

Tropes and the Generality of Laws

Are the red of this apple and the red of this vase, which exactly resemble each other in shade, numerically distinct? That is, are properties particulars, or, in other words, tropes? Or, do the apple and the vase both instantiate a single universal: a universal that is also instantiated by any other object that shares their shade? The great battle between upholders of tropes and upholders of universals is a multi-layered one that is impossible to disentangle from debates about the nature of powers, causation, and laws of nature. And it is on this last topic — the nature of a law of nature — that universals are generally presumed to have a serious advantage over tropes, some would argue a decisive one. David Armstrong (1993a; 1996; 1997; 2004) has long argued that with tropes, unlike with universals, one cannot forge the required link between causes and laws. Peter Forrest (1993) claims that for upholders of tropes to make this link they must invoke unappealing meta-laws. And E. J. Lowe's (2006) main reason for admitting the category of universals in addition to that of tropes, is that he considers that without universals one cannot formulate a satisfactory account of the ontological status of a law of nature.

This paper is concerned with a problem that Forrest and Armstrong both present as a central one for a trope account of laws — that of explaining the generality of laws. According to them, laws are general. The law that bodies do not accelerate unless acted on by a force implies that *every* body that is not acted on by a force will not accelerate. The law that water dissolves common salt implies that *every* quantity of water that comes into contact with common salt would, provided that nothing inhibits this, dissolve the salt.¹ But what explains this generality? Why couldn't some as yet unexperienced body accelerate despite not being acted on by a force? Why must water dissolve common salt in all times and places? Both Forrest and Armstrong claim that upholders of universals can, whereas upholders of tropes cannot, explain the generality of laws. In this paper I shall argue that neither Forrest nor Armstrong successfully establish any such thing. If the conclusion of this paper — namely, that universals have no advantage over tropes when it comes to accounting for the generality of laws — is correct, then this would be a significant victory for the trope-based approach.

¹ With Forrest and Armstrong, I shall assume that laws are general. But note, not everyone would wish to accept the generality of laws. Hence, for example, Lowe maintains that laws describe how an object *tends* to behave in various circumstances, not how it actually *does* behave. See Lowe (1987) and Lowe (2006, p. 131).

§1. Forrest's argument

Forrest's (1993, pp. 48-50) argument for the claim that universals can explain the generality of laws goes as follows: Where F and G are universals, say that something causes there to be a G solely in virtue of instantiating F. In this particular case, the instantiation of F caused the instantiation of G because of something about F-ness. With Forrest, call whatever it is about F-ness that did this Ω , 'where " Ω " is a suitable predicate whose analysis need not here concern us' (*ibid*, p. 49). Consider another instantiation of F. As F is a universal, it is identical across instantiations. Hence, given the Indiscernibility of Identicals, it will be true of F-ness in this further instantiation that Ω . Hence, in identical circumstances, this instance of F would also produce a G.

The generality of laws is therefore explained given the following combination of claims: 1) It is properties that make the causal difference. Hence, taking property-instantiations (where a property-instantiation is the instantiation of a property by a substance²) to be the causal relata as Forrest does, it is the property of the instantiation that makes the causal difference. For example, the flame instantiating the property of heat causes the copper sulphate crystals to instantiate the property of whiteness. It is the heat of the flame which enables it to bring about this causal effect; 2) properties are universals and hence repeatable and 3) identical properties play an identical causal role in identical circumstances.

Although the generality of laws can apparently be explained by appealing to the nature of a universal, according to Forrest (1993, p. 49) — and Armstrong would agree (see, for example, Armstrong 1997, p. 222) — a similar argument is not available for those who hold that properties are tropes. To demonstrate this Forrest starts with the observation that the latter account of properties treats "the repeatable property F-ness as a class of particulars, and it is not by belonging to a class of particulars that one thing causes another" (Forrest 1993, p. 49).

To explain this claim let us assume the account of property-types advanced by trope-theorists such as Keith Campbell (1990), for this account is precisely the sort that Forrest considers himself to be attacking (Forrest 1993, fn. 10). It cashes out property-types in terms of sets of resembling tropes, with a set of *exactly* resembling tropes providing a substitute for a universal. Hence, the repeatable property F-ness is to be identified with a set of exactly

² No particular ontological account of substance need be assumed here. In particular, it need not be assumed that the category of substance is ontologically additional to the category of property; substances may be nothing other than bundles of properties.

resembling tropes. Resemblance is here to be understood as an internal relation: a trope is a member of a resemblance class because of what it is. Hence, whether two tropes exactly resemble depends entirely on their particular natures.

Now upholders of tropes agree that it is properties that make the causal difference — indeed, according to Campbell, (1990, pp. 22-23) and many other trope theorists, causes just are properties. But properties are tropes. They are therefore non-repeatable. For this reason, they cannot be numerically identical in different tokens of the same causal sequence. Furthermore, given the trope account, a trope does not make the causal difference that it does by belonging to a set of tropes. It makes the causal difference that it does in virtue of its particular nature and the other members of the set do not determine this nature and, hence, have nothing to do with its causal efficacy.

Applying these considerations, let us say that: 1) the substitute for universal F is the set of exactly resembling tropes ‘f’ and the substitute for universal G is the set of exactly resembling tropes ‘g’; 2) f1 and g1 are tropes, where the first belongs to the set f and the second to the set g and 3) f1 causes g1.³ Now consider another trope that is a member of f, call it ‘f2’. As f2 is not numerically identical to f1, what reason, Forrest would ask, is there to conclude that it would cause a trope that exactly resembles g1?

It is true that f1 and f2 exactly resemble each other, but the point, according to Forrest, is that they are not identical. Hence, rather than appealing to the meta-law that ‘identical causes identical’ as the upholder of universals can, the best, Forrest considers, that trope theory can do to explain the generality of laws is to adopt the meta-law that ‘like causes like’. Causes that are like each other, in circumstances that are like each other, will give rise to effects that are like each other. More specifically, exactly resembling tropes will play an exactly resembling causal role in exactly resembling circumstances. Forrest questions the plausibility of this principle, and in doing so is in agreement with Armstrong whose dislike of the principle spans many years (1993a, p. 67; 1996, pp. 97-98; 1997, p. 222; 2004, p. 132). According to Armstrong, “[i]ntuitively, this is a somewhat less compelling principle than the principle that identical causes give rise to identical effects” (1997, p. 222) and one that “is exposed to sceptical doubts when it is asked how it in turn comes to be justified” (1993a, p. 67). As Armstrong further objects, “what truthmaker is there for this principle? It hardly

³Note that Forrest’s argument is not dependent on the claim that tropes are the causal relata, but rather that the properties that make the causal difference are tropes. Hence, for example, Forrest’s argument is equally applicable to accounts that maintain that the causal relata are substances, where a substance is a cause in virtue of a trope that characterises it.

seems a necessary state of affairs. That the principle should be flouted by actual singular sequences seems not self-contradictory” (2004, p. 132).⁴

Before responding to Forrest’s argument, it is worth drawing attention to two initial points.

First, in §3 it will become clear that the interpretation of Forrest’s argument depends on whether it is embedded in a dispositionalist or a categoricalist account of properties. Forrest neglects to make this point or to state which account he is assuming. In this paper I will consider both alternatives and show that under *neither* interpretation does Forrest establish that universals have any advantage over tropes in accounting for the generality of laws. If dispositionalism is accepted, then the principle that ‘identical causes identical’ and the principle that ‘exactly resembling causes exactly resembling’ are *equally* plausible. If dispositionalism is rejected, then the principles are *equally* implausible.

Secondly, observe that Forrest’s account of laws does not appeal to higher-order relations among universals. According to Forrest there are particulars that instantiate universals and these property-instantiations stand in various causal relations to one another. Laws are not ontologically additional to these entities but instead universal generalizations which quantify over them. Although Armstrong considers Forrest’s argument to reveal a serious problem for a trope account of laws (Armstrong 1993a, p. 67, Armstrong 1997, Ch. 15 and Armstrong 2004, p. 132), he parts company with Forrest in claiming that a satisfactory account of the generality of laws requires, not only a commitment to universals, but also to higher-order relations among them. In §4 I shall return to Armstrong’s account, and consider whether it succeeds where Forrest’s fails. The question that I wish to address first is whether, without an appeal to higher-order relations among universals, one really can establish that universals have any advantage over tropes in accounting for the generality of laws.

§2. *A Response to Forrest*

Let me begin by pointing out one way that trope theory should *not* respond to the problem. On the one hand, the substitute for a universal, according to trope theory, is a set of exactly resembling tropes. On the other hand, the substitute for a trope, according to those who

⁴ To these general worries about the principle, Forrest (1993, p. 49) adds a more specific one, namely, that with such a meta-law one is unable to deal with functional laws. This paper shall concentrate on worries of the first type. As Forrest and Armstrong both acknowledge, providing an account of functional laws is problematic regardless of whether properties are tropes or universals. The issue of whether one does a better job than the other deserves a separate discussion of its own.

accept universals, is an instance of a universal, that is, the instantiation of a universal by a substance. The latter is a complex entity whose constituents include a substance (a particular) and a universal (a qualitative nature). Unlike it, a trope is not a complex of a particular and a qualitative nature. That is, it is not the case that a trope consists of a constituent that plays the role of particulariser and a further constituent that plays the role of characteriser. It is the trope (not any constituent of it) that is both particulariser and characteriser. To deny this by separating a trope's particularity from its qualitative nature is to admit that a trope is a complex that has a universal as one of its parts — assuming that the universal/particular distinction is an exhaustive one, a characterising constituent that is not itself a particular can be none other than a universal. Consequently, one collapses tropes into instances of universals.⁵ With such a model of tropes, one could, however, easily adopt a Forrest-style explanation of the generality of laws, arguing that causal relations between tropes hold in virtue of the 'characterising constituent' of a trope. These characterising constituents would be numerically identical amongst exactly resembling tropes and one could appeal to this numerical identity — invoking the 'identical causes identical' principle — to explain the generality of laws, in much the same way that Forrest does. This fails as a trope response to the problem, because it amounts to the adoption of a theory of universals in all but name.

The correct response to Forrest's argument is, I consider, to question why the principle that exactly resembling causes exactly resembling should be considered any less plausible than the principle that identical causes identical. I shall argue that the thought that it is less plausible is fostered either by an inadequate understanding of the relationship of exact resemblance or by treating a trope account of laws less charitably than Forrest treats his own account of laws.

To develop this response it is first important to make explicit two features of the account of tropes that I am assuming. They are not ones that I take to be contentious amongst most upholders of tropes.

First, the only thing that differentiates numerically distinct tropes that exactly resemble is the fact that they are distinct particulars. (Universals are not particulars, and hence exactly resembling universals are not numerically distinct).

⁵ These claims are widely accepted by upholders of tropes. See, for example, Campbell 1990; Ehring 1997; Ehring 1999; Heil 2003; Maurin 2002 and Robb 2005.

Secondly, the particularity of a trope is not a property of it — it does not, in some way, characterise the trope. This point perhaps requires some justification. The reason is based on a priori considerations concerning the categories of being. Ontological categories, which I understand to be demarcated by their existence and identity conditions, form a hierarchical system. Hence, the claim that tropes are particulars is to be interpreted as the claim that tropes are an ontological category which falls within the more general ontological category of particular. In providing a hierarchy of ontological categories, the aim is to *structure* the elements of being. But as ontological categories structure the elements of being, they should not themselves be counted as elements of being. Hence, neither a trope nor the particularity of a trope are to be included alongside such things as tables and trees, and the greenness of a leaf or the scarletness of an apple, in a list of what there is. (For further defence of this point, see Lowe 2006, pp. 6-7 and pp. 40-44). From this it follows that the basis on which formal ontological predicates such as ‘is a particular’ apply to an entity differs from the basis on which empirical predicates such as ‘is scarlet’ apply to an entity. The apple is scarlet in virtue of its instantiating the property of scarletness. Unlike this, a trope is not a particular in virtue of its instantiating the property of ‘particularness’. Given the claim that ontological categories are demarcated by their existence and identity conditions, a trope instead falls within the category of particular in virtue of its existence and identity conditions. (For further defence of this point, see Lowe 2006, pp. 198-200). What this amounts to depends on one’s understanding of what it is that distinguishes particulars from universals.⁶

From all of this, we can draw a number of conclusions about exactly resembling tropes — conclusions that, once again, I take to be uncontentious amongst many upholders of tropes, but which need to be made fully explicit for the purpose of this discussion. These conclusions are as follows:

The only possible *empirical* difference between exactly resembling tropes will be a spatio-temporal one. This is because all that distinguishes exactly resembling tropes is their

⁶ Hence, Lowe maintains that a universal is that which has instances, whereas a particular does not (Lowe 2006, p. 39). According to his four-category ontology, tropes are particulars because they lack instances, whereas a universal has tropes as its instances. This can be explained by consideration of the various ontological dependence relationships that the four categories stand in to one another, which in turn depends on each category’s existence and identity conditions. Alternatively, one might claim, with Forrest, that universals are repeatable whereas particulars are not. Hence, a trope is a particular in virtue of the fact that it could not exist in more than one place at a time. According to still yet another account, universals can characterize more than one substance at a time, whereas tropes cannot.

particularity. ‘Is a particular’ is not an empirical predicate, but a formal one. The difference between exactly resembling tropes is therefore *ultimately* not an empirical one but a metaphysical one. I say ‘ultimately’ because one’s account of what it is to be a particular might entail that different particulars, and hence exactly resembling tropes, could not exist in the same spatio-temporal location. Put slightly differently, there is no more of an empirical difference between two exactly resembling tropes than there is between two different instances of a universal.

Relatedly, a trope’s particularity does not contribute to its powers. That is, it does not make a difference to the way in which it could affect an entity.⁷ If the claim that a trope is a particular were to be analysed in the same way as the claim that an apple is scarlet — that is, if one were ascribing a property to an element of being — it would be reasonable to raise the question of whether the particularity of a trope does contribute to its powers. This is because, returning to the plausible claim which Forrest’s argument makes use of, it is properties that make the causal difference. But a trope is not an element of being and the particularity of a trope does not refer to a property that characterises it. The ways in which a trope could causally affect an entity is wholly accounted for by the qualitative nature of the trope. The fact that a trope is a particular, and hence cannot characterise more than one entity at a time, makes no difference to these powers.

Indeed, those who support Forrest’s argument for the claim that universals can explain the generality of laws, but wish to reject the claim that the particularity of a trope has no causal role to play can clearly be accused of inconsistency, for they themselves must hold that the particularity of a property-instantiation has no causal role to play. Say that particular P1 instantiates universal F and that this causes P2 to instantiate universal G. In this instance, the first instantiation produced the second because of something about F-ness, namely Ω . Now plug a different particular, P3, into the first property-instantiation. Forrest assumes that it will still be true of this new instance of F that Ω , and hence that, in the relevant circumstances, P3’s instantiation of F will produce an instance of G. The particularity of the instantiation does not affect F’s ability to bring about an instance of G.

Given these considerations, let us return to Forrest’s argument against tropes. With regard to exactly resembling tropes f1 and f2, if they did not cause exactly resembling tropes in exactly resembling circumstances, the only thing that distinguishes f1 and f2 — the fact

⁷ Power here, of course, need not be interpreted according to the dispositionalist account.

that they are distinct particulars — could not be appealed to to explain this difference in their effects.

This provides an *initial* defence of the principle that exactly resembling causes exactly resembling. If *f*1 causes *g*1 and *f*2 exactly resembles *f*1, then, in exactly resembling circumstances, *f*2 must cause a trope that exactly resembles *g*1. This is because, given what has been argued above, the difference between *f*1 and *f*2 is not one that causation would be sensitive to. *f*1's and *f*2's qualitative natures will be indistinguishable, and hence their causal effects must also be indistinguishable.⁸

§3. *Dispositionalism and categoricalism*

It is notable, however, that this defence smuggles in the assumption that having the qualitative nature that *f*1 does and causing *g*1 are intimately connected; that causing a *g* (that is a trope from the set of exactly resembling tropes to which *g*1 belongs) is built into the qualitative nature of *f*1, and hence that *f*1 wouldn't be *f*1 unless, in suitable circumstances, it caused a *g*. Certainly, given this understanding of the connection between *f*1 and *g*1, from what has been said above, it is reasonable to conclude that any trope that exactly resembles *f*1, and, hence, whose qualitative nature is indistinguishable from *f*1 will also, in suitable circumstances, cause a *g*. The power to cause a *g* flows from the qualitative nature of *f*1, and hence will also flow from the qualitative nature of any trope that exactly resembles *f*1. But, if one abandons the claim that there is any such intimate connection between *f*1 and *g*1, if *f*1's power to cause a *g* is not entailed by *f*1's qualitative nature, why should we assume that anything that exactly resembles *f*1 will itself cause a *g*?

For this reason, Armstrong, who rejects a dispositionalist account of properties, would presumably not consider that a satisfactory response to Forrest's problem has here been presented.⁹ According to him, properties are not powers. This is true regardless of whether properties are universals or tropes. This leads to the rejection of the necessitarianism that dispositionalism engenders. If a property is wholly categorical then, as Bird puts it, its

⁸ It should be remembered that at no stage is the suggestion that the distinction between *f*1 and *f*2's qualitative nature and *f*1 and *f*2's particularity a distinction between constituents of a trope. I would instead suggest that it is a formal distinction which can arguably be recognised by an act of partial consideration. See, for example, Campbell (1990, p. 56). I shall not defend this claim here, as it would detract from the main aim of my paper.

⁹ Indeed, note that in more recent writing Armstrong (2004, p. 133) is not resistant to the claim that if tropes are embedded within dispositionalism, then the 'like causes like' principle becomes plausible. This claim is not one, however, that he explores in any detail.

“existence does not, essentially, require it to manifest itself in any distinctive fashion in response to an appropriate stimulus” (2007, p. 66). There is, therefore, no necessary link between a trope’s having the qualitative nature that it does and its having a certain effect.¹⁰ It follows that even though *f1* and *f2*’s qualitative natures are indistinguishable there is no reason whatsoever to infer from this that they will be causally indistinguishable. This has nothing to do with the thought that the particularity of a trope makes a difference to the way in which it affects an entity. Rather, it is because there is no necessary link between *f1*’s qualitative nature and the power to cause a *g* in the first place. Without dispositionalism, the problem that Forrest raises for tropes seems insoluble.

But matters are not as straightforward as they at first seem. On closer inspection, Forrest’s argument for the principle that identical causes identical suffers from exactly the same kind of problem. According to Forrest, an instantiation of universal *F* brings about an instantiation of universal *G* because of Ω (*F*-ness). As *F* is identical across its instantiations, Forrest concludes that every instantiation of *F* will be Ω , and thus, in identical circumstances, would cause an instantiation of *G*. But on what basis should we assume that *F* will always have this effect in its different instantiations? One cannot respond that *F*’s ability to cause an instance of *G* is part of *F*’s nature, for we are operating on the assumption that dispositionalism is false. But, then, what is the truthmaker for the claim that *F* will cause an instance of *G* in different instantiations? What grounds the claim that identical causes identical?

Armstrong recognises this problem for Forrest’s version of the argument for the principle that identical causes identical. He considers that, given the desire to avoid dispositionalism, the best that Forrest can do is to say that the truthmaker is “the nature of universality, what it is to be a universal, perhaps following this up with the claim that the identical universals→identical effects principle supervenes upon what it is to be a universal” (Armstrong 1997, p. 222).

What exactly this claim amounts to is unclear. According to the suggestion, it is a feature of the ontological category of universals that identical universals have identical effects. Is this supposed to be a brute fact about the category of universals? That is, is it simply true of universals that the principle that identical universals cause identical effects holds, where this principle is not itself explicable in terms of anything about the intrinsic nature of a universal? Surely the explanation cannot stop here! Certainly, if this is the

¹⁰ See further Armstrong (1997, p. 260).

suggestion, given the above observations about exact resemblance, it seems no more questionable or elusive to claim that it is a brute fact about the category of tropes that exactly resembling tropes have exactly resembling effects. If, on the other hand, the claim that identical universals have identical effects is not a brute fact about universals, but is true of a universal in virtue of something about the intrinsic nature of a universal, we are back where we started, for we have simply abandoned categoricism for dispositionalism.

I should emphasise that if one does maintain that universal F will, in the relevant circumstances, always cause instances of G because of something about the intrinsic nature of F, exactly the same move will be available to upholders of tropes. Say that tropes f1, f2, etc. belong to a set of exactly resembling tropes that is a substitute for universal F and that tropes g1, g2, etc. belong to a set of exactly resembling tropes that is a substitute for universal G. Whatever it is about the intrinsic nature of F that links F to G, would also be something about the intrinsic nature of f1 that links it to a trope from the set that is a substitute for universal G. To see this, compare the universal redness with a trope that belongs to the set of exactly resembling tropes that are red. A universal is nothing but a qualitative nature. Regarding tropes, in selectively attending to the redness of the trope, one has considered the qualitative nature of that trope in its entirety — the particularity of the trope is not some additional qualitative feature of it. Hence, a red trope has all of the qualitative nature that the universal red has and no more. The one difference between a trope and a universal is that the qualitative nature of a universal exhausts its intrinsic nature, and hence the exact resemblance of two universals entails their numerical identity. The qualitative nature of a trope does not exhaust its intrinsic nature, and hence the exact resemblance of two tropes does not entail their numerical identity.

Given that a universal just is a qualitative nature, and that a trope has all of the qualitative nature that a universal has and no more, whatever it is about the intrinsic, and hence qualitative, nature of universal F which causes it to bring about an instance of G would also be something about the qualitative nature of trope f1 which causes it to bring about a g; the link between f1 and its power to bring about a g would be of exactly the same strength as that between universal F and its power to bring about of an instance of G. Having established this link between the qualitative nature of a trope and its effects, we can then return to our initial defence of the principle that exactly resembling causes exactly resembling.

To summarise, if properties are powers then upholders of tropes are just as able to defend the generality of laws as upholders of universals. If, on the other hand, one accepts categoricism, then Forrest has failed to establish that a trope account of the generality of

laws is any worse off than the account he offers in terms of universals. The stumbling block for both accounts is providing a strong enough link between a trope's or a universal's qualitative nature and its power to bring about a certain effect. If such a link could be provided, then, given a proper understanding of what distinguishes exactly resembling tropes, the principle that 'exactly resembling causes exactly resembling' would be no less plausible than the principle that 'identical causes identical'. Forrest's account and the trope account of the generality of laws stand and fall together.

§4. *A Response to Armstrong*

What if we were to abandon Forrest's claim that one does not need to appeal to higher-order relations between universals in order to explain the generality of laws? Certainly, the appeal to these higher-order relations is what Armstrong considers to be missing from Forrest's account (Armstrong 1997, p. 222).

Let me briefly explain Armstrong's account of laws as presented in *A World of States of Affairs* (1997). According to Armstrong, singular causation is a relation between first-order states of affairs; where S1 and S2 are thin particulars, and F and G are universals, S1 instantiating F brings it about that S2 instantiates G. For first-order states of affairs to be causally related, they must exemplify types that are lawfully connected. The lawfully connected types that the states of affairs exemplify are the universals that partly constitute the states of affairs. Thus 'S1's instantiating F causes S2 to instantiate G' is true if and only if F and G are lawfully connected. Crucially, unlike with Forrest's account, the lawful connection between universals is a direct one, it does not hold via their instances, that is, via first-order states of affairs. Furthermore, the nomic connection between state-of-affairs types (universals) is, according to Armstrong, a causal connection. That is, F and G are lawfully connected if and only if F brings about G. It is thus Armstrong's claim that causal connections are not merely between states-of-affairs tokens but also between states-of-affairs types (1997, p. 225). Indeed, according to Armstrong, the *fundamental* causal connection holds at the type level. Singular causation is nothing other than the instantiation of this causal connection in a particular case (1997, p. 227).¹¹

¹¹ In earlier work, Armstrong (1983) understands the lawful connection between universals to be the necessitation relation, laws having the form 'F-ness necessitates G-ness'. As the connection does not hold between universals via their instances, Armstrong took laws to be *second-order* necessitation relations between universals (1983, p. 88). (Laws are still contingent for Armstrong — there are possible worlds in which F-ness does not necessitate G-ness). However, van Fraassen (1989, Ch. 5) objected that this account faces the

Because Armstrong maintains that there is a direct causal connection between universals, his account of why universals explain the generality of laws differs from that of Forrest's. If, in a particular case, an instance of F causes an instance of G, this is in virtue of the fact that F causes G — the first causal connection is nothing but an instance of the second. This direct connection between F and G entails, not only that this instance of F causes an instance of G, but that, in identical circumstances, every instance of F will cause an instance of G. Thus the truthmaker for the claim that F will cause G in different instantiations—a truthmaker which Forrest's account was arguably unable to provide—is the higher-order relation between F and G. (Armstrong 1997, p. 222). This is the real reason, according to Armstrong, why identical causes identical.

If Armstrong's account succeeds, then universals have a clear advantage over tropes in their account of laws, for a similar response is clearly unavailable to the upholders of tropes. Singular causation does not hold between tropes because of a more fundamental causal connection between type-level entities, that is, because of a causal connection between sets of exactly resembling tropes. Rather claims about type-level connections are true in virtue of claims at the singular level, that is, claims about singular causation.

But does Armstrong really provide a more successful account of the generality of laws? Given Armstrong's account, the strength of the inference that an instance of F would cause an instance of G depends on the strength of the connection between F and G. Now, of course, if the causal connection between F and G were a necessary one, then the relation between F and G could not change and the claim that, in the relevant circumstances, an instance of F always causes an instance of G would drop out of this. But Armstrong holds that the connection between F and G is contingent. This raises a question for Armstrong's account that he is all too aware of: "Why may it not be that F has the nomic relation G at one time, but later, since the connection is contingent, this relation lapses, perhaps being

'identification problem' (the problem of how we should understand the relation of necessitation between universals) and the 'inference problem' (the problem of explaining what information the claim that one universal necessitates another gives us about regularities). Furthermore, solving one of these problems leaves the other insoluble. Armstrong's response to the identification problem is that the relation is the causal relation, and his response to the inference problem is that if the relation holds between state of affairs types then it must hold between tokens of these types (Armstrong 1993b and 1997, p. 227-228). Note, Van Fraassen's (1993) has questioned whether the relation between states of affairs type and the relation between tokens of these types can plausibly be identical.

succeeded by F's being related to H?" (Armstrong, 1997, p. 257). For Armstrong, there is no explanation of why F and G are causally connected in the first place which could then be appealed to to ground the claim that F and G will always be causally connected; although regularities among singular states of affairs are explained by causal connections between universals, and some of these connections might themselves be explained by appealing to more fundamental causal connections between universals, at the level of fundamental causal connections between universals the explanation stops, contrary to the Dispositionalist. That said, Armstrong used to deny the possibility that the causal connection between F and G, if it obtains, might then cease to obtain; although the causal connection need not hold in other possible worlds, there is intra-world stability. But in more recent work, Armstrong (1997, pp. 257-262) has revoked this position, considering that, given his account, he is forced to admit that contingent relations between universals might change. To quote Armstrong, "If F-ness produced G-ness, then F-ness has the power to produce G-ness. It may only have this power in a certain spatiotemporal area. It may at some point lose this power." (1997, p. 261).

The resulting problem in accounting for the generality of laws is clear. If, in a particular case, an instance of F causes an instance of G, this is in virtue of the causal connection between F and G. But we cannot reason from this causal connection between F and G to the claim that a further instance of F will also cause an instance of G, because the causal connection between F and G may be space-time sensitive; that is, it might vary from space to space and time to time.

Now compare the problem facing Armstrong's account of the generality of laws with the problem facing the trope account of the generality of laws if dispositionalism is rejected. Of course, if causation is space-time sensitive, this will also present a problem for a trope account of the generality of laws. Exactly resembling tropes exist in different spatio-temporal locations and hence, in virtue of this difference, might, if causation is space-time sensitive, differ in their causal effects. However, the resulting problem facing the trope account of the generality of laws is none other than the problem facing Armstrong's account of the generality of laws.

The distinct, and additional, problem facing the trope account is that causal relations might differ from particular to particular, that is, that causation might be sensitive to particularity. (Note that depending on one's understanding of the distinction between a universal and a particular, if causation is sensitive to particularity, this might entail that causation is sensitive to space-time location.)

But what Armstrong fails to recognise is that if we grant that the world might be such that causal relations differ from particular to particular, an extended version of the problem facing his own account can be advanced. The original problem was that the causal relation between universals F and G might not obtain in different spatiotemporal areas — it might be space-time sensitive. But, if we are allowing that in the case of tropes, causation might be sensitive to particularity, then we surely have to allow that in the case of universals, causation might be sensitive to particularity. This raises the following problem for universals: If in a particular case, an instance of F causes an instance of G, this is in virtue of the causal connection between F and G. But we cannot reason from this causal connection between F and G to the claim that a further instance of F will also cause an instance of G, because the causal connection between F and G might not obtain for different instances of F and G, and this is not in virtue of the fact these different instances occupy a different spatiotemporal area, but simply in virtue of the fact that they are different instances, that is, that they involve different particulars. The resulting problem of how to move from the claim that universal F causes universal G to the claim that, in a particular case, an instance of universal F would cause an instance of universal G seems no less problematic than the problem of how to move from the claim that trope f1 causes trope g1 to the claim that a trope that exactly resembles f1 would cause a trope that exactly resembles g1.

Now Armstrong does have a reply to the point that causation might be space-time sensitive. In his defence of the claim that universal F would, as a matter of fact, stand in a causal relation to G in different spatio-temporal locations, he argues that F “did have the power at a certain time. Is it not an attractive and simple hypothesis that it will continue to have this power at all times and places? (Power here, of course, does not have to be understood according to the Dispositionalist model.)” (1997, p. 261). In other words, is it not an attractive and simple hypothesis that causation relations are not space-time sensitive? As Armstrong goes on to acknowledge, this justification “may not be quite all one might hope for, but it seems to have real value.”

One would think that Armstrong would find the hypothesis that causal relations are not sensitive to particularity even more attractive than the hypothesis that causal relations are not sensitive to space-time. While ‘is in spatio-temporal location x’ is an empirical predicate, ‘is a particular’ is a formal predicate and thus, it is hard to see how nomic connections, which are empirical, could be sensitive to the difference between two particulars, qua particularity.

But if Armstrong allows that, in the case of universals, the causal relation is not sensitive to the particularity of the instantiation, how, if he is to be consistent, could he not

allow that, in the case of tropes, the causal relation is not sensitive to the particularity of the trope? An empirical law would be no more sensitive to the difference between exactly resembling tropes than it would be to the difference between two different instances of a universal. As with Forrest's argument, so with Armstrong's — Armstrong's account of the generality of laws and the trope account of the generality of laws stand and fall together.

§5. Some final remarks

The aim of this paper has been to establish that neither Forrest nor Armstrong successfully demonstrate that universals do a better job of explaining the generality of laws than tropes. Given a dispositionalist account of properties, tropes and universals are equally successful in explaining the generality of laws. If, on the other hand, properties are categorical, universals are no better off than tropes, facing similar problems, which upholders of universals and upholders of tropes can attempt to respond to in similar ways. Contrary to Armstrong (2004, p. 132), to suggest that the principle that exactly resembling causes exactly resembling could be flouted in singular cases carries no more force than the claim that the principle that identical causes identical could be flouted in singular cases.

There is, of course, more work to be done in order to demonstrate that upholders of universals do not have an advantage over upholders of tropes when it comes to laws — discussions concerning the generality of laws are but one aspect, albeit a very important one, of this project. Universals might be thought to have an advantage over tropes in accounting for the link between laws and counterfactuals or in accounting for functional laws.¹² And the problem of how to distinguish law-like regularities from mere accidental regularities will not go away for those upholders of tropes who combine a regularity theory of laws with a regularity theory of causation, although clearly the problem is less pressing for those upholders of tropes who attempt to advance a less deflationary account of singular causation.

It is important to recognise that this discussion's focus has been on Forrest's and Armstrong's appeal to universals to account for the nature of laws of nature. Other ontological accounts may have a stronger case for the claim that one can provide a better account of the generality of laws with universals than one can with tropes. In particular, I

¹² For the former problem, see Armstrong 1983, p. 103; 1996, p. 100-101 and 1997, p. 261. As Armstrong (1996, p. 100-101) acknowledges, the problem is removed if there is a necessary connection between a trope and its effects. Equally, given Armstrong's denial of intra-world stability, it is not altogether clear that his own account of the link between laws and counterfactuals is entirely satisfactory, as Armstrong (1997, pp. 259-262) himself recognises. For the latter problem, see Forrest (1993).

have in mind Lowe's four-category ontology. Lowe (2006) considers that in order to provide a truly satisfactory account of laws one needs, not only universals, but also substantial kinds. More importantly for this discussion, unlike Armstrong, Lowe treats universals as abstract, that is as non-spatiotemporal entities. For this reason, Lowe understands laws (to the extent that they involve universals) to be timeless and placeless. The issue of whether this account is able to avoid the difficulties afflicting Armstrong account has not been a topic of this discussion, but is one that deserves further exploration.

To raise a final point, this paper has established that, at least as far as Forrest's and Armstrong's accounts of a law of nature are concerned, the universal-based approach and the trope-based approach are equally successful (or unsuccessful) in explaining the generality of laws. This equivalence in their explanatory power might raise the suspicion that the ultimate lesson to be learned is that there is not really any substantive difference between the two approaches. That is, to talk about multiply located *in re* universals and to talk about singly located exactly resembling *in re* tropes is to use two different languages to ultimately say the same thing — it is to make a distinction without a real difference. If so, it is no surprise that neither theory has an explanatory advantage in explaining the generality of laws.

I would urge against this conclusion. There is a substantive difference between tropes and universals because they have utterly different identity conditions. While tropes are particulars, universals are not. In virtue of this difference, the exact resemblance of universals F and G entails their numerical identity, while the exact resemblance of tropes f1 and g1 does not entail their numerical identity. There is a substantive difference between tropes and *instantiations of* universals, because while the latter is a complex entity whose constituents include a substance and a universal, a trope does not have either of these entities as a constituent, indeed, it is not a complex entity. Although these differences between the two approaches does not entail any difference in their ability to explain the generality of laws, one would be incorrect to conclude that the two approaches were explanatorily equivalent in all respects. To mention but one of the resulting, well-known differences, those who maintain that universals are *in re* tend to consider that universals are 'wholly present' in the various substances that instantiate them. Hence, they accept that a universal can be wholly in two different places at the same time. The plausible objection that it makes no sense to say that anything, not even a universal, can be wholly in two different places at once, motivates the

thought that universals cannot be concrete entities. *In re* tropes clearly face no such problem because they are not instantiated by more than one substance at a time.¹³

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