Resemblance

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Abstract: Our ordinary judgments and our metaphysical theories share a common commitment to facts about resemblance. The nature of resemblance is, however, a matter of no small controversy. This essay examines some of the pressing questions that arise regarding the status and structure of resemblance. Among those to be discussed in what follows: what kinds of resemblance relations are there? Can resemblance be analyzed in terms of the sharing of properties? Is resemblance an objective or subjective matter? What, if any, resemblance facts are fundamental? How does resemblance relate to naturalness?[1]

§1. Introduction

Platitudes aside, few things are more similar than apples and oranges. Consider, then, a more heterogeneous list of entities: the Stanley Cup, the Fourth Century BCE, *Caddyshack*, the Twin Prime Conjecture, and the property of *punctuality.* None of these entities resemble one another nearly as much as an apple resembles an orange. In fact, their marked differences rule out any easy verdict on which are most similar to which. And, while it is commonplace to assume that we can aptly speak about relations of similarity among ordinary entities like apples and oranges, it is far from obvious that the resemblance structure of reality—the distribution of similarity relations among entities—is so rich as to settle any and every question we might pose about resemblance. For instance, is *Caddyshack* more like the Twin Prime Conjecture or the Stanley Cup? To what degree do the Fourth Century BCE and *punctuality* resemble one another? To take sides on these issues is, in part, to take sides on a debate about the resemblance structure of the world. Conversely, to take sides on issues about resemblance is to settle (or, of necessity, leave unsettled) these and other questions about what is similar to what.

The motivation for trying to understand the nature of similarity is obvious enough: it plays a ubiquitous role in cognition. Among many other roles, it underwrites our categorization of entities, our recognition of patterns, and perhaps our inductive and analogical reasoning.[2] So, to the extent we seek a metaphysical explanation of the successes or failings of our cognition, we owe some metaphysical explanation of facts about resemblance. This essay surveys some of the metaphysical concerns that arise in making sense of resemblance. (Throughout, I use "resemblance" and "similarity"

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[2] On similarity in cognition, see Tversky (1977), Goldstone (1994), Hahn and Ramscar (2001), and Goldstone and Son (2005). On similarity in analogical reasoning, see Bartha (2010: 195-238).

interchangeably.[3]) These by no means exhaust the issues raised by resemblance, but they are among the most important in developing a full-fledged metaphysics of resemblance.

In Section Two, some species of resemblance are introduced and the connection between resemblance and properties is discussed. In Section Three, Nelson Goodman's influential arguments regarding resemblance and, in particular, the connection between properties and resemblance are examined. After marking some additional puzzles about the nature of resemblance, Section Four considers some competing views about the metaphysics of resemblance and its fundamental structure.[4]

Throughout what follows, a recurring theme will be that, despite standard assumptions to the contrary, little about resemblance is uncontroversial and, more often than not, natural assumptions about the connections between properties and resemblance prove untenable upon close scrutiny. There is, it seems, a tendency to follow Hume's methodological lead and give resemblance a critical role in our theories while saying precious little about precisely what resemblance consists in.

§2. Species of Similarity

Our rough talk of resemblance is shot through with vagueness, but, quite often, it can be made precise by focusing upon two general species of resemblance relations, which we can call *respective resemblance* and *overall resemblance*.[5] Respective resemblance relations hold among entities in virtue of those entities being similar in certain respects. For instance, a pill bug and a coffee bean respectively resemble each other in size, but not in taste. Jamaica and Kosovo resemble each other with respect to total area, but not in climate. Obviously enough, pragmatic and contextual considerations inform the respective resemblances with which we are concerned. These same considerations also

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[3] On this terminological matter and the potentially differing connotations of 'similarity' and 'resemblance', see Paseau (2015: 95) who suggests that talk of 'resemblance' likely implies the a subjective relation.

[4] Among omissions from the following is any discussion of the role of resemblance in depiction and representation. For recent work on depiction and resemblance, see Lopes (1996), Abell (2009), Greenberg (2013), and Blumson (2014).

[5] These are by no means the only theoretically significant relations of resemblance invoked in the literature. Here, I follow Price (1955: 14) in taking them to be the preeminent ones. Instead of respective or overall resemblance, one might focus on minimal resemblance, where some entities minimally resemble just in case they stand in some resemblance relation or other. Views that hope to use resemblance to define up resemblance classes and, in turn, dispense with properties are presumably best served to rely on this notion of minimal resemblance rather than overall or respective resemblance. (The latter simply seems like the wrong notion and the latter would induce circularity if our hope is to dispense with properties.) If, however, we assume from the outset that absolutely all entities resemble one another, then it's unlikely that minimal resemblance is of much analytic value. Unsurprisingly, however, views that seek to dispense with properties via resemblance have ample reason to reject the idea that resemblance would be indiscriminate in this way. (Or, if they do, they presumably have to rely on some comparative relation of minimal resemblance to do the relevant theoretical work.) On minimal resemblance, see Guigon (2009: 18).

account for differences in what we communicate (and whether we speak truly) when we assert sentences like "Kosovo and Jamaica are quite similar" in different contexts. In many cases, such claims are plausibly taken to concern more than just a single relation of respective resemblance. We might, for instance, be concerned exclusively with resemblance with respect to height and weight, even while disregarding all other sorts of respective resemblance.

A second species of resemblance concerns the "total" or "cumulative" resemblance between entities. It is this sort of resemblance we are concerned with when we make claims like "All things considered, Jason Vorhees and Michael Myers are very similar." So, while respective resemblance concerns a limited range of features, overall resemblance somehow "aggregates" all respective resemblances or respective dissimilarities. (For brevity's sake, I will typically omit qualifications regarding *dissimilarities*.) Similarity of this overall sort is "a resultant, determined by the balance of very many similarities and dissimilarities in various respects that get balanced." (Lewis 2015: 18)

The assumption that there is a unique relation of overall resemblance is a familiar one and, if correct, it provides a useful analytic tool. It is assumed, among other places, in Lewis' earliest presentation of counterpart theory in Lewis (1968). On that view, your counterpart in a possible world is that which overall resembles you more than any other thing in that world. [6] More generally, in considering competing views about resemblance, Quine (1967: 122) notes the apparent primacy and theoretical appeal of overall similarity, saying "one would like to be able to show that a single general standard of similarity… is all we need, and that respects can be abstracted afterward."

Overall resemblance will, of course, depend upon the myriad respective relations of resemblance among entities. In fact, it seems impossible for things to differ in their overall resemblance to one another without differing in their respective resemblances. Despite this, some have argued that there is no way to analyze overall resemblance in terms of the seemingly more basic relation of respective resemblance. This is so despite the fact that respective resemblance plainly constrains or partially determines facts about overall resemblance.[7] As Morreau (2010: 481), puts it:

> Take, for instance, similarities in respect of weight and temperature… Let one person resemble you more closely, overall, than someone else does. And let him become a bit less like you in respect of his weight by gaining a little. Now answer these questions: How much warmer or cooler should he become to restore the original overall comparison? How much more similar in respect of his height?

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[6] See Lewis (1968: 114).

[7] As Morreau (2010: 474) notes, if there is some individual that dominates—i.e., in each respect, more closely resembles you than does any other—in respective resemblance, it is implausible to deny that such an entity most closely overall resembles you. But, since such cases are rare indeed, they do nothing to close the analytic gap between respective and overall similarity.

What about his income or his wisdom or his hairstyle? That there might be factual answers to these questions is hard to believe.[8]

If Morreau and other critics of overall resemblance are correct, the analytic gap between respective and overall resemblance can be closed only if we help ourselves to highly contentious assumptions about respective resemblances. If, for example, we simply stipulate that there are only ten respects for resemblance, each of which enjoys an equal weight, we might proffer a recipe for connecting respective with overall resemblance. The artificiality of such assumptions is obvious enough, but, absent dubious assumptions of this sort, the status of overall resemblance remains quite unclear. And, even if Morreau's falls short of undermining a commitment to overall resemblance, it would seem to strongly suggest that overall resemblance must be vague in nature.

If overall resemblance resists analysis in terms of respective resemblance, then, unless some other analysis is forthcoming, those who retain it as a theoretical commitment must admit it as a primitive relation, lacking any non-circular reductive analysis. But, without evidence that overall resemblance serves some indispensible theoretical role—namely, one that respective resemblance cannot—this commitment would be a gratuitous one. Indeed, it is on these grounds that Quine (1967: 121) ultimately disavows overall or "cosmic" similarity, claiming "that it is a mark of maturity of a branch of science that the notion of similarity or kind finally dissolves, so far as it is relevant to that branch of science." Quine's contention that similarity ought to disappear within mature branches of scientific inquiry is plainly tendentious. Among other things, it presupposes contestable views of science, kindhood, and similarity, but, regardless of its merits, Quine's case against similarity highlights a key question for naturalists: what exactly is the role of resemblance, whether respective or overall, within our best scientific theories?[9]

Setting aside the fate of overall resemblance, there is a lengthy tradition of holding resemblance, whether respective or overall, to be properly understood in terms of entities sharing (or failing to share) properties.[10] Such views take respective resemblance to be rightly explained by positing the existence of properties and then holding that entities resemble in virtue of instantiating the same properties (or being dissimilar in virtue of failing to instantiate certain properties).

In some cases, the apparatus of properties is easily integrated into the metaphysics of resemblance. This is the case with the relation of *perfect respective resemblance*. For, on the standard view, some particulars perfectly resemble in a certain respect in virtue of sharing one and the same property like *being an electron* or *being made entirely of iron*. Matters are, however, far less clear when we turn to quantitative

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[8] On Morreau's argument, see Kroedel and Huber (2013).

[9] For a recent discussion of the role of similarity in science and modeling, see Weisberg (2012).

[10] Most often, the entities of interest are particulars and properties are assumed to be universals. For neutrality's sake, I'll stick to talk of entities and properties, though different views yield markedly different complications. On resemblance within trope theory, see Manley (2002).

properties that admit of degree like *mass.*[11] Intuitively, objects that are two and three grams in mass respectively resemble each other to a greater degree than objects that are two and twenty grams in mass. And, while we might seek to account for the relevant resemblance facts by looking to the quantitative structure of mass, it is far from clear what to say in more complex cases where quantities are multi-dimensional and vary along multiple axes (e.g., colour or shape properties). In such cases, closer scrutiny of the relation of respective resemblance reveals a complex resemblance structure that is not easily accounted for and further compounds the above-noted problem concerning the respective-overall resemblance connection. For, even if we had a fixed stock of respective resemblance relations (e.g., height, weight), the fact that these admit of degree complicates any proposal for aggregating respective resemblance in determining overall resemblance. [12]

A commitment to properties also affords us a valuable resource in sharpening up our theory of resemblance by drawing critical distinctions. Two such property-theoretic distinctions prove especially useful.

The first distinction separates the *intrinsic* properties of entities from their *extrinsic* properties.[13] So, while the intrinsic properties of an entity like its mass, chemical composition, and mereological structure are (arguably) had solely in virtue of the way that entity is, extrinsic properties like *being the most massive object* or *being fifty miles from Chicago* are had in virtue of how that entity is related to other entities. So understood, you and I can be similar with respect to our intrinsic features (e.g., our mass or chemical composition) or our extrinsic ones (e.g., our distances from a black hole).

The second distinction separates the *qualitative* properties of entities from *non-qualitative* ones, where the latter properties are bound up with facts about the identities of entities.[14] So, while properties like *having five grams mass* and *being between two rivers* are qualitative, properties like *being friends with Socrates* or *being between Kripke and Lewis* are non-qualitative in nature. Quite often, talk of resemblance is tacitly restricted to the sharing of qualitative features, whether intrinsic or extrinsic. This is, in part, because resemblance with respect to certain non-qualitative properties—namely, haecceities like *being Socrates*—entails identity. But, although talk of similarity in metaphysics is typically restricted to qualitative properties, non-qualitative resemblance is a perfectly legitimate sort of resemblance. For example, dissimilar objects like lamps, lake houses, and law firms can be similar in virtue of sharing the non-qualitative property *being owned by Larry.*

Once granted the above distinctions, our repertoire for capturing resemblance structure expands considerably. We can introduce the notion of *qualitative indiscernibility*,

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[11] On the metaphysics of quantities, see Eddon (2013).

[12] To be sure, mathematical representations of quantities offer an easy framework for presenting different views about how respective resemblances aggregate into overall resemblance, but, as in the qualitative case, the key challenge consists in motivating the relevant principles of aggregation.

[13] On the intrinsic/extrinsic distinction, see Lewis (1986: 61) and Marshall (2012, 2013).

[14] On the qualitative/non-qualitative distinction, see Adams (1979) and Cowling (2015).

which is just perfect resemblance with respect to all qualitative properties.[15] We can also define up a more restricted notion of similarity: *duplication*, which is perfect resemblance with respect to intrinsic qualitative properties.[16] These notions prove remarkably useful for many theoretical purposes.[17] And, since these resemblance relations are characterized in terms of certain kinds of properties, these analyses provide support for the idea that resemblance is rightly understood via the sharing of properties.

§3. Reservations about Resemblance

Although a commitment to properties illuminates our understanding of resemblance, the interaction between theories of properties and the nature of resemblance is a deeply fraught matter. There is, for instance, an intuitive package of assumptions about the property-resemblance connection that would undermine any viable theory of resemblance.

Following Goodman (1967), this package issues from two main theses: (A) Properties are abundant: for any entities, there is some property had by all and only those entities; (B) Overall resemblance between entities is determined by the number of properties those entities have in common (or fail to have in common). While (B) is motivated by an intuitive platitude connecting resemblance and properties, (A) is motivated by views that identify properties with sets of entities or that hold all (non-paradox-inducing) predicates to express a property. Such views accept a vast proliferation of properties, well beyond "sparse" views that posit a comparatively limited stock of properties—e.g., only those corresponding to the primitive predicates of our best physical theories.[18]

The puzzling interaction of (A) and (B) is most apparent when we assume there are infinitely many individuals.[19] If so, each entity instantiates infinitely many properties and shares infinitely many properties with every other entity. So, if resemblance is simply a matter of the number of shared properties, all entities will overall resemble one another to exactly the same degree. It looks, then, like no view about properties and

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[15] One might think that respective resemblance constrains overall resemblance such that qualitative indiscernible entities maximally resemble one another overall. Note, however, that entities might share all their qualitative properties yet differ with respect non-qualitative properties (e.g., *being owned by Larry)* and so even qualitatively indiscernible entities might differ in their comparative similarity. Those who deny that non-qualitative features make for resemblance can, however, take qualitative indiscernibility to be the limit of overall resemblance.

[16] On qualitative indiscernibility and duplication, see Lewis (1986: 89).

[17] Perhaps most notably, proponents of resemblance nominalism hold that an ontology of properties is dispensable once provided a suitable metaphysics of resemblance. See Paseau (2015) and Rodriguez-Pereyra (2002).

[18] Lewis (1986: 60). The sparse conception is often paired with thesis that the sparse properties are natural or perfectly natural. On such a view, see Lewis (1983). On the connection between naturalness and resemblance, see Section Four below.

[19] The assumption of infinitely many individuals is dispensable here. For any finite number of individuals, n, there will, given the relevant view of properties, be a fixed number of properties, 2^{n-2} all distinct individuals share.

resemblance can simultaneously uphold both (A) and (B), while avoiding a wildly implausible view about the world's resemblance structure.

According to Goodman, the proper moral to draw from the conflict between (A) and (B) is that "[s]imilarity cannot be equated with, or measured in terms of, possession of common characteristics."(28) In turn, this requires that serious philosophical projects can admit no crucial appeal to resemblance. Memorably, Goodman concludes that "[i]f statements of similarity, like counterfactual conditionals and four-letter words, cannot be trusted in the philosopher's study, they are still serviceable in the streets."(29)

For those who hope to retain similarity as a theoretical notion, while also upholding its connection to the sharing of properties, several options are available. One might reject (A) and the abundant conception of properties in favour of a sparse view. Although this will avoid the problem as posed above, proponents of the sparse view still owe some account of how resemblance facts connect up with the sharing of sparse properties.[20] A second option is to retain the abundant conception of properties, but reject (B). In doing so, one might hold that there is an elite class of properties—perhaps those corresponding to the ones admitted by sparse views—that make for resemblance, while denying that other properties make for resemblance.[21] Alternatively, one might hope to replace the simple platitude that connects sharing and resemblance with some more nuanced recipe for determining overall resemblance. Perhaps more promisingly, one might pursue several of these strategies simultaneously. On the resulting view, sparse properties can be more or less fundamental and the sharing of especially fundamental properties makes for greater resemblance than the sharing of less fundamental or non-sparse properties.

If, *contra* Goodman, one hopes to explain resemblance in terms of shared properties, some account is owed of how to properly weight the sharing of various sparse properties. But, for those wary of accepting a sparse conception of properties, a remaining line of response that squares with Goodman's own views suggests itself.[22] This response denies that resemblance is an objective affair, depending upon mind- and context-independent facts about the nature of properties. In keeping with Goodman's sentiments, such a view holds that "[c]ircumstances alter similarities" (27) and that there can be "no constant measure of overall similarity," (29) since any resemblance structure is merely a subjective "projection" on to the world. But, if this projection is determined by facts about contexts and practical interests, subjectivists about resemblance are nicely

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[20] Merely invoking a sparse conception of properties does little to solve the problem without taking on substantive assumptions about the nature of sparse properties and which properties qualify as sparse. On some challenges here, see Buras (2006) and Guigon (2014).

[21] Note that distinguishing between the sparse and abundant does not suffice to address the present worry. If, for instance, there are properties that are more or less sparse, some account is still needed of how varying degrees of sparseness or fundamentality bear upon resemblance.

[22] On accounting for resemblance without an objective distinction between sparse and non-sparse properties, see Taylor (2004).

positioned to explain away both widespread disagreement about and the apparent inconstancy of our resemblance judgments.[23]

Subjectivist conceptions of resemblance seem to avoid Goodman's problem above, but subjectivism about resemblance comes in a variety of forms.[24] Some subjectivists will differ in how they capture the role of contexts and practical interests, others will differ in the portion of resemblance structure that is deemed to be subjective rather than objective. It is, for example, open to the subjectivist to maintain that facts about duplication, qualitatively indiscernibility, and perfect respective resemblance are objective, while still maintaining that other resemblance facts—e.g., those about overall resemblance—are not. Notably, subjectivists who can do so retain the analytic benefits of retaining notions like duplication and qualitative indiscernibility, while avoiding the task of providing a metaphysical analysis of overall resemblance.

For subjectivists about overall resemblance, the more pressing challenge is to articulate, in some systematic way, how contextual matters impact our judgments of overall resemblance. In providing such an account, it is tempting to assume that, by empirically investigating individuals' similarity judgments, we can get a better handle on the nature of subjective resemblance relations.[25] But, for would-be subjectivists, it is worth pointing out that empirical research on similarity judgments has been claimed by some to undermine standard assumptions about the formal features of similarity.

The conflict between staple assumptions about resemblance and psychological studies of similarity judgments is perhaps easiest to appreciate when we assume a metrical conception of similarity.[26] This conception takes resemblance to be properly understood via geometric models, where such models take individuals to be points in a metric space and dissimilarity to be a metric distance function, δ, that assigns any two points within a metric space a non-negative number.[27] Intuitively, this number corresponds to "how far apart" individuals are in respective or overall similarity. This metric distance function is typically claimed to obey (at least) three axioms:

(i) **Minimality**: $\delta(a, b) > \delta(a, a)$ if $a \neq b$; and $\delta(a, a) = 0$.

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[23] At the same, fans of objective overall resemblance still owe some recipe for explaining away contextual variation in judgments of overall resemblance. One option here is to deny that there is a single overall resemblance relation and, instead, admit a plurality of such relations, which aggregate respective resemblance in different ways but conform to certain constraints.

[24] On subjectivism about resemblance, see Guigon (2009, 2014), Goodman (1967), and McLure (1964). Note that subjectivists still owe some response to the worries about aggregation voiced by Morreau, but, if resemblance relations prove to be subjective, their vagueness is likely to seem far less worrisome.

[25] Goldstone and Son (2005) is a useful jumping-off point.

[26] Note that subjectivism does not require the metrical conception nor does subjectivism require the metrical conception. Here, the metrical conception serves to illustrate the present challenges to subjectivism.

[27] On challenges to the geometric approach, see Tversky and Gati (1978) and Douven and Decock (2011). On the compatibility of sparse property sharing and geometric model views, see Blumson (MSb).

(ii) **Symmetry:** δ (a, b) = δ (b, a).
(iii) **Triangle Inequality**: δ (a, b) + δ (b, c) ≥ δ (a, c).

Roughly speaking, Minimality implies that every individual is at the same distance—namely, no distance at all—from itself and any distinct entities are at some positive distance. Symmetry implies that the distance between *a* and *b* is the same as the distance between *b* and *a*, so *a* is as dissimilar (or similar) to *b* as *b* is to *a*. Finally, Triangle Inequality implies that the distance of direct path from *a* to *c* does not exceed the length of an indirect path from *a* to *c* through *b*.

  Each of the axioms above has been called into question by certain experimental research into our judgments regarding similarity.[28] Granted some auxiliary assumptions about the connection between similarity and object recognition, the fact that certain objects are more easily identifiable has been taken by some to suggest a failure of Minimality insofar as some objects seem to more closely resemble themselves than others do.[29] More plausibly, Symmetry has been called into question by noting subjects' willingness to accept claims like "North Korea is similar to China," while denying "China is similar to North Korea."[30] Regarding Triangle Inequality, Tversky (1977: 329) says:

> The following example (based on William James) casts some doubts on the psychological validity of [Triangle Inequality]. Consider the similiarity between countries: Jamaica is similar to Cuba (because of geographical proximity); Cuba is similar to Russia (because of their poltical affinity); but Jamaica and Russia are not similar at all… [It] suggests that the perceived distance of Jamaica to Russia exceeds the perceived distance of Jamaica to Cuba, plus that of Cuba to Russia—contrary to the triangle inequality.[31]

For subjectivists about resemblance, these results might suggest that, not only do judgments of respective or overall resemblance vary with context, but that we are mistaken in ascribing certain basic features to resemblance. Subjectivists can, of course, resist such a conclusion, but, in doing so, they move closer to objectivist views of resemblance, which hold steadfast in a commitment to objective resemblance relations

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[28] An additional challenge to the metric conception concerns the nature of the points of the metric space. As Blumson (MSa) argues, if we view the points of the metric space as actual individuals, the possibility of worlds with finitely many individuals entails that certain desirable conditions are merely contingent features of that metric spaces that determine resemblance. And, if there are too many merely possible individuals, we cannot model their resemblance via a metric distance function. See Lewis (1973: 51) and Williamson (1988: 458). One alternative is to identify the points of this metric space with total intrinsic qualitative profiles and ascribe the metric relations directly to the space of properties. On such a view, see Cowling (2014).

[29] See Goldstone and Son (2005) for an overview of the psychological literature on the challenge to Minimality and other axioms.

[30] See Tversky (1977), but see also Gleitman *et al* (1996).

[31] See also Tversky and Gati (1982).

(and the assumptions above) but seek to either explain away these empirical results or be content with a divergence between objective resemblance structure and our ordinary judgments of similarity.[32]

§3. The Structure of Similarity

Perhaps the most famous argument concerning the resemblance relation is offered in Russell (1912). There, Russell argues that any view that seeks to dispense with universals like *whiteness* and *triangularity* will invariably be saddled with a commitment to different resemblances, which must, in turn, fall under the universal *resemblance*. As he puts it:

> Since there are many white things, the resemblance must hold between many pairs of particular white things; and this is the characteristic of a universal. It will be useless to say that there is a different resemblance for each pair, for then we shall have to say that these resemblances resemble each other, and thus at least we shall be forced to admit resemblance as a universal.[33]

Whether or not Russell's argument succeeds, few, apart from Quine and Goodman, have opted for eliminativism about resemblance. But, even among those who admit a resemblance relation, there is space for metaphysical disagreement about the deep nature of resemblance. It is, for example, an open question which resemblance facts are the most fundamental or, put differently, what resemblance facts ground all other resemblance facts. Indeed, it seems that disagreement about which resemblance facts are fundamental is possible even in the face of complete agreement about what resembles what and to what degree.

When it comes to discerning the world's fundamental resemblance facts, the range of possibilities is most easily divided up according to their logical structure. Intuitively, these options line up with the different kinds of claims we might affirm regarding resemblance. Roughly categorized, possible structures of fundamental resemblance facts include (but are not limited to) the following:

(i)   *Binary*: x is similar to y,
(ii) *Ternary*: x is more similar to y than z,
(iii) *Quaternary*: x is more similar to y than z is to w,
(iv) *Quantitative*: x is similar to y to degree n, where n is some number,

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[32] The former view would aim to account for violations of the Triangle Inequality by, say, positing shifts in context between judgments about the resemblances between distinct pairs of entities. Similar contextual mechanisms might be held to explain away apparent violations of Similarity or Minimality. The latter strategy—i.e., denying the relevant results bear upon the nature of resemblance—might seek to show that the relevant experiments track relations other than resemblance—perhaps a relation like contextual salience.

[33] Russell (1912: 48). For discussion, see van Cleve (1994) and Rodriguez-Pererya (2001).

(v)　　*Collective*: the *xs* are similar.[34]

These options by no means exhaust the range of possible views.[35] But, if a view is to deliver a plausible account of fundamental resemblance facts, it must provide a means for recovering the world's entire resemblance structure and, given different metaphysical assumptions, different views fare better or worse. There are also general concerns about fundamentality that can be brought to bear in assessing these proposals. Note, for example, that if the fundamental resemblance facts are quantitative in the sense above, they would involve relations between particulars and abstract mathematical entities—e.g., the specific numbers chosen to index the relevant quantities. But, as parallel objections regarding the metaphysics of quantities go, it is difficult to believe that the most fundamental resemblance facts connect individuals with specific numbers, especially since the relevant numbers used to index quantitative resemblance would seem to be arbitrarily chosen from among a variety of equally good ways to index the resemblance relation.[36]

　　　　Views about the world's basic ontological categories bear directly upon the nature of fundamental resemblance facts. For instance, standard versions of trope theory typically posit a fundamental binary relation of resemblance among tropes, which is then used to spell out facts about resemblance among objects.[37] In a similar vein, Rodriguez-Pereyra (2002) argues that, given sets and merely possible individuals, the fundamental resemblance relation is a binary one among particulars. This debate can, in principle, be extended to more exotic metaphysical views—e.g., fact-based ontologies in which certain kinds of facts intuitively "go together." (See Sider (2012: 89).) In turn, views that admit a plurality of different ontological categories like *object*, *property*, and *fact*, might hold that the structure of fundamental resemblance relations within these categories are notably different.

　　　　Still other disagreements about the structure of resemblance concern entities that do not form their own distinctive ontological category.[38] The best example in this regard concerns possible worlds, which, depending upon one's preferred view, fall within some broader category like *object*, *property*, or *proposition*. In any case, leading

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[34] There is a wealth of subtleties omitted here. Among them is the distinction between the kinds of argument places relations have and the number of their argument places as well as the modal variability of the resemblance relation. For example, on one fairly radical view, the resemblance relation is multigrade, varying in the nature and number of argument places from instance to instance. On the myriad options, see Guigon (2009), Paseau (2015), and Rodriguez-Pererya (2002). On the connections between quantitative, comparative, and quaternary notions, see Williamson (1988).

[35] On competing views about fundamental resemblance relations, see Manley (2002: 93).

[36] See Eddon (2013a: 637). An alternative approach would run along the lines of Field (1980), who seeks to characterize the structure of quantities using primitive many-place predicates rather than invoking relations between individuals and mathematical entities.

[37] See Lewis (1986: 65) on the relation of "perfect duplication" between tropes.

[38] On similarity as relation among experiences, see Shoemaker (1975).

views about the truth-conditions of counterfactuals like "If Edie had eaten the remote, she would be thirsty" hinge on facts about the "closeness" of worlds, where "closeness" is a relation of resemblance relation among worlds. On one leading view, the above counterfactual is true just in case all of the possible worlds that most closely resemble the actual world where Edie ate the remote are worlds where Edie is thirsty. It is, however, controversial how to characterize the relevant notion of "closeness"—e.g., as a distinctive respective or overall resemblance relation—but it is also controversial whether the underlying resemblance relation between worlds is quantitative, ternary, or quaternary.[39]

Commitment to an ontology that includes a relation like resemblance is, of course, incompatible with nominalists' disavowal of abstract entities. Moreover, views on which resemblance is a fundamental relation, akin to other fundamental relations like spatiotemporal distance, point toward odd results regarding the nature of resemblance. If, for instance, all fundamental relations must admit of "free recombination" (i.e., bear no relations of necessary connection or exclusion to one another), fundamental resemblance delivers bizarrely contingent facts about what resembles what.[40] Among other things, there could be a world where things are qualitatively just as they actually, but where you more closely resemble the Eiffel Tower than anything else. For this and other reasons, there is little to like about an ontology that includes a fundamental relation of resemblance. And, while Russell's argument purports to show that an ontology of resemblance relations is unavoidable, recent work on theoretical ideology suggests an importantly different option.[41] Like instantiation and identity, resemblance seems to be naturally assimilated into the primitive ideology of our best theories. For *ideologists* about resemblance, there are fundamental resemblance facts and a fundamental resemblance predicate—presumably in the form of one of the options set out above.[42] But, like logical constants and primitive modal operators, the resemblance predicate corresponds to no entity in the world. It is, instead, an ineliminable piece of metaphysical structure, unavoidable in aptly describing the world and which of its parts resemble one another. So, in investigating the fundamental resemblance facts, our proper concern is, not solely with their form, but with whether such facts are underwritten by the *ideology* of primitive resemblance or an *ontology* including fundamental resemblance relations.

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[39] On similarity as a relation over possible worlds, see Lewis (1973: 50-52) and Williamson (1988).

[40] On the recombination of fundamental relations, see Sider (2007).

[41] See, e.g., Rodriguez-Pereyra (2002: 105-123).

[42] The relevant resemblance here is presumably a resemblance relation other than respective or overall resemblance. (See fn. 5.) Note, also, that such a view is a boon for nominalists. For those almost-nominalists who admit sets (as well as possibilia), the proposal in Rodriguez-Pereyra's (2002) will look appealing. For full-fledged nominalists, the suggestion in Lewis (1983: 348) of admitting an infinitary, multigrade, comparative resemblance predicate warrants careful consideration. On a similar proposal, see Hausmann (1979).

§4. A Natural Conclusion

Our best metaphysical theories require some tool that allows us to carve at nature's joints when describing the world. Since Lewis (1983), a standard approach is to invoke the notion of a natural property, where such properties figure into the laws of nature, constrain interpretations of thought and talk, and ground qualitative resemblance. As Lewis noted, one can account for natural properties through ontological or ideological means. One can posit an "elite" class of universals and simply deny there are any other properties or hold that, even if there are other properties, only universals are natural. Alternatively, one can admit an abundance of properties (perhaps viewed as sets), but introduce a primitive piece of ideology—e.g., a predicate like 'is natural' or 'is more natural than'—that applies to only some of these properties.

While Quine's challenge sought to show that resemblance is theoretically otiose, naturalness seems to be theoretically mandatory and to bear some analytic ties to resemblance.[43] We might hope, then, that naturalness is what will ultimately furnish us with a theory of resemblance or, if it falls short in this regard, perhaps it might serve as a kind of replacement for resemblance. The prospects for either outcome depend, of course, primarily on one's view of naturalness. Suppose, following Sider (2012), that naturalness extends "beyond the predicate" and applies, not just to the properties of objects, but to second-order properties, quantifiers, and other elements of metaphysical structure. Given this extended conception, naturalness is most plausibly viewed as piece of primitive ideology, not just a matter of including universals in one's ontology. So, for those who hope to retain a workable theory of resemblance, such an account will, at some level, involve appeal to the primitive ideology of naturalness. If, however, we are content to follow Quine in jettisoning resemblance, we might hope that naturalness can still provide us a replacement notion that aptly marks the joints in nature. To be sure, naturalness is unlikely to explain (much less validate) all of our ordinary judgments about resemblance (e.g., about similarities between movies or molehills), but it is an open question whether it might still suffice to do the joint-carving required for fundamental metaphysics. For this reason, sorting out the connection between naturalness and resemblance is perhaps our best route for sorting out where, if at all, resemblance fits into fundamental reality.

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[43] On natural properties and resemblance, see Eddon (2013b), Dorr and Hawthorne (2013) and Guigon (2014).

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