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The Metaphysics of Sparse Properties and Deep Resemblance Nominalism

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Abstract. This paper introduces *Deep Resemblance Nominalism* (DRN) as a novel approach within the framework of resemblance nominalism and compares it to other forms of nominalism, including Rodriguez-Pereyra's *Resemblance Nominalism* (RN). DRN departs from RN in two significant ways. The first major difference lies in the formal properties of the resemblance relation. In RN, resemblance is treated as a two-place relation that holds between pairs of particulars. In contrast, DRN interprets resemblance as a plural relation, connecting a particular to a plurality of particulars, rather than as a two-place relation between individual pairs of particulars. The second key difference lies in how the resemblance relation is understood. While RN characterizes resemblance as an internal relation grounded solely in the existence of resembling particulars, DRN treats resemblance as an irreducible relation that exists among particulars, rather than an internal one. I will argue that DRN offers a superior nominalist approach, not only when compared to RN but also to the other nominalist alternatives discussed in this paper.
Keywords: resemblance nominalism, mereological nominalism, class nominalism, primitives, fundamentality, primitive modality.

Pamatinių savybių metafizika ir giliojo panašumo nominalizmas

Santrauka. Straipsnyje pristatomas *giliojo panašumo nominalizmas* (GPN), kuris pateikiamas kaip naujas požiūris panašumo nominalizmo kontekste ir lyginamas su kitomis nominalizmo formomis, tokiomis kaip Rodriguezo-Pereyros *panašumo nominalizmas* (PN). GPN nukrypsta nuo PN dviem svarbiais aspektais. Pirmasis esminis skirtumas susijęs su formaliosiomis panašumo santykio savybėmis. PN interpretuoja panašumą kaip dvivietį santykį, kurio esama konkrečių esybių porose. Tačiau GPN panašumą interpretuoja kaip daugybinį santykį, kuomet viena esybė siejama su gausybe kitų esybių vietoje dviviečio santykio konkrečių esybių porose. Antrasis esminis skirtumas susijęs su tuo, kaip panašumo santykis yra suvokiamas. PN apibūdina panašumą kaip vidinį santykį, kuris yra pagrįstas tik panašių esybių egzistavimu. Tuo tarpu GPN panašumą laiko neredukuojamu santykiu, egzistuojančiu tarp esybių, o ne jų vidiniu ryšiu. Straipsnyje teigiama, kad GPN pateikia nominalistinį požiūrį, kuris yra pranašesnis lyginant ne tik su PN, bet ir su kitomis nominalistinėmis alternatyvomis, aptariamomis šiame straipsnyje.
Pagrindiniai žodžiai: panašumo nominalizmas, mereologinis nominalizmas, klasių nominalizmas, pirminiai elementai, pamatiškumas, neredukuojamas modalumas.

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1. Introduction

The core thesis of nominalism asserts that properties can be analyzed in terms of particulars. This analysis may take the form of classes, mereological sums, or pluralities of particulars. I will examine contemporary interpretations of class nominalism, mereological nominalism, and resemblance nominalism, and introduce *Deep Resemblance Nominalism* (DRN) as a novel version of resemblance nominalism. I will advocate for this new approach by comparing it with the other forms of nominalism discussed in the paper.

The nominalist views examined here restrict their focus to *sparse properties* – such as the mass or negative charge – that play a causal-explanatory role in the natural sciences and reflect genuine similarities in the world. They reject *abundant properties*, which include any linguistically definable predicate, such as the disjunctive 'being a human or a dog', which fails to correspond to any real resemblance or shared causal power. Additionally, each analysis is presented as a constitutive, rather than a semantic, thesis. An analysis may be presented as a semantic thesis about the meaning of a particular term within a theory. Accordingly, in the case of resemblance nominalism, this theory would function as a semantic analysis, providing a definition for the term 'resemblance'. Alternatively, resemblance nominalism could be framed as a constitutive analysis, explaining what grounds the relation of resemblance or in virtue of what this relation holds (see Melia, 69–71). Rodriguez-Pereyra (2002), for instance, makes it clear that he views resemblance nominalism as a constitutive analysis by invoking the concept of 'truth-making' in his analysis of the resemblance relation. According to him, the existence of the particulars serves as a truthmaker for the resemblance relation between them. That is, the resemblance relation is grounded by the existence of resembling particulars.

In Section 2, I will outline Armstrong's realist substance-attribute account to lay the groundwork for examining nominalism's central idea. I will then present and critically assess the most advanced forms of class nominalism and mereological nominalism.

Section 3 offers a more detailed discussion, covering Rodriguez-Pereyra's resemblance nominalism and introducing DRN as a new variant. I show how DRN differs from Rodriguez-Pereyra's view. As noted, Rodriguez-Pereyra provides a constitutive analysis of resemblance, maintaining that the existence of the particulars themselves grounds the resemblance relation. He characterizes resemblance as an *internal* relation. In his view, the predicate 'resemblance' applies whenever an internal resemblance relation holds between particulars. Yet, as a nominalist, he cannot appeal to a shared property to explain this internal relation. Consequently, he grounds resemblance in the existence of resembling particulars, he treats the predicate 'resemblance' as a *conceptual primitive* – it cannot be further defined within his theory's own vocabulary. In contrast, DRN conceptualizes the resemblance relation as something existing over and above the resembling particulars. According to DRN, resemblance is a fundamental tie operating at the most basic level, linking particulars in a manner analogous to Armstrong's 'instantiation', which connects particulars to the universals they instantiate. Consequently, DRN's predicate 'resemblance', denoting this fundamental tie, is a metaphysical primitive as well as a conceptual primitive.

A second key difference concerns the *formal properties* of the resemblance relation. In Rodriguez-Pereyra's account, resemblance is a two-place relation that holds between pairs of particulars. DRN, however, views resemblance as a *two-place plural* relation, expressed as R(x, the X's), which is read as "x collectively resembles the Xs."

Section 4 provides a comprehensive evaluation of DRN in relation to the other nominalist theories discussed, ultimately arguing that DRN is the superior option among its rivals.

2. Realist Substance-Attribute Account, Class Nominalism and Mereological Nominalism

2.1. Armstrong's realist account

Armstrong (1989) identifies sparse properties with universals and includes universals as *sui generis* entities in his ontology alongside particulars. According to Armstrong, a particular ball is red because it instantiates the universal 'redness'; similarly, it possesses the property of 'sphericalness' by instantiating the universal 'sphericalness'. In general, a particular x is F as a result of its instantiating the universal F (1989, 84–87).

Armstrong distinguishes between thin particulars, which are bare subjects of instantiation, and thick particulars, which consist of a thin particular together with the universals it instantiates (1989, 94). Thin particulars are structureless and qualitatively indeterminate. Their role can be clarified by analogy with nodes in the graph theory, a mathematical framework that studies structures composed of nodes (or vertices) and edges (or links). In such structures, a node is an abstract, non-qualitative point defined solely by its position and connections within the network – such as a station in a subway map or a user in a social network. Similarly, a thin particular functions as a metaphysical node: it is a point at which universals are instantiated, without contributing any qualitative content itself. A thick particular, such as a red spherical ball, however, is a qualitatively determinate entity, composed of a thin particular and specific universals like redness and sphericality. This distinction provides a structured account of how concrete individuals are constituted through instantiation.

Armstrong claims that the instantiation relation which combines thin particulars with various universals to form a thick particular, is a fundamental tie – something in addition to both the thin particulars and the universals they instantiate (1989, 108). He explains this as follows. The instantiation relation cannot be an internal relation. Since his concept of thin particulars is akin to mathematical nodes, the mere existence of the thin particular and the universal cannot, by themselves, ground the thin particular's instantiation of the universal. In the language of truthmakers, the thin particular x and the universal F, on their own, cannot necessitate 'x's instantiating F', and therefore are not jointly sufficient truthmakers for the proposition "x instantiates F". A fundamental tie of 'instantiation' is required between them to necessitate this relation. This tie is fundamental because there is no deeper fact that constitutes it. He posits this instantiation fact as a fundamental tie, which connect the thin particular with universals (ibid.).

As for the status of the predicate 'instantiation' within Armstrong's substance-attribute account, Armstrong states that this predicate is a primitive of his theory (ibid.). Melia (2005) differentiates metaphysical primitives from conceptual ones. According to him, a predicate is a metaphysical primitive if it denotes an irreducible aspect of reality, whereas it is a conceptual primitive if it serves as an undefinable term within the theory (2005, 71–72). So, one must conclude that Armstrong's substance-attribute theory's predicate 'instantiation', denoting a fundamental tie – an instantiation fact that connects the thin particular with various universals – is a metaphysical primitive as well as a conceptual primitive.

2.2. Class nominalism

Nominalist theories reject the existence of intentional entities such as universals, and instead identify properties with particulars. As a result, these theories explain a particular's possession of a property in terms of its bearing a specific relation to another particular or to a collection of particulars. To explore this further, we can begin with class nominalism, a representative example of such nominalist approaches. *Class Nominalism* (CN), as developed by David Lewis (1983), analyzes properties in terms of classes of particulars. For instance, according to Lewis' theory, the property *F* is identified with the class of all and only F-particulars (1983, 344). However, Lewis further refines his theory by distinguishing between natural and non-natural classes (1983, 347). Natural classes correspond to what he calls 'sparse' properties, while non-natural classes are associated with 'abundant' properties. This distinction is central to Lewis's account, as it emphasizes his focus on analyzing sparse properties. A sparse property like F is analyzed in terms of the natural class containing all and only F-particulars, and a particular possesses the property F by virtue of belonging to that natural class.

Moving deeper into Lewis's theory, one encounters the issue of 'naturalness' in classes. Proponents of resemblance nominalism might find Lewis's treatment of 'natural' and 'non-natural' classes particularly compelling. As Lewis notes, one can explain the naturalness of classes *in practice* by appeal to overall resemblance among their members, but he nonetheless treats the naturalness of a class as primitive, since resemblance itself is to be explained by the naturalness of the classes involved (ibid.).

A question I would like to raise at this point is how the naturalness of a class should be understood. Although Lewis denies that the naturalness can be constituted in virtue of overall resemblance relations among the members of a class, it might still be grounded in the fundamental ways in which the members of the class exist (ibid.). In this case, from Melia's perspective on the distinction between merely conceptual primitives and those that are both metaphysical and conceptual, Lewis's predicate 'naturalness' would remain a conceptual primitive, as it cannot be defined within the theory. Alternatively, the naturalness of a class might lack any grounding in an underlying fact, making it a fundamental fact about the class itself. In this case, however, based on Melia's distinction, I argue that Lewis's predicate 'naturalness' should be regarded as both a metaphysical and

a conceptual primitive. Since Lewis's text provides no clarification on this issue, both of these interpretations remain open possibilities.

2.3. The problem of co-extensional properties

By identifying properties with universals as purely intensional entities, Armstrong is able to distinguish between contingently co-extensional properties, such as 'being cordate' and 'being rhenate', and necessarily co-extensional properties, such as 'being trilateral' and 'being triangular'. In contrast, class nominalism fails to differentiate between these types of co-extensional properties. Regardless of whether the co-extensionality is contingent or necessary, class nominalism identifies such properties with the same class. The inability to distinguish between co-extensional properties presents an objection to class nominalism.

Lewis (1986) approaches the problems of necessarily and contingently co-extensive properties in distinct ways. According to Lewis, necessarily co-extensive properties do not exist; 'being trilateral' and 'being triangular' are simply different terms for the same property (1986, 55). In the case of contingently co-extensive properties, however, he relies on his modal realism to provide a response. According to this response, class nominalism's natural classes encompass not only actual particulars but also *possibilia*. The class of 'cordates' encompasses both actual animals and merely possible ones; likewise, the class of 'rhenates' includes both actual and merely possible animals. These classes are distinct because, in some possible worlds, certain animals may be cordate but not rhenate, or vice versa, resulting in the classes' being associated with distinct properties, such as 'cordate' and 'rhenate' (1986, 55–57).

"Membership in a class" is a second primitive: Let us address now the question of what it is for a particular to possess a property. I argue that Lewis, just like Armstrong, provides a constitutional account in response to this question. To reiterate, according to Armstrong's substance-attribute account, a particular possesses the property F by bearing a relation – the fundamental tie of 'instantiation' – to the universal F. Lewis offers a similar analysis, succinctly stating: "To have a property is to be a member of a class" (1983, 344). Assuming that being spherical is a natural property, Lewis holds that a ball's sphericity is grounded in its membership in the natural class consisting of all and only spherical particulars. In other words, the ball's being spherical is constituted by the fact that it is a member of the class containing all and only spherical particulars. Membership in a class is not an internal relation; like Armstrong's instantiation, it is a fundamental tie connecting the particular to the class of which it is a member. Therefore, the predicate 'being a member', which denotes a fundamental tie of membership, must serve as both a metaphysical and a conceptual primitive within Lewis's class nominalism.

2.4. Effingham's mereological nominalism

Mereological nominalism identifies properties with 'scattered big things', or fusions of particulars. Effingham (2018) offers the most developed version of mereological nominalism, by asserting that "every property is a fusion of its instances" (2018, 1). In

Effingham's Mereological Nominalism (EMN), fusions are defined as wholes composed of particular parts (referred to as Effingham's instances). For instance, according to this view, the property of 'sphericalness' is the fusion of all and only spherical particulars. The relationship between particulars and their corresponding fusion is explained through the concept of 'proper parthood'. Accordingly, each spherical particular bears a proper parthood relation to the fusion that encompasses all and only spherical particulars. This relation could be analyzed as an internal relation, in which case the predicate 'proper parthood' would be regarded as merely a conceptual primitive. Alternatively, it could be understood as a fundamental tie, in which case the predicate 'proper parthood' would be considered both a metaphysical and a conceptual primitive. Effingham does not clarify this point, thus leaving both interpretations as open possibilities.

However, when Effingham addresses the question of what it is for a particular to possess a property, his account leads to a difficulty. The sphericalness of a ball cannot be grounded solely in its being a proper part of the fusion comprising all and only spherical particulars. Given the transitivity of the proper parthood relation in mereology, half of a ball, as a proper part of the ball, must also be a proper part of the fusion of all spherical particulars. Consequently, half of the ball must also be spherical.

To address this issue, Effingham posits of the 'instantiation' relation, which links a particular to its corresponding fusion (2018, 7–8). Effingham's instantiation relation, which links particulars to fusions, functions similarly to Armstrong's instantiation relation – viewed as a fundamental link connecting thin particulars to universals – and to Lewis's membership relation, which connects particulars to the natural classes of which they are members. A particular ball is spherical because a brute fact of instantiation connects the ball to the fusion of all and only spherical particulars. In contrast, half of the ball is not spherical because no such brute instantiation relation links this half-ball to the fusion. In conclusion, Effingham offers a constitutional analysis of a particular's possession of a specific property, comparable to the approaches developed by Armstrong and Lewis. In Armstrong's analysis, a particular possesses the property F by virtue of bearing an 'instantiation' relation to the universal F. In Lewis's framework, a particular has the property F because it bears a 'membership' relation to the natural F-class. Similarly, in Effingham's mereological nominalism, a particular bears an instantiation relation to the fusion of all and only F-particulars (2018, 8). Although Effingham does not clarify the nature of instantiation relation as a fundamental tie comparable to Armstrong's 'instantiation' relation, it must nonetheless be regarded as a fundamental link that constitutes a particular's possession of a specific property. Therefore, the predicate 'instantiation' must be considered both a metaphysical and conceptual primitive within Effingham's mereological nominalism.

2.5. EMN and the challenge of co-extensional properties

Effingham's thesis that properties are instance fusions entails that properties with the same fusions cannot be distinct. Effingham does not address necessarily co-extensive properties but could adopt Lewis's stance, denying their existence. Effingham's solu-

tion to contingently co-extensive properties, such as 'cordate' and 'rhenate', mirrors a prominent response to a similar objection brought against 'multi-thingism'. According to *multi-thingers*, when there is an object (e.g., a lump of clay) at a certain location, there is a multiplicity of distinct objects (e.g., a statue, a lump of clay, etc.) at this location (Bennett 2004, 339–40). However, the objection arises: if this is the case, what grounds the distinctness between the lump and the statue? One possibility is that it is a brute fact that they are distinct (see della Rocca 2005). A more compelling response, however, is that their distinctness is grounded in brute *de re* modal facts, such as differences in their modal profiles. The statue is essentially shaped as a statue and only accidentally composed of this particular lump of clay, whereas the lump is essentially composed of this material and only accidentally takes the shape of a statue (Bennett 2004, 340).

In a similar way, Effingham proposes differences in brute *de re* modal facts to address the problem of co-extensional properties (2018, 9–10). When there is a fusion of animal instances, there are at least two distinct entities: a fusion of cordate instances and a fusion of rhenate instances. Their distinctness is grounded in brute *de re* modal facts, such as differences in their modal profiles. Cordate instances are essentially defined by having a heart but only accidentally having kidneys, while rhenate instances are essentially defined by having kidneys but only accidentally having a heart. Thus, brute *de re* modal facts can explain how the fusion of animal instances can constitute two distinct properties.

3. Rodriguez-Pereyra's Resemblance Nominalism and DRN

3.1. Resemblance relation

In its traditional formulation, resemblance nominalism identifies properties with classes of resembling particulars (Carnap 1928; Goodman 1966; Rodriguez-Pereyra 2002). My focus will primarily be on Rodriguez-Pereyra's version, which I will refer to as *RN*. Rodriguez-Pereyra proposes RN as an account of sparse properties, identifying the property F with the class containing all and only F-particulars, where each member bears a pairwise resemblance relation to every other member. When we consider the resemblance relation among particulars, this relation should not be understood as an aspectual resemblance. To say that two balls resemble each other with respect to their shape introduces a property that a nominalist theory seeks to analyze. Therefore, the resemblances among particulars must be understood as overall resemblances rather than aspectual ones.

However, despite relying on overall resemblances in its analysis, RN still fails to account for a single property. The objection commonly referred to as the 'Russellian regress' argues that the relation of resemblance itself persists as a property (see Russell 1912, 96–97).

Rodriguez-Pereyra addresses this objection by arguing that resemblance among particulars is an internal relation, and not an external one – meaning that it does not add anything to reality – and is instead grounded in the existence of the resembling particulars themselves. He defends his constitutional thesis of resemblance by appealing to the concept

of 'truth-making', by asserting that the existence of resembling particulars alone serves as the truthmakers for their resemblance (2002, 115). In other words, if there is resemblance between two particulars, the proposition that they both exist entails the proposition that they resemble each other (2002, 116). However, this entailment is not acceptable in its current form. Entailment is a necessary relation, unlike a material conditional. In the language of possible worlds, two particulars may resemble each other in the actual world, but there are other worlds where they do not. Therefore, the proposition that they exist does not entail the proposition that they resemble each other.

Rodriguez-Pereyra defends his position by appealing to the counterpart theory (2002, 116), which holds that each particular exists in exactly one possible world. For example, a particular red ball exists only in the actual world. In other possible worlds, there are distinct entities – its 'counterparts' – that take its place. Because some of these counterparts are blue, the red ball is said to be 'possibly blue'. Building on this framework, Rodriguez-Pereyra argues that if two particulars resemble each other in a given possible world, their mere existence there entails that they resemble each other: there is no possible world in which the very same particulars exist but fail to resemble one another.

The objection against Rodriguez-Pereyra's account, then, can be stated as follows: the concept of 'entailment' within the framework of the counterpart theory, as endorsed by Rodriguez-Pereyra, does not fully align with the concept of 'necessity' as it is understood in the standard conception of truthmaking. Under this standard conception, a truthmaker for a proposition must necessitate the truth of that proposition. Thus, if the existence of resembling particulars serves as the joint truthmakers for their resemblance, then, their existence must necessitate their resemblance – i.e., they must necessarily resemble one another. But this is not satisfied within the counterpart theory because not all counterparts of the resembling particulars in their worlds resemble each other.

Recognizing this possible objection, Rodriguez-Pereyra appears to severe the link between the concept of 'truthmaking' and the concept of 'necessity' that is part of the standard truthmaking theory. He argues that it is simply false that "if x and y are the joint truthmakers of 'x and y resemble each other' then they must necessarily resemble each other" (2002, 116). In his later work, Rodriguez-Pereyra explicitly separates the concept of 'truthmaking' from the concept of 'necessity', when discussing a related issue (2023, 192).

However, if the existence of resembling particulars cannot necessitate the proposition that they resemble each other – as Rodriguez-Pereyra acknowledges – then they cannot serve as the truthmaker for this proposition in the robust sense required by truthmaking. Consequently, resemblance among particulars cannot be an internal relation grounded in the existence of resembling particulars. Therefore, one must conclude that Rodriguez-Pereyra fails to present a constitutive account of the resemblance relation in his resemblance nominalism.

Although Armstrong is not a proponent of RN, he also acknowledges that resemblance, within the framework of RN, can be treated as an internal relation (1989, 43). He proposes a constitutional account, asserting that the 'resemblance' relation "must flow from the natures of the resembling things" (1989, 44). However, in his effort to maintain

strict nominalism, Armstrong contends that these natures cannot be universals but must instead be particulars, with resemblance among particulars grounded in an agreement of their particularized natures.

At this point, critics might argue that particularized natures seem to be an additional layer of reality alongside the particulars, suggesting that Armstrong is offering a constitutional account of the particulars themselves rather than a constitutional account of the resemblance relation. And this would conflict with the fundamental principles of nominalism. For instance, Rodriguez-Pereyra argues against Armstrong's suggestion by asserting that "endowing particulars with particularized natures means abandoning resemblance nominalism" (2002, 89).

However, upon closer examination of Armstrong's text, this is not what he does; he does not separate particularized natures from the particulars themselves but instead asserts that "a thing is its particularized nature" (ibid.). To interpret Armstrong's position on resemblance nominalism, one could argue that his particulars exist in certain fundamental ways – as particularized natures – and that these fundamental ways of existence ground their resemblances to one another.

In summary, according to Armstrong, the fundamental modes that particulars exist constitute their resemblances. In other words, the resemblance between particulars – being an internal relation – is not grounded solely by their existence, but rather by the specific (fundamental) modes in which they exist.

But if that is the case, what is objectionable in Armstrong's proposal from a nominalist perspective is not his presentation of a constitutional account of particulars (granting that he does not do so) but rather his grounding of the resemblance relation in their modes of existence. According to strict nominalism, resemblances must be constituted by the existence of particulars themselves, and not by the modes in which those particulars exist. Therefore, one must agree with the nominalist critique and conclude that Armstrong's proposal in support of RN fails to demonstrate that resemblance among particulars can be an internal relation constituted solely by the existence of those particulars.

3.2. Resemblance relation in DRN

As argued above, neither Rodriguez-Pereyra nor Armstrong succeeds in presenting a constitutional account in which resemblance is an internal relation grounded solely in the existence of resembling particulars. However, an alternative constitutional account has been overlooked in the literature, one in which resemblance is not an internal relation but rather an irreducible relation among particulars. I propose such an account here as a novel version of resemblance nominalism, which I term '*Deep Resemblance Nominalism*' (DRN). DRN also appeals to overall resemblance – not to aspectual resemblance – and does not regard overall resemblance as an internal relation, as it conceptualizes its particulars – akin to Armstrong's 'thin' particulars – as bare entities or 'nodes' in the framework of the graph theory used by mathematicians. Consequently, much like Armstrong's 'instantiation' relation, which operates at the fundamental level by linking his thin particulars

to universals, DRN treats resemblance as a fundamental tie that connects its particulars. In DRN, resemblance is fundamental because it is not constituted by any further fact.

The distinction between DRN and Rodriguez-Pereyra's RN can be better illustrated by invoking the metaphysicians' metaphorical God. According to DRN, if God were to forget to link the particulars with a fundamental resemblance tie after creating them, those particulars would not resemble one another. In contrast, if resemblance were an internal relation – as in Rodriguez-Pereyra's RN – then, once God created the particulars, some of them would naturally resemble one another without any additional effort on God's part.

So, in DRN, based on the distinction drawn by Melia, the status of the predicate 'resemblance' is analogous to Armstrong's predicate of 'instantiation' in his substance-attribute theory. In DRN, following the distinction drawn by Melia, the status of the predicate 'resemblance' parallels Armstrong's predicate 'instantiation' in his substance-attribute theory. So, DRN's predicate 'resemblance', denoting a fundamental tie, is both a metaphysical and a conceptual primitive.

3.3. The issue of extensional adequacy

To recapitulate, Rodriguez-Pereyra analyzes properties as classes of resembling particulars and considers resemblance to be an internal relation. He adheres to the traditional account of RN, asserting that resemblance is a two-place relation that holds between pairs of particulars. For example, the property 'red' is identified with a property class, defined as the maximal class containing all and only red particulars, where each member pairwise resembles every other member. However, when resemblance is construed as a two-place relation between pairs of particulars, the resemblances among red particulars are neither sufficient nor necessary to form a maximal property class that can be identified with the property 'red'. The 'imperfect community' problem addresses the sufficiency objection, while the 'companionship problem' addresses the necessity objection. Together, these challenges call into question the extensional adequacy of the resemblance relation in Rodriguez-Pereyra's RN.

I will examine Rodriguez-Pereyra's solution to these problems and argue that DRN provides a solution that aligns better with the principles of nominalism than his approach.

3.4. The imperfect community problem

This problem seeks to demonstrate that pairwise resemblances among particulars are insufficient to form a property class that can be identified with a property. Suppose that x is both F and G, y is both G and H, and z is both F and H. The problem arises because, although each of these particulars pairwise resembles the others, there is no single property common to all three. In other words, resemblance, when construed in this way, fails to distinguish between an 'imperfect community', such as the one described, and a 'perfect community', where all particulars share a single common property.

Rodriguez-Pereyra addresses the imperfect community problem by asserting that resemblance must be evaluated not only among individual pairs of particulars but also

among pairs of pairs and so forth throughout the set-theoretic hierarchy, ensuring that resemblance is maintained at every hierarchical level (2002, 163). However, in the example of the imperfect community provided above, this condition for a perfect community is not satisfied, thereby identifying it as an imperfect community. Thus, Rodriguez-Pereyra solves the imperfect community problem by extending his two-place resemblance relation beyond individual particulars.

Before presenting DRN's solution to the imperfect community problem, I will further refine DRN by examining the formal properties of the resemblance relation. As previously discussed, DRN views resemblance not as an internal relation but as an external tie, operating at the fundamental level to connect its particulars. In developing DRN, my primary focus will be on the question: What is it for a particular to have the property F? In answering this question, I will introduce a *sui generis*, two place plural resemblance relation, represented as R(x, the X's), which will be interpreted as 'x collectively resembles the X's' (see also Passeau 2015, 110–11). This differs from Rodriguez-Pereyra's concept of resemblance, which is treated as a two-place relation within standard logic. DRN, by contrast, utilizes the resources of plural predicate logic, which distinguishes between singular and plural terms. A singular term denotes only one single particular, such as 'x', whereas a plural term denotes a plurality of particulars, such as the X's. Furthermore, since each particular resembles itself, when x collectively resembles the X's, x is included among the X's.

According to DRN's analysis, for a particular to be F is constituted by its collective resemblance to the plurality of all and only the F-particulars, specifically, the X's. To illustrate this, let us consider a simple world consisting of Meloni, Merkel, Macron, Donatello, and Fabio. Assuming that being a politician is a sparse property, Meloni is a politician because she collectively resembles a plurality that includes Meloni, Merkel, and Macron. This collective resemblance is grounded in a fundamental tie that connects her to this plurality. Similarly, assuming that being Italian is another sparse property, Meloni is Italian because she collectively resembles a different plurality comprising Meloni, Donatello, and Fabio. This second collective resemblance is grounded in another fundamental tie that links her to this plurality.

It is worth noting that DRN's account of how a particular possesses a property is structurally similar to Armstrong's substance-attribute theory, Lewis's class nominalism and Effingham's mereological nominalism. In Armstrong's account, a particular possesses a property, such as F, by bearing a fundamental tie of 'instantiation' to the universal F. In Lewis's account, a particular is F by being in a membership relation to the natural class containing all and only F-particulars. And, in Effingham's account, a particular is F by bearing a fundamental 'instantiation' tie to the fusion of all and only F particulars. Similarly, according to DRN, a particular is F by bearing a fundamental tie of 'collective resemblance' to the plurality of all and only F-particulars. In all these accounts, the fundamental tie – whether it is 'instantiation', 'membership', Effingham's 'instantiation', or DRN's 'collective resemblance' – is treated as an irreducible feature of reality.

Having provided a constitutional analysis of how a particular possesses a specific property, I now turn to the analysis of properties themselves. Broadly speaking, accord-

ing to DRN, a property like F is identified with the plurality comprising all and only F-particulars. More specifically, the property is a plurality of particulars, each of which is connected to this plurality through a fundamental tie – a collective resemblance relation. Reconsidering the simplified world example mentioned earlier, the property of being a politician is identified with the plurality comprising Meloni, Merkel, and Macron, each of whom is connected to this plurality by a fundamental tie of resemblance. Similarly, the property of being Italian is identified with the plurality consisting of Meloni, Donatello, and Fabio, each of which is linked to this second plurality by a tie of resemblance.

By accepting resemblance relation as a collective resemblance rather than a two-place resemblance relation holding between pairs of particulars, DRN can easily solve the imperfect community problem. Its plural collective resemblance relation, symbolized as 'R(x, the X's)', which holds between each particular in the plurality and the plurality itself, ensures that each particular in the plurality shares a common property. Imperfect communities, in which no single property is shared by all members, are effectively ruled out, as the plural collective resemblance relation does not hold in those cases.

3.5. The Companionship Problem

The companionship problem aims to show that Rodriguez-Pereyra's pairwise resemblance relation among particulars cannot be necessary to form maximal classes that can be identified as property classes. The issue arises in cases where a property class, such as the resemblance class of G-particulars, is a subclass of another property class, such as the class of F-particulars. If conjunctive or determinable properties are accepted as sparse properties, they can be used to illustrate the companionship problem. Suppose G is a sparse property, which is a conjunction of F and H properties. Also, consider the resemblance class of G-particulars with the companion resemblance class of F-particulars. In such a case, the resemblance class of G-particulars cannot qualify as a maximal resemblance class (and therefore cannot be a property class), because the maximality condition is not met, as its members also resemble those in the resemblance class of F-particulars.

To address the companionship problem, Rodriguez-Pereyra introduces a graded concept of resemblance, by distinguishing a property class from its companion based on their degrees of resemblance (2002, 179–85). He adopts the notion of resemblances of degree *n*, where resemblance is no longer a two-place relation but a three-place relation involving two particulars and a natural number *n*. The number n represents the number of respects in which two particulars resemble one another. Consequently, Rodriguez-Pereyra can distinguish the property class of G-particulars from its companion property class of F-particulars. G-particulars pairwise resemble each other under the resemblance relation of degree 2, whereas each G-particular resembles F-particulars only to degree 1.

Critics might challenge Rodriguez-Pereyra's solution, by arguing that his account seems to reify the respects in which particulars resemble one another. Passeau observes that his approach "does not, strictly speaking, reify properties at the outset but appears to enumerate them" (2015, 115). The conclusion must be that his enumeration of the

number of respects occupies a middle ground on the spectrum of reification, with outright reification of respects at one end and complete avoidance of reification at the other.

By contrast, DRN offers a straightforward solution to the companionship problem. Consider again the world where Meloni is a politician and an Italian. In this setting, Meloni is a politician because she collectively resembles a plurality composed of Meloni, Merkel, and Macron, all linked by the fundamental resemblance tie. Likewise, she is Italian because she collectively resembles a different plurality composed of Meloni, Donatello, and Fabio, connected by the fundamental resemblance tie. Thus, the property of being a politician or being German is identified with a plurality of particulars that collectively resemble each other through the fundamental resemblance tie. Consider now the property of being a politician alongside its companion property, being human. Being a politician corresponds to the plurality of Meloni, Merkel, and Macron, each collectively resembling one another through a fundamental resemblance tie. Likewise, being human corresponds to a larger plurality – Meloni, Merkel, Macron, Donatello, and Fabio – with each member collectively resembling the plurality under a fundamental resemblance tie. To generalize, in DRN, one distinguishes a property G from its companion property F by associating each with a distinct plurality of particulars, where the members of each plurality are connected by their fundamental resemblance tie.

3.6. The Challenge from co-extensional properties

To address this problem, Rodriguez-Pereyra adopts a strategy like the one employed by Lewis in his solution within the framework of class nominalism. He also opts to say that necessarily co-extensive properties cannot exist. In the case of contingently co-extensive properties, such as 'being rhenate' and 'being cordate', he, like Lewis, relies on modal realism to address the challenge. His resemblance classes include mere *possibilia* alongside actual particulars. The classes of cordate and rhenate animals are distinct because, in some possible worlds, certain animals are cordate without being rhenate, or vice versa. This distinction results in the classes being associated with different properties, such as 'cordate' and 'rhenate'. It is important to observe that Rodriguez-Pereyra interprets resemblance as a trans-world relation. This is because resemblance is not confined within the actual world; it also extends across particulars in different possible worlds.

DRN also faces the problem of co-extensional properties. Following both Lewis's class nominalism (CN) and Rodriguez-Pereyra's resemblance nominalism (RN), DRN denies that there are necessarily co-extensive properties. For contingently coextensive properties, such as 'cordate' and 'rhenate', rather than adopting modal realism – which relies on possibilia and trans-world resemblance relations – I will adopt a strategy similar to Effingham's approach for addressing this issue in his account of mereological nominalism. As previously discussed, Effingham argues that whenever there is a fusion of animals, there are at least two distinct entities: a fusion of cordate animals and a fusion of rhenate animals. Their distinctness is grounded in brute *de re* modal facts, such as differences in their modal profiles. Similarly, within the framework of DRN, I propose

an analogous solution. Whenever there is a plurality of all and only animals, there exist both a plurality of rhenate animals and a plurality of cordate animals. The distinctness of these pluralities is grounded in the brute modal facts of the animals they comprise, such as their differing modal profiles. A rhenate animal is defined as essentially having kidneys but only accidentally having a heart, whereas a cordate animal is defined as essentially having a heart but only accidentally having kidneys.

To evaluate the solutions to the problem of co-extensional properties proposed by Rodriguez-Pereyra and DRN, I argue that DRN's solution is just nominalistically acceptable as Rodriguez-Pereyra's – and, by extension, Lewis's solution. To address the co-extension problem without resorting to modal realism, DRN adopts a pluralist variant of Effingham's non-extensional mereology. Effingham argues that a single plurality of rhenate and cordate animals generates two distinct fusions, differentiated by their brute *de re* modal profiles. However, this approach departs from standard extensional mereology and appears to involve an intensional distinction between fusions. It could be argued that a theory reliant on non-extensional individuation of fusions cannot be fully consistent with the principles of strict nominalism. Similarly, DRN seems to differentiate the plurality of rhenate animals from the plurality of cordate animals. However, DRN cannot distinguish between pluralities of animals as pluralities of rhenate animals and cordate animals without first distinguishing the animals themselves as rhenate or cordate. So, just like Effingham does in the case of fusions of animals, DRN counts the same animal twice under different brute *de re* modal profiles. Counting a fusion of animals twice by appealing to two different *de re* modal profiles is a departure from strict nominalistic principles. Similarly to Effingham's approach with fusions of animals, DRN counts the same animal twice under different brute *de re* modal profiles. Counting a single animal twice by invoking two distinct *de re* modal profiles, thereby introducing an intensional distinction, also departs from the principles of strict nominalism.

I argue that both Rodriguez-Pereyra's Resemblance Nominalism (RN) and Lewis's Class Nominalism (CN) also depart from strict nominalist principles by invoking the possibilia of modal realism. Rather than distinguishing rhenate animals from cordate animals in terms of brute *de re* modal profiles, they interpret *de re* modal facts within a modal realist framework, thus quantifying over merely possible entities. Yet introducing non-actual animals alongside actual ones proves no more ontologically innocent than relying on brute modal *de re* facts – and thereby counting the same animals twice. Accordingly, I conclude that neither Lewis's nor Rodriguez-Pereyra's response to the problem of co-extensional properties is any more in line with the demands of strict nominalism.

4. Conclusion

In comparison to Rodriguez-Pereyra's Resemblance Nominalism (RN), DRN appears to perform notably better. As previously argued, Rodriguez-Pereyra fails to offer a fully constitutive account of the resemblance relation. Although he maintains that resemblance is an internal relation grounded in the existence of resembling particulars, he does not

show that the mere existence of these particulars necessarily entails their resemblances. DRN, by contrast, treats resemblance as a fundamental 'tie' connecting a single particular to a plurality of others – akin to the 'instantiation' tie in substance-attribute theories that connects a particular to a universal. This framework successfully explains how particulars come to resemble one another.

Furthermore, DRN outperforms Rodriguez-Pereyra's RN in addressing both the companionship and imperfect community problems. In the case of the companionship problem, although Rodriguez-Pereyra's solution avoids overtly reifying respects of resemblance (and thus properties), it nonetheless relies on enumerating and counting these respects, which conflicts with nominalist principles. In contrast, DRN resolves the companionship problem without reifying anything whatsoever. To address the imperfect community problem, Rodriguez-Pereyra extends his two-place resemblance relation to encompass pairs of pairs and further extends it throughout the set-theoretic hierarchy. This approach could be seen as departing from the spirit of resemblance nominalism, which was originally conceived of resemblance as a relation between individual particulars. In contrast, DRN resolves the problem by invoking a collective resemblance relation that holds exclusively among individual particulars.

When measured against Effingham's Mereological Nominalism (MN), DRN fares slightly better. Both DRN and MN tackle the issue of co-extensional properties by invoking brute *de re* modal differences – Effingham's approach double-counts fusions, while DRN double-counts particulars – thereby introducing a level of intensionality that violates strict nominalism. As previously mentioned, Rodriguez-Pereyra's RN and Lewis's Class Nominalism (CN) can likewise be criticized for relying on 'hyperrealist' solutions to the same problem. Still, DRN is more parsimonious in its use of primitives. While DRN requires only one primitive – the 'resemblance' predicate – Effingham's MN employs two: 'being a part of' and 'instantiation'.

Finally, when compared to Lewis's CN, DRN appears to be marginally preferable. Both theories depart from strict nominalism, but in different ways: Lewis's CN appeals to merely possible particulars to handle co-extensional properties, while DRN depends on brute *de re* modal profiles. Nevertheless, DRN is more economical in its reliance on primitives, by using only one predicate ('resemblance'), whereas Lewis's CN uses two ('membership in a class' and 'naturalness of a class').

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