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SCOTUS ON ACCIDENTAL AND ESSENTIAL CAUSES¹

INTRODUCTION

In the argument for the existence of God that he gives in his *Ordinatio* 1, d. 2, q. 1, Scotus makes the claim that the existence of an accidentally ordered series of efficient causes requires the existence of an essentially ordered series of causes. More precisely, he argues that:

[In the case of accidentally ordered efficient causes], no change of form is perpetuated save in virtue of something permanent which is not a part of the succession. The reason for this is that everything in this succession, which is in flux, has the same nature. However, no part of the succession can be co-existent with the entire series for the simple reason that it would no longer be a part of the latter. Therefore something that is essentially prior to the series exists, for everything that is part of the succession depends upon it; and this dependence is of a different order from that by which something in the series depends on the immediately preceding cause, where the latter is a part of the succession....²

Historically, this reasoning has found few defenders because, as has variously been pointed out, the claim that in the case of accidentally ordered efficient causes “no change of form is perpetuated save in virtue of something permanent

¹ The analysis that follows owes much to Allan B. Wolter, O.F.M., whose Summer course on Scotus first sparked my interest in and admiration for the Subtle Doctor when I was a graduate student at the University of Michigan. However, this is not to suggest that Fr. Wolter would have agreed with all of it.

² Trans. A. Wolter, O.F.M. in Wolter, A. *John Duns Scotus: Philosophical Writings; translated and with an Introduction* (Indianapolis: Bobbs-Merrill, 1962), 47.

which is not a part of the succession" is not at all obvious.³ Yet without this premise the argument collapses. In this brief note, I should like to take up the challenge of showing that, given the metaphysical parameters within which Scotus is operating, his claim is indeed valid and that while his argument for the existence of God in the *Ordinatio* ultimately fails, it does not fail for this reason. I shall argue that the critics of Scotus's argument have failed to consider the ontology of the theory of substance, accident and causation with which Scotus is operating, and that once this is taken into account, the difficulties about the relationship between essentially and accidentally ordered efficient causes disappears.

SUBSTANTIAL AND ACCIDENTAL PROPERTIES: THE STANDARD STORY

To begin with the theory of causation that Scotus employs. According to this theory, every causal interaction is a species of change and, as such, requires the action of an efficient cause imposing a formal cause on a material cause for a final cause. The theory also maintains that every change involves the actualisation of a potential that is inherent in the material cause, where this actualisation can be brought about by the efficient cause only if the efficient cause contains within itself, either actually or eminently, the formal cause that it imposes.

One of the more important things about this analysis of causality is that it requires the acceptance of certain ontological propositions. In particular, it requires the assumption that an efficient cause is a substance that has a particular nature in virtue of its substantial form. The standard onto-

³ Cf. William of Ockham, *Quaestiones in lib. I Physicorum*, Q.45: "An infinity of accidentally ordered entities can be kept in existence without there being some nature that endures forever and on which the entire succession depends. It cannot be proved ... that one man cannot be produced by another as his total cause." For a modern (sympathetic) critique that recasts the argument by using the Fregean notion of an ancestral relation, see R.G. Wengert, "The Logic of Essentially Ordered Causes," *Notre Dame Journal of Symbolic Logic* 12:4 (1971): 406-22.

logical analysis of substantial forms in Scotus's time was that they are ontologically constituted of essential properties but that they leave room, so to speak, for accidental properties — where essential properties are the properties that a substance must have in order to be that kind of substances (say, a goat or a narcissus) whereas accidental properties are properties that are merely incidental to the nature of the substance *qua* that kind of substance. According to this theory, therefore, a substance cannot change or lose its essential properties without ceasing to be that particular kind of substance (or, differently, without ceasing to be a member of the species that is defined by having that type of substantial form) but it can change or lose its accidental properties without ceasing to be a member of its species.⁴

As I said, this way of presenting the notion of substance and of characterising the difference between essential and accidental properties was — and still is — fairly standard. However, while it has the advantage of familiarity, it obscures the very point that is central to Scotus's reasoning and hides the reason why regularity in the succession of substantial forms in the sequences of accidental efficient causes requires essential causes.

More specifically, this way of presenting the relationship between substances and their essential and accidental properties gives the impression that accidental properties are fundamentally distinct from essential properties and that they are, so to speak, mere add-ons to the ontological constitution of a substance. On this understanding, the ontological assay of a substance may be symbolised as follows;

$$\text{Fig. 1 } S = [\Phi, \Psi, \chi, \dots \Omega \dots \alpha, \beta, \gamma, \dots]$$

where 'S' is a substance and the upper-case Greek letters are variables that stand for essential properties and the lower-case Greek letters are variables that stand for accidental properties.

However, this sort of analysis fundamentally obscures the nature of substances and is misleading about the logical

⁴ Numerical identity is also implicated; however, that is not important in the present context.

(and ontological) relationship between essential and accidental properties. Focusing for the moment on the relationship between essential and accidental properties, the problem is usefully brought out by using the modern vocabulary of first- and second-order properties. First-order properties are properties that substances actually have: for example, particular instances of the colour Prussian blue or of burnt umber. By contrast, second-order properties are properties of properties — for instance, being a colour.

Now, the standard way of presenting the difference between essential and accidental properties that is symbolized in Fig. 1 makes it look as though both essential and accidental properties are first-order properties, and that the main difference between them is that a substance cannot change its essential properties without ceasing to be that kind of substance while this is not true of accidental properties.

PROPERTIES, SUBSTANCES AND ONTOLOGICAL COMPLETENESS

In a sense, of course, this is correct. However, it is true only in a sense and, more importantly, it is not the whole of the story. To put it in a nutshell, essential properties are not first-order properties at all but second-order properties. The *instances* of essential properties are first-order properties and, moreover, these instances as such are as much accidental properties as are what traditionally have been called accidental properties.

This, of course, takes some explaining. So, to see why this is the case — and to show how this relates to Scotus's claim about essential and accidental causation — we have to take a slight detour and look at the ontology of substances *qua* substances and how essential and accidental properties figure in their constitution.

The major point here is that substances are ontologically complete entities. Crudely put, they are ontologically complete because they are not “gappy” — which is to say, they instantiate all the numbers and types of properties that are necessary for them to constitute a complex that leaves no logical room for any other property without losing one of the properties that they currently have. The analogy that comes

to mind is that of a pie. A pie is constituted of all and only those slices which, together, make for a complete pie. No more slices can be added — unless one takes away one of the other slices. By the same token, all the slices must be there in order for the pie to be a pie; without them, it is just a partial pie. By contrast, properties are “gappy.” To continue the analogy, the properties of substances are like pieces of pie, and in that sense are ontologically incomplete.⁵

If we now look at properties from a purely logical point of view, we can say that properties not merely have a qualitative content or aspect but also a logical nature, which latter is functionally related to their content. This logical nature also determines the range of other properties with which the property may be associated. For instance — and this is *merely* an example and ultimately breaks down — the property of being green (all over) can be associated with the properties of being sweet, hairy, spherical, juicy and turgid (e.g., in a gooseberry) but it cannot be associated with the property of being red (all over), or the property of being 200 gauss or of having 1500 electron volts. In other words, the qualitative nature or content of a property determines its logic, which in turn logically determines the properties with which it can be coinstantiated or be *compossible*.

Considered purely logically, the totality of compossibilities of a particular property — the totality of possible coinstantiations with other properties — may be called the *logical form* of that property.

It should also be noted that while the logical form of a property allows for its coinstantiation with a whole host of other properties, it does not allow for coinstantiation with more than one property of a particular type at any one time. Such multiple coinstantiation is excluded as a matter of logic. For

⁵ One could also put this by saying that properties are incomplete because their logical/ontological structure does not fulfil the principle of sufficient reason in the sense that the instantiation-dependence of properties leaves them inherently incomplete in themselves. Hence they cannot exist *as such* because they do not have a complete *ratio*. By contrast, substances are ontologically complete because they do fulfil the principle of sufficient reason. They have a complete *ratio*. Hence they are independent and do not require something other than themselves in order to exist.

instance, and continuing with the preceding example, while the property green may be coinstantiated with the properties soft and hard respectively, it cannot be coinstantiated with each of these at one and the same time because the one logically excludes the other. Therefore, for any property, the total set of its compossible properties in an absolute sense — the properties with which it can be coinstantiated in virtue of its logical form — can be divided into mutually exclusive sets of compossible coinstantiations.

Building on this, we can say that for any two coinstantiated properties, the total set of compossible properties for that set of coinstantiated properties will be the set of compossible properties of the initial property *in that particular instantiation* as augmented by the totality of compossibilities of the other property *in that coinstantiation*. Another way of putting this is to say that the totality of compossibilities of coinstantiated properties taken as a set is functionally determined by the logical forms of the members of that set.

Clearly, this set of compossible possibilities of a set of coinstantiated properties will not be identical with the total additive set of compossible possibilities of each of the components of that set. In other words, the complete set of compossible properties for the two properties *as coinstantiated* will not be the same as the set that can be generated simply by adding the possibilities that determine the logical forms of each of the properties taken in and by themselves. Instead, it will be the reduced set of the total additive set of compossible coinstantiations for each of the two property taken by itself, where the reduction is a result of the fact that some of possible coinstantiations of the two properties taken by themselves are ruled out in virtue of the logical form of the other property.

We can now say that for any given property, its compossibility with another property is realized if and only if it is coinstantiated with that other property. Given this, we can then define the notion of ontological completeness in terms of coinstantiation: A coinstantiation is ontologically complete if and only if all of the compossibilities determined by the ontological constituents of that coinstantiation are realized — which is to say, the total set of compossibilities of all prop-

erties *as coinstantiated in that context*, which is the reduced set that was identified in the preceding paragraphs. Given this definition, we can now define a substance as an entity that is ontologically complete, and a property as an entity that is not ontologically complete.

SUBSTANCES, ESSENTIAL AND ACCIDENTAL PROPERTIES

The way this all comes together is as follows. Essential properties define ranges of individual specific properties from which the substance, whose essential properties they are, must have exactly one. Therefore if a substance lacks a property instance from that range, it will not only be ontologically incomplete but will also not be a member of the species that is characterized by possession of the substantial form to which the essential property is integral. In that sense, a substance cannot change its essential properties. By contrast, accidental properties are specific properties the possession of which is neither a necessary nor a sufficient condition for membership in a species. However this does not mean that if a substance can have such an accidental property then it can lose that accidental property and not replace it with another of the same sort. If that were to occur, the substance would be logically indeterminate with respect to the possibility of having that kind of accidental property — which is to say it would be incomplete. In other words, both of what are traditionally called essential and accidental properties respectively are necessary for the ontological completeness of a substance; they differ in how they are necessary.⁶

Another way of putting this would be to go back to the distinction between first- and second-order properties. First-order properties are particular properties that cannot be made more specific — in the language of A. N. Prior, they are determinates⁷ — whereas second-order properties are determinables that are indeterminate with respect to the

⁶ This analysis confines itself to constitutive properties and does not include what are usually called relations.

⁷ Arthur N. Prior, "Determinables, Determinates and Determinants." *Mind* (New Series) Vol. 58, No. 229 (Jan., 1949): 1-20.

first-order properties that are their instantiations. At their level, they simply determine the nature of what it is to be that kind of property. Thus, quadrupedicity is a second-order property because it merely determines the logic of being a quadruped: It does not determine the length of the legs, their thickness, the proportions among the parts of the individual legs, etc. These latter are determinations of the determinable quadrupedicity, and while it is necessary for a quadruped to have some specific version of these properties, which one it has is irrelevant as long as it falls within the specific range that is characteristic of quadrupeds. In other words, which specific instance of an essential property a substance has is an accidental matter. In that sense, essential properties *as instantiated* are in fact accidental properties.

This way of putting the matter allows us to see that all first-order properties of a substance are accidental properties; they merely differ in what kinds of accidental properties they are. Some accidental properties are instantiations of essential properties whereas others are not. The accidents that are instantiations of essential properties are instantiations from the range of properties that are determined by the (second-order) properties that define membership in the species; accidents that are not instantiations of essential properties are just that — accidental.

Therefore what the tradition calls essential properties are in fact not first-order properties at all but second-order properties whose instantiations — i.e., these second-order properties *as specified or determined to their ultimate limit* — are first-order properties. Therefore the proper way of representing symbolically the ontological assay of a substance is not as in Fig. 1 above but rather as follows:

Fig. 2 $S = [\Sigma^\Phi, \Sigma^\Psi, \Sigma^\chi, \dots \Sigma^\Omega, \dots \alpha, \beta, \gamma, \dots]$

where the Σ s are ranges of possible ways of being that kind of property — e.g., quadrupedicity — and the lower-case Greek letters represent truly accidental properties in the sense indicated above.

There is one more point about essential properties that is worth keeping in mind for evaluating Scotus's argument. While there is a logical connection between the instances of

an essential property and the essential property itself — the former are all instances of the latter — there is no logical connection between essential properties themselves beyond the fact of compossibility. In other words, one essential property does not entail another. *Given* a particular substantial form, it of course follows logically that all who share in it will instantiate a certain set of properties; however, that is quite different from there being any sort of entailment among the essential properties that constitute the substantial form itself.

THE ONTOLOGY OF CAUSATION

Let us now return to Scotus on accidental and essential causes. Scotus tells us that an accidental efficient cause differs from an essential efficient cause in that an essential cause is simultaneous with its effect and must persist as long as the effect does, whereas an accidental efficient cause can exercise its causality and then cease to exist without the effect ceasing to exist.⁸

So far, so good — but why does he say that a series of accidental efficient causes requires essential efficient causes in order for the chain of accidental efficient causes to show regularity? Suppose we consider a family of dogs going back hundreds of years, where this family can be ordered into a series in such a way that every member in the series is the offspring of preceding dogs and the progenitor of other dogs in the series. Why does this series of dogs (considering the dogs as accidental efficient causes) require essential efficient causes in order for the members of the series — the dogs — to regularly be dogs rather, than, say cats or tulips?

What underlies Scotus's position here is really a version of the Principle of Sufficient Reason, and the point that he is here making is that any imposition or transmission of form

⁸ Scotus, *op. cit.* at 45-46: "The third difference is that all *per se* and essentially ordered causes are simultaneously required to cause the effect ... it follows from the third difference that essentially ordered causes must exist simultaneously."

requires an ontological explanation. So his argument here is that if we consider the dog parents to be accidental efficient causes, then this regularity in the causal chain (the fact that the offspring of dogs are puppies, not flowers or cats) requires an ontological explanation but none is forthcoming within the series of accidentally ordered efficient causes. Hence, so he argues, we must step outside of that series — which means, we must appeal to essential efficient causes.

It is tempting to reply that this inference does not hold; that the regularity is accounted for by the fact that the substantial forms of the dogs who are acting as accidental efficient causes are the ontological ground of the regularity of characteristics that are found in the canine offsprings and that make them be like their parents. (For the sake of expository convenience, let us ignore the variations in pooch physiognomy and physiology among breeds, etc. and just talk about “dogs.”) The argument in support of this reply would have three steps: *First*, the substantial form *canis lupus familiaris* is constituted of a particular set of essential properties (each of which defines a range). *Second*, the manner of a dog’s acting as efficient cause is therefore fixed by its substantial form. This means that the forms that the dogs *qua* efficient causes can impose on the material cause when they are active as efficient causes must be found within the range of forms determined by the essential forms that are constitutive of the substantial form *canis lupus familiaris*. *Third*, the dog-parents *qua* efficient causes can only act as efficient progenerative causes by imposing the whole substantial form *canis lupus familiaris* on the material cause. That is why puppies will vary in the particular instances of the essential properties that they have — recall that essential properties are second-order properties that determine ranges of first-order properties — but they will always be dogs, not cats or tulips.

However, when we take into account what has been sketched above about substantial forms and essential and accidental properties, we can see why Scotus would argue that such an explanation would be insufficient to explain what he calls the regularity in accidental causal sequences — in this case, the regularity of substantial forms in the

progression of canine progenitors and progeny. Scotus would here point to the *third* step in the argument that was just sketched as problematic. The fact that the canine substantial form is constituted of certain essential properties would explain this regularity if and only if the essential properties that make up *canis lupus familiaris* were logically so tightly connected that they could only act together and in a certain way. However, in order for that to be the case, the ontological constituents of the substantial form *canis lupus familiaris* would have to be logically connected with each other. And, that, in turn, would mean that the essential properties that constitute the substantial form would have to entail each other, since otherwise the logical bond that would bind them together into one unit would be missing.

But, as we have seen, that is precisely what is not the case. The substantial form *canis lupus familiaris* is indeed constituted of essential properties; however, *none of them logically entail each other*. If they were logically connected — which is to say, if one entailed the other — then, given one of the properties, all other properties would automatically be entailed. Or, to put it in ontological terms, if there were the sort of relationship between essential properties that was postulated in the *third* step above, then it would be a matter of ontological necessity that the existence of one these properties would automatically entail the existence of all the other properties. However, that would mean that a dog could not share any of its properties with any other any animal because, if it did, then the logical connection that would then obtain among the properties that make up the substantial form *canis lupus familiaris* would entail that *all* its properties would have to be shared — which would mean that all other substances having any dog-properties would also have all of the other properties and therefore would all have to be dogs.

Therefore the logical connection among the various (essential) properties of a dog *qua* substance must be contingent. This, in turn, means that the overall logical structure of the substantial form *canis lupus familiaris* is contingent. But this means that when the substance that is structured by this contingent assemblage of properties that is the sub-

stantial form of dog acts as an efficient cause, there is no logical reason in the world why what it produces should be true to type — i.e., why it should only act as a whole, and why the dog *qua* accidental efficient cause should only impose the complete substantial form *canis lupus familiaris* on a material cause to produce another dog. Differently, there is no logical reason why the substance that is structured by the substantial form of *canis lupus familiaris* should act in just such a way that whatever has that form imposes only dog properties on the material cause (the matter) and, moreover, only all essential dog properties connected in a certain way. While the ontology of causality would entail that a dog could only impose on matter a form that was contained in its substantial form — one cannot give what one does not have — the logic of the substantial form *canis lupus familiaris* would not determine either that all such properties would be imposed or that a particular one of them would be. The set of properties/forms that would be imposed could be an entirely random set — or it could be a collection of essential and accidental properties. Moreover, this holds for all substances, not just dogs.

ACCIDENTAL AND ESSENTIAL SERIES OF CAUSES

In other words, neither the Aristotelian theory of causation nor the Aristotelian notion of substantial forms and accidental and essential properties can account for the regular transmission of substantial forms. However, as Scotus says, the members of series of chains of accidental efficient causes — which is to say, the members of the efficient causal chains that we find in the world — do act in a regular way and do pass on substantial forms in a regular, not a random manner. Since this regularity cannot be explained by the substantial forms of the agents in these causal chains, it follows that this regularity cannot be grounded within the chains of accidental causes but requires an appeal to an external agency.

One could of course argue that once there is a substantial form, then the substance that is structured by that substantial form will act on the basis of the logic inherent in its na-

ture even if there is not logical connection between its ontological components. To draw an analogy, one could argue that while there is no logical connection between the grains of sand in a sand pile, once there is a sand pile that pile will act on rivers, wind, etc. in a manner dictated by its nature as a sand pile — and that action will be regular and predicable.

However, while this is correct, it misses the point of Scotus's position. While the sand pile will act as sand pile, the results of its causal interaction with rivers (as a sand-bank), rain and wind does not lead to other sand piles. It leads to modifications of pre-existing substances (namely, rivers, rain, wind, etc.) — and what is more, its interactions will never lead to the same outcome. Otherwise all rivers would look the same, all sand-dunes (as a result of interaction with the wind) would look the same, etc. But they don't. That is because the formal parameters of a sand pile's substantial form are not logically interconnected. That is why they cannot consistently lead to the same result — i.e., result in regularity.

CONCLUSION

To sum up and generalise: The substances that act as accidental efficient causes do impose form on matter — that is integral in the Aristotelian theory of efficient causation. Moreover, the manner in which they impose form on matter must be a function of their natures — which is to say, it must find its explanation in the natures of their substantial forms. However, the substantial forms of these entities cannot determine which of its formal aspects will be imposed/transferred during the causal process or that the substantial form as a whole will be imposed. This means that the explanation must lie outside of the series of accidentally ordered efficient causes.

It is here that the notion of essentially ordered efficient causes enters the picture.⁹ Their agency is not causative in

⁹ It is probable that Scotus derived the notion of essentially ordered efficient causes from Ibn Sina who, in the *Kitab al-Shifa* (Book of the Heal-

the sense of imposing form on matter but causal in the sense of combining formal ontological parameters into substantial forms. They are, so to speak, the ontological glue that holds together the essential properties constitutive of the substantial forms of efficient causes and accounts for the regularity of their causality. Therefore, since accidental efficient causes can only explain which particular forms are imposed on matter when they are causally active — as was said, one cannot give what one does not have — but cannot explain why a particular combination of forms is imposed in the causal act, any regularity in passing on of anything requires a different kind of cause. That cause is an essential cause. Hence the existence of regularity in the series of accidentally ordered efficient causes requires the existence of essential causes.

As a final note, it should be clear that if this interpretation of Scotus's argument is correct, then the argument is deeply embedded in the logic of the Aristotelian concepts of substance and causality and should have been obvious to his contemporaries. The fact that neither they nor his successors seem to have appreciated this fact may be an indication of why he was called *doctor subtilis*.

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ing of the Soul), VIII: 1 uses it to prove the existence of God as first cause. See also his *Danish Nama-i'alai (Book of Scientific Knowledge)* Part I sec. 16. For an exposition of Ibn Sina's argument in the *al-Shifa*, see M.E. Marmura, "Avicenna's Proof from Contingency for God's Existence in the Metaphysics of the Shifa," *Mediaeval Studies* 42 (1980): 337-52.