Beauty as a Guide to Truth: Aquinas, Fittingness, and Explanatory Virtues

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[P]erhaps that ancient trinity of Truth, Goodness and Beauty is not simply an empty, faded

formula as we thought in the days of our self-confident, materialistic youth?

—Alexander Solzhenitsyn, *Nobel Lecture*, 1972.

Abstract: Many scientists and philosophers of science think that beauty should play a role in theory selection. Physicists like Paul Dirac and Steven Weinberg explicitly claim that the ultimate explanations of the physical world must be beautiful. And philosophers of science like Peter Lipton say that we should expect the loveliest theory to also be the most likely. In this paper, I contend that these arguments from loveliness bear a striking similarity to Thomas Aquinas' arguments from fittingness; both seem to presume that the most beautiful theory is also the most probable. To do this, I first explain the explanatory virtues that are commonly thought to be constitutive of a lovely theory. Second, I elucidate Aquinas' arguments from fittingness and show how they work in light of his account of beauty. Lastly, I connect the two kinds of aesthetic arguments and show the extent to which they overlap.

Introduction

We cannot seem to escape the conviction that beauty and truth are deeply intertwined. Even now,

when few scientists seriously entertain the thought that the heavens declare the glory of God and

the firmament the works of his hands, many physicists still want beauty to be a guide to theories

that get us closer to the truth. Similarly, many philosophers of science think that when we are

comparing the plausibility of competing scientific theories of equal scope, we should consider the

theories' seemingly aesthetic qualities, contending that the loveliest explanations are also the most

likely. But it appears to have gone completely unnoticed that these aesthetic arguments for scientific theories are almost prefigured by Thomas Aquinas' "arguments from fittingness." In this paper, I develop the thesis that the arguments from beauty regularly employed by both physicists and philosophers of science are remarkably similar to Aquinas' arguments from fittingness; both seem to presume that the most beautiful theory is also the most probable. I show that both kinds of arguments rely on the belief that simpler, more unified, less *ad hoc*, and more explanatorily powerful theories are also the most probable.

The connection between science/philosophers of science and Aquinas may appear odd at first. But Edmund Byrne (1968) suggests that there is much overlap between the probabilistic nature of contemporary science and what Aquinas calls opinion. Aquinas follows Aristotle in saying that science is purely deductive; one proceeds from epistemically certain first principles to equally certain conclusions, and all non-deductive arguments fall into the realm of mere opinion. However, in post-Aristotelian science, there is a "kind of wedding between *opinio* and *scientia*" (Byrne 1968, p.303). Scientific conclusions are no longer certain but only probabilistically confirmed by evidence.[1] As we will see, Aquinas has much to say about arguments that are only probable, so the connection between contemporary science/philosophy of science and Aquinas' thought should become clear.

The structure of this essay is as follows. In section I, I give examples of both scientists who want beauty to guide their research and philosophers of science who claim that loveliness is a guide to true theories. In section II, I explain what Aquinas means by arguments from fittingness

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[1] I am assuming that current scientific practices are, to a large extent, correct. I am not trying to enter the debate among Thomists on whether philosophy of science went off the rails post-Hume. I assume that one can know *p* scientifically without being able to demonstrate *p* from first principles. For a critique of modern science for being "too fallible and revisable, ever incapable of arriving and truth and certitude," see Wallace (1996, p. xii).

and illustrate with some of his own examples. And in section III, I connect arguments from loveliness to arguments from fittingness and show the extent to which the two overlap.

I. Arguments from Loveliness

There is a strong intuition among many of the greatest physicists in the 20th century that our physical theories should be beautiful.[2] When discussing Schrodinger's formulation of the eponymous wave equation, Paul Dirac writes,

> I think there is a moral to this story, namely that it is more important to have beauty in one's equations than to have them fit experiment. If Schrodinger had been more confident of his work, he could have published it some months earlier, and he could have published a more accurate equation (Dirac 2010).

And although Einstein developed his general relativity theory in part to account for astronomical phenomena—such as Mercury's perihelion, which is not predicted by Newtonian mechanics—he was largely motivated by hunches, intuitions, and a strong desire to find an elegant equation that governs the universe. (Given that many physicists think that Einstein's mass-energy equivalence equation is the most beautiful in all of physics, he appears to have succeeded at this.) However, not only was Einstein convinced that general relatively was correct *before* the theory was tested, he would have been convinced that the theory was correct *in spite of* testing. He thought that general relativity was so elegant and yields so much explanatory power that if we were to discover disconfirming empirical evidence, the evidence must be wrong, not the theory. In response to a journalist's question on how he would react if general relatively were disproved, Einstein remarked, "Then I would feel sorry for the good Lord. The theory is correct" (Gleiser 2015). Both of these giants in physics felt so strongly that physical theories should be beautiful and elegant that aesthetics partially drove their research.

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[2] A brief look at the titles of some of the more popular-level books on physics is also quite revealing: *The Elegant Universe* (Greene 2003), *Fearful Symmetry: The Search for Beauty in Modern Physics* (Zee 2007), and *Deep Down Things: The Breathtaking Beauty of Particle Physics* (Schuum 2004).

Additionally, when discussing the prospects of a final physical theory, some renowned scientists emphatically insist that beauty's role should be front and center. For instance, Steven Weinberg writes,

> Plato and the neo-Platonists taught that the beauty we see in nature is a reflection of the beauty of the ultimate, the *nous*. For us, too, the beauty of present theories is an anticipation, a premonition, of the beauty of the final theory. And in any case, we would not accept any theory as final unless it were beautiful (Weinberg 2011, p.165).

It is not that Weinberg feels some ephemeral desire for a set of equations that catch his eye. No, Weinberg wants the final theory of physics to be superlatively beautiful. He has an overwhelming sense that, at its foundational level, the universe is lovely, and he intuits that the final physical theory will reflect this.

Many philosophers of science also think that beauty should play a central role in adjudicating between theories. They cash out the beauty or "loveliness" of a scientific theory in different ways. Typically, philosophers of science who write in explanatory terms rank theories based on how well they exemplify the explanatory virtues. There are a variety of explanatory virtues on which one can rely to decide between theories. Some virtues, such as *coherence* and *simplicity*, are purely internal to the theory. Coherence is the absence of *ad hoc*-ness: an internally coherent theory is one that does not need to be gerrymandered in order to fit the empirical data (McMullin 2011). Coherent theories are free of epicycles. Simplicity, in the *a priori* sense, is minimization of the number of entities, types of entities, properties, kinds of properties, and so on (Swinburne 1997). A simple theory makes do with little.

There are also a variety of external virtues, such as *consilience* (sometimes known as *unification*) and *explanatory power*.[3] A theory admits of consilience when it serves as a unifying

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[3] While I pull the distinction between internal and external virtues from McMullin (2011), Bird (2017) points out that this is exactly how Einstein writes about the norms of judging the plausibility of scientific hypotheses:

principle and explains a variety of different phenomena in disparate domains; evidence that would otherwise be independent and unrelated is captured under a single hypothesis (McGrew 2003). Explanatory power is closely related to consilience—in fact, some philosophers think of them as the same thing—but a theory ranks highly in explanatory power if it decreases the extent to which a phenomenon is surprising or unexpected (Schupbach and Sprenger 2011). Explanatory power takes a "surprising fact" and renders it a mere "matter of course" (Peirce 1931–35, 5.189). A lovely theory will be one that ranks highly in most, if not all, of the explanatory virtues.

When explanatory virtues provide the guide to adjudicating between theories, Peter Lipton calls this "Inference to the Loveliest Explanation" (Lipton 2004, p.59).[4] He distinguishes between a theory's likelihood and its loveliness: a likely theory is one that is the most warranted or probable, but a lovely theory is one that gives the most understanding. Although likeliness and loveliness often go together, they can diverge. One major difference between the two is that likeliness is relative to the amount of the evidence available at a given time, whereas loveliness is less subject to change, for loveliness is more fixed and stable. The best explanation will incorporate elements of both, but Lipton thinks that loveliness should, for the most part, trump likeliness. He writes,

> [I]f Inference to the Loveliest Explanation is a reasonable account, loveliness and likeliness will tend to go together, and indeed loveliness will be a guide to likeliness. Moreover, given the opacity of our 'inference box', we may be aware only of inferring what seems likeliest even if the mechanism actually works by assessing loveliness (Lipton 2004, p. 61).

This point of view, whose exact formulation meets with great difficulties, has played an important role in the selection and evaluation of theories from time immemorial. The problem here is not simply one of a kind of enumeration of the logically independent premises (if anything like this were at all possible without ambiguity), but one of a kind of reciprocal weighing of incommensurable qualities…. I shall not attempt to excuse the lack of precision of [these] assertions … on the grounds of insufficient space at my disposal; I must confess herewith that I cannot at this point, and perhaps not at all, replace these hints by more precise definitions. I believe, however, that a sharper formulation would be possible. In any case it turns out that among the "oracles" there usually is agreement in judging the "inner perfection" of the theories and even more so concerning the degree of "external confirmation" (Einstein 1946, pp. 21, 23).

[4] For a recent analysis of Lipton's view, see Bird (2017).

So, on Lipton's view, loveliness should be our guide to accepting a theory. As we will see in the following section, while Aquinas makes a weaker claim than Lipton, he does think that aesthetic considerations can give us good reason to prefer one explanation over another.

II. Arguments from Fittingness

For Aquinas and the other medievals, an argument is either demonstrative or merely persuasive on the basis of compelling arguments (Daston 1988). Demonstrative arguments that lead to knowledge are a part of science (*scientia*). But arguments that neither begin with nor derive from self-evident principles cannot lead to knowledge, for their contents are not the proper objects of knowledge. They are relegated to the domain of opinion (*opinio*).

However, not all opinions are equally warranted. Some are more probable than others. For Aquinas, probability is a binary notion. Unlike the modern notion of probability—which holds that if *p* is probable, then not-*p* is improbable—two contradictory opinions can both be probable. For the medievals—and perhaps all thinkers before the development of a formal probability calculus in the mid-seventeenth century—"*Probabilis* was a qualitative predicate accruing to propositions and opinions, claiming that the propositions in question were fit for adoption and sufficiently, although not optimally, backed by reasons for truth" (Schuessler 2019, pp.37-38). There are many reasons, or pieces of evidence, that might lead one to think that a proposition is true—the testimony of eyewitnesses or the opinions of wise people, for instance. But no amount of probable evidence can result in an epistemically certain conclusion.

When discussing propositions that do not admit of certainty or demonstrative arguments because of their contingent subject matter, Aquinas thinks that we must make do with merely probable arguments. For example, he claims that although it is possible that two or three independent witnesses may lie, it is improbable that they would do so (*S.T* II-II q.60 a.3). And

while scripture may give a believer certainty, the teachings of some church authorities or the philosophers can give us only probable reason to believe (*S.T* II-II q.70 a.2 and q.69 a.2). For although he thinks that believers and unbelievers alike can rely on reason alone to come to many true conclusions about the faith (*praeambula fidei*), the proper truths of the faith are incapable of being demonstrated. But this in no way means that probable arguments are unimportant or insignificant for Aquinas. Indeed, they play a crucial role his thought. Aquinas writes, "[H]uman reason is adapted to the knowledge of the truth of faith (which can be known in the highest degree only by those who see the divine substance) insofar as it is able to put together certain probable arguments in support of it, which nevertheless are insufficient to enable us to understand the aforesaid truth as though it were demonstrated or understood in itself" (*S.C.G* I ch.8). Probable arguments allow one to be rationally convinced of some truths—especially the believer of a truth of faith.

One kind of probable argument on which Aquinas relies heavily are arguments from fittingness (*argumentum ex convenientia.*). Lonergan characterizes fittingness as being "said of something that is intelligible in the proper sense of the word and yet not necessary as to either its existence or its essence" (Lonergan 2011, p.483). An argument from fittingness "offers a form of reasoning that is in a way suppler than that of the syllogistic demonstration and which reveals what might be called an 'aesthetic' dimension to Thomas's theology" (Bauerschmidt 2013, p.161). Unlike demonstrative arguments, arguments from fittingness attempt to establish only that their conclusions are appropriate or harmonious. As Bauerschmidt writes,

> In [a fittingness] argument, Thomas is not seeking to establish a necessary conclusion, but to engage the reader in an act of persuasion that might be described as '*aesthetic*': he is attempting to display the decorous convergence of a variety of truths, so as to manifest the contours of a particular truth of faith … Such arguments are not absolutely probative, but depend on one's willingness to intellectually step back, so as to be able to gain a wider view of the beauty of what God has shown us, its sheer fittingness. This beauty will

probably not convince an unbeliever (though one ought not to underestimate the *persuasive power of beauty*), but it will surely move the Christian to greater love of God by virtue of the intellect's deeper grasp of the interlocking patterns of divine revelation. (Bauerschmidt 2016, emphasis added).

Thus, although arguments from fittingness, which are in a very real way arguments from beauty, can never render a conclusion *certain*, they can render a conclusion *probable*. An argument from fittingness for a truth of the faith, for instance, shows "the ways in which the mysteries of faith interlock with each other and with our ordinary knowledge of the world" (Bauerschmidt 2013, p.162).

But before we get to Aquinas' specific arguments from fittingness, it is worth taking a brief look at what he thinks *makes* for a fitting or beautiful object. For Aquinas, beauty is an objective part of being. Although there is a subjective component of beauty, beauty is not merely a human construct that we map onto the external world. Aquinas writes, "[A] thing is not beautiful because we love it; rather, because it is beautiful and good, it is loved by us; for our will is not the cause of things, but is moved by things" (De div. nom. IV, lec. 10). Beauty delights us and elicits in us a desire to ponder it.

Aquinas gives three objective properties of beauty: "[1] *integrity* or *perfection*, since those things which are impaired are by the very fact ugly; [2] due *proportion* or *harmony*; and lastly, [3] *brightness*, or *clarity*, whence things are called beautiful which have a bright color" (*S.T* I q.39. art 8). Although it is not clear whether all beautiful things must possess each of these properties, Aquinas thinks that any object which is inappropriately deficient in one of these areas will be less beautiful than it could be.

Integrity or perfection "is a comparative feature of objects, again pertaining to a kind of fit between the particular instance and its paradigmatic ideal" (Sevier 2015, p. 116). As Sevier points out, this is the aspect of beauty that Aquinas discusses the least of the three. But it "seems to do

with the purity of the parts themselves and the completion of the whole taken as a whole" (Ibid., p.117). A well-integrated object, then, does not have any deficient or lacking parts.

Closely related to integrity is proportion or harmony, which "has to do with a certain harmonious arrangement of the parts to the whole" (Ibid.). All of a thing's parts conform to its ideal form; there is no *ad hoc*-ness to it. Proportionality may be the most important of the three conditions for beauty. Eco suggests that because our senses are naturally fitted to their objects, there is a kind of synonymy between reason (*ratio*) and proportion (*proportio*) in that proportion is "a disposition of the senses toward the sensible, in the manner of a potency" (Eco 1988, p.94). There is a deep connection between our admiring the proportionality within objects because our senses are designed to perceive proportionality as good, and this proportionality makes the object eminently intelligible.

Lastly, brightness or clarity is, in part, the "light that makes beauty seen" (*S.T* II-II q. 120 a.2). Clarity is what invites one to gaze upon an object by making its beauty known. It is typically the first aspect of a beautiful object that we notice, for clarity is what draws our eyes to the beauty in the thing. These three properties—integrity or perfection, proportion or harmony, brightness or clarity—are the principles that Aquinas' thinks are constitutive of beauty. And if an argument exemplifies some number of these properties, it is rightly called an argument from fittingness.

One paradigm case of fittingness is Aquinas' argument for the Incarnation. Unlike Anselm, who claims to show the necessity of the incarnation and passion by showing its fittingness (Anselm 1998), Aquinas makes a weaker claim. By reflecting on the multiplicity of Christ's accomplishments while on earth, Aquinas shows not that Christ *must have* become incarnate in order to save us, but that it was *appropriate*; he shows that the incarnation makes sense of "the bringing together of various things" that would otherwise be disparate and disconnected (Johnson

2010, p.305). Thus, Aquinas' argument proceeds by "demonstrating that it brings together the greatest number of desired effects" (Ibid.). He writes, "Among means to an end that one is the more suitable whereby the various concurring means employed are themselves helpful to such end. But in this that man was delivered by Christ's passion, many other things besides deliverance from sin concurred in man's salvation" (*S.T* III q.46 a. 3). Aquinas, in fact, gives ten such fitting reasons, showing that for each of them, the incarnation is more appropriate for God's carrying out His salvific plan. As Mongaeu writes, "Each reason of fittingness appeals to the fulfillment of material previously considered and gathers it in the 'climax' of the Incarnation, thereby transforming it and bringing it to its fullness of meaning" (Mongeau 2015, p.102). In other words, Aquinas argues for the incarnation by showing that it provides the most beautiful explanation.

Another tenet of Christianity for which Aquinas argues using fittingness is man's natural desire to see God. He writes,

> For there resides in every man a natural desire to know the cause of any effect which he sees; and thence arises wonder in men. But if the intellect of the rational creature could not reach so far as to the first cause of things, the natural desire would remain void. Hence it must be absolutely granted that the blessed see the essence of God (*S.T* I q.12 a.1).

While some commentators claim that Aquinas thinks of this as demonstrative proof of our natural desire to partake in the beatific vision, I disagree. I contend that Aquinas is making a weaker fittingness argument here. And I have many eminent commentators on my side. Domingo Báñez argues that Aquinas thinks that while man's natural (conditional) desire to see God is no way a demonstration of man's end as vision of God, it is still "maximally fitting" (Feingold 2010, p.

270).[5] Suárez also thinks that in *S.T* I q.12 a.1 Aquinas is not trying to give a demonstration but give an argument that is "very probable and eminently fitting" (Ibid., p.273).

While he most readily uses fittingness arguments for truths of the faith, Aquinas sometimes uses them in arguing for and against physical and metaphysical thesis. When arguing against occasionalism, Aquinas writes,

> If we take away the actions of things we take away the order of things to one another, for there is no tying together (*colligatio*) of things that are diverse according to their natures into the unity of an order except by the fact that some are active and some are passive. It is not fitting (*inconveniens*), therefore, to say that things do not have their proper actions (*S.C.G.*, III, c. 69, trans. from Blanchette 1992, p.265).

Here, Aquinas is arguing that it would be unharmonious for substances to be incapable of acting on one another, and he takes this lack of harmony to be an argument against occasionalism. Additionally, Blanchette (1992) shows that Aquinas makes use of fittingness many places when discussing the order of the universe. While Aquinas explicitly says that we can demonstrate neither the finitude nor eternity of the universe, he gives an argument from fittingness that our universe has a finite past. The fact that an eternal universe would mean the possibility of an infinity of souls or an infinite final cause is reason to reject Aristotle's claim that the universe is infinite, for such consequences are not fitting. As Blanchette writes, "[I]n the concrete, when we consider the order of generation, as Saint Thomas did, with man at its summit and truly part of it, it becomes more reasonable to suppose that it had both a beginning and an end" (Blanchette 1992, p.266).

Aquinas also seems to think it fitting that the cosmos be united by a rational intellect. Blanchette argues that for Aquinas, the cosmos is ordered toward the rational, human soul. Aquinas contends that the universe's being composed of discrete, singular, material objects cries out for a

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[5] As another brief example of a fittingness argument, Báñez contends that in *S.C.G* IV, ch.79, Thomas is arguing that "the resurrection is maximally *fitting* because of the natural desire of the soul to be rejoined to the body and to be complete in its nature" (Feingold 2010, p.270).

unifying principle. This unifying principle is the soul. In one sense, there is a multiplicity of beings, but in another sense, there is only being. However, in order for disparate beings to come together, they must be united by a common principle. And, as Blanchett writes, such a unification or "coming together of beings cannot be in a fundamental and ontological sense unless there is some being in whose nature it is to come together with everything" (Blanchet 1992, p.269). As Aquinas writes, "This [unification] is possible only if there is something which is such that it agrees with every being. Such a being is the soul, which, as is said in *The Soul,* 'in some way is all things'" (Aquinas 1952. Q.1 a.1). Thus, it is fitting that there be the soul to unite all things.

We have now seen many examples of the ways in which Aquinas uses arguments from fittingness.[6] Arguments from fittingness rely on an aesthetic sense that one explanation is more beautiful than another; they take many explananda that would otherwise be disjointed and unites them under one beautiful principle. With this in hand, we are in a position to see how exactly Aquinas' arguments from fittingness relate to contemporary arguments from loveliness.

III. Connecting Loveliness and Fittingness

Let us take stock. The physicists at whom we looked want their theories to reflect the profound beauty of the universe and rely on this desire in order to lead them to theories that are closer to the truth. Many philosophers of science who think that science is truth tracking evaluate the reasonableness of a theory depending on how well the theory exemplifies certain explanatory virtues such as coherence, simplicity, unification, and explanatory power—virtues that are

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[6] For more examples of arguments from fittingness, J.P. Torrell (2005) contends that, lest God's actions be necessitated, nearly all of Aquinas' arguments for the contingent history of salvation cannot be demonstrated from first principles. Torrell writes, ``[Concerning arguments of fitness], we meet in the *Summa* large chunks of biblical theology—such as the work of the six days (Ia QQ. 67074), the treatise on the Old Law (Ia IIae QQ. 98-106), the life of Jesus (IIIa QQ. 27-59)—that would not find any place in an overly deductive conception of theology" (Torrell 2005, p. 156).

constitutive of lovely explanation. And Aquinas regularly employs aesthetic arguments from fittingness to show that certain lovely explanations make the most sense given some set of background knowledge. I hope that it is now clear that arguments from beauty/loveliness regularly employed by both physicists and philosophers of science are strikingly similar to Aquinas' arguments from fittingness, but it is worth making this connection explicitly.

While there might not be a one-to-one correspondence between the explanatory virtues in contemporary philosophy of science and Aquinas' beauty-making principles, there is still an uncanny amount of overlap. Both the explanatory virtue of coherence and the beauty-making principle of proportionality or harmony have to do with a freedom from *ad hoc*-ness; the whole does not need to be gerrymandered to account for the parts.

Harmony captures significant portions of the virtues of unification and explanatory power as well. Recall Aquinas' arguments for the Incarnation and against occasionalism: both say that if a hypothesis were not true, there would be a large number of disparate phenomena that would lack a common unifying principle; therefore, there is some reason to think the hypotheses true. These arguments exemplify the virtue of unification, which says that explanations that capture otherwise independent and unrelated evidence are better than explanations lacking this property. They also exemplify the virtue of explanatory power, which says that explanations that take an otherwise surprising event and renders it a mere matter of course are better than explanations lacking this property.

Even if there are significant differences between the virtue of simplicity and the beauty-making principle of integrity (or perfection), but they also have much in common. Recall that a simple theory is one that relies on the fewest number of entities, types of entities, properties, kinds of properties, etc., and the principle of integrity is a fit between a paradigmatic ideal and a

particular instance. A simple explanation is often identical with an idealized explanation. (In fact, according to some philosophers, simple explanations are always ideal explanations.[7]) Explanations that rank high in simplicity will border on being idealizations of what we actually encounter in the world. Similarly, explanations possess the beauty-making feature of integrity to the extent that they fit a paradigmatic ideal. The more well-integrated the theory, the better it conforms to this ideal. So, both simplicity, construed a particular way, and integrity deal with the extent to which a theory satisfies some ideal.

Lastly, while there is no specific explanatory virtue corresponding to the beauty-making feature of brightness (or clarity), something about beautiful explanations catches our eye. Consider again Schrodinger's wave equation or Einstein's mass-energy equivalence equation: there is something impalpably beautiful about these simple theories that draws us to them. In this way, they are exceptionally bright or clear. And Weinberg's statement that we "would not accept any theory as final unless it were beautiful" elicits the idea that we are on the lookout for such a theory, a theory that will be irresistibly beautiful.

The similarity between arguments from loveliness and arguments from fittingness should make perfect sense given the natural human disposition to prefer simpler, more elegant explanations. Many recent studies have suggested that humans are predisposed to reason using explanatory virtues, especially simplicity and scope (Johnston et al. 2017, Lombrozo 2007, 2012, and 2016). If we do in fact have this tendency, then it seems we should expect to find a similarity between Aquinas' non-deductive arguments and inferences to the loveliest explanation: both are simply more systematic ways of making the inferences that we find naturally intuitive. Historians of science have long noted that many contributions to the development of science from the

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[7] See Weisberg (2007) for an excellent discussion of this.

conviction that lovely explanations are preferable over the unseemly. If I have been convincing, we have good reason to think that Aquinas is simply doing the same when employing arguments from fittingness in theology and metaphysics.

I want to conclude by gesturing toward two different approaches available to the Thomist for discussing the articles of the faith with non-believers: one might say that neither arguments from loveliness nor arguments from fittingness can render a conclusion convincingly probable, or one might say that both can do so. Aquinas seems to take the former approach. He thinks that one should use fittingness arguments only to help the faithful understand what they believe and not to convince a non-believer of the truths of the faith. He writes,

> [C]ertain probable arguments must be adduced for the practice and help of the faithful but not for the conviction of our opponents, because the very insufficiency of these arguments would rather confirm them in their error if they thought that we assented to the truth of faith on account of such weak reasonings (*S.C.G* I ch. 9).

But I am not convinced that the modern Thomist need be so modest. Many philosophers of science certainly are not. Perhaps we need not ignore probable arguments for non-demonstrable truths when discussing them with non-believers. Nothing has changed in the sense that the modern Thomist will still say that because faith is an infused virtue and a gift of God, we do not assent to the faith *on account of* such weak reasonings. However, this does not mean that the non-believer cannot use their reason to come to believe that an article of faith is very likely true. We could agree with John Henry Newman (1985) and say that we have an entire faculty, the illative sense, which takes in fallible, probable arguments and subconsciously combines them into a full picture of the truth of an *opinio*. Or we could say that we now know that, thanks to a more robust probability calculus, *many weak* reasonings can lead to *a strong* reasoning via cumulative case arguments. Perhaps Aquinas would agree, or perhaps he would think that both methods are weak and unsatisfying. Either way, the natural theologian is in no worse of a position than philosophers of

15

science in using probable arguments, whether they be from fittingness or something else, as guides to truths that we do not yet hold. Either way, the natural theologian and the philosopher of science are in the same boat.

Conclusion

I have argued that there are striking similarities between arguments from loveliness in contemporary philosophy of science and Aquinas' arguments from fittingness. Both see a tight connection between beauty and truth. If I have been successful, we have seen how the explanatory virtues that are constitutive of lovely theories have a significant amount of overlap with Aquinas' beauty-making principles. I have not attempted to provide a justification of arguments from loveliness or fittingness, which is a significant project in its own right.[8] However, we can say that, at the very least, Aquinas' arguments from fittingness appear to be no worse off than arguments from loveliness. And since Aquinas can appeal to the working of an eminently beautiful creator, perhaps he is in a better position to explain *why* aesthetic arguments lead us to the truth: for where we find the good and the beautiful, we also find the true.[9]

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[8] See Psillos (1999) for a defense of inference to the best (or loveliest) explanation.
[9] See Koons (2000) for an argument in this vein.

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