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AGAINST DISJUNCTIVE PROPERTIES: FOUR ARMSTRONGIAN ARGUMENTS

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1. Introduction

In this paper, I shall defend the view that there are no disjunctive properties. After introducing the issue and setting the stage, I first present my argument from truthmaking against such properties, an argument which is so congenial with Armstrong's version of logical atomism (1997) that it qualifies as 'Armstrongian'. Next, I consider three arguments that appear explicitly in Armstrong's work from 1978 and onwards in his middle period (e.g. 1978, 1989; 1997): I call them his 'early arguments'. Although they are not as good as the first argument, two of them should still be taken seriously by philosophers who are fans of disjunctive properties. Finally, I therefore consider objections to them, put forward by two such fans. The first objection is Louise Antony's rejection of Armstrong's argument against disjunctive properties from 'the powerful truism' that a universal is strictly identical across its instances (Antony 2003). The second objection is Alan Penczek's opposition to a more wide-ranging view shared by Armstrong, namely, the thesis that disjunctive properties are not causally efficacious (Penczek 1997). Importantly, these objections are simultaneously positive arguments *for* disjunctive properties and, if successful, they might lead us to reject the two early arguments they oppose – and perhaps also feel less confident about the argument from truthmaking. However, I shall argue that they fail.

What is a disjunctive property? A rough definition can be given as follows. Trivially, in the singular case, for properties F and G, a disjunctive property is a property F∨G of particular *a* if and only if *a* is F or G (the 'or' being exclusive, a qualification I shall henceforth take as read). Likewise, in the plural case, if particular *a* is F but not G and particular *b* is G but not F, F∨G is a disjunctive property shared by *a* and *b*.[1] For example, if an apple is red or green, then being red-or-green is a disjunctive property of the apple. And, to take an example that might occur in ordinary thought and talk, if today is (was) wet but not windy and tomorrow is windy but not wet, being

[1] For simplicity, here and throughout the paper, I shall state only the binary instance of the plural case and assume that what I say holds, *mutatis mutandis*, for all plural cases.

wet-or-windy is a disjunctive property shared by today and tomorrow. Note that prima facie the disjunct of a disjunctive property may in itself be a complex property, as in the notorious example of being grue (i.e. either green if examined on or before 2500 A.D. or blue otherwise). However, in fact this is not possible for the disjunctive properties this paper argues against: in a disjunctive property, F∨G, as defined above, F and G are simple properties. As we shall see in Sect. 3 below when assessing Antony's objection, this is a rather important point.

This leads us directly to the following point. A familiar and plausible view is that properties fall into sparse and abundant ones (Lewis 1983). Sparse properties carve reality at the joints and their number is relatively small, while abundant properties, by definition, correspond to predicates and hence are plentiful. There are, of course, abundant disjunctive properties, but they are not relevant for the purposes of this paper: metaphysics is concerned with sparse properties. In general, abundant properties include as a subset complex properties obtained by the Boolean operations of conjunction, disjunction and negation, but these properties, as well as the operations, are not relevant here either, and for the same reason. What is at issue is whether or not sparse properties include disjunctive properties, i.e. whether disjunctive properties, at least some, are sparse. Accordingly, by 'disjunctive property' I generally mean '*sparse* disjunctive property' and take this as implied, though I shall make the qualification explicit if I think clarity requires it in the specific context.

In Armstrong's terminology, the distinction between sparse and abundant properties is equivalent to the difference between 'first-class properties' on the one hand and 'second- and third-class properties' on the other. A well-known notion that corresponds to this distinction is the difference between the 'scientific image' and the 'manifest image', with sparse properties occupying the former and abundant properties the latter.[2] Armstrong, with his strong belief in a posteriori realism about universals is always cautious about giving examples of universals. But in his opinion, if they are to be found anywhere, it is in fundamental physics. As he would be the first to admit, however, what at one time in fundamental physics is a property identified as a universal

[2] This is not to say they are philosophically uninteresting. For instance, on Lewis's own view, they are required 'to provide the semantic values for a systematic, compositional semantics for our language and to characterize the contents of our intentional attitudes' (Lewis 1983, p. 219). This non-metaphysical importance may be overlooked if one denigrates them as 'second- and third-class' or belonging to the manifest image only.

(first-class property) may turn out *not* to be a universal at a later stage of the discipline's development. Hence, in general, it is prudent to abstain from attempting to give examples of specific sparse properties.

Given the distinction between abundant and sparse properties, there is no one-to-one correspondence between predicates and (sparse) properties. For instance, 'is a mermaid' corresponds to no property, 'has charge –e' corresponds to one property and 'is a game' corresponds to many properties. Conversely, one property may correspond to no predicate (an unknown property); one predicate (e.g. having charge –e), though we could easily construct more; or many predicates (e.g. having gravitational rest mass M and having inertial rest mass M). Hence, we cannot infer from the obvious existence of disjunctive predicates, such as 'is red or green' and 'is wet or windy', that the matching disjunctive properties exist.

In my view, a fitting response to the lack of (i) a priori identification of universals/first-class properties and the lack of (ii) one–to–one correspondence between predicates and properties is to use toy examples of sparse disjunctive properties, such as being red-or-green and being wet-or-windy. Thus, this is what I shall continue to do.

As a universal-realist, Armstrong identifies all and only first-class properties with universals. This identification is central to at least one of his arguments against disjunctive properties, which I call the 'argument from the powerful truism' and which I shall present in Sect. 3 below. In my view, however, the best argument against disjunctive properties, the argument from truthmaking, does not require any particular view of the ontology of properties. All it needs is the thesis that sparse properties exist at the truthmaker level while abundant properties do not.

2. The argument from truthmaking

First, let us introduce some terminology. I call sparse properties 'truthmaking irreducible' (TM-irreducible) and abundant properties 'truthmaking reducible' (TM-reducible). As we have seen, the existence of abundant (TM-reducible) disjunctive properties is not an issue. By the view that there are no disjunctive properties, I mean the view that no disjunctive property is TM-irreducible or sparse. Now, there is a lot that could be said about truthmaking, but for the purposes of this paper, I do not need to go into it. But I would like to put a bit more formally what I mean by 'TM-

reducible' or 'TM-reducibility'. First, let us say that truthmakers are entities that satisfy the following schema (cf. Fox 1987):

(T) Entity E is a truthmaker of ⟨p⟩ iff ⟨E exists⟩ entails ⟨p⟩.

Roughly speaking, schema (T) covers the intuition that truthmakers are entities that 'make true' truth-bearers (when true). As indicated by this, I consider propositions to be truth-bearers. Other philosophers have considered sentences or statements to be truth-bearers, which may be feasible, but in any case I think it is mainly a pragmatic issue which entities to take as truth-bearers. But when defining TM-reducibility, the choice of propositions does require me to stipulate that a putative entity E*, such as a (sparse) disjunctive property, is 'stated' by the relevant proposition, using the inverted commas as scare quotes. For propositions do not state or express anything. They *are* what is stated or expressed. (An alternative to 'state' it 'express', but this term should likewise be employed in inverted commas in this context.) So the proposition that *a* is F∨G 'states' the disjunctive property F∨G. I use that locution in my definition of TM-reducibility:

(TR) Entity E* 'stated' by ⟨p⟩ is TM-reducible to entity or entities E=$_{df.}$ E make(s) ⟨p⟩ true.

On the notions of truthmaker and TM-reducibility thus defined, it is easy to see that disjunctive properties are TM-reducible (to atomic truthmakers). Before showing this, however, it is necessary to state two equivalences. First, there is an equivalence between a disjunctive property for the singular case and a disjunctive state of affairs:

(S) (F∨G)*a* iff F*a*∨G*a*.

Second, there is the corresponding equivalence for the plural case:

(P) (F∨G)*b* and (F∨G)*b* iff F*b*∨G*b* and F*b*∨G*b*.

Given these equivalences along with (T) and (TR), it follows that disjunctive properties are TM-reducible (to atomic truthmakers). For firstly, disjunctions, such as ⟨*a* is F or *a* is G⟩, can be made true by either of the truthmakers of their disjuncts, say, the truthmaker of ⟨*a* is F⟩. Hence, by 'Lewis's Razor' – the principle of ontological economy that we should not postulate types of entity (as opposed to tokens) beyond necessity (Lewis 1973) – we should not postulate disjunctive truthmakers. Secondly, consider the equivalence (F∨G)*a* iff F*a*∨G*a*. Corresponding to it is the fact that ⟨*a* is F∨G⟩ is equivalent to ⟨*a* is F or *a* is G⟩. Given Lewis's Razor, ⟨*a* is F∨G⟩ is made true by the truthmaker of ⟨*a* is F⟩ or the truthmaker of ⟨*a* is G⟩; and similarly for the plural case. Hence, any proposition 'stating' a disjunctive property, such as ⟨*a* is F∨G⟩ or ⟨(F∨G)*a* and (F∨G)*b*⟩, is made true by atomic truthmakers. In other words, a disjunctive property is TM-reducible to these truthmakers. Or equivalently, there are no sparse disjunctive properties.

On a historical note, interestingly, this result is in line with logical atomism, broadly speaking. For both Russell's and Wittgenstein's versions of logical atomism eschew disjunctive facts and, given the above argument, both reject disjunctive properties. Of course, they differ in that Russell posits conjunctive and negative facts, whereas Wittgenstein rejects all molecular facts, a difference that is central to the distinction between Russell's and Wittgenstein's logical atomism (Simons 2003).

3. Armstrong's three early arguments

The argument from truthmaking in my view is compelling, but it might seem a tad crass. Firstly, it has an air of suspicious easiness: it seems that no matter what can be said for postulating disjunctive properties, and no matter which reasons we may have for postulating them, the argument can always be used to counter them to obtain the conclusion that they only are relevant to TM-reducible disjunctive properties. Secondly, it seems to be too strong for our purposes, since it rules out not only disjunctive properties, but also conjunctive and negative ones. It perfectly matches Wittgenstein's logical atomism, as it were. This forcefulness may in general be a virtue, or it may be a vice – but either way it is signing up for more than we need. Thirdly, the notion of truthmaking (with truthmaking entities) is quite controversial, cf. e.g. Schnieder (2006) and Dodd (2010), but see Meinertsen (2018) for a defence of truthmaking. For these reasons, it would be

agreeable if we could strengthen the case against disjunctive properties with arguments that are independent of truthmaking.

Fortunately, there are three early arguments in Armstrong, in *Universals and Scientific Realism*, and onwards in his middle period (mid-1970s to late 1990s), which prima facie are more or less independent of truthmaking. At this point in the dialectic it is useful to adopt or at least entertain the Armstrongian view that TM-irreducible properties are universals. Certainly, this thesis is significant to the appreciation of Armstrong's first argument. This argument makes use of what he sometimes calls the 'powerful truism' that universals are strictly identical in all of their instantiations (e.g. 1997, pp. 28, 85). He applies this thesis to the disjunctive case:

> Consider two objects. One has charge C but lacks mass M. The other lacks charge C but has mass M. So they have the disjunctive property having charge C or having mass M. But surely that does not show that, in any serious sense, they thereby have something identical? The whole point of a universal, however, is that it should be identical in its different instances. (1989, p. 82).

This formulation of the argument might seem to rely too explicitly on Armstrong's notion of a 'universal', but an earlier passage does not:

> [D]isjunctive properties offend against the principle that a genuine property is identical in its different particulars. Suppose *a* has property P but lacks Q, while *b* has Q but lacks P. It seems laughable to conclude from these premises that *a* and *b* are identical in some respect. Yet they both have the 'property', *P or Q*. (1978, II, p. 20)

But then his formulation just seems to assume the *same* 'powerful truism' for a 'genuine property' rather than a 'universal', and it also is more overtly rhetorical. At any rate, proponents of disjunctive properties (universals) might respond that this argument is begging the question: on their view, there *is* something identical in each of the instances, namely, the disjunctive universal F∨G. Is the argument begging the question, then? Roughly, begging the question is to merely assume as true a claim that is to be argued for, i.e. here that the two particulars do *not* possess something identical or are identical in some respect corresponding to 'FvG'. Now, it seems clear from the quoted passages that Armstrong does not provide any serious argument for this claim. On

the other hand, however, in Armstrong's overall metaphysical system, there are independent requirements for being a genuine entity which disjunctive properties fail to meet, as we shall see shortly. Thus, given this system, Armstrong does appear to provide some non-question-begging argument. Hence, I think the first early argument is worthy of serious consideration, which certainly is what Louise Antony (2003) affords it (Sect. 4).

Armstrong's second early argument relates to one of the requirements for being a genuine entity in his metaphysical system, viz. that it be closely linked to an empiricist epistemology. This is not the case for disjunctive properties, he thinks. In 1997, he says that the 'giveaway' of putative disjunctive (first-class) properties is that they are 'so easily manufactured *a priori*' (1997, p. 27). This constraint is put rather diplomatically. By contrast, in 1978, he called a version of it the Irish Principle: 'If it can be proved a priori that a thing falls under a certain universal, then there is no such universal.' (1978 II, p. 172). This argument, like the previous one, may also be said to derive some credence for Armstrong's overall system. Unfortunately, it does seem to be begging the question against disjunctive properties in a more conclusive way, since they are, by definition, 'easily manufactured *a priori*'. So, I shall not consider it further in the present paper.

However, Armstrong's third early argument, which also concerns one of his requirements for being a genuine entity, is better. It is an argument from causation: suppose again that *a* has F but lacks G. Then the predicate 'F$\vee$G' applies to it. But the causal capacities of *a* seem to be due to its being F, not to its being F$\vee$G (ibid., p. 20). Consider a more specific example he gives of this argument (1989, p. 83). He again supposes that charge C and mass M are universals and invokes a particular with charge C that lacks mass M: 'In virtue of charge C, it has certain powers to act. For instance, it repels things with like charge. Possession of the disjunctive property C or M adds nothing to its power' (ibid.). This suggests, Armstrong thinks, that 'C or M' is not a genuine universal. This rejection of causally idle universals adheres to Armstrong's attractive Eleatic Principle (after the Eleatic Stranger in Plato's *Sophist*, 247d-e) that 'power is the mark of being' or that 'everything that exists makes a difference to the causal powers of something' (1997, p. 41).[3] Now, perhaps someone might object that this argument is no less question-begging than the two previous ones, on the grounds that Armstrong's metaphysics of *a posteriori* realism forbids

[3] The name, the Eleatic Principle, is due to Graham Oddie (1982).

causally idle universals (mainly due to his epistemological view that if they existed, we could not detect them). Nonetheless, one could respond, since this metaphysics, including the Eleatic Principle, is independently motivated, if one had to choose between it and causally idle universals, one probably ought to choose the former unless a very strong case could be made for the latter. In any case, however, the best response to this argument by proponents of disjunctive properties would of course be to show that disjunctive properties (at least some of them) are *not* causally idle. This is precisely what Alan Penczek attempts (1997), as we shall see in the following section.

4. Two objections

Given the problematic status of Armstrong's three arguments, it might seem that the argument from truthmaking so far is the only powerful tool against disjunctive properties. However, as mentioned, truthmaking is controversial, so it is desirable if we can refute critics of the case against disjunctive properties. While perhaps most philosophers reject disjunctive properties, there are several important areas of philosophy where disjunctive properties are often invoked, e.g. the philosophy of mind, theories of causation and theories of determinables (AUTHOR'S WORK).[4] The two critics I shall consider come from the first two areas.

Disjunctive properties are sometimes appealed to in the debates on non-reductive physicalism and multiple realizably in philosophy of mind. This field usually proceeds independently of analytic metaphysics proper. Despite this, Louise Antony (2003; cf. Antony 2008; Clapp 2001) directly addresses the first of Armstrong's three arguments, the argument from the 'powerful truism'. She maintains that, *pace* Armstrong, there is 'real commonality' between the particulars that possesses each disjunct of a disjunctive property, at least in some cases. Her example is that of cows and bulls. Clearly, the predicate 'cow or bull' applies to all cows and bulls. In German, however, although the noun 'Kuh' is a counterpart to the word 'cow', it can be used also to refer to either a cow or a bull.

But, as she correctly points out, 'surely the mere fact that English speakers have only a (complex) disjunctive term to do what German speakers can do with a primitive term has no

[4] More recently, Skiles (2016) has provided an original defence of disjunctive properties, in part as a response to Audi (2013). However, both authors focus on distinctively non-Armstrongian issues and are hence beyond the limits of the present paper.

bearing on the relation between the properties the two terms express' (2003, p 10).). In her view, the property they express – their genuine commonality – is the respect of species membership, the property of being a *Bovidae Bos taurus* (being a domesticated bovine). She implies that there is a similar 'real commonality' between the particulars possessing the disjuncts in many other cases.[5] Note that I am here bracketing Antony's own general stance concerning which properties are 'real properties', as she calls them (that is, sparse or TM-irreducible properties). She intimates her view only in passing, and it seems that she thinks is a matter of corresponding to a 'real commonality' or 'real resemblance' (ibid.). For all that matters to her argument against Armstrong is her view that this 'real commonality' – in the example, being a domesticated bovine – is what Armstrong takes to be a universal.

The question we now face is whether or not she has provided a good objection to Armstrong's argument from the 'powerful truism' or, more specifically, if she has offered a counterexample to his claim the instances possessing a disjunctive property are identical in some respect. Certainly, Armstrong allows that a (a cow) and b (a bull) have something in common in virtue of which 'cow or bull' (or '*Kuh*') applies to either, viz. being a *Bovidae Bos taurus* (being a domesticated bovine). As we saw above, however, the premise in his argument is that '*a* is F but not G and *b* is G but not F' and, of course, he assumes that F and G are *distinct* properties, or he assumes that F and G are *simple*, which arguably entails that they are distinct. The fact that '*a* is a cow but not a bull and *b* is a bull but not a cow' is simply not an instance of this premise, precisely because the properties of being a cow and being a bull are not distinct. This is evidenced lexicographically by the word '*Kuh*' being neutral between them in German. More generally, it is a simple consequence of the fact that cows and bulls are both domesticated bovines.

Of course, Antony succeeds with her example in showing that that the *abundant* disjunctive property of being a cow-or-bull is shared by cows and bulls. But that is not our concern: her argument is thus an *ignoratio*, if you like. In short, she has not been successful in her attempt to refute Armstrong's first argument.

Let us next turn to the objection to Armstrong's third argument, the argument from causation. Alan Penczek (1997) argues that selected disjunctive properties are needed in causation

[5] An earlier case of adducing this type of example in defence of disjunctive properties is Meixner (1992). His example is being male-or-female (being sexed).

(cf. Sartorio 2006; Ballerin 2014). If correct, this would very much be beating Armstrong at his own game: by the Eleatic Principle, he would have to admit disjunctive properties.

Penczek considers a pigeon, Sophie, that has been conditioned to peck at red objects and also conditioned to peck at triangular objects. Sophie is now presented with a red triangle and pecks. In virtue of what did Sophie peck? He argues that it is the disjunctive property being red-or-triangular ('red-or-triangular').

Penczek's analysis of causation is counterfactual. Specifically, he analyses the causal efficacy of properties like this (restricting himself to provide only a sufficient condition):

> A property X of *c* is causally efficacious with respect to the occurrence of *e* if:
> if c had not been X, then e would not have occurred. (1997, p. 206)

Applying this to the pigeon example, he gets:

> If the object had not been red or triangular (that is, if the object had not been red, and had not been triangular), then Sophie would not have pecked. (ibid.)

Does this argument show that that at least some disjunctive properties are causally efficacious and hence, by the Eleatic Principle, real (sparse)? I think not. For Penczek's counterfactual analysis of causation lives its life at the level of truths, not the level of truthmakers. It concerns causal truths as opposed to causal truthmakers. In somewhat older parlance, it concerns (mainly) causal explanations and not causal relations, a distinction that can easily be overlooked. This is especially the case for philosophers who are not mindful of, or who do not accept, the distinction between the level of truths (or 'truth-conditions') and the level of truthmakers. But all that is required is actually just that one recognizes the distinction between the causal relation and the relation of causal explanation. One philosopher who is eminently aware of the distinction is Strawson, who calls the former the 'natural relation' and the latter the 'non-natural relation'. Paying special attention to how the two relations can easily be confused, he says:

> We use the same range of expressions – for example 'cause' itself, 'due to', 'responsible for', 'owed to' – to signify both the natural and the non-natural relation, or we use the expressions in such a

> way that we may be hard put to say which relation is specified and thus perhaps be led to doubt whether any such distinction exists to be drawn. (Strawson 1985, p. 116)

However, Penczek seems unaware of the distinction, or does not acknowledge it. In fact, he extends his case for disjunctive properties in a way that, to my mind, shows even clearer that he overlooks it. He holds that if Sophie is presented with an object that is red but *not* triangular, it is still more correct to say that Sophie pecked in virtue of the object's being red *or* triangular than just to day Sophie pecked in virtue of the object's being red:

> [I]f in fact Sophie has been conditioned to peck at red or triangular objects, then to say only that Sophie pecked in virtue of the object's being red is, in effect, to ignore a further fact about her conditioning history. By saying instead that Sophie pecked in virtue of the object's being red or triangular (even when it is not triangular) we give both a more complete and a more accurate *explanation* of why it is that Sophie pecked. (Penczek 1997, p. 207, my emphasis)

Penczek's reasoning here seems quite plausible, but we do not need to consider if he has succeeded in providing a good explanation. All that matters here is that his disjunctive properties are properties at the level of causal explanation, i.e. of causal truths. Such properties are of course TM-reducible, i.e. not the sparse properties relevant to Armstrong's argument.

This response to Penczek is Armstrongian at its heart, in two ways. Firstly, generally speaking, as a realist about causation, Armstrong also distinguishes the ontology of causation, the 'natural relation', from the epistemological relation of causal explanation. Second, more specifically, Armstrong's view of (singular) causation cannot consider Penczek's account as candidate for telling us the true story about causation. Briefly, Armstrong's theory of causation is that it is an instantiation of a law of nature, N(F, G), where N is universal relation of 'nomic necessitation' holding between the universals F and G. Needless to say, F and G may not be disjunctive properties (though he allows that they may be conjunctive). N(F, G) is instantiated when *a*'s being F causes *b*'s being G. At the level ot types, N *is* the causal relation. (The phrase 'the causal relation' is ambiguous between the repeatable relation of causation ('type–type

causation') and singular causation ('token–token causation'). Although he shares the standard view that (singular) causation supports counterfactuals – if token event *c* causes *e*, then if not-*c*, not-*e* – for such counterfactuals to be *entailed*, certain *ceteris paribus* additions are required. And since these involve references to singular causation, a vicious circularity ensues (1997, 210).

In short, Penczek's objection to Armstrong's third argument from causation fails. Penczek has not showed that some disjunctive properties are causally efficacious, and hence sparse; he has at most showed that they are involved in causal explanations, and hence not that they are sparse.

5. Concluding remarks

The argument from truthmaking against disjunctive properties is a strong one. But truthmaking is controversial, so it would be nice if there are arguments against them that are independent of it. Armstrong's three early arguments are a case in point and, and at least two of them should be countered by proponents of disjunctive properties. Antony attempts to do this directly for the first argument; Penczek does it indirectly for the third one; jointly they provide a serious challenge to the Armstrongian case against disjunctive properties. Fortunately for this undertaking, if what I have argued is correct, both attempts fail. In short, not only does this project have the argument from truthmaking in its favour, it also benefits from two of Armstrong's early arguments.[6] Moreover, even if the argument from truthmaking is not decisive, these early arguments in my view offer good independent grounds for rejecting disjunctive properties.

[6] For helpful comments on earlier drafts of this paper, I am grateful to audiences at Complutense University of Madrid and Fudan University, including Donnchadh O'Conaill, Javier Cumpa, Nikk Effingham, Malcom Foster, Borris Henning, Adam Marushak, Andrea Strollo, and Erwin Tegtmeier, and, in particular, the anonymous reviewers for *Philosophia*.

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