle's famous distinction between 'first actuality' and 'second actuality'—viz., *possession* of a potentiality and its *exercise*—they argue that qualities, when not perceived, do not enjoy a potential but actual existence. Yet, they add, this existence corresponds to 'first actuality' in the sense of being 'possessed' by material objects—since the end of an acquisition process of a quality is itself an actuality. *Only while* being perceived, qualities can attain actuality in the 'second' sense, namely, that of being 'exercised' by their possessors on animals. This approach therefore grants unperceived qualities an actual existence, namely, first actuality. Yet, this is not the sort of actuality I seek for. The present approach links qualities' second actuality *solely* to their perception. However, my objective in this study is to determine whether qualities can be actual in the second and full sense even in the absence of perception.

In this paper, I will challenge the views that restrict the causal efficacy of qualities to that of producing perceptual changes. I shall argue that, in Aristotle's opinion, qualities are causally efficacious agents, capable of generating non-perceptual material effects in nature, and, therefore, part of actual causal explanations of natural phenomena. Showing this will indicate that, for him, qualities can have a fully realised or actual existence even when not being perceived—specifically, when they produce non-perceptual effects in nature.

The view I defend here has received little attention in the literature. Broackes (1999, pp. 107-109) gives some of the evidence, which I discuss in this paper, indicating the power of qualities to cause material effects. Similarly, Marmodoro (2014, p. 128) argues that qualities cannot be, as she calls them, "single-track powers", namely, they cannot have a single type of effect (i.e., perception). While I mainly align with these scholars, I adopt a novel approach here. To show that qualities are causally efficacious in a material sense, I systematically discuss contexts in Aristotle's writings where qualities appear to be at work in nature without leading to perception in animals, and I consider these cases within the framework of his realism.

This paper has two main parts. In the first part, I examine the evidence presented by views that limit the causal efficacy of qualities to producing perception. And, to demonstrate the untenability of these views, I discuss cases in Aristotle's works where qualities affect *insentient* bodies—bodies where the actions of qualities cannot result in perception. I present the effects of individual modality-specific qualities on insentient bodies, starting with the familiar case of tangible qualities and then addressing the cases of flavours, odours, sounds, and colours. In the second part, I consider cases where qualities work on *sentient* bodies, but where their work *fails* to engender perception.

## II. Qualities' Effects on Insentient Objects

In a central passage in *De Anima*, Aristotle initially proposes a view that can be interpreted as opposing the view which, in this paper, I contend he actually holds. He seems to suggest that material objects *cannot*, in virtue of their qualities like odours and colours, affect other material objects, unless those other objects have sensory capacities such as the capacities to smell and to see:

One might be puzzled as to whether what is *incapable* of smelling might be *affected* [*paschein*] in any way by odour, or what is incapable of seeing by colour, and likewise for the others. But if the object of smelling is odour, if it *produces anything* [*ti poiein*], odour produces the act of smelling. Hence, *nothing incapable of smelling can be affected by odour*. And the same argument applies to the others. Nor can anything with this capacity be affected except in so far as each is capable of perception. And at the same time this is clear from the following consideration: neither light and darkness, nor sound, nor odour *affects* [*poiein*] in any way *bodies* [*somata*]; but what does so is the thing in which they are present; for instance, the air accompanying the thunder splits the wood (*DA* II.12 424b3-12, Miller tr., modified).

This excerpt comes after a long inquiry into sensory modalities and their objects. Aristotle opens *DA* II.12 by giving a general account of perception, and attempts to explain why plants cannot perceive. Within this context he asks, in the excerpt, the following explicit question pertinent to the scope of this paper: can what is unable to smell be affected by odour? Likewise, can what is unable to see be affected by colour? He replies, speaking of the case of beings destitute of the capacity to smell, that they *cannot*. Importantly, he does not hesitate to generalise this claim to the effect that it is also true of beings that are incapable of seeing and hearing (and perhaps, tasting, and touching). To reinforce this conclusion, he adds that neither light and darkness (likely, meaning colours, here) nor sounds nor odours can affect bodies; what does so is the objects in which these qualities reside. For instance, what breaks the wood is *not* thunder (i.e., sound) but the air accompanying the thunder.

In keeping with the line Aristotle articulates in the excerpt that “nothing incapable of smelling can be affected by odour”, one commonplace view makes the following claim: Qualities are *causally inefficacious* over material objects except for a very specific type of efficacy, namely, producing the effect of perception, as long as the objects that are to receive this type of effect happen to have sensory powers. More precisely, excepting tangible qualities (likely after observing his frequent use of them to explain various natural phenomena), the proponents of this view assert that Aristotle confines the causal efficacy of non-tangible qualities to that of letting themselves perceptually known by animals. Code (2008), for instance, says about the case of colours:

In Aristotle's philosophy of nature *colors are there to be perceived*, but leave inanimate objects as well as plants alone. *Unlike tangible qualities* such as heat, moistness and their contraries, *colors do not cook things, crumble them, rot them or make them wither away*. Nonetheless animals that can be affected by them in

such a way as to see them thereby receive a great deal of information about the world that they inhabit (p. 222, emphasis added).

Broadie (1993) speaks likewise, but of all non-tangible qualities:

In Aristotle's view, the sensible qualities are causal, but, with one class of exceptions [*sc.* the tangibles], *causal of only a single type of effect: the perception of them by animals. Colors, smells, sounds, tastes* are true qualities of the objects they seem to qualify, but the only difference they (or the objects *qua* qualified) can make to anything else is that of their being perceived (pp. 145-6, emphasis and brackets added).

Brodie and Code appear to reach their conclusion by comparing non-tangible qualities to the tangibles. They seem to require the non-tangibles to do the same kind of causal work as the tangibles do—e.g., as Code says above, cook, crumble, rot, or make things wither away—to deem them causally efficacious in a material sense. I find this move problematic. It sets a criterion of causal efficacy that appears to lack a basis for requiring the non-tangibles to meet. Against this view, I shall, in the following pages, argue that *all* perceptible qualities can cause non-perceptual material effects. To do so, I will show that for Aristotle, different classes of qualities have varying impact areas, wider or narrower: while some of them can impact almost anything material, others can affect only specific groups of bodies. Call this proposal 'Impact Area Thesis'. Unlike the commonplace view, this thesis does not demand that the non-tangibles do the same type of causal work as the tangibles do. If they perform some non-perceptual work, they count as causally efficacious. There will be opportunities to flesh out this thesis as we proceed.

Despite seeming to support the commonplace view in the long *DA* passage excerpted earlier, Aristotle appears to take a new turn in the lines right after the excerpt, speaking in a way that favours the impact area thesis. He begins with saying that the tangibles and flavours cannot be causally inefficacious:

But both the tangibles and flavours *act on things* [*poiein*]; for, if they did not, by what would *inanimate things* [*ta apsycha*] be affected [*paschein*] and altered [*alloiousthai*]? Therefore, will those *other perceptibles* also act on things? Perhaps it is not every [*sc.* sort of] *body* [*soma*] capable of being affected by *odour and sound*; and the ones affected are those that are *indeterminate* [*aorista*] and *do not stay put* [*ou menei*], as, for instance, *air* (for it gives off odour as though being affected in some way). What, then, is the act of smelling apart from being affected in some way? Perhaps the act of smelling is also an act of perceiving, while *the air* upon being affected quickly becomes *perceptible* (*DA* II.12 424b12-18, Miller tr., modified).

Tangibles and flavours must be productive of non-perceptual effects; otherwise, we would lack causal agents to explain changes observed in inanimate objects. Aristotle thus points to a realm where certain qualities can do causal work that does not give rise to perception: insentient realm. This quote does not mention life, but recall rather the formerly-cited part of *DA* II.12: the discussion is whether qualities can affect entities

lacking sensory powers. By the expression “inanimate things”, Aristotle must then mean ‘insentient bodies’—namely, not only lifeless objects like rocks, gold, copper, and objects like air and water, but also plants which have life but which lack sensory powers. Having introduced a realm where tangibles and flavours can do causal work, he asks whether other perceptibles such as odours, sounds, and, likely, colours can do the same. He replies that it is not every sort of body that can receive their impact, but only those that are ‘indeterminate’ or ‘unbounded’ and ‘do not stay put’, e.g., air. The distinction between determinate and indeterminate bodies is significant, and I will elaborate on it shortly, but, first, let me make the important observation that in the above excerpt, Aristotle explicitly recognises the causal efficacy of not merely the tangibles, but also flavours, sounds, odours, and colours, over insentient bodies. He does so by specifying their impact areas: they can affect either a wider or a narrower area, among classes of bodies.

## II.1 Tangible Qualities

As seen, Aristotle deems tangible qualities causally efficacious over insentient objects: “*the tangibles* and flavours do act on things; for, if they did not, by what would inanimate things be affected and altered?” (DA II.12 424b12-13). This is in line with the way he treats them elsewhere. In discussions involving elemental or simple bodies, he presents the tangibles such as hot, cold, wet, and dry (his so-called ‘first qualities’) as agents of chemical changes in formations of complex bodies. Specifically, he thinks that hot and cold are *active* qualities (*poietika*) as they dispose the bodies possessing them to affect others, while wet and dry are *passive* (*pathetika*) in disposing their possessors to be affected (GC 329b24-26). Drawing upon various active and passive dispositions introduced by these qualities, and also by their tangible derivatives (e.g., hard/soft, heavy/light, viscous/brittle, rough/smooth, and coarse/fine<sup>2</sup>), in his physical works Aristotle systematically endeavours to explain natural phenomena. One of the pieces of evidence that display the impact area of tangible qualities is this interesting passage:

And since the actions and movements present both in animals as a whole and in their non-uniform parts are complex, it is necessary for their components to have distinct *potentialities* [*dynameis*]; for *softness* is useful for some things, *hardness* for others; certain things must have *elasticity*, others *flexibility*. Thus, while in the uniform parts such potentialities are distributed part by part (one of them is *soft* while another is *hard*, one *wet*, another *dry*, one *viscous*, another *brittle*), in the non-uniform parts they are distributed to many and are conjoined with each other; for a different potentiality is useful to the hand for *pressing* and *grasping* (PA II.1 646b14-25, Lennox tr., modified).

Animals consist of non-uniform and uniform parts, with non-uniform parts being made of uniform ones. In this quote Aristotle explains that the complex actions and movements of animals and their non-uniform parts originate in simpler potentialities or

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<sup>2</sup> See GC II.2. Cf. *Meteor.* IV.8 for a somewhat different list of derivative tangibles.

dispositions of their uniform parts. Uniform parts possess tangible qualities, e.g., hardness, softness, wetness, dryness, elasticity, and brittleness, which *dispose* them to act in certain ways. He says, for example, that the hand, as a non-uniform part, needs distinct qualities and thus distinct potentialities in its uniform parts to press and grasp things. This text holds significant value for citation, as here he describes the tangibles by their potentialities to have *non-perceptual* effects. By this, I mean not only the aforesaid effects, namely, grasping and pressing things, but also various effects that uniform parts, *qua* hot, wet, viscous, or brittle, can generate or undergo.

The above quote concerns animals and their parts, discussing the effects these bodies, in virtue of their tangible qualities, produce and undergo. In the following excerpts, Aristotle focuses solely on *active* qualities among the tangibles (specifically, hot and cold) in affecting *insentient* bodies. Consider this:

And of the nutriment which is received by animals it is the perceptible qualities which are *tangible* that *produce* [*poiein*] *growth and decline*; for the *cause* [*aition*] of these processes is what they receive in so far as it is *hot* and *cold* (*SS* 4, 441b27-30, Miller tr.).

Here, he mentions animals but after this quote, includes such insentient beings as plants too. Absorbed food, *qua* hot and cold, causes animals and plants to receive the non-perceptual effects of growth and decline. Further, he attributes hotness and coldness (or fire and ice having these qualities) the powers to boil and freeze things: “But fire is an excess of heat, just as ice is an excess of cold. For freezing and boiling are excesses of cold and heat respectively” (*GC* II.3 330b25-28, Williams tr.). He does not explicitly say so, but clearly thinks of ‘water’ or ‘watery substances’ here, as these bodies can boil or freeze. Elsewhere, he adds: “fire heats not only when in contact with things but also when it is *at a distance* from them: for the fire heats the air and the air heats the body, *air* being of a nature both *to act* and *to be affected*” (*GC* I.9 327a3-6, Williams tr.). Bodies like fire, *qua* hot, can heat not only bodies with which they are in contact but also *those at a distance*, on the grounds that they heat *the air*, and the air, which can both receive and generate effects, heats the distant bodies. This quote reveals how wide the impact area of the tangibles is: they affect not only ordinary objects that have boundaries of their own (i.e., determinate bodies), but also those that have *no* boundaries of their own (i.e., indeterminate bodies), e.g., air and, by the previously-cited text, water. Finally; objects, *qua* cold, can make others lose their flavours and odours: “[...] cold and freezing dull flavours and make smells disappear; for cooling and freezing make the heat, which is *the moving and creative force*, disappear” (*SS* 5, 443b14-16, Miller tr.). Aristotle ascribes coldness the power to cause even such effects, because he believes hotness and coldness to be fundamental qualities of matter (*GC* II.2), and because hotness is *the maker* (*to demiourgoun*) of non-tangible qualities (e.g., flavour and odour) and its absence—i.e., coldness—makes the non-tangibles disappear.

Some scholars contest that the non-perceptual effects surveyed above are the effects of the same tangibles as those that animals perceive. Freeland (1995) and Johansen (1997) claim that Aristotle distinguishes between phenomenal (e.g., cold as experienced) and non-phenomenal qualities (e.g., cold that freezes things), and that *only*

non-phenomenal ones can non-perceptually affect bodies.<sup>3</sup> They base their claim mainly on *Parts of Animals* II.2. Here, to determine whether ‘hotness’ is spoken univocally, Aristotle attempts to individuate five different ways things are called ‘hotter’ than each other. Of the first two, he says: “In one way that which *makes* what touches it *hotter* is said to be hotter; in another way that which *arouses greater sensation* during touching, [...]” (648b12-15, Lennox tr.). As he lists the hotter things’ non-perceptual effect ‘making other things hotter’ and perceptual effect ‘arousing stronger tactile perception’ in *separate* headings here, Freeland (1995, pp. 246-7) takes this to imply that Aristotle admits to a distinction between non-phenomenal and phenomenal tangibles, e.g., hotness. Further, after listing the ways things can be hotter, Aristotle adds: “[...] but it is *impossible* that being hotter belong in *all* these ways to the same thing” (648b25, Lennox tr.). This suggests, Johansen (1997, pp. 277-8) argues, that for Aristotle, an object can be hot perceptually without being hot non-perceptually. Yet, I am not convinced that the *PA* passage is definitive enough to attribute him the distinction in question. He does not say that a thing can be hotter *exclusively* in *one* of the five ways, but only that it cannot be hotter “in *all* these ways.” He does not provide any indication that it cannot be hot in *both* the first and second ways.

## II.2 Flavours

Aristotle places flavours alongside the tangibles as qualities capable of affecting insentient objects, in *DA* II.12, to recall: “the tangibles and *flavours* do act on things; for, if they did not, by what would inanimate things be affected and altered?” (424b12-13). It is admittedly challenging to find a context where flavours affect insentient objects. He mostly presents flavours either as *affections* [*pathe*], or features, acquired by moist bodies after undergoing alterations, or as *powers* to excite the sense of taste. Part of the difficulty in identifying a relevant context seems to be that flavours have a *narrower* impact area compared to tangibles. Still, in *De Sensu* 4, he mentions a case which can explain his inclusion of flavours among causally efficacious qualities in *DA* II.12. After arguing that flavours are features of nutriment, he writes:

But it *qua* *tasteable* is that what they receive is nourishing; for *everything is nourished by what is sweet*, either by itself or mixed with other flavours. [...] Other flavours are mixed into the nutriment in the same way as salt and acid, for seasoning. This is because they counteract *the excessively nutritive effect of the sweet and its tendency to rise to the surface of the stomach* (442a1-2 & 8-12, Miller tr., modified).

Food, *qua* sweet, causes nutrition in animals and plants. Further, people mix sweet with other flavours—i.e., bitter or salty (both are contraries or privations of sweet), harsh, pungent, sour, and acidic (*SS* 442a17-19)—to lessen the excessively nutritive effect of the sweet. Otherwise, food, *qua* sweet, could rise to the surface of the stomach undigested. All these are non-perceptual effects. That is, Aristotle treats sweetness,

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<sup>3</sup> For a similar view, see Broadie (1993, p. 147). Cf. Krizan (2018, p. 95).

here, in terms *not* of its perceptibility but of its nutritiveness and possible deleterious effects. His mention of the stomach may cause a worry, though, that here he thinks of animals, *not* plants. Also, the above quote contains the locution “*qua* tasteable”. As only animals can taste, one might say, he must mean that food, ‘*qua* tasteable by animals’, is nutritive, and he must still be talking about perceptual effects of the sweet.

However, the evidence suggests otherwise. *First*, he seems to have borrowed the contrast between sweet and bitter or salty from the contrast between drinkable (e.g., rainwater that makes up lakes, streams, and rivers) and undrinkable water (e.g., seawater). In *Meteorology*, for example, he says that with the action of the sun’s heat on waters in the world, “the *drinkable, sweet* water, then, is light and is all of it drawn up while the *salt water* is heavy and remains behind, but not in its proper place” (II.2 355a32-34, Webster tr., modified). Since drinkable, sweet water corresponds to food in the case of plants, it is likely that these insentient beings can also suffer adverse material effects from consuming sweet water, analogous to food rising to the surface of an animal’s stomach. We may think by example of how plants mostly die if they absorb excessive water. *Second*, further evidence from *SS* 4 indicates that Aristotle has both animals and *plants* in mind, here. In an attempt to elucidate how food generates growth, decline, and nutrition, he says:

Heat produces growth and creates *nutriment*, and it draws up what is light, and leaves what is salty and bitter to fall due to its heaviness. In fact, what the external heat *produces* [*poiein*] in external bodies, this [*sc.* internal heat] produces naturally in animals and *plants*, which is why they are *nourished by what is sweet* (442a3-8, Miller tr.).

Just as the heat of the sun (“external heat”) draws up the light, sweet water but lets the heavy, bitter or salty water fall back onto the earth, ‘internal heat’ does the same inside the animate body during digestion. After an animal or plant absorbs food, their body’s natural heat begins to act on it, drawing up the sweet components and leaving the bitter or salty parts as residue (*Meteor.* 355b6-11, *GA* 776a28–30), and the sweet components, in turn, cause nutrition.

What happens if an animal with the capacity to taste experiences a food as sweet, and another animal experiences the same food, say, as bitter? Should we conclude that it is nutritive for the former but not for the latter? The answer relates to the ontological status and appearance conditions of qualities. As mentioned earlier, Aristotle is a realist, believing that qualities exist independently of perception. Today we might think that sweetness is a feature of our sensory experience of the world, a phenomenal quality. Yet, for him, qualities like sweetness reside in objects in the environment, picking out their perception-independent or objective features. As for the qualities’ appearance conditions, I share the opinion of Kenny (1967, 2004), Politis (2004), and Lee (2005): according to Aristotle, if an object (e.g., food) appears conflictingly (e.g., sweet and bitter) to two perceivers, this is *not* because the object simultaneously has conflicting qualities, but because other factors playing roles in perception, e.g., the senses and media, are in deviant conditions. In our case, the same food would always taste sweet (as long as it is so) provided that all the relevant factors

are in the right conditions, as is often the case. By establishing a consistency in perceivers' experience of qualities, and thanks to his realism, Aristotle can, therefore, consider qualities, e.g., sweetness, in terms of their non-perceptual effects, e.g., nutrition.

While flavours do not have an impact area as wide as that of the tangibles, these two classes of qualities can affect objects that have natural boundaries of their own, like animals and plants. This is likely why Aristotle mentions them as his first exceptions to his provisional assertion of causal inefficacy in *DA* II.12. Another commonality between these two: in discussions of perception, Aristotle presents them as qualities that animals must get into immediate contact with their senses to perceive them (*DA* 424b27-30). Call the tangibles and flavours, then, 'tactile qualities' for the sake of convenience. Next comes the case of 'non-tactile qualities', i.e., odours, sounds, and colours.

### *II.3 Odours, Sounds, Colours*

The situation is not as evident regarding the question of whether odours, sounds, and colours affect insentient objects. Recall that in *DA* II.12, Aristotle writes: "*neither* light and darkness, *nor* sound, *nor* odour *affects* in any way *bodies*; but what does so is the thing in which they are present; for instance, the air accompanying the thunder splits the wood" (424b10-12). In cases where we think that these qualities have non-perceptual effects, it is actually the bodies possessing the qualities that cause such effects. However, a passage from *De Caelo* suggests the contrary. When discussing the Pythagorean theory that the movements of the heavens make a harmonious sound, Aristotle says that if this were true, the resulting sound would have perceptual and non-perceptual effects:

melodious and poetical as the theory is, it cannot be a true account of the facts. There is not only the absurdity of *our hearing nothing*, the ground of which they try to remove, but also that *no effect other than perceptual is produced*. Excessive sounds shatter the masses even of *inanimate bodies* [*apsycha somata*]*—for instance, the sound of thunder splits rocks and the strongest of bodies*. But if the moving bodies are so great, and the sound passing through is proportionate to their size, that sound must reach here in an intensity many times that of thunder, and the strength of its force must be immense (II.9 290b30-a4, Stocks tr., modified).

In lines before this quote, Aristotle remarks that others have already criticised Pythagoreans, asking them to explain why we do not hear the alleged music of the stars. Pythagoreans reply that as their sound is there since our birth, we are now used to it and unable to notice it—just as coppersmiths, over time, become indifferent to the noise dinning around them (290b24-29). Aristotle finds this reply unconvincing—since the alleged sound would be too enormous for us to get used to. However unlikely it is, let us assume that there is such a sound, but that we do not hear it. Still, he sees another difficulty begging for an explanation: why does the sound in question "produce no effect other than perceptual"? To clarify regarding to what these 'non-perceptual effects' correspond, he mentions a familiar phenomenon: excessive sounds destroy

insentient objects, as, for example, thunder splits rocks and the strongest bodies. Now, if even thunder can cause such effects, the alleged sound of the heavens, given their size, would be proportionally greater and destroy everything on the earth. From the absence of such effects, Aristotle deduces the non-existence of the alleged cause: the revolutions of the heavens do not make a sound (290a4-6).

Now, here Aristotle says that thunder splits rocks, but in *DA* II.12 he claims that it is the air, in which the thunder resides, that splits the wood. For him, it is easy to reconcile these two claims—it would not affect his argument against Pythagoreans, as it seems. But for this study, this would significantly mean that sounds (and, by the same reasoning, odours and colours) *cannot* affect such insentient objects as rock and wood—bodies that have boundaries of their own. Let this be the conclusion of the foregoing discussion. Still, the *De Caelo* excerpt makes a critical point: the distinction between qualities' perceptual and non-perceptual effects is a distinction which Aristotle himself makes, *not* one that this paper imposes upon his philosophy from a contemporary perspective.

In *DA* II.12, after granting the tangibles and flavours the power to affect insentient objects, Aristotle asks whether odours, sounds, and colours can do the same: “will those other perceptibles also act on things?” (424b14). He seems to believe that they will. However, (as the above discussion has also revealed) he thinks that unlike tactile qualities, they do not seem to affect bodies that have natural boundaries of their own, e.g., animal, plant, rock, wood. He says in *DA* II.12, to recall: “Perhaps it is not every body capable of being affected by *odour and sound*; and the ones *affected* are those that are *indeterminate* and *do not stay put* as, for instance, *air*” (424b14-16). Odours and sounds affect bodies that are ‘indeterminate’ and ‘do not stay put’. He gives ‘the air’ as an example, but elsewhere adds ‘water.’ *Colours* are not explicitly mentioned here but, actually, they also affect air and water:

Both *air* and *water* appear *coloured*; for they gleam in this way. But in this case because it is in an *indeterminate thing* [to aoriston], *the colour of the air or sea* is not the same to those who approach them up close and those who view them from a distance; while in bodies, unless the surrounding atmosphere brings about a change, the colour has a *determinate* [horizesthai] appearance (SS 3, 439b1-6, Miller tr.).

Here, Aristotle, further, differentiates between the ways colours appear, in terms of the sorts of bodies in which the colours reside: determinate and indeterminate bodies. Colours in indeterminate bodies, e.g., air and sea, do not appear the same to viewers up close as they do to those at a distance whereas colours in determinate bodies appear the same, regardless of proximity. This claim is not in itself important for the present discussion, but it prompts reflection on two significant issues: *First*, why can non-tactile qualities impact only indeterminate bodies? *Second*, given his mention of the *appearances* of colours, can we interpret this in a general way, such that the changes that occur in air and water are *not* non-perceptual effects of non-tactile qualities, but merely changes that make these qualities *appear* to perceivers?

Let me begin with the *first* question: what makes air and water uniquely susceptible to the effects of non-tactile qualities? The qualifications ‘indeterminate’ and ‘not staying put’ which we see Aristotle using for them can perhaps explain their special status. The word ‘indeterminate’ translates the Greek term *aorista* (literally, ‘unbounded’ or ‘without boundaries’), which denotes a certain state of air and water. According to his taxonomy of elements, although air and water differ in that the former is warm while the latter is cold, they share wetness. And the wet, as he defines it, is “that which is *not bounded* [*aoriston*] by any boundary of its own but is easily bounded” (*GC* II.2 329b30-31, Williams tr.). Drawing upon this, he differentiates air and water (and in fact, airy and watery bodies) from bodies like animal, plant, rock, and metal: while the latter are ‘determinate’ as they each begin and end somewhere with their own natural limits, the former are ‘indeterminate’ in having *no* natural boundaries of their own, but tend to be bounded by the others. Also, as he says, air and water ‘do not stay put’. This seems to denote their tendency to disperse quickly in all directions. It appears that these qualifications together set air and water apart from the remaining sorts of bodies.

Even so, this does not directly explain why only air and water can be affected by non-tactile qualities. I say this because Aristotle deems them receptive to the impact of the qualities not just when they are in their original indeterminate and unstable states, but also—in fact, especially—when they are contained by some boundary. For instance, he says that for sounds to be produced “[...] solid objects must strike against each other and against the air, and this happens *whenever the air stays put after it is struck and is not dispersed*” (*DA* II.8 419b19-22, Miller tr.). Likewise for colours: in the case of reflection, “[...] the air is affected by shape and colour *as long as it remains a unitary mass*. And it is a unitary mass over a smooth surface” (*DA* III.12 435a6-8, Miller tr.).<sup>4</sup> In general, ‘the best results’ are obtained when the air and water non-tactile qualities are going to affect are contained and compressed by some boundary.

Considering this, one proposal could be as follows: as air and water are indeterminate and unstable, and as there is a limit in their compressibility, they cannot retain for a long time the effects they receive. In turn this makes such bodies lack their own odours, sounds, and colours, and, thereby, disposes them to “borrow”, as Sorabji (2004) calls it, those of determinate objects. Indeed, this seems to be what Aristotle thinks. He connects the absence, e.g., of sound in the air to the latter’s indeterminate and unstable state: “In fact, the air itself is *soundless because it is easily broken up*; but when it is prevented from breaking up, its movement is a sound” (*DA* II.8 420a7-9, Miller tr.). Likewise for colours and sounds: “*The colourless* is able to receive colour, and *the soundless* to receive sound. The transparent is colourless, as is the invisible or the scarcely visible, as the dark seems to be” (*DA* II.7 418b26-29, Miller tr.). The term ‘the transparent’ here refers to air and water in the case of colours.<sup>5</sup> He collectively labels them as such, considering their common nature, namely, their particular kind of

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<sup>4</sup> Saying that air is unitary over smooth surfaces, Aristotle speaks analogously to the state of unshaken or still water (*Meteor.* 372a29-31). See *DA* 435a2-5.

<sup>5</sup> See *SS* 442b29-a2 for the analogous status of air and water in the case of odours.

visibility (*DA* 418b4-6). As this issue relates to perception, we do not need to go in detail. In the case of odours, Aristotle does not particularly take up the state of air and water, but it seems that they should also be *odourless*, to receive the odours of determinate bodies (see *SS* 443a9-21). Therefore, it is due to their lack of qualities of their own that air and water tend to ‘take on’ the odours, sounds, and colours of determinate bodies. And this ‘taking on’ is just another way of saying that they can receive the non-perceptual effects of non-tactile qualities.

Some scholars reject the conclusion above. This brings us to the *second* question raised earlier: are the changes which non-tactile qualities generate in air and water genuinely non-perceptual, or merely changes by which these qualities *appear* to perceivers? While I argue for the former, these scholars go for the latter. Pointing, among other places, to the last clause of the *DA* II.12 passage, the line “the air upon being affected quickly becomes *perceptible*,” they argue that Aristotle, here, is merely interested in showing how air and water are ‘made perceptible’. Burnyeat (1995), for example, says that odours, sounds, and colours affect things “at least in the case of indeterminate (*aorista*) things like air. What they do to air is make it *smellable*, *hearable*” (p. 25). Broadie (1993) likewise asserts that in granting these qualities the power to act on air and water, “Aristotle seizes on the fact that, here, what was not perceptible in a given way—something odorless or colorless, etc.—is *made to become so*” (p. 147, emphasis added). And finally, Johansen (1997), referring to the status of air and water as ‘media’ between perceivers and non-tactile qualities, says: “the medium is changed by the sense-object *insofar as* the sense-object *appears* to the perceiver *through it*” (p. 137, emphasis added).

In discussions of perception, Aristotle relies on the observation that animals perceive odours, sounds, and colours *from afar*—unlike the tangibles and flavours that are perceived through direct contact. Yet, as every causal process requires contact between agent and patient, he thinks that non-tactile qualities must be perceived through ‘proxies’ or ‘media’. Seeing that he assigns air and water the role to play such media, these scholars argue that Aristotle, here, merely offers a mechanism, as it were, for the perception of qualities of distant objects, without ascribing these qualities the power to non-perceptually affect air and water. Call this view ‘phenomenal approach’<sup>6</sup> as it suggests that the changes that occur in air and water are phenomenal, enabling non-tactile qualities to *appear* through themselves to perceivers at a distance.

I agree that Aristotle attempts to give the basis for how animals perceive qualities of distant objects. However, merely positing air and water as ‘media’ to account for this does not imply that the actions of these qualities on them are phenomenal. As shown, air and water can be affected by non-tactile qualities, and since these beings are insentient, the effects they receive must be considered non-perceptual.

Further, Aristotle notes that in perception, the distance between perceivers and non-tactile qualities matters, e.g., of sounds and odours: “the person *nearby* perceives the smell *sooner*, and the sound of the stroke arrives *later than* the stroke occurs” (*SS* 6,

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<sup>6</sup> After Marmodoro (2014, p. 150-1).

446a24-25, Miller tr.). The changes odours generate in the air affect the perceiver who is nearer to the odorous object *earlier than* the perceiver who is further away; and sounds affect perceivers *a while after* they are struck.<sup>7</sup> If changes generated in air and water were phenomenal, the distance in question should not have made a difference.

Still, my opponents may argue that even if we admit that non-tactile qualities can cause air and water to undergo material changes, these changes in turn would not generate any further change in some other bodies except for perceptual changes in sentient ones. Broadie (1993) expresses this line of thought:

Colors and smells and sounds *as such* [*sc.* taken on by air and water] cannot *kill* or *damage* anything; they cannot make anything *grow* or *flourish*; they cannot *heal* or *poison*; they cannot cause anything to *ripen* or *ferment* or *decay*. Such effects may be signaled by changes in sensible qualities, but that is not what they essentially are (p. 147, emphasis and brackets added).

Broadie contends that since the changes produced in air and water cannot, in turn, kill, poison, or make things grow, these changes must be phenomenal. However, demanding that something do all these things in order to qualify as materially causally efficacious sets the bar too high. Recall the thesis that qualities have varying impact areas. This applies also to the changes generated in air and water. They do not need to cause all those effects. They count as causally efficacious even if they are operative in a narrow impact area. And Aristotle, indeed, appears to think that changes generated in air and water can induce further material changes in other airy or watery bodies. In *De Insomniis*, for example, he says that watery substances like oil and wine acquire, *through air*, the odours of nearby objects:

the *oil* which has been prepared quickly *takes on* the smells of *nearby things*, and *wines* are *affected* in the same way; for they *take on* not only the smells of things thrown into them or mixed with them but also of things which are placed, or which grow, *near their containers* (2, 460a28-32, Miller tr.).

The scents of, say, nearby flowers or trees, affect the air, and the air in turn affects oil and wine in vessels. What Aristotle says here is not unique to the example. In lines after this quote, he mentions the preparation of perfumery in a similar fashion. It seems that people intentionally benefit from the transfer, as it were, of changes between air, water, airy substances, and watery ones.

In conclusion, in *DA* II.12, Aristotle initially suggests that qualities cannot affect insentient objects. However, as I have argued, he actually thinks that *all* qualities possess causal efficacy, albeit with varying areas of influence: while tangibles affect anything material (determinate and indeterminate alike), flavours cause nutrition in determinate bodies like animals and plants. As for odours, sounds, and colours, their

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<sup>7</sup> Distance does not make a difference in the case of colours, but this is because he believes that changes which colours produce in air and water *happen at once* (SS 446b9-10, b27-a11).

impact area is limited to such indeterminate bodies as air and water, and airy and watery substances.

### III. Qualities' Effects on Sentient Objects

My aim so far has been to demonstrate that qualities can affect insentient objects. By utilising their incapacity to perceive, I could identify the changes these objects undergo, as non-perceptual. Further, if qualities can affect insentient objects, they should affect sentient ones too, given that both are material. However, the fact that qualities can cause perception in sentient objects complicates matters. To address this, I propose examining cases where Aristotle discusses how perception *fails* to occur. Examining such failure cases can reveal that qualities can generate effects other than perception in sentient objects as well.

Aristotle sometimes refers to anomalous conditions of the perceiver, which result in a failure of perception, e.g., illness, intoxication, and sleep. He also mentions abnormal conditions of sense organs, e.g., their being overwhelmed by receiving stimuli the whole day; or conditions of the medium rendering it inconducive to perception, as for example of air (in the case of seeing) not being properly illuminated. Yet, as all these cases seem to involve the deviant conditions of factors which otherwise play crucial roles in perception, and not such conditions of qualities, they do not directly concern us here. There are two types of cases, though, where he relevantly connects failures of perception to qualities themselves. In one such case, as he claims, qualities, when excessive, can damage the senses. The other is one in which, as he asserts, intrinsically bad odours can damage the animal by destroying the sense of smell.

#### III.1 Excessive Qualities

Aristotle says that sensory capacities deal not only with 'perceptible' qualities but also with 'imperceptible' ones, and that the latter can damage the senses:

Sight is concerned with both the visible and *the invisible* [*to aoraton*] (for darkness is invisible although sight discriminates it as well) and, moreover, with what is *exceedingly* bright (for this also is invisible but in a different way from darkness). Similarly hearing is also concerned with both sound and silence, of which the former is audible and the latter inaudible, and also with a *loud* sound, just as sight is with a bright object; for just as a faint sound is *inaudible* [*anekoustos*], so too in a way is a loud and *violent* one. [...] In this same way also taste is concerned with the tasteable and *the tasteless* [*to ageuston*]; and the latter possesses little flavour or a foul flavour or one *destructive* [*phtartikon*] of the sense of taste (*DA* II.10 422a20-26, 29-31, Miller tr.).

Here he gives the cases of sight, hearing, and taste but elsewhere presents the cases of smell and touch too, in the same vein (*DA* 421b5-14, 424a10-15). He explains the idea by means of example. Sight deals with the visible and the invisible. The visible refers to such qualities as white, black, and any intermediate colours like yellow, red, purple, green, and blue; and their actions on the sense of sight under suitable conditions generate perception. As for the invisible, it also corresponds to colours (*DA* 422a26-29),

but since they reside in bodies either *scarcely* (e.g., darkness in the air)<sup>8</sup> or *excessively* (e.g., brightness in the sun), their actions, *ceteris paribus*, do *not* engender perception. Hence, they are called ‘invisible’. The way Aristotle uses such words as ‘invisible’, ‘inaudible’, and ‘intangible’ (in general, ‘imperceptible’) suggests that these qualities (or, qualities in this state) are ‘unsafe to perceive’. Namely, the label ‘imperceptible’ in this context does not mean imperceptible in an absolute sense, but denotes the state of qualities whose actions on the senses can cause undesired outcomes. To explain this, Aristotle, in lines after the above quote, mentions the pair of terms ‘drinkable’ and ‘undrinkable’ for items like rainwater and seawater, respectively. The latter also falls in the class of the drinkable as it has a certain taste, but since, in the event of absorption, it can hurt animals or plants, it is called undrinkable (422a31-34).

Considering the qualities labelled as ‘imperceptible’ in this fashion, we can say that they fall in the same class of perceptible qualities. Based on this, since they reside in bodies either *scarcely* or *excessively*, call the former ‘scarcely perceptible qualities’, and the latter ‘excessively perceptible qualities’, for the sake of convenience. They are, respectively, either too weak or too powerful to stimulate the senses, but in either case, their stimulations can induce effects other than perception in animals. Aristotle does not address the effects, if any, of scarcely perceptible qualities. As for excessive ones, he says that they can cause their corresponding sense organs either to cease to function for a while, or else to be destroyed for good:

And if, after looking at the sun or some other *bright* object, we shut our eyes, then, if we watch closely it appears directly aligned with what our line of sight happens to be, at first in the same colour and then it changes into red and then purple, until it becomes black and disappears. [...] Again, *people become deaf due to loud noises and have a weak sense of smell as a result of strong smells*, and likewise in similar cases (*Insomn.* 2, 459b13-18 & 20-22, Miller tr.).

All these effects are non-perceptual. This conclusion prompts two important questions: *first*, earlier we learnt that Aristotle confines the impact area of non-tactile qualities to air and water. However, he now suggests that they can also affect their respective sense organs, albeit destructively. Why is it so? In fact, there is no conflict in his statement. He believes that each sense organ, at least predominantly, is composed of either air or water, which in turn places the organ within the impact area of non-tactile qualities: “[...] it is out of these two elements alone that sense-organs are composed, namely *air and water*. For the pupil of the eye is composed of water, and the organ of hearing of air, and the organ of smell of one or the other of these.” (*DA* III.1 425a3-5, Miller tr.). This point also indicates that when he states, in the *DA* II.12 passage, that odours affect *only* what is able to smell, and later that they affect air and water, he does not, actually, change his mind. He just considers the case of changes in the organ of smell as an example of changes in air and water effected by the same qualities.

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<sup>8</sup> Cf. *DA* 426a30-b7 where he takes darkness, not among scarcely visible qualities, but among excessive ones.

Now we turn to the *second* question: if non-tactile qualities can affect sense organs on account of the latter's airy or watery nature, then what makes each class of the qualities so associated to a sense organ that the former can affect the latter exclusively? In *Generation and Corruption* I.7, Aristotle indirectly addresses this question. When explaining how alteration occurs, he asserts that it can occur only between objects whose qualities are *generically* the same as but *specifically* contrary to each other (324a5-6). In our case: in order for an object to alter a sense organ, it must possess a quality falling under the same genus as that of the organ—both must have, e.g., colours, or sounds, or odours. However, this is not sufficient for the organ to alter, the qualities of the object and the organ must also be specifically contrary to each other—i.e., their colours, or sounds, or odours must be different.

But what makes the organ the patient and the object the agent of alterations? This is not a necessity;<sup>9</sup> Aristotle frames it this way because he is interested in how the object alters the organ (in perception). Specifically, he thinks that each sense organ, before alteration, occupies 'a mean state' with respect to the species of qualities it is naturally adapted to (*DA* 423b27-a16). Recall that as air and water lack qualities of their own or have them scarcely, they tend to receive qualities of determinate objects. Likewise, the organ, while being in its mean state, lacks a quality (or scarcely has it), and this makes it the patient of alterations. Given that the organ is in such a state, the object must possess an 'extreme' quality so that it can alter the organ—extreme in the sense that it either (moderately) exceeds or (moderately) falls short of the organ's mean state. When an animal encounters such an extreme quality, its sense organ starts to alter until it assimilates to the quality (*DA* 418a5-6). Only when this assimilation is granted can the animal perceive the quality. However, if the animal encounters an excessive quality, it overstimulates the organ, potentially causing its destruction.

There is one exception: the tangibles. Excess in any quality can destroy its respective sense but excessive tangibles can also damage the animal itself:

the other perceptibles—for example, *colour, sound, and odour*—when they are excessive, do not destroy the animal but only its sense organs, unless coincidentally, for example, a push or a blow were to occur the same time as the sound, or sights and odours move other things which *destroy* objects by contact. And flavour, too, destroys objects in so far as it happens to be tangible. But *excess in tangible objects—for example hot, cold, or hard—is fatal to the animal*. [...] excess in tangible objects destroys not only the sense organ but also the animal, because it is only this sense that it must possess (*DA* III.13 435b7-14 & 18-19, Miller tr., modified).

Aristotle offers two explanations for this phenomenon. *First*, he invokes the impact area thesis: non-tactile qualities, when excessive, can destroy airy or watery bodies like their corresponding sense organs. Yet, if these qualities are observed to destroy determinate objects like an animal, it must be because they occur together with a push or blow

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<sup>9</sup> See *Insomn.* 459b26-a11 where Aristotle considers a case in which the organ of sight takes the role of agent, by resorting to a strange example: the eyes of a woman, during menstruation, might turn red, and can thereby act on the medium (the air).

which, likely due to its tangible qualities ‘density’ or ‘hardness’, does the destruction “by contact” (*haphei*). *Second*, he draws from his biological works. Observing that not all animals have all the five senses but some rely solely on the sense of touch, he concludes that animals differ from plants in possessing this sense, only (*HA* 489a17). As this sense is animals’ defining capacity, Aristotle argues in the above excerpt that if an excessive tangible quality destroys it, the animal, also, is destroyed.

### *III.2 Intrinsically Bad Odours*

Aristotle recognises another group of quality that can be destructive, but this time (apparently) destructive of animals, namely, intrinsically bad odours:

none of the non-human animals is troubled by the smell of objects that are malodorous *in themselves* [*kath’ auta*] unless some of them happen to be *destructive*. But they are *killed* by these things in the same way as human beings who *become drowsy*, and often are killed by the vapour from charcoal; thus, non-human animals are killed by the potent fumes of brimstone and bituminous stuff, and they avoid them because of their affect (*SS* 5 444b28-5a1, Miller tr.).

In lines before this quote, Aristotle says that there are two species of odours: coincidentally good or bad ones, and intrinsically good or bad ones. The former are coincidentally so because they happen to be classified along with flavours; and flavours, most truly, are qualities of nutriment. Animals give heed to these odours because they all live on nutrition, and these odours, coinciding with pleasant or unpleasant food, contribute to nutrition. As for the second species, these odours are intrinsically good or bad—intrinsically because they do not borrow their goodness or badness from pleasant or unpleasant food. The smells of flowers can be an example of intrinsically good odours. Aristotle’s examples for intrinsically bad odours, are the vapor from charcoal, the odours of brimstone, bitumen, and sulphur. Only humans, he adds, give heed to these odours because they possess the largest, moistest, and coldest brains relative to their overall size, enabling them to handle the heat and movement caused by ill-smelling stuff and to enjoy good-smelling stuff (444a33-b2). Non-human animals, however, pay attention to these odours only when they are destructive. Aristotle notes in the above excerpt that intrinsically malodours can induce sickness, drowsiness, or even harm to animals. Consequently, animals, noticing the onset of their deleterious effects, avoid objects possessing such odours (see *HA* 534b21-25).

But I have been arguing that odours affect only airy and watery objects, like the organ of smell. How can intrinsically malodours damage the animal itself? In *DA* II.9, in addressing the question of whether non-breathing animals smell, Aristotle indirectly addresses this question. He says: “[bloodless animals] are also evidently destroyed by the same powerful smells as are humans, for example, bitumen, sulphur, and so forth. Therefore, they must smell but do so without breathing in” (421b23-26, Miller tr.). If non-breathing animals do not smell, intrinsically malodours would fail to affect them. Yet, since they are observed to suffer the destructive effects of such odours, they must smell, except that unlike lung-equipped animals, they smell without breathing in. This

argument critically indicates that intrinsically malodours affect animals *only* by being operative in their impact area, namely, by destroying the organ of smell.

The foregoing discussion also addresses a potential concern. Since Aristotle, as seen, invokes the effects of heat on the animal brain to explain the destructive effects of intrinsically malodours, one might wonder if the latter reduce to the former. However, this is not the case, since if the effects of odours could be entirely explained by heat, Aristotle would not argue that non-breathing animals must smell if they receive the deleterious effects of intrinsically malodours. This suggests that Aristotle considers the effects of odours on the organ of smell as irreducible to the effects of any other quality like heat.<sup>10</sup>

#### IV. Conclusion

This paper has explored two contexts in Aristotle's works: one concerning the impact of qualities on *insentient* objects, and the other involving cases where qualities produce non-perceptual effects in *sentient* objects. This exploration leads to a significant conclusion: For Aristotle, qualities possess causally efficacy in producing non-perceptual material effects in nature. With this finding, it becomes evident that Aristotle's realism withstands a threat posed by views that restrict the causal efficacy of qualities to the production of perception: Qualities do not have to remain unactualised outside perception. They can achieve full actuality also when they generate non-perceptual effects. Further, our examination of cases where excessive qualities and malodours generate non-perceptual, material effects in animals strongly suggests that qualities, when neither excessive nor malodorous, can materially affect animals also during perception.

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<sup>10</sup> See SS 442a29-b3. See Freeland (1995), Lee (2011), and Caston (2018) for an anti-reductionist reading of non-tangible qualities, a view which I also endorse. See Broackes (1999, pp. 102-103) for a reductionist reading, cf. Carter (2019, pp. 129-130).

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