Thomas Aquinas, Perceptual Resemblance, Categories, and the Reality of Secondary Qualities

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Abstract: Arguably one of the most fundamental phase shifts that occurred in the intellectual history of Western culture involved the ontological reduction of secondary qualities to primary qualities. To say the least, this reduction worked to undermine the foundations undergirding Aristotelian thought in support of a scientific view of the world based strictly on an examination of the real—primary—qualities of things. In this essay, I identify the so-called "Causal Argument" for a reductive view of secondary qualities and seek to deflect this challenge by deriving some plausible consequences that support a non-reductive view of secondary qualities from an Aristotelian view (*via* the philosophical commentary of Thomas Aquinas). Specifically, my argument has two facets. First, I show that Aristotle's view both implies recognition of the extramental existence of secondary qualities and is a *prima facia* natural view to take regarding the ontology of secondary qualities. Second, I show that the Causal Argument, which is thought to undermine a natural view of secondary qualities as real things, loses its bite when one examines perception in light the ontological relationship among the categories of quality, quantity and substance.

I.

In *The Metaphysical Foundations of Modern Physical Science*, Edwin Burtt brings out a stark contrast between two world-views: that of the medieval scholastic, which found its philosophical model in Aristotle and Neo-Platonism, and that of the contemporary modern, who envisions the expanse of knowledge as being built on, or at least delimited by, positive science.[1] However, with each distinctive philosophical horizon comes its own host of challenges. Burtt poignantly expresses a dismal consequence of the contemporary modern worldview by reflecting on a passage from Bertrand Russell's *A Free Man's Worship*—a book written by someone who, as a child of the twentieth century, drank deep from the well of thought of Galileo, Kepler, Newton, Darwin, et al. Burtt expresses Russell's view as follows:

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> To Russell, man is but the chance and temporary product of a blind and purposeless nature, an irrelevant spectator of her doings, almost an alien intruder on her domain. No high place in a cosmic teleology is his; his ideals, his hopes, his mystic raptures, are but the creations of his own errant and enthusiastic imagination, without standing or application to a real world interpreted mechanically in terms of space, time, and unconscious, though eternal, atoms. His mother earth is but a speck in the boundlessness of space, his place even on the earth but insignificant and precarious, in a word, he is at the mercy of brute forces that unknowingly happened to throw him into being, and promise ere long just as unknowingly to snuff out the candle of his little day. Himself and all that is dear to him will in course of time become "buried in a universe of ruins."[2]

This view stands in significant contrast to the world-view of Aristotle and the medieval scholastics. For such scholastics, not only is the natural world immediately present and intelligible to one's mind but a human being as a whole is comprehendible within this natural order.

But when and why did such contrasting views gain purchase? How did the modern viewpoint with its very different notions regarding reality arise? This judgment in favor of a scientific world-view was advocated by Galileo. This makes sense given Galileo's innovations and interests in providing explanations that are expressible in quantificational and mathematical terms. Thus, it is no surprise that he held an eliminativist and projectionist view about those perceived qualities that do not admit of quantification or measurement. He explains his position clearly in the following passage:

> But that external bodies, to excite in us these tastes, these odours, and these sounds, demand other than size, figure, number, and slow or rapid motion, I do not believe; and I judge that, if the ears, the tongue, and the nostrils were taken away, the figure, the numbers, and the motions would indeed remain, but not the odours nor the tastes nor the sounds, which, without the living animal, I do not believe are anything else than names, just as tickling is precisely nothing but a name if the armpit and the nasal membrane be removed; . . . and turning to my first proposition in this place having now seen that many affections which are reputed to be qualities residing in the external object, have truly no other existence than in us, and without us are nothing else than names.[3]

The discrepancies between modern scientific and Aristotelian world-views have led philosophers to designate properties that we naively associate with reality as secondary qualities. Secondary qualities—identified by terms such as, 'red,' 'heavy,' 'cold,' 'loud,' 'bitter'—are contrasted with primary qualities, which are those properties of things without which quantificational explanation would not be possible. For this reason, a scientific world-view heretofore has supported a reductive view of secondary qualities. For, we may not have reason to be anti-

realist regarding the association between our ideas of primary qualities and the way in which primary qualities exist as properties of objects, yet, we do have reason to wonder if our ideas of secondary qualities express reality regarding the things which we associate with these ideas. As a result, secondary qualities are to be understood as deceptive. They make us think that truly the ideas that we have of things accurately represent the things as they are. However, for Galileo and subsequent philosophers, it is strictly speaking false to say that, for example, Elizabeth Taylor's eyes really are blue.[4] The blueness of her eyes is only how they appear to us, and depends on the particular experience of a given person, which is subjective. Or, Willy Wonka's chocolate is not really sweet. Or, heat is not the warmth we feel on our skin. The only way to understand objects is through their primary qualities by describing them in terms of ideas that are not relative to how they are perceived: for example, we can describe heat through energy absorption and the movement of atoms; or, we can talk about light reflection off surfaces with certain wavelengths, or the constitution of table sugar (which produces a sweet taste) as $C_{12}H_{22}O_{11}$. It is primary qualities that form the basis upon which we obtain scientific knowledge of objects. For example, position, motion and mass form a basis through which one can articulate the scientific concepts of gravity and electromagnetic attraction among ionized particles and protons. The same cannot be said for ideas of secondary qualities.

However, a reductionist view of secondary qualities has its complications. For example, it is one thing to say that secondary qualities are subjective insofar as they are dependent on the particular condition of the perceiver, and it is quite another to say that that they are absolutely subjective. Whereas the former seems true, the latter seems quite false. The latter seems false because we know that colors as perceived by us tell us something about the world around us; they are the way by which primary qualities can be ultimately known. Beyond this, it seems obvious that there is something about the object itself that has the disposition to make us have a given perception of it.[5] Thus, a clearer understanding of what it means for secondary qualities to not be real is required. In his *Problems from Locke* J. L. Mackie hones in on a clear articulation of secondary quality anti-realism through the notion of "resemblance": secondary qualities are properties of things that produce ideas in us that have no resemblance with the things that produce them.[6] On the other hand, primary qualities—referred to by terms such as square, in front of, moving, solid—are such that, "the ideas of primary qualities . . . are resemblances" of the properties of things.[7] Similarly, our ideas of secondary qualities do not resemble things as they exist in things; or, in other words, the world as it is in itself is not like the secondary qualities through which we perceive them. Rather, secondary qualities are dispositions in things to produce certain subjective responses or affections but these dispositions are themselves ultimately caused by primary qualities.[8] So, in this way, one can say that secondary qualities are grounded directly in real things in the world—primary qualities—but on the other hand, we cannot say that secondary qualities are really like the way we perceive them to be.

Since secondary qualities do not resemble our ideas of them, they do not provide an explanation of the world that rivals what can be known through primary qualities. Primary qualities push out the possibility that our ideas of secondary qualities have explanatory power. The connection between primary qualities and science "show that there is no good reason for postulating features of a certain other sort, namely thoroughly objective features which resemble our ideas of secondary qualities."[9] Specifically, they do not provide us with a "case for postulating the existence of qualities with the spatial structure of colours, either in addition to or instead of the hypothesized micro-structures to which physicists would at present refer in explaining colour phenomena."[10] Let us then call this the "Causal Argument" (henceforth, CA) against the objective existence of secondary qualities. Mackie's way of making the primary/secondary quality distinction through the notion of resemblance can be used to articulate the CA in the following way: since, secondary properties can be explained sufficiently in terms of primary qualities and since our ideas of secondary qualities do not resemble the primary qualities through which a sufficient explanation is obtained, we are able to say that secondary qualities do not really exist in things. Our ideas of primary qualities resemble primary qualities and an analysis of objects in terms of primary qualities yield an explanatory view of such objects. Thus, only primary qualities are real. So, although we call an object red, it is not really red in the sense that it resembles our idea of the secondary quality of redness. Things in reality are not as our ideas of secondary qualities would suggest.

Having highlighted the importance of the issue, we shall next offer an Aristotelian-Thomistic response. Our task at this point is try to offer some justification for the belief that so-called secondary qualities exist in things themselves and not specifically in virtue of, or reducible to, primary qualities, even though there is a kind of explanatory priority to those based on primary qualities. We argue that not only can we have knowledge of a specific color property according to its appearance to us, but we can also claim that an object objectively possesses some entity (like an essence or form) that resembles our color experience of that entity. In other words, the property responsible for us having a certain color percept resembles our idea of that property. However, in order to accomplish this task, we need to address CA. In order to do this, we shall do two things: (1) discuss what it means to say (from a Thomistic-Aristotelian analysis) that an idea resembles some extra-mental property. By discussing '(1)', in contrast to a representationalist view of mental content, we shall suggest that there is a special relation of sameness between the percept and the object perceived (viz., the quality inhering in some substance) to provide justification for believing that secondary qualities have objective ontological status. We also need to (2) show that the analysis of an object in terms of its primary qualities does not undermine the positing of existing secondary qualities; in other words one can still claim that secondary qualities are real even though a relevant analysis in terms of primary qualities can be given. We shall take up '(1)' in section II and '(2)' in III.

II.

Our first task is to address some preliminary considerations that offer support to an Aristotelian viewpoint and exposes some ambiguities inherent in Mackie's articulation of the primary/secondary distinction given above.

First, let us examine Mackie's description of secondary qualities as properties (or dispositions) of things that are expressed by ideas that do not resemble the properties of things as they really exist in the things themselves. The term 'resemble' here is ambiguous.[11] What does it mean for an idea to resemble the thing that it represents?[12] In the Cartesian tradition, representation is to be understood precisely as independent from the notion of resemblance. This is so because to say that a concept resembles the thing that is understood through it is to say that there is some sameness existing between the content of the concept and the thing understood. This implication is unacceptable to a modern sensibility.[13] Rather than using resemblance to articulate the relationship between objects and our ideas of them, one is to understand a brute notion called 'representation' in which for idea *Y* to represent object *x* is merely to present an accurate notion of *x*, without there being anything more fundamental to serve as an analysis of this relation. This brings the analysis of the relation to an explanatory end and, many have thought, leads to skepticism. Let us examine an alternative to the Cartesian view. To do so, we shall turn to Aristotle's view of perception found in the *De anima* and its relation to a perceived object. But first we need to briefly discuss what is generally involved with sense perception.

Usually, when one thinks about perception in Thomistic-Aristotelian terms, one thinks of the object perceived and the phantasm that arises in the subject from which an intellectual grasp arises. When discussing sensation, Aquinas comments on the relationship between conscious awareness, which he calls the power of sensation, and the so-called "primary sensitive part," which is that which receives the form of the sensed object:

> Aristotle assigns to sense an organ, observing that the 'primary sensitive part', i.e. organ of sense, is that in which a power of this sort resides, namely a capacity to receive forms without matter. For a sense organ, e.g. the eye, shares the same being with the faculty or power itself, though it differs in essence or definition, the faculty being as it were the form of the organ. . . . So he goes on to say 'an extended magnitude', i.e. a bodily organ, is what receives sensation', i.e. is the subject of the sense-faculty, as matter is subject of form; and yet the magnitude and the sensitivity or sense differ by definition, the sense being a certain ratio, i.e. proportion and form and capacity, of the magnitude.[14]

So, in sensation there is the reception of a form, which is received, Aquinas says, without matter, in the extended magnitude, which is the sense organ. Yet, as receptive it is the material aspect of sensation. This is coupled with the power of sensation proper, which is the formal aspect of sensation, which is presumably the consciousness

of the sensible form (also referred to as "seeing one's own seeing," mentioned in the next passage). As mentioned above, there is a resemblance between the form as actualized in sensation and the form received in the sensitive organ. Finally, when discussing the subject and object of sensation, Aquinas gives further support to the idea that there is a likeness between being able to see what one is seeing (the actualized power of sensing), the seeing itself (what is received into the sense organ), and the thing seen (the object). About this, Aquinas says the following:

> [Aristotle] says that while one solution of the difficulty was found by maintaining that the subject seeing colour was not coloured, another might be argued on the assumption that the subject seeing colour is in a certain sense coloured, inasmuch as, in seeing, it takes in a likeness of colour, becoming like the coloured object. This is why the power by which one sees one's own seeing can still be strictly a power of sight. . . . So the one who sees becomes coloured in so far as he retains a likeness of colour and of the coloured thing; and not only sight, but any act of sense is identical in being with the act of the sensible object as such; although the mind can consider them apart.[15]

In this way, it is true to say that in one sense the subject seeing color is colored and in another sense the subject seeing color is not colored. The former sense is true because there is retention of color in the subject from the colored thing and a likeness between them. The latter sense is true because although there is a likeness, the sense organ receives the form from the sensible object without the matter of the object sensed.

With a basic indication of the likeness relationship that holds between what is received in the magnitude of the sense organs, the experience of what is sensed, and the object perceived, we can continue to fill in some details regarding the nature of these forms and the various ways in which they are realized. We can also understand what Aristotle means when he says that a form is received in sensation without matter. Aristotle offers us an analogy in which he explains the resemblance or formal identity between objects, what is received in the sense organ, and what is experienced:

> It must be taken as a general rule that all sensation is the receiving of forms without matter, as wax receives a seal without the iron or gold of the signet-ring. It receives an imprint of the gold or bronze, but not as gold or bronze. Similarly the sense of any sense-object is acted upon by a thing having colour or flavour or sound; not, however, in respect of what each is called as a particular thing, but in so far as each has a certain quality and according to its informing principle.[16]

Here Aristotle is telling us that there is an impression in sensation that has as its source that which comes from the object of the perception. Thus, there is a resemblance between that which is sensed and that which is the ultimate source of the impression; just as there is a resemblance between the gold ring and the impression

made in the wax.[17] Due to this relation, the sensation is "able to receive the forms of sense-objects" in different ways.[18] In his *Commentary on Aristotle's De Anima*, Aquinas elaborates further on this passage:

> [W]hile it is true that every recipient receives a form from an agent, there are different ways of receiving form. . . . Sometimes . . . the recipient receives the form into a mode of existence other than that which the form has in the agent; when, that is, the recipient's material disposition to receive form does not resemble the material disposition in the agent. In these cases the form is taken into the recipient 'without matter,' the recipient being assimilated to the agent in respect of form and not in respect of matter. And it is thus that a sense receives form without matter, the form having, in the sense, a different mode of being from that which it has in the object sensed. In the latter it has a material mode of being, [*esse naturale*] but in another sense, a cognitional and spiritual mode.
>
> [T]he sense is affected by the sense-object with a colour or taste or flavour or sound, 'not in respect of what each is called as a particular thing,' it (the sense) is indifferent to what in each case the substance is.'[19]

So, Aquinas is suggesting that forms have a commonality or sameness even among different ways in which they are realized (forms are received and assimilated). There is a connection of resemblance between the perception and that which is perceived. However, he continues to say that the resemblance is not between the perceptive idea in the mind and the thing as it is according to its substance, but according to some accidental reality.[20]

That a form is assimilated between two modes of existence implies that there is something the same or formally identical between that which is the source of an impression and that which is perceived.[21] In the *Metaphysics*, Aristotle discuses this notion of sameness among things in the context of a discussion of differences among categories: some things "are said to be the same essentially, and in the same number of ways in which they are said to be one. For those things whose matter is one in species or in number, and those whose substance is one, are said to be the same. Hence it is evident that sameness is a kind of unity of the being of many things."[22] There are a couple of important features of this passage. The first is that Aristotle is saying that between two things, there can be an essential sameness between them even if they are not numerically identical to each other. For example, there is sameness between Socrates and Plato because they are both men.[23] Plato and Socrates, although distinct beings, are essentially the same. The second point is that this unity among things should be understood in different ways when considering different categories. On this point, Aquinas elaborates: "Now the parts of unity are sameness, which is oneness in substance; likeness, which is oneness in quality; and equality, which is oneness in quantity."[24] This is an important passage because it suggests that unity of accidental forms—such as a color or some other secondary quality—exist in an object and in the mind as a percept of it. The unity that exists

between an idea of an object as colored is likeness and not sameness. With likeness there is merely some aspect which is the same while not being sameness according to a substantial designation.

But since unity involves a relation among forms, what is the difference between saying that form x (existing in some object) and form y (existing cognitively in a subject) have sameness in common, whereas form q (existing in some object) and form r (existing cognitively in a subject) have likeness in common? How should these be understood in comparison with the unity that characterizes the unity of equality of quantity? These questions can be answered through an in-depth examination of modes of being. In short, the difference lies in the fact that with substantial forms existing immaterially and intelligently in mind there is nothing occluding identifying the form in the mind with the very form existing outside of the mind because of the immaterial modality of its existence. With the forms of qualities, since they are received in magnitude in the sense organ (the material condition of sensation), although not receiving the matter of the thing outside the mind (such as gold or bronze), nevertheless, since it is received in magnitude the form exists according to a mode of being that does occlude it from full identity or sameness. This relation is called, instead, likeness, which expresses this intermediate situation.

At this point, before we discuss modes of being, and the categories of substance, quantity, and quality we are in fact in a place to understand how realism about secondary qualities follows. This realism follows from our idea about how one could understand the notion of resemblance, which is a condition through which Mackie distinguishes primary and secondary qualities. There is some likeness between a percept and the thing that it is a perception of; not a likeness of the substantial nature of the thing, but only according to an accidental characteristic. In order for there to be resemblance for Aristotle at these different levels, there is required likeness of form expressed between then. In this way, we are able to answer affirmatively the question about whether a ripe apple really is red or not: that an apple really is red is guaranteed by the fact that there is a likeness between the percept and some quality existing in the object.[25] Specifically, the likeness between the percept and the object is *not* to be understood as a disposition in the thing to produce a perception, but rather that the percept itself (and the form as it exists in the magnitude of the sense organ) is like the object which it represents as it is. That is, the fact that our percept is a likeness not of the substance but only of an accidental quality of the substance helps us to avoid the absurd conclusion that a color resembles the material conditions that underlie the color's inherence. In this way, common sense judgments in which we impute color essences to objects need not succumb to a reduction of them to primary qualities.[26]

III.

Based on the notion of resemblance—according to different kind—we were led to conclude that secondary qualities exist in the same kind of way that they are experienced. However, this position seems to be undermined by CA. It is appropriate

now to address this problem. In this section I argue that the explanatory primacy based on primary qualities does not ultimately undermine the existence of secondary qualities due to the fact that, based on an understanding of differences and relations among categories, that the mode of being of qualities inhere in quantity. Next, then, we need to expand the notion of modes of being, especially in the context of the different categories of substance, quality and quantity.

We have been discussing three notions that are included under idea of "sameness" or unity (which describes a relation among forms, and specifically for our purposes, forms that exist outside and inside the mind): namely, sameness (proper), equality and likeness. Each of these were associated in a mutually exclusively way with substance, quantity and qualities, respectively. Thus, to do justice to our topic, we need to address the nature of these three ontological categories, and in so doing, we will be able to expand further on the notion of modes of being, since categories are identified by Aquinas and Aristotle as fundamental modes of being.

So, what are categories and what role do they play in an Aristotelian ontology? Aristotle offers the following introduction to the notion of categories:

> Those things are said in their own right to be that are indicated by the figures of predication; for the senses of 'being' are just as many as these figures. Since some predicates indicate what the subject is, others its quality, others quantity, others relation, others activity of passibility, others its place, others its time, 'being' has a meaning answering to each of these.[27]

Categories are fundamental ways in which being is divided; the basic ways in which things are. So, if we were to take all created things that exist and line them up, everything would be able to be sufficiently identified with one of these categories. For this reason, they are called modes of being. For example, the way that a quality exists is different than the way that a substance or relation does.

Two such modes of being are identified in Aristotle's *Categories*. He says, "[s]ome things . . . are present in a subject, but are never predicable of a subject. . . . [Also, t]here is . . . a class of things which are neither present in a subject nor predicable of a subject, such as the individual man or the individual horse."[28] Here Aristotle is distinguishing between two different ways that things exist in the world.

One can connect a mode of being with the notion of a category by reflecting on the relation that predicates have to their subjects. Symington and Gracia explain the relationship between modes of being and the function of the copula and predicate in the following way:

> The copula and the predicate term are both predicated of the subject but with distinct intensions: the copula expresses existence, and the predicate term expresses a formal designation of the subject. Beyond this, a parallel condition is understood to hold between reality and the basic structure of predication: "Socrates is" is to "Socrates is a man" as "to be" is to "to be a man." In this way, "to be a man" is a mode of being ("to be").[29]

Since there are two distinct but integrated meanings that are predicated of an extra-mental subject, we are able to distinguish between a common (or formal) nature and a mode of being that is expressed in the proposition in relation to the subject. For example, "This ripe apple is red," contains a predicate with these two distinct elements: the formal component "red" and the mode of being of the redness in an apple. Let us look at the first three categories to see if we can understand how, for example, the question regarding the existence of redness—which is a quality—fits into an analysis of distinct modes of being.

Substance is the ultimate subject matter of our grasp and knowledge of the world. Aristotle says that, "the term substance is used in two senses. It means the ultimate subject which is not further predicated of something else; and it means anything which is a particular being and capable of existing apart. The form and species of each thing is said to be of this nature."[30] Substance exists on its own and is the ultimate foundation for all other things that exist within it. A mental grasp of substance has a relation of resemblance to substances existing extra-mentally described as sameness (proper). This sameness can be described as identity of formal content; my grasp of Socrates is identical with Socrates with respect to being a man, and the same thing is true in the relation between Socrates and Plato.

Quality is Aristotle's third category of being. Aristotle says that, "all the modifications of substances which are moved, such as heat and cold, whiteness and blackness, heaviness and lightness, and any other attributes of this sort according to which the bodies of changing things are said to be altered, are called qualities."[31] Examples of qualities are color, heat, shape, etc. Qualities have a mode of being such as to exist in another (*inesse*). For example, qualities can inhere in the quantity of a substance. Qualities involve incidental changes that exist monadically in substances and quantities. Quality is that which is most directly related through sensation—especially since sensation is activated through alteration or motion (in other words, qualities are the proper object of sensation). They are things existing in things themselves that are related through their likeness in sensation; they are communicated to one's awareness via the translation of form into sensation.

With this preamble in place, we can now address the CA. Secondary qualities appear to be suspiciously causally inert. They do not seem to have the kind of impact on the world like primary qualities do: photons traveling through space and impacting the eye seems more tangible than do the transference of a form from an object to a perceiving subject. Does this situation not undermine the very existence of secondary qualities? Along these lines, CA undermines the reality of secondary qualities by pointing out that it is only primary qualities that have explanatory power and not secondary qualities. To counter CA, we need to talk about the category of quantity in relation to quality.

Quantity, is defined by Aristotle as "what is divisible into constituent parts, both or one of which is by nature a one and a particular thing."[32] Aquinas elaborates on this:

> [Aristotle] gives the kinds of quantity; and of these there are two primary kinds: plurality or multitude, and magnitude or measure. And each of

> these has the character of something quantitative inasmuch as plurality is numerable and magnitude is measurable. For mensuration pertains properly to quantity. However, plurality is defined as what is divisible potentially into parts which are not continuous; and magnitude as what is divisible into parts which are continuous. . . . The same thing holds true of surface and of body.[33]

Quantity has properties that lend itself to numerical comparison, analysis and measurement. Because of this property, quantity makes possible scientific explanation insofar as it can provide explanations for things derived through measurement and mathematical analysis (it allows for the quantification of results).

The ontological reason why quantity lends itself to scientific explanation is because the kind of unity that exists among forms that fall under the category of quantity is equality. When commenting on Aristotle's view of relations, Aquinas expands on this notion of equality:

> [W]hen it is said in the case of quantities that this quantity is greater than that one, or is related to that one as what includes is related to what is included in it, not only is this ratio not considered according to any definite species of number, but it is not even considered according to number at all, because every number is commensurable with another. For all numbers have one common measure, which is the unit. But what includes and what is included in it are not spoken of according to any numerical measure; for it is what is so much and something more that is said to have the relation of what includes to what is included in it. And this is indefinite, whether it be commensurable or incommensurable; for whatever quantity may be taken, it is either equal or unequal. If it is not equal, then it follows that it is unequal and includes something else, even though it is not commensurable.[34]

Since magnitudes can be reduced to a unit, there is one common measure. This allows for there to be a more clear understanding of things in terms that can be verified. This clarity allows for a strict comparison among things in terms of equality or inequality. Thus, we see that the sameness or unity between two things regarding quantity is simple mathematical equality, in virtue of the principle of commensurability between units or measurement. Thus, Plato and Socrates are unified by the fact that they are each five feet tall. In this way, we can see that quantity is the ground for so-called primary qualities.

So, why and how is it possible for a causal explanation based on primary qualities (viz., quantity) to be consistent with the existence of qualities (secondary qualities)? Aquinas addresses this by discussing the ways in which quality and quantity are ontologically related:

> [The] terms which signify the properties of quantity pure and simple are also transferred to other things besides quantities. For whiteness is said to be large and small, and so also are other accidents of this kind.

> But it must be borne in mind that of all the accidents quantity is closest to substance. Hence some men think that quantities, such as line, number, surface and body are substances. For next to substance only quantity can be divided into distinctive parts. For whiteness cannot be divided, and therefore it cannot be understood to be individuated except by its subject. And it is for this reason that only in the genus of quantity are some things designed as subjects and others as properties.[35]

Thus, Aquinas explains that although a quality like white exists in its own right as its own mode of being with its own distinctive forms (and these forms are translated in perception), nevertheless since they inhere in quantity—they have their being in quantity—they are subject to an accidental quantitative analysis. In this way, "things are said to be accidentally quantitative only because they are accidents of some quantity."[36] The same is true for things like time, sound, and motion, which is also quantifiable in virtue of the fact that quantity is closest to substance.

Thus, we have an answer to our concern about the non-reality of secondary qualities due to the causal efficacy of primary qualities. A given ripe apple really is red insofar as there is a likeness between the perception of the apple's color and that in the apple which had the power to produce it in perception. But this color as it exists in relationship to the object that is colored exists in a way as to inhere in the quantity of the apple. Due to this, since the being of the color is grounded in the being of the quantity of the apple, the notion of color can be understood in a prior way according to the notion of quantification; which, in turn, yields a scientific description of color according to the relation of light wave-lengths, electrons etc. So, 'red' in "This apple is red" can either be understood to have a likeness between the perception of redness and the property of the apple that falls under the category of quality, or it can be understood in relation to that in which it exists: quantity. Quantity is not the ultimate causal account of an object. Rather, substance is that which gives being to quality and quantity.[37]

There are two ways in which secondary qualities are causally efficacious: 1) Since a quantificational analysis does not account for the quality of color as it is experienced, extramentally existing qualities provide an ultimate determination for the content of perception. 2) Due to the relation of likeness between objects and percepts, since quality ultimately inheres in substance, and since we have a grasp of substances through secondary qualities, there must be a resemblance between our percepts and the secondary qualities that inhere in substances.

Thus, it can be fully recognized that a quantificational analysis of secondary qualities is appropriate and even ontologically prior to color as understood according to its ontological designation as a quality without undercutting the reality of secondary qualities in objects and without the stark consequences engendered by scientism.

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Notes

1. Special thanks to Jean Degroot, Tim Connolly, Michael Sirilla, and Steven Striby for their comments on earlier stages of this paper.

2. Edwin Burtt, *The Metaphysical Foundations of Modern Science* (Garden City, N.Y.: Doubleday, 1954), 10.

3. Galileo Galilei, *Il Saggiatore*, *Opere*, IV (Florence, 1842), 333ff.

4. Of course, one need not hold a falsity view and be an anti-realist about secondary qualities. However, the two have been traditionally connected. For example, Colin McGinn holds that to call something a certain color (meaning what is seen) is not to make a false view based on the fact that the subjective view is ineliminable condition for experience. One could not have experience that consists only of primary qualities. Colin McGinn, *The Subjective View: Secondary Qualities and Indexical Thoughts* (New York: Oxford University Press, 1991), especially chapter 6.

5. Of course this is not an obvious position. One realist view about secondary qualities is called dispositionalism. This view holds that secondary qualities are dispositions to produce a range effects and not something beyond this. For a representation of this view see Christopher Peacocke, "Colour Concepts and Colour Experiences," in *Readings on Color*, ed. Alex Byrne and David R. Hilbert (Cambridge: MIT Press, 1997).

6. J. L. Mackie, *Problems from Locke* (New York: Clarendon Press, 1976).

7. Ibid., 13.

8. For excellent discussions on the primary and quality distinction, mostly in the context of Locke, see Reginald Jackson, "Locke's Primary and Secondary Qualities," in *Locke and Berkeley: A Collection of Critical Essays*, ed. C. B. Martin, D. M. Armstrong (Garden City: Doubleday, 1968), 53–77; and Jonathan Bennett, "Substance, Reality, and Primary Qualities," in the same work. Jackson stresses the objectivity of secondary qualities but as dispositional in virtue of primary qualities. Bennett articulates an argument for the primary/secondary distinction based on the idea that one can be color blind but not shape blind. In this way, primary qualities do not admit of the kind of alteration that secondary qualities do.

9. Mackie, *Problems from Locke*, 18, 19.

10. Ibid., 19.

11. For another approach to understanding the notion of resemblance—specifically in terms of an information-theoretic approach to perceptual cognition and the distinction between primary and secondary qualities based on it—see John Kulviki, "Perceptual Content, Information, and the Primary/Secondary Quality Distinction," *Philosophical Studies* (2005) 122: 103–131. Although an interesting argument, in this paper I am approaching the distinction from a qualitative similarity between felt experience and the object that possesses the quality.

12. Jonathan Bennett, in his *Locke, Berkeley, Hume: Central Themes* (New York: Clarendon Press, 1979), also has difficulty with Locke's notion of 'resemblance' as a way of making the distinction between primary and secondary qualities: "Since ideas cannot resemble either bodies or qualities of bodies, this [notion of resemblance] must be either discarded or transformed. The only plausible transformation is into something like the following: in causally explaining ideas of primary qualities, one uses the same words in describing the causes as in

describing the effects (shape-ideas etc. are cause by shapes etc.); whereas in causally explaining ideas of secondary qualities one must describe the causes in one vocabulary and the effects in another (colour-ideas etc. are caused by shapes etc.). If this is not what Locke's 'resemblance' formulations of the primary/secondary contrast mean, then I can find no meaning in them" (106)

13. For further elaboration for why this view is unacceptable see Reinhardt Grossmann, *The Categorial Structure of the World* (Bloomington: Indiana University Press, 1983), 27, 28.

14. Aquinas, *Commentary on Aristotle's De Anima*, trans. Kenelm Foster, O. P. and Sylvester Humphries, O. P. (New Haven: Yale University Press, 1951), II, Lect. 24, 555.

15. Aquinas, *Commentary on Aristotle's De Anima*, III, Lect. 2, 590.

16. Aristotle, *De anima*, II, 12 (424a16–424b20), found in Aquinas, *Commentary on Aristotle's De Anima*, II, Chapter 12.

17. Although Aquinas holds an identity theory of non-literalism view regarding how he understands Aristotle's view of how the form of an object and the form in sensation are the 'same,' which we are following here, there is controversy in scholarship on Aristotle on what this exactly means. For example, Richard Sorabji in his "Body and Soul in Aristotle," *Philosophy* 49 (1974): 63–89, holds that Aristotle means that to say that the form of red is the same in the eye as that in a red object is to say that the eye is literally red. This view has its detractors. See, Christopher Shields, "Aristotle's Perception" (appendix) in the *Stanford Encyclopedia of Philosophy*, http://plato.stanford.edu/entries/aristotle-psychology/#6, where he mentions Aristotle's view regarding the different senses in which the form is the same under these different existential modalities.

18. Aristotle, *De anima*, II, 12 (424b20) cited from Aquinas, *Commentary on Aristotle's De Anima*, II, Chapter 12.

19. Aquinas, *Commentary on Aristotle's De Anima*, II, Lect. 24, 551, 552.

20. Aquinas mentions elsewhere in his *Commentary on Aristotle's De Anima*, II, Lect. 14, that sight is the most spiritual sensual modality: "by a 'spiritual change' I mean, here, what happens when the likeness of an object is received in the sense-organ, or in the medium between object and organ, as a form, causing knowledge, and not merely as a form in matter. For there is a difference between the mode of being which a sensible form has in the senses and that which it has in the thing sensed. Now in the case of touching and tasting (which is a kind of touching) it is clear that a material change occurs: the organ itself grows hot or cold by contact with a hot or cold object; there is not merely a spiritual change. So too the exercise of smell involves a sort of vaporous exhalation; and that of sound involves movement in space. But seeing involves only a spiritual change-hence its maximum spirituality; with hearing as the next in this order. These two senses are therefore the most spiritual, and are the only ones under our control."

21. In Antony Kenny's "Intentionality: Aquinas and Wittgenstein," in *Thomas Aquinas: Contemporary Perspectives*, ed. Brian Davies, O. P. (New York: Oxford University Press, 2002), 243–256, Kenny argues that Aquinas holds a straight-forward view of identity between that which is sensed and that which is sensing.

22. Aristotle, *Metaphysics*, V, Chapter 9 (1018a5–9), cited from Thomas Aquinas, *Commentary on Aristotle's Metaphysics*, trans. John P. Rowan (Notre Dame: Dumb Ox Books, 1961).

23. In Sandra Edwards, *The Realism of Aquinas*, in *Thomas Aquinas: Contemporary Perspectives*, 97–116, Edwards interprets Aquinas's view of identity as a *qua* view of sameness without abandoning Leibniz's Law.

24. Thomas Aquinas, *Commentary on Aristotle's Metaphysics*, V, Lect. 11, 907.

25. Christopher A. Decaen in "The Viability of Aristotelian-Thomistic Color Realism," suggests that if anything, Aquinas should be considered a Primivist about color properties, although it is not a perfect fit. A Primitivist holds that colors are not reduced "to a surface's quantitative aspects (i.e., to primary qualities)" (201). I agree that Aquinas is most like the Primitivist view (while not being a perfect fit) in that secondary qualities cannot be reduced to primary qualities, but the reason why I argue that this is so is because of the likeness relation between how secondary qualities are experienced and how they exist in things: a quantificational analysis cannot account for this relation but rather expresses a different kind of relation.

26. With an understanding of the notion of sameness of form, especially likeness, which characterizes sensation, we can understand Aquinas's realism about qualities mentioned in the following passage from his *Commentary on De anima*: "For, in the first place, sense-perception is always truthful with respect to its proper objects, or at least it incurs, with respect to these, the minimum of falsehood; for natural powers do not, as a general rule, fail in the activities proper to them; and if they do fail, this is due to some derangement or other. Thus only in a minority of cases do the senses judge inaccurately of their proper objects, and then only through some organic defect; e.g. when people sick with fever taste sweet things as bitter because their tongues are ill-disposed" Aquinas, *Commentary on Aristotle's De anima*, III, Lect. 6, 661.

27. Aristotle, *Metaphysics*, V, trans. W. D. Ross, in *The Complete Works of Aristotle*, Vol. 2 (Princeton: Princeton University Press, 1995), p. 1606 (1017a7–1017a30).

28. Aristotle, *Categories*, in *The Complete Works of Aristotle*, Vol. 1, trans. E. M. Edghill (Princeton: Princeton University Press, 1995), Sect. 2.

29. Paul Symington and Jorge J. E. Gracia, "Grossmann and the Ontological Status of Categories," in *Studies in the Ontology of Reinhardt Grossmann*, ed. Javier Cumpa (Rutgers University: Ontos Verlag, 2010), 133–154

30. Aristotle, *Metaphysics* V, Chapter 8 (1017b23–26), cited in Aquinas, *Commentary on Aristotle's Metaphysics*, V.

31. Aristotle, *Metaphysics*, V, Chapter 14 (1020b8–12) cited in Aquinas, *Commentary on Aristotle's Metaphysics*, V.

32. Aristotle, *Metaphysics*, V, Chapter 13 (1020a7–8), cited in Aquinas *Commentary on Aristotle's Metaphysics*, V.

33. Aquinas, *Commentary on Aristotle's Metaphysics*, V, Lect. 15, 978.

34. Ibid., V, Lect. 17, 1021.

35. Ibid., V, Lect. 15, 980, 982, 983.

36. Ibid., V, Lect. 15, 980, 982, 984.

37. Decaen, in his excellect paper, "The Viability of Aristotelian-Thomistic Color Realism," *The Thomist* 65 (2001): 179–222, concludes that primary and secondary qualities are not inconsistent. For example, he says that "if the proper subject of color is surface, one would expect the proper subject of a particular species of color to be a particular kind of surface.

Now, surfaces are essentially quantitative and have quantitatively analyzable qualities, such as shape and texture. Thus, it seems that it is in accord with the Aristotelian-Thomistic account to allow for an essentially quantitative proper subject within the definition of color." (205). However, his conclusion is obtained through a different course of thought. I stress the relation of similarity among percepts and objects and then show that based on an understanding of different modes of existence and their relations we can see that they are not inconsistent (and do this through an analysis of three categories of being). Decaen stresses that colors are enlightened by an analysis of the matter through which they are individuated, does not stress the nature of colors at the level of how they are perceived, and does not conduct an analysis of categories and their relations. Instead of an analysis based on modes of existence, Decaen identifies the relationship between colors as perceived and their scientific analysis as that between form and matter: "While the classical account maintains that colors are not to be identified with microphysical properties, as physicalism holds, colors are essentially related to them, as an accident is to its proper subject or a form is to its matter" (207, 208). Finally, Decaen discusses realism of color in the context of discussions among anti-realists and realists, and specifically within the context of the realist views of dispositionalism, primitivism and physicalism. My analysis discusses the problems associated with an anti-realism about secondary qualities, specifically through the definition of primary and secondary qualities not having or having resemblance to the thing to which it refers. In this way, my paper continues the discussion advanced by Decaen in his excellent article.