Counting the Colours*

6.020 words

Abstract: The paper starts with the presentation of a puzzle about how we ordinarily count the colours of an object. Four different solutions are proposed. Two of the proposals actually solve the puzzle, but they differ in what concepts they employ.

1. The Lemon Puzzle

Argle (unpacking what he brought for dinner):[1]

Look at this beautiful lemon I bought; it's just perfectly coloured, isn't it?

Bargle: Indeed.

Argle: How many colours does it have (I believe that, as the friend of abstract objects you claim to be, you think we can *count* colours)?

Bargle: It is really evenly coloured; one colour, therefore (by the way: I do not comment upon parenthesised remarks).

Argle: If I were to ask you what its colour was, what would you say?

Bargle: 'Yellow' seems an obvious candidate.

Argle: Certainly; but 'lemon-yellow' would also be appropriate?

Bargle: Doubtless.

Argle: Now, lemon-yellow is a colour, right?

Bargle: I cannot but agree.

Argle: And yellow?

Bargle: A colour too.

Argle: Is lemon-yellow identical to yellow?

Bargle: Pardon?

Argle: Is lemon-yellow the same colour as yellow?

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* Kevin Mulligan has done a great service to the profession of philosophy in Europe. Among other things, he has made Geneva a centre of analytic philosophy which provided financial and intellectual resources for numerous PhD-students over the years. Being one of them, I found that Kevin was an extremely supportive supervisor whose advice proved invaluable to me on many occasions. I owe him a lot. With gratitude and affection, I dedicate this paper to him.

1 For the dialogue I allowed myself to borrow David Lewis's famous two characters. Since they are known to enjoy disputes about abstract objects, they are natural choices for the above conversation.

Bargle: Well, no, not the same.

Argle: Got you.

Bargle: Hm?

Arlge: You agreed that this lemon is yellow, that it is lemon-yellow, that both yellow and lemon-yellow are colours, and that they are not identical. But then, there are *two* colours you would ascribe to the lemon—contrary to what you said before, when I asked you about the number of its colours.

Bargle: That's fishy.

Argle: Perhaps it is; but if so, why?

2. Really a Puzzle?

Being confronted with Argle's puzzle for the first time, some people seem to have a strong inclination to believe that it is no *genuine* puzzle. I disagree. But one may, of course, quarrel about the standards a genuine puzzle has to meet. So let me briefly lay down a standard on which the Lemon Puzzle *is* a genuine puzzle:

Puzzle Standard If there is a number of sentences, perfectly acceptable on ordinary standards, that appear to strictly imply some non-acceptable sentence, we have a puzzle to solve.

Now let me present the Lemon Puzzle in a concise form. It is constituted by the following six sentences (to stress the fact that it has to deal with some particular lemon—not *the lemon* understood as a kind of fruit—I will give that lemon a name: 'Leroy'):

P.1 Leroy, the lemon, is yellow.

P.2 Leroy, the lemon, is lemon-yellow.

P.3 Yellow is a colour.

P.4 Lemon-yellow is a colour.

P.5 The colour yellow ≠ the colour lemon-yellow.

P.6 Leroy, the lemon, has only one colour.

These sentences are inconsistent. For, P.3, P.4 and P.5 together imply:

(i) $\forall x$ ((x has the colour yellow & x has the colour lemon-yellow) $\rightarrow$ $\exists y\, \exists z$ ($y \neq z$ & y is a colour & z is a colour & x has y & x has z)).

But (i) states that anything having the colour yellow and the colour lemon-yellow has *two* colours (after all, quantification plus non-identity equals counting). So (i) together with

P.1 and P.2, implies:[2]

(ii) Leroy, the lemon, has two colours.

Together with P.6, (ii) implies a conceptual impossibility:

(iii) Leroy has only one colour & Leroy has two colours.

In fact, (iii) is even *logically* impossible. For, formally rendered (iii) becomes:

(iii*) $\exists x\, \forall y\, (x = y \leftrightarrow (y \text{ is a colour \& Leroy has } y))$ &
$\exists x\, \exists y\, (x \neq y \text{ \& } x \text{ is a colour \& } y \text{ is a colour \& Leroy has } x \text{ \& Leroy has } y)$,

which implies the logical falsehood '$\exists x\, (x \neq x)$'.

Hence, the Lemon Puzzle is not spurious; from the perfectly acceptable sentences P.1 to P.6 we can derive not only some controversial sentence, but a logical falsehood. To get around this result, we cannot merely reassure ourselves that certainly *something* is fishy about the puzzle (of course, something *must* be fishy about it, because contradictions are not true). We have to find the weak link; either one of the sentences P.1 to P.6 has to be denied, or a fallacy has to be discovered. I shall present four candidate solutions in what follows. (I will not consider solutions that consist in denying the existence of the colour yellow or the colour lemon-yellow; the puzzle is dedicated to those who—like Bargle—accept such entities and want to cope with them.)

3. Solving the Puzzle: Four Proposals

a. Shades of Colours versus Colours

Let us first ask: is there, despite the appearances, a direct problem with one of the sentences P.1 to P.6? As far as I can imagine, the only sentence that some people, as a first reaction, perhaps could want to deny is sentence P.4. After acknowledging the puzzle, one might declare that lemon-yellow is *not* a colour after all, but only a *shade* of a colour. But this manoeuvre seems futile to me; although it is true that we can call lemon-yellow a shade of a colour (in fact, we can call any sample of a colour a shade of a colour), it is *also* correct to call it a colour (any shade of a colour is itself a colour)—saying otherwise means to *remodel* the rules of English in order to circumvent a problem.[3]

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2 The implication is analytic, but apparently not logical. It is based on two (trivial) principles that I take to be non-controversial:

B.1 $\forall x\, (x \text{ is yellow} \rightarrow x \text{ has the colour yellow})$

B.2 $\forall x\, (x \text{ is lemon-yellow} \rightarrow x \text{ has the colour lemon-yellow})$.

3 In the OED's entry for 'shade' one reads: '**4** a colour, esp. with regard to its depth or as distinguished from one nearly like it.'

But even if we were to make the said distinction that would only provide a superficial solution to our problem, as it creates a revenge case. A similar puzzle would immediately arise about counting shades of colours. We can ask how many shades of a colour we find exemplified by Leroy and the natural and correct answer will be: one. However, Leroy is not only lemon-yellow, it also has a specific variety of lemon-yellow. This variety is a shade of a colour, and it is not identical to the shade lemon-yellow. So there are two shades of a colour to be found at Leroy, and yet we say Leroy has only one such shade. Hence, the current account is unsatisfying for two reasons: not only does it draw an artificial line between colours and their shades, but it cannot cope with a simple variant of the original puzzle.

So I take it that sentences P.1 to P.6 are as acceptable as they seem to be. To get rid of the Lemon Puzzle, one should therefore try to discover a fallacy in the derivation of the contradiction. I will now develop three accounts that may dissolve the Lemon Puzzle on principled grounds, and not by terminological fiat.

b. Tropes to the Rescue

Colours seem to be properties, or at least property-like entities.[4] Now while we sometimes talk about colours as shareable entities, it seems we sometimes talk about them as non-shareable particulars (or, as recent coinage has it, as *tropes*). We apparently can

4 Why the caution? Isn't it obvious that colours are properties? Not quite. Admittedly, the classification of colours as properties is very natural. However, there are some peculiarities in how we talk about colours which may at least cast some doubt on that classification. // Let me explain: in order to refer to colours we typically use colour-adjectives as substantives. But there are also two other classes of designators related to colour-adjectives: first, there are derived nouns with the suffix '-ness'—'redness', 'yellowness', etc.—, second, there are gerundive constructions such as 'the property of being red', 'the attribute of being yellow', etc. The latter obviously denote properties—for sure, the property of being red is a property. (I ignore Frege's worries about the concept *horse* here, as I regard them as confused and only indicative of problems within his own theory; see Haverkamp 2011.) Presumably, terms such as 'redness' also denote properties, and indeed the same properties: redness is the property of being red. // Furthermore, the property of being red (aka redness) seems to be identical to the property of *having the colour red*. The identity holds intuitively and it would be entailed by an intensional individuation of properties, on which there are no two properties that are necessarily exemplified by the same objects; but it seems to hold on much finer individuations too. // Redness is a colour-property then; that is, a property whose possession consists in having a certain colour. But is it also *a colour*? Being asked about the colour of some thing, we naturally use the pure colour words 'red', 'green' etc.—but *not* 'redness', 'greenness' and the like. So, there are differences in the usage of terms such as 'red' etc. on the one hand and 'redness' etc. on the other. Such differences might correspond to a difference between *colours* and *colour-properties*, as Levinson (1978: 4) assumed. But is there a philosophically interesting account of this difference? or is it only an idiosyncrasy of our language? Since I do not have a definite opinion on this point, I use the cautionary formulation in the main text.

distinguish the colour of one rose from the colour of another rose merely on the grounds that two roses are involved—two bearers, two properties (colours).

Pointing to our lemon, we may say things like: ‘that colour is *a* yellow (or: a particularly nice yellow etc.)’, or ‘that colour is *a* lemon-yellow’. Such statements may involve reference to colour-tropes rather than colour-universals. So, assume there are colour-tropes and assume we do sometimes talk about them—then, perhaps, we sometimes count them. And this may resolve the Lemon Puzzle: when we count the colours of an object, so the idea, what we are counting are *colour-tropes*. The lemon possesses exactly one such trope: a yellow-trope. As a matter of fact (or even of necessity), this trope is also a lemon-yellow trope. It is an instance of both yellow and lemon-yellow (that one entity can instantiate more than one type should not surprise us; after all, that someone is both an instance of the kind *carnivore* and of the kind *human* is neither surprising, nor does it make the man *two animals*). This would justify sentence P.6 then: when we say the lemon has only one colour, we talk about particular instances of shareable colours, and in fact, the lemon has but one such colour-instance. But sentence P.5 does not deal with tropes (the definite article would not be appropriate then); it deals with shareable properties. Accordingly, its consequence (ii)—‘the lemon has two colours’—deals with *shareable* properties, not with tropes. Hence, it cannot contradict P.6 which we gave a trope-reading. On this account, the lemon-puzzle therefore involves some kind of equivocation in the term ‘colour’: this word exhibits a sort of type/token-ambiguity and it is not constantly used in one sense throughout the argument that leads to contradiction.

The described position would resolve the Lemon Puzzle as it was introduced above—but is it a good solution? I have my doubts. For even if we ordinarily counted colour-tropes when we count colours, we certainly *can* count shareable colours: we can, for instance, look at two objects and say how many colours they have in common. Then, we obviously do *not* talk about the number of *shared* colour-*tropes*: there are no such things. We then positively talk about shareable colours. Now imagine we have another lemon, call it Luc, which is of the same lemon-yellow as Leroy, but which has a big green spot somewhere. How many colours do Luc and Leroy have in common? The correct answer, of course, is ‘one’. But now the Lemon Puzzle rears its ugly head again: after all, Leroy and Luc are both yellow and lemon-yellow, these are non-identical colours etc. In this case, tropes will be no help: when we talk about the number of shared colours, we do not talk about tropes. So the trope-solution to the Lemon Puzzle seems inadequate.

c. Determinables and Determinates

Some properties stand in a very peculiar relation to other properties: they are determinate *cases*, *specifications*, or *varieties* of the latter. Colours are a case in question: lemon-yellow is a specification of yellow. With a terminology taken from E. J. Johnson,[5] such pairs of properties (or property-like entities) are often called determinates and determi-

[5] Johnson (1921: ch. 11).

nables. Let us, for the nonce, assume we understand the relation between determinates and determinables. The two colours involved in the lemon puzzle, lemon-yellow and yellow, stand in this relation. This observation may lead to an idea about how to resolve the puzzle:

Det What we are counting when we count colours are only *perfectly determinate* colours, not *determinables*.

Assume, **Det** is correct. Then to say that something, *A*, is monochrome amounts to saying that it has only one *perfectly determinate* colour. It may and will nevertheless have a number of other, determinable colours, of which the determinate colour is a case. But we do not count determinables when we count.

If we follow this line of reasoning, '*A* is monochrome' should not be rendered as:

Mono $\exists x\ \forall y\ (x = y \leftrightarrow (y$ is a colour & A has $y))$,

as it was rendered above. Rather, it should be rendered as:

Mono-D $\exists x\ \forall y\ (x = y \leftrightarrow (y$ is a perfectly determinate colour & A has $y))$.

And **Mono-D** is compatible with the following statement:

Colours $\exists x\ \exists y\ (x \neq y$ & x is a colour & y is a colour & A has x & A has $y)$.

After all, two colours that *A* has and that are not both perfectly determinate will make **Colours** true without making **Mono-D** false.

Thus, based on **Det** we can offer a solution to the puzzle: the derivation of the contradiction is based on an inadequate rendering of P.6. In its natural reading, P.6 does not conflict with the fact that there are two colours that Leroy possesses, if at least one of the two colours in question is not perfectly determinate. Note that P.6 will probably *also* have the reading employed in deriving the contradiction, since this is the straightforward result of deriving its meaning by compositional principles. So, on the current proposal the sentence allows for two different interpretations; this might either be because it is ambiguous, or because of some contextually salient quantifier restriction. The question need not be decided here.

So far, so good. Does anything speak against this solution? One may have a doubt about **Det**: for sometimes we are inclined to say that some object has only one colour (namely, yellow) even though this object is not *perfectly* homogenously coloured (it *is* yellow *all over*, but one *could* distinguish some shades of yellow in it). So sometimes we seem to count determinable colours, and not perfectly determinate ones.

Here the proponent of **Det** may reply that in such a case, we speak rather loosely: it would just be more correct to say that the object *does* have more than one colour. Although this response is not obviously mistaken, it should be noted that we would speak loosely *most of the times* then, and that usually the correct answer to the question about the number of colours some object has will be: *indefinitely* many. For wherever there is a smooth transition of colours, there will be indefinitely many perfectly determinate colours involved.

Perhaps, we can improve upon **Det** without giving up its central idea. Why not say that sometimes we do indeed count determinable colours—but we never simultaneously count a determinable *and* a determinate of it:

Det* When we count colours, we count only those colours that are not determinates or determinables of one another.

Det* still provides the material to solve the puzzle. For if **Det*** is correct, '*A* is monochrome' should be rendered as:

Mono-D* $\exists x\ \forall y\ (x = y \leftrightarrow (y \text{ is a colour } \&\ A \text{ has } y\ \&\ y \text{ is neither a determinate nor a determinable of } x))$.

And this is still compatible with **Colours**, such that the derivation of the contradiction would again rely on an inadequate reading of P.6.[6]

d. Counting Regionwise

The determinable/determinate-account fares better much than the trope-account. It presupposes, however, the determinable/determinate-distinction which itself is not beyond doubt. While the idea of that distinction seems intuitive at first, spelling it out precisely has turned out to be rather problematic.[7] And not only the exact analysis of the distinction is disputed, but even what kinds of things are distinguished by it, i.e. whether it should be understood as a distinction between two types of (a) predicates, (b) properties, or (c) concepts. As long as a robust account of the distinction is missing, the solution to the Lemon Puzzle might be paid for with a bounced check. A related, but more general worry is that a solution in terms of determinates and determinables might be too theoretically laden. The puzzle arises from how we ordinarily talk about colours and how we count them. But it may appear as if we can talk about and count colours without much knowledge about the distinction between determinables and determinates, especially since the latter distinction seems philosophically dodgy. Of course, appearances might be deceptive so that ordinary speakers know much more about that distinction than it may

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6 The determinable/determinate solution may seem natural to many philosophers. As far as I know, though, the solution has not been worked out in any detail before, just as the puzzle has not been stated in print before. Moreover, the connection between the determinable/determinate distinction and the counting question is not mentioned in recent contributions to the debate about determinables; see, for instance, Funkhouser (2006), or Sanford (2011).

7 For a survey of the problems related to the distinction, and of the relevant literature, see Sanford (2011).

seem at first. They might have some kind of implicit knowledge of it, manifesting itself, for instance, exactly in such cognitive procedures as counting colours. Nevertheless, it seems at least worthwhile to me to explore whether there is an alternative solution to the Lemon Puzzle that can manage with less theoretical ballast.

As will now be shown, such a solution is suggested by a somewhat phenomenological reflection about how we actually *proceed* when we count the colours of a thing. So, how do we start counting colours? First, we look at the coloured object; we look at one region that has some colour. Then we go on looking whether anywhere else the object has another colour instead of it. *Instead of it*—that is, we look for some region *lacking* the colour of the first region while still having some colour. If we find one, the object has at least two colours. We then proceed as before—just that now, we look for coloured regions lacking the colours of both the first region and the second region. If we find one, the object has at least three colours, etc.

What will be the result if we thus inspect Leroy? We start with one region and go on to look for another region, differently coloured. But we won't find any. Of course, we may suddenly realize that one region of Leroy is lemon-yellow—but that does not raise the count, because Leroy is not lemon-yellow *instead of yellow* at that region (recall that 'x has C instead of C^*' was spelled out as 'x has C but lacks C^*'). To the contrary, we will have to realize that the starting region was lemon-yellow *too*.

The given description of how we proceed in counting the colours of an object is a sort of idealized rational reconstruction. As such, it abstracts from particular cases and serves only as a basic model for them, while not necessarily being faithful to every empirical aspect of a given case. An aspect in which the model might be amended for greater empirical adequacy concerns, for instance, its presupposition of a procedural nature of counting. While initially counting certainly seems to be a procedural affair, we arguably sometimes conduct a count in an instantaneous fashion. For, often when we see an object we can tell *at one glance* how many colours it has. It remains, of course, an empirical question for neuroscience whether such a recognition is, albeit seemingly instantaneous, nevertheless backed up by quickly performed cognitive processes. But suppose it is not and counting can occur at an instant. The above description of counting could then be adapted accordingly. Assume, for instance, Argle sees at one glance that Leroy is monochrome. In such a case, Argle receives a complete visual representation of Leroy and instantaneously recognizes that there are no two regions of it with different colours (such that Leroy has a colour in one region which it lacks in the other). This description saves the spirit of the proposal but pays respect to cases of instantaneous counting.

In the previous section I noted that we sometimes arrive at different counts depending on how scrupulous we are about counting different shades of a colour. The present proposal can easily accommodate this fact: when we start counting, we choose a region and a colour it possessed. Here we may make a more or less specific choice, which will affect the result of looking for regions that lack the colour ascribed to the first one. (Assume we examine an object with three shades of yellow; if we first choose *yellow*, we will not find regions lacking the colour, but if we first choose *lemon-yellow* we may.)

I take it that this is a good description about how we count colours. Then, in effect, what we are counting when we count colours as possessed by certain equivalence classes of regions. If this is our standard procedure of counting colours, it may affect what we mean when we say an object A is *monochrome*. This statement, then, should *not* be rendered as it was above:

Mono $\exists x\ \forall y\ (x = y \leftrightarrow (y \text{ is a colour } \&\ A \text{ has } y))$.

Rather, it should be rendered as follows:

Mono-R $\exists x\ (x \text{ is a colour } \&\ A \text{ has } x\ \&\ \neg\exists y\ (y \text{ is a colour } \&\ \text{at some region, } A \text{ has } y \text{ instead of } x))$.

And **Mono-R** is compatible with

Colours $\exists x\ \exists y\ (x \neq y\ \&\ x \text{ is a colour } \&\ y \text{ is a colour } \&\ A \text{ has } x\ \&\ A \text{ has } y)$.

For, two colours can make **Colours** true without making **Mono-R** false, if only they are present at the same regions (such that they do not satisfy 'at some region, A has x instead of y').

So, in one sense it is true that Leroy has two colours (there are two colours, yellow and lemon-yellow, which it possesses). But this is not what we ordinarily mean when we count colours and say that an object has two colours: then we talk about colours possessed *instead of each other* at different regions. Just like the region-account, the current one therefore attributes two possible readings to P.6. So we can dissolve the puzzle by pointing out that the derivation of the contradiction relies on an inadequate rendering of P.6: properly understood, it does not conflict with (i). Hence, the puzzle is solved.

4. Comparison

a. Ideology

Two of the four proposals discussed seem to deliver the goods. Let us call them the *determinative* and the *regional* account. Are there reasons that favour one of them over of the other? One relevant point was mentioned earlier. The determinative account employs a distinction which is not unproblematic. Even if the distinction turns out fine in the end, the ideology of the determinative account will remain more demanding than that of the regional account. Other things being equal, this would incline me to opt for the latter account.[8] But there are other factors relevant for choosing between the proposals.

[8] It was suggested to me that the two proposals may, in the end, turn out to be stylistic variants of each other, and that the regional account therefore does not manage to avoid the

b. Generality

An important aspect is whether the solutions can be generalized to parallel cases. Obviously, the determinative account can be applied to any variant of the puzzle in which the determinate/determinable distinction is applicable. The regional account, on the other hand, seems to be much more limited. It can straightforwardly be applied only to cases of properties (or other abstract features) that are regionally possessed by an object. But many properties are not possessed at a region, and the puzzle can apparently arise for such properties too.

c. Limitations of the Regional Account

Let us take a look at an example: shapes. Even if we usually do not count the shapes of an object (because the boring answer would always be: one), we *may* do so. Now imagine a square object. It has (as usual) only one shape, although it is both square and rectangular, and being square is not the same as being rectangular. Can the regional account deal with the shape-puzzle (which obviously is a variant of the Lemon Puzzle)? The problem is that it does not seem as if we counted shapes regionwise.

Two strategies are possible. First, one may try to argue that actually we do count shapes regionwise, but that there is only one region that matters: the shape is all over the object. So we pick a starting region (there is not much to choose), we pick a shape *S* that the object possesses at that region, and we look for another region at which the object lacks shape *S* and possesses another shape instead. Since we cannot find any (there are no other relevant regions), the count will always be one.

Therefore the regional account is directly defendable in the case of shapes, but I admit that there may be some tricky flavour to the given defence. Moreover, there are many properties which are certainly not possessed at regions, so the defence is of limited value.

A second and better strategy of using the regional account for counting shapes involves a modification of iz. In its current form, regions seems essential to the account. But we can describe the proposal on a higher level of abstraction as follows: we count properties with respect to some additional parameter at which they occur. The regional account is a variety of this generalized proposal, in which the parameter in question is taken to be spatial (a region at which a property is possessed). But as far as the general idea of the proposal is concerned, the parameter need not be spatial. In certain cases, some other kind of parameter might be pertinent, for instance a temporal one (such that we count properties as

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determinable/determinate-ideology. Although I am sceptical about the suggestion, I cannot easily show that it is wrong. But notice that the regional account only makes use of highly basic notions (having and lacking a property) which certainly do not have to analysed in terms of the notions of determinates and determinables. So, *if* the proposals converge, then only because the regional account somehow involves the material of analysing the determinate/determinable distinction and not *vice versa*. On the assumption of a convergence, the regional account might then still be preferable.

possessed at different times), or one of still some other sort. We may call the introduced generalisation of the regional account the *parametric account*.

Now let us return to the shape-variant of the Lemon Puzzle. I remarked earlier that we usually just do not count the shapes of an object; after all, we know the result of the count in advance. Any shaped object has exactly one shape. Nevertheless, in certain situations such a count makes sense, namely if an object *changes* its shape over some time. Then we may count the shapes that the object possessed during a certain period. Imagine, for instance, an amount of dough that we moulded into a cube first, then into a ball, and finally into a cube again. How many different shapes did the dough possess? Setting aside the periods in which we were actually moulding the object (otherwise, the correct answer would be 'countless'), the answer is 'two' (even though, in its cubic stage, the object was also cuboid). Here, a temporal variety of the parametric account would yield the correct result: when we count the shapes that an object possessed over some time, we actually count shapes as possessed by certain equivalence classes of times or phases. Begin with a phase at which the object does not change its shape and a shape *S* that the object has at that phase. Now look for another phase at which the object lacks *S* but has another shape *S** instead. If there is such a time, the count goes up to two. We then look for another time at which the objects lacks both *S* and *S** (and so forth). In our example, the count will stop at the second step. If we decided to classify the object as cubic at the first stage, we will find another stage at which the object lacks that shape but is spherical instead. No other stages are relevant (if we choose to classify another stage as cuboid now, it will not raise the count, since at that stage the object is *both* cuboid and cubic and therefore does not lack the shape of the first stage).

This variety of the parametric account can handle how we count shapes then; we count them phasewise. In other cases of properties, still other varieties of the parametric account apart from the regional and the temporal variety may be required. Such modifications are faithful to the original account as long as they find a parameter of some sort with respect to which the properties in question are plausibly counted.

So, although the original regional account is clearly limited, the generalised parametric account has much broader applications. Still, it might be limited to some degree. Perhaps there are variants of the Lemon Puzzle in which no parameter can be specified with respect to which the properties in question are counted. If so, the determinative account might score against the parametric account in terms of generality.

d. Limitations of the Determinative Account

On the other hand, the determinative account may have limitations of its own. Here is one: the determinable/determinate distinction is often contrasted with the genus/species distinction, where a species can be defined in terms of its genus and some differentiating features.[9] And variants of the Lemon Puzzle apparently can arise in cases of species and genera too. This is witnessed by the example of shapes: a square object has only one shape, even though it is square and rectangular. That we do not count such an object as having two shapes cannot be explained by the determinative account, is so far as being square is a species of being rectangular, not a determinate of it.

One might try to make the determinative proposal more general. A straightforward possibility would be to make it disjunctive. Roughly, the proposal would be that if we count properties or features of some sort, we do not raise a count because of two properties which relate to each other as either determinate to determinable, *or* as species to genus.

e. Taking Stock. So far, the discussion of the respective advantages of the determinative and the parametric account remains inconclusive. Both accounts are able to solve the Lemon Puzzle and both of them are applicable to at least a range of parallel cases. For the time being, I shall rest content with this result.

5. Epilogue

Bargle: I've thought about your puzzle and I came up with two possible solutions. Even if it was a neat puzzle, I knew that my belief in colours (which are non-material entities) was never really threatened by it.

Argle: I see; your proposals may be working. In fact, I like your account of regionwise counting. It might provide the means of explaining what we *really* do when we seem to be counting colours: we are counting regions that look alike in some way.

Bargle: No. Even if our practice of counting colours may be connected to the practice of counting regions, the regions can never replace the colours. If you want, I can show you why not.

Argle: No thanks (at least, not right now). In any case, I think the discussion of the puzzle was worthwhile. For notice that in both your proposals you had to use

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9 Johnson himself did not seem to place too much weight on the contrast, as Sanford (2011, §1.3) points out. But many regard it as substantial. It has been argued, for instance, that determinate/determinable pairs and species/genus pairs come apart with respect to the order of explanation or grounding. A thing possesses a determinable property *because* it possesses the corresponding determinate one; the order of grounding or explanation here runs from the specific term to the more general one. However, since conjunctions are explained in terms of their conjuncts, something belongs to a species (it is *F* and *G*) partly *because* it belongs to a genus (it is *F*); here the order of grounding runs from the more general term to the specific one. On the issue, see Rosen (2010: 126–30), or Schnieder (2006: 32f.) on 'because' and determinables, and Schnieder (2011) on 'because' and conjunction.

some unorthodox way of counting colours: we are *not* just counting non-identical colours, as one would have thought at first.

Bargle: Is that a problem? I thought you agree that the proposals I came up with solve your puzzle.

Argle: They do. But recall our other controversies, as for instance that about holes. Since my account of holes as material objects appeared to be at odds with how we count holes, I was forced to spell out some non-straightforward method of counting holes: we do not count *non-identical* holes, but rather holes which are *not the same*, where the sameness of two holes consists in their being coperforated. You thought this proposal is unnatural and makes my materialist position less attractive.[10] But now we see that you have to resort to the same kind of manoeuvre when it comes to abstract entities and our practice of counting them.

Bargle: Point taken. I should better grant you such moves in the future.

Argle: So, rehearsed and refreshed, let us return to—say—the question of holes.[11]

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[10] Cp. Lewis (1970).

[11] I would like to thank to Miguel Hoeltje, Tobias Rosefeldt, Alex Steinberg and some anonymous referees for comments and discussion.