

The Distinction between Intrinsic and Extrinsic Properties

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I propose an analysis of the metaphysically important distinction between intrinsic and extrinsic properties, and, in the process, provide a neglected model for the analysis of recalcitrant distinctions generally. First, I recap some difficulties with Kim's well-known (1982) proposal and its recent descendants. Then I define two independence relations among properties and state a 'quasi-logical' analysis of the distinction in terms of them. Unusually, my proposal is holistic, but I argue that it is in a certain kind of equilibrium and so probably pins down the target distinction uniquely. Finally, I suggest diagnoses of the previous failed attempts to analyse the distinction.

We intuitively distinguish 'intrinsic' from 'extrinsic' properties. Roughly, any property whose instantiation by some individual is a matter of the nature of that individual alone, regardless of the nature or existence of any distinct individual, is intrinsic; all other properties are extrinsic.¹ So, for example, redness, roundness and being 3kg are intrinsic, while being one metre away, being the fattest, and being an uncle are extrinsic.

This distinction is important to metaphysics in several ways. One is that it marks the difference between 'genuine' and 'mere Cambridge' changes: genuine changes are changes in intrinsic properties; mere Cambridge changes are changes only in extrinsic properties. Another is that it marks the difference between 'qualitative' and 'numerical' identity: qualitative identity is the sharing of intrinsic properties; numerical identity is the sharing of all properties, intrinsic and extrinsic alike. A third is that it marks the borders of 'modal recombination': the intrinsic properties of distinct individuals, unlike their extrinsic properties, can vary independently of one another.²

In this paper I attempt to analyse this distinction. My proposal is 'quasi-logical': it is couched solely in terms of logical, mereological, modal, and set-theoretical notions. This renders the distinction precise

¹ Here and in what follows 'distinct' means 'wholly distinct', that is, having no parts in common, and 'individual' means 'concrete part of some possible world' (so mereological sums of individuals from distinct worlds, if such there be, are not individuals).

² Vallentyne (1997) points out the involvement of the distinction in change and identity.

and, by making explicit the role of modality, shows what philosophical work it is fit for. The proposal is also ‘holistic’: it treats the distinction’s classifications of properties as mutually dependent. This helps to show why previous attempted analyses failed, and exemplifies a neglected approach to analysing recalcitrant distinctions generally.

1. Kim, loneliness, and independence

Kim (1982) has suggested a quasi-logical (though non-holistic) analysis. Say that an individual is lonely iff it does not coexist with any distinct contingent individual, and accompanied otherwise. And say that two properties are compatible iff it is possible that there be a single individual that instantiates both (simultaneously).³ Kim’s suggestion is, in effect, that a property is intrinsic iff it is compatible with loneliness.⁴

However, this is not quite right. Properties that are not just compatible with loneliness but also require it, for example, loneliness itself, will be classified as intrinsic by this criterion. Yet, intuitively, they are extrinsic.⁵ (In what follows, I ignore the following: higher-order properties, such as being a colour; properties characteristic of necessarily existent or abstract entities, such as being atemporal; necessary properties, such as being determinate; impossible properties, such as being both tall and not tall; and haecceitistic properties, such as being Socrates. These provide unclear test cases and their classification does nothing to illuminate the issues of change, identity, and recombination that give the distinction its interest.)

A second suggestion: a property is intrinsic iff it is compatible with both loneliness and accompaniment. This excludes properties that require loneliness. However, it still includes properties whose instantiation is compatible with both loneliness and accompaniment but whose *non*-instantiation is not, for example, being the fattest individual, and being a proper part of a world. Yet, intuitively, these too are extrinsic.

Suggestion three: a property is intrinsic iff both its non-instantiation and its instantiation are compatible with both loneliness and accompaniment, that is, iff all four cases are possible: a lonely individual having the property, an accompanied individual having it, a lonely individual

³ Formally: individual x is *lonely* iff $\neg\exists y (y \neq x)$, and it is *accompanied* iff it is not lonely; properties F and G are *compatible* iff $\Diamond\exists x (Fx \ \& \ Gx)$. Clearly, these two notions—and any notions defined in terms of them, for example, being compatible with loneliness—are quasi-logical.

⁴ Kim suggestion here updates a suggestion of Chisholm’s (1976). This way of stating the suggestion is not Kim’s own, but is due to Lewis (1983).

⁵ Lewis (1983) first made this point.

lacking it, and an accompanied individual lacking it.⁶ This excludes the property of being the fattest individual because if an individual is *not* the fattest individual, it cannot be alone. And it excludes the property of being a proper part of a world because if an individual is *not* a proper part of a world, then it must itself be a world, and so cannot be accompanied (worlds are all lonely).⁷

But it still won't do. Consider the property of existing at a world where something is red. There are worlds containing lonely red individuals, worlds containing accompanied individuals where some things are red, worlds containing lonely non-red individuals, and worlds containing accompanied individuals where nothing is red. So all four cases are possible. Yet this property is extrinsic.

Suggestion four: a property is intrinsic iff it is independent of every property, where one property is independent of another iff there are worlds at which both are instantiated, worlds at which just the one is instantiated, worlds at which just the other is instantiated, and worlds at which neither is instantiated. Where suggestion three, in effect, identified intrinsic properties with those that are independent of loneliness, suggestion four requires them to be independent quite generally. The idea is that what makes a property intrinsic is that its instantiation or non-instantiation by some individual fails to constrain not just the existence but also the *properties* of any distinct individual. And this criterion correctly classifies the property of existing at a world where something is red as extrinsic; for clearly this property is not independent of, for example, redness: it is impossible that it be instantiated unless redness is also instantiated.

Unfortunately, suggestion four leads to catastrophe: it classifies all properties as extrinsic! There is no property that is independent of *all* others; no property *F* is independent of, for instance, the property of existing at a world where something is *F*.

Should we say that the intrinsic properties are those that are independent of just *some* rather than all properties? The problem is to specify which ones. Clearly, loneliness and the like should be included, and clearly the property of existing at a world where something is red and the like should be excluded. What is not clear is how to formulate a general characterization of the dividing line in quasi-logical terms. One difficulty is that this characterization must guarantee that the intrinsic properties are all included, for intuitively they do seem to be mutually

⁶This suggestion comes from Langton and Lewis (1997).

⁷This is guaranteed by our definition of 'individual' (see n. 1).

independent. But it cannot do so by *saying* they are to be included; that would be circular. How then?

At this point one may suspect that the quasi-logical path is a dead end. And most recent attempts to analyse the distinction do in fact invoke non-quasi-logical primitives, for example, naturalness (Lewis 1983), duplication (Vallentyne 1997), non-disjunctiveness (Langton and Lewis 1998). It seems to me, however, that there is a way forward for the quasi-logical approach, even retaining the emphasis on independence. But two changes are required: we must disentangle an ‘external’ notion of independence from our current ‘internal’ notion, and we must adopt a holistic approach to analysing the distinction. I propose to analyse the distinction between intrinsic and extrinsic properties as a mere reflection of the pattern of internal and external independence among properties generally.

I will proceed as follows. In section 2, I generalize our current notion of independence. In section 3, I explain internal and external independence in terms of this generalized notion. In section 4, I describe the pattern of internal and external relations among properties generally. In section 5, I convert this description into an explicit analysis of the intrinsic–extrinsic distinction. In section 6, I exploit the holistic nature of the proposed analysis to argue that it probably succeeds in pinning down the distinction uniquely.

2. Full independence

Intuitively, one property should qualify as fully independent of another iff any pattern of instantiation of the one is compatible with any pattern of instantiation of the other. Notice, however, that our current notion of independence fails to capture this idea. It entails, for instance, that the property of being accompanied by red things is independent of redness (because all four cases are possible), even though the pattern of instantiation of being accompanied by red things clearly constrains the pattern of instantiation of redness. Three refinements to our current notion are needed if it is to capture this intuitive notion of full independence.

First, its notion of ‘instantiation’ should be generalized. Usually—perhaps because we tend to focus on intrinsic properties—we think of an individual as instantiating a property *simpliciter*. But if the property is extrinsic, then whether an individual instantiates it depends on facts about *other* individuals.⁸ And when considering properties generally it

⁸ Perhaps haecceitistic properties, such as being identical to Socrates, are extrinsic properties that don’t depend on facts about anything else. But recall that haecceitistic properties fall outside the scope of our discussion.

helps to make this relativity explicit. The most flexible approach is to think of an individual as instantiating a property ‘under an accessibility relation’, a relation which associates with each individual the set of individuals relevant to which extrinsic properties it instantiates. Our primitive (non-modal) locution then will not be the binary ‘ x instantiates F ’, but the ternary ‘ x instantiates F under R ’.⁹ So instead of saying that an individual instantiates bigness iff it is larger than most individuals, or that it instantiates loneliness iff there are no other individuals, we’ll say that it instantiates bigness under R iff it is larger than most of the individuals to which it bears R , that it instantiates loneliness under R' iff there are no other individuals to which it bears R' , and so on. Note two points about this ternary locution. First, it has just as strong a claim to being pre-theoretically grasped and quasi-logical as the more usual binary locution, which can anyway be recovered as a special case: x instantiates F *simpliciter* iff x instantiates F under every accessibility relation (or perhaps: iff x instantiates F under some default accessibility relation, for example, one that picks out all and only an individual’s world-mates). Second, to choose a ternary primitive locution is not to say that instantiation is *ontologically* ternary; it is merely to eschew further analysis. Our project is conceptual analysis; ontology is a matter for another day.¹⁰

The second way we need to refine our current notion of independence is to generalize its notion of the ‘instantiators’. We should focus not on individual instances and non-instances of a property—‘all four cases’—but on its ‘distribution’ among any number of individuals. The notion of a distribution can be captured set-theoretically: a distribution =_{df} a triple $\langle U, U^*, R^V \rangle$, where U , U^* and V are sets of individuals, U^* is a subset of U , and R^V is a relation from U to V . The idea is that U consists of the individuals over which the property is distributed, U^* consists of the individuals in U that instantiate the property (so $U - U^*$ consists of the individuals in U that do not instantiate it), and R^V determines which individuals in V are accessible to which individuals in U (colloquially: it determines which individuals in U can ‘see’ which individuals in V).¹¹ Let us say then that for any property F , world w , and dis-

⁹ In modal contexts, (see below) we will add a relativization to worlds. Our primitive locution will be: x instantiates F under R at w . I have suppressed the world-variable here for clarity of discussion (and nothing relevant turns on it; after all, everyone needs a way to interpret what is the case at various worlds).

¹⁰ Similarly, one can take the ternary ‘ x instantiates F at time t ’ or ‘ x instantiates F at possible world w ’ as a primitive locution in certain contexts even if one follows the four-dimensionalist in denying that instantiation is at bottom a relation to times or the possibilist in denying that it is at bottom a relation to worlds.

¹¹ V may be identical to U or disjoint from U or a sub- or superset of it.

tribution $\langle U, U^*, R^V \rangle$, $\langle U, U^*, R^V \rangle$ is the distribution of F at w iff the members of U all exist at w , and U^* contains all and only those individuals in U that instantiate F under R^V at w .¹² And let us say that $\langle U, U^*, R^V \rangle$ is a possible distribution of F iff there is some world w such that $\langle U, U^*, R^V \rangle$ is the distribution of F at w .¹³

Third, its notion of ‘compatibility’ must be reformulated in terms of entire patterns of instantiation of properties—distributions—rather than individual instances and non-instances of a property. The idea is simple: distributions of properties are compatible when they are compossible. Formally: a possible distribution of F , $\langle U_1, U_1^*, R_1^{v_1} \rangle$, is compatible with a possible distribution of G , $\langle U_2, U_2^*, R_2^{v_2} \rangle$, iff there is a single world w such that $\langle U_1, U_1^*, R_1^{v_1} \rangle$ is the distribution of F at w and $\langle U_2, U_2^*, R_2^{v_2} \rangle$ is the distribution of G at w .¹⁴

Finally, with these three refinements in place, we can formulate a full-strength notion of independence: F is fully independent of G iff every possible distribution of F is compatible with every possible distribution of G . This notion of independence is intended to be sensitive to every way in which the distribution of F might constrain the distribution of G .

3. Internal and external independence

However, this notion of full independence is not itself directly involved in analysing the distinction between intrinsic and extrinsic properties. The point of discussing it is to see how to generate the two more restricted kinds of independence that are involved: ‘internal’ and ‘external’ independence.

Internal independence results from restricting its quantifiers to ‘internal’ distributions, distributions over individuals that are accessible only to themselves (if anything). Formally: F is internally independent of G iff every possible internal distribution of F is compatible with every possible internal distribution of G , where a distribution $\langle U, U^*, R^V \rangle$ is internal iff for every u in U , and v in V , $uR^V v$ only if $u = v$. This restriction renders internal independence ‘externally insensitive’, insen-

¹² As I mentioned above (n. 9), to cover modal contexts, I adopt primitive locutions of the form, ‘ x instantiates F under R^V at w ’.

¹³ And clearly some *are* impossible: $\langle U, U^*, R^V \rangle$ is not a possible distribution of loneliness if $U = V$, R is universal on $V (= U)$, and U^* contains multiple individuals, for instance.

¹⁴ Here I ignore any complications having to do with the transworld identity of individuals. I assume that if some set of individuals U exists at one world and another set U^* exists at another world, then there is a world at which all the individuals in U and U^* coexist, that is, at which the union of U and U^* exists.

sitive to whether an individual's being *F* constrains whether any *distinct* individuals are *G*. And this means that *F* can fail to be internally independent of *G* only if its pattern of instantiation among some individuals constrains the pattern of instantiation of *G* among those very same individuals. Notice that since the individuals in an internal distribution are blind to one another, it makes no difference how many there are; the same properties turn out to be internally independent of each other regardless.¹⁵ In particular, there may as well be just one. So internal independence reduces to our earlier notion of independence: *F* is internally independent of *G* iff the four cases are possible: an individual instantiating both *F* and *G*, one instantiating just *F*, etc.

External independence is the result of restricting the quantifiers in full independence to distributions of *F* and *G* such that the former 'spy' on the latter; that is, all the former's individuals see all the latter's, but none of the latter's see any of the former's. Formally: *F* is externally independent of *G* iff every possible distribution of *F* is compatible with every possible distribution of *G* on which it 'spies', where one distribution $\langle U, U^*, R^V \rangle$ spies on another $\langle U', U^{*'}, R^{V'} \rangle$ iff every member of *U* sees every member of *U'* but no member of *U'* sees any member of *U*. The spying restriction has two important consequences. First, if $\langle U, U^*, R^V \rangle$ spies on $\langle U', U^{*'}, R^{V'} \rangle$, then *U* and *U'* must be disjoint (because any common member would have to both see and not see itself), and this renders external independence 'internally insensitive', insensitive to whether an individual's being *F* constrains whether *it itself* is *G*. And this means that *F* can fail to be externally independent of *G* only if its pattern of instantiation among some individuals constrains the pattern of instantiation of *G* among *distinct* individuals. Second, since the spying requirement is asymmetric, it guarantees that failures of external independence are due to *F* constraining *G* rather than *G* constraining *F*. Thus external independence (unlike internal independence) is non-symmetric. Redness qualifies as externally independent of the property of being accompanied by red things, for instance, but not vice versa.

In short, *F* is internally independent of *G* iff the distribution of *F* among certain individuals does not affect the distribution of *G* among those *same* individuals, and *F* is externally independent of *G* iff the distribution of *F* does not affect the distribution of *G* among *other* individuals. Notice finally that if *F* is fully independent of *G* iff it is both internally and externally independent of *G* and vice versa.

¹⁵ Where for any distribution $\langle U, U^*, R^V \rangle$ and individual *u*, *u* is in $\langle U, U^*, R^V \rangle =_{df}$ *u* is a member of *U*.

4. The pattern of internal and external independence among properties generally

Roughly, external insensitivity is the hallmark of an intrinsic property, and internal insensitivity the hallmark of an extrinsic property. This is revealed in a pattern in their internal and external independence relations, though the pattern is complicated by certain mixed cases, properties that are partly intrinsic and partly extrinsic in character. In this section I describe this pattern.

Consider first the intrinsic properties. Intuitively, intrinsic properties are all mutually externally independent; it is just unintelligible that the intrinsic natures of distinct individuals should constrain one another. How could whether an individual is or isn't red, or positively charged, or 3kg, for instance, affect which intrinsic properties are instantiated by other wholly distinct individuals (or even whether there are any)? Indeed, it is unintelligible how an intrinsic property could constrain even the extrinsic properties of distinct individuals; intrinsic properties just do not 'reach out' beyond their instances or non-instances at all. (Of course, if an individual is red, its worldmates cannot fail to have the property of being accompanied by something red. But, intuitively, it is the property of being accompanied by something red rather than redness itself that does the 'reaching out' here. And the definition of 'external independence' is designed to accommodate such asymmetries; that's why spying is asymmetric. Recall, in particular, that redness qualifies as externally independent of the property of being accompanied by something red, but not vice versa.) In short, intrinsic properties seem to be externally independent of all properties, including themselves.

On the other hand, no intrinsic property seems to be internally independent of every other intrinsic property.¹⁶ For whether an individual instantiates an intrinsic property has to make a difference to its nature, that is, to which other intrinsic properties it has.¹⁷ Moreover, if a property is intrinsic, so are its negation and its contraries; redness, for instance, is intrinsic, and so are non-redness, blueness, greenness, etc. But no property can be internally independent of its negation or its contraries.

¹⁶ '... every *other* intrinsic property', not simply '... every intrinsic property' because no property of any kind is internally independent of itself.

¹⁷ Perhaps certain necessary properties, for example, being determinate, are intrinsic properties whose instantiation does not make a difference to a thing's nature because there is no alternative to having them—it is impossible that anything fail to be determinate. But recall that necessary properties fall outside the scope of our discussion.

Finally, any conjunction of intrinsic properties seems to be intrinsic itself.¹⁸ In particular, it seems to stand in the above independence relations. Clearly, the property of being *F* and *G* will fail to be internally independent of any properties that either *F* or *G* failed to be internally independent of. And it is hard to see how conjoining intrinsic properties, each of which is externally independent of all properties, could result in a property that fails to be externally independent of some properties. Where would the external constraint come from?

Consider next the extrinsic properties. Often, they seem to be internally but not externally independent of all intrinsic properties. Whether or not something is lonely, or three feet from the wall, or accompanied by something red does not affect its intrinsic nature—whether it is also red itself, or 3kg, or positively-charged; but it does affect the intrinsic nature of the rest of the world—whether it contains red things, or walls, or things at all. Let us call such extrinsic properties ‘pure’. There are also two types of ‘impure’ or ‘mixed’ extrinsic property: (a) those that are neither internally nor externally independent of all intrinsic properties, for example, being the only red thing; (b) those that are both internally and externally independent of all intrinsic properties, for example, being red iff lonely. Now, intuitively, impure extrinsic properties combine internal and external constraints.¹⁹ This is clear in the case of the (a)-type properties, but in the case of the (b)-type properties, these constraints are implicit.²⁰ However, they can be smoked out by conjoining certain intrinsic or pure extrinsic properties, resulting in an (a)-type property. To be more precise, for every (b)-type property *F*, there is some intrinsic property *G* and some pure extrinsic property *G** such that the property of being both *F* and *G* and the property of being both *F* and *G** are (a)-type properties. Example one: the property of being red or lonely is a (b)-type property, but the property of being both blue and red or lonely, and the property of being both

¹⁸ At least as long as the conjunction is not an impossible property—one that no possible individual instantiates—such as being both red and not red. But recall again that impossible properties fall outside the scope of our discussion.

¹⁹ These extrinsic properties are mixed in the sense specified, which has to do with their independence relations, not in the ontological sense that they are ‘composed’ somehow of intrinsic properties and pure extrinsic properties. The latter sort of mixing is not sufficient for the former. Being accompanied by something red, for example, is ontologically mixed, but it is not mixed in our sense; it is a pure extrinsic property.

²⁰ Roughly, this is because (b)-type impure extrinsic properties are implicitly disjunctive and manage to avoid constraining either the nature of their instances or the nature of the world beyond their instances by ‘switching back and forth’ between their disjuncts. The property of being lonely iff red, for instance, is equivalent to the disjunctive property: being either lonely and red or not lonely and not red.

accompanied and red or lonely are (a)-type properties. Example two: the property of being red iff lonely is a (b)-type property, but the property of being both red and red iff lonely, and the property of being both lonely and red iff lonely are both (a)-type properties.

5. A quasi-logical analysis of the distinction

It seems to me that collectively the observations of section 4 exhaust the essence of our distinction; in effect, they implicitly define it. So our analytic task reduces merely to converting this implicit definition into an explicit analysis. Here is one way to do so.²¹

First, say that a triple of classes of properties $\langle I, P, M \rangle$ is eligible iff it realizes the observed pattern of independence relations, that is, iff:

- (I1) Every member of I fails to be internally independent of some other member of I.
- (I2) Every member of I is externally independent of every property.
- (I3) Any conjunction of two members of I is itself a member of I.²²
- (P1) Every member of P is internally independent of every member of I.
- (P2) Every member of P fails to be externally independent of some member of I.
- (M1) Every member of M either: (a) fails to be internally independent of some member of I and fails to be externally independent of some member of I; or (b) is both internally and externally independent of every member of I.
- (M2) For every (b)-type member of M, there is some member of I, G, and some member of P, G^* , such that: the property of being both F and G and the property of being both F and G^* are (a)-type members of M.

Next, say that a triple of classes of properties $\langle I, P, M \rangle$ is maximal iff every property is in I, P or M. Finally, the analysis: a property is intrinsic if it is in the first member of a maximal eligible triple, pure extrinsic

²¹ For a discussion of this way of converting implicit into explicit definitions see Lewis (1970).

²² Ignoring impossible conjunctive properties.

if it is in the second member, and mixed extrinsic if it is in the third (and extrinsic *simpliciter* if it is either pure extrinsic or mixed extrinsic).

Notice that this analysis allows the classification of one property to depend on that of a second even though the classification of the second itself depends on that of the first; that is, it makes the classifications of properties mutually dependent. This means that, unlike the previous suggestions, it treats the distinction as *holistic* and does not yield an account of any one class, for example, the intrinsic properties, independently of the others; it provides an account only of all three classes together as a complete package.

6. Uniqueness and equilibrium

An adequate analysis of our distinction must pin it down uniquely. So there had better be only one maximal eligible triple, only one way to sort properties into three groups while still respecting constraints (I), (P) and (M). I don't know how to prove this. However, the holistic approach means that we can talk meaningfully about 'equilibria': for any natural number n , say that a maximal eligible triple is in n -equilibrium iff its classification of any n properties is uniquely determined given its classification of the rest. And this provides a way to gain indirect evidence of uniqueness. For, as I argue in the Appendix, maximal eligible triples are in 1-equilibrium. This does not show that there could not be two or more of them, but it does show that there could not be two of them differing only in how they classify a single property. I also argue in the Appendix that they are in 2-equilibrium, which shows that there could not be two of them differing only in how they classify two properties. Although far from conclusive, this constitutes some reason to think that there is only one maximal, eligible triple, that is, that the analysis does indeed pin down the distinction uniquely. At least it remains to be shown otherwise. (Of course, it would be better to establish that maximal eligible triples are in n -equilibrium for all n , as this would show that the only maximal eligible triples that there could be other than the distinction itself would have to be very different from it indeed—'infinitely different'. And this makes it very unlikely that there are other maximal eligible triples. But I don't know how to show this either.)

7. Summary and conclusions

According to this analysis, the distinction between intrinsic and extrinsic properties is simply a reflection of a pattern of independence relations among properties, nothing more. These relations in turn concern the compatibility of various patterns of instantiation of properties. So the distinction is modal in nature: to classify a property according to it is to say something about how that property could be distributed *vis à vis* other properties. And since this analysis is quasi-logical, there can be no question that the distinction is a precise and contentful one, fit for serious philosophical work, for example, in analysing change (though not, on pain of circularity, in analysing modal recombination).

This analysis also suggests a diagnosis of the failure of the previous suggestions. One problem was that they recognized only a single independence relation, roughly internal independence. This analysis, however, reveals that external independence is also required; without it, the intrinsic properties cannot be distinguished from the mixed extrinsic properties. (And notice that it was the formulation of external independence that required the generalization of the notions of instantiation and what does the instantiating.) Another problem was that each attempted a 'direct' analysis of the distinction: each attempted to find necessary and sufficient conditions for falling on one side of the intrinsic–extrinsic dividing-line. This analysis reveals, however, that the distinction is holistic, that its property classifications are mutually dependent. And no holistic distinction can be analysed directly (at least if it is irreducibly holistic). For if a distinction is holistic, it can be characterized only by referring to the interrelations among its categories, and no direct analysis can do that without circularity. In short, the previous suggestions were doomed both by their inadequate conceptual resources and by their adoption of a direct approach.

Finally, this analysis provides a model for other analyses. Say that an analysis is functional if it first isolates certain specified features of its target distinction, and then identifies the distinction with whatever division of the relevant entities has those features. Even a holistic distinction may be analysed functionally, for there is no reason some of the specified features should not be 'inner' features concerning the interrelations among its categories. In fact, our analysis was functional. Now, a drawback of functional analyses is that they presuppose that there is exactly one division having these features—exactly one maximal eligible triple, for instance—and this can be difficult to justify. However, we saw that a division of the relevant entities may have to be

in equilibrium to have the specified features if some of them are inner features. And this cuts down on the eligible candidates, perhaps sometimes even narrowing them down to just one. Thus, our analysis suggests that to analyse recalcitrant distinctions generally, one might try treating them as holistic and analysing them functionally, while making sure to include enough inner features to guarantee an equilibrium. This avoids the circularity that often threatens direct analyses, while ameliorating the uniqueness problem inherent in functional analyses.²³

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Appendix

In this Appendix, I show that any maximal eligible triple is in both 1-equilibrium and 2-equilibrium.

Any Maximal Eligible Triple is in 1-Equilibrium

Let $\langle I, P, M \rangle$ be a maximal eligible triple, and let F be any property. Ask: Which independence relations does F bear to the properties already in I ?²⁴ There are four possibilities. (1) F is both internally and externally independent of every property already in I . Then it is in M . It cannot be in I on pain of violating (I1), and it cannot be in P on pain of violating (P2). (2) F is internally but not externally independent of every property already in I . Then it is in P . As before, it cannot be in I on pain of violating (I1). And it cannot be in M on pain of violating (M1): since it is independent in one sense but not the other, it qualifies neither as an (a)- nor as a (b)-type member of M . (3) F is externally but not internally independent of every property already in I . Then it is in I . It cannot be in P on pain of violating both (P1) and (P2). And, as before, because it is independent in one sense but not the other, it cannot be in M on pain of violating (M1). (4) F is neither internally nor

²³ I would like to thank the anonymous referees for this journal for several helpful suggestions.

²⁴ By 'the properties already in X ', I mean 'every property in X except possibly the property or properties whose classification is under consideration'.

externally independent of every property already in I. Then it is in M. It cannot be in I on pain of violating (I₂) and it cannot be in P on pain of violating (P₁).

Thus, whatever *F*'s independence relations to the other properties, its classification is determined uniquely. So $\langle I, P, M \rangle$ is in 1-equilibrium.²⁵

Any Maximal Eligible Triple is in 2-Equilibrium

To show that $\langle I, P, M \rangle$ is in 2-equilibrium, we must show that its classification of any two properties *F* and *G* is uniquely determined by their independence relations to other properties and possibly to each other.

Let us start by asking whether *F* and *G* are internally independent of the properties already in I. There are three possibilities: both are; one is and the other isn't; neither is. Let us consider them separately.

Possibility 1:

Both *F* and *G* are internally independent of all the properties already in I.

Then, on pain of violating (I₁), neither *F* nor *G* can be in I, unless they are both in I (and they fail to be internally independent of each other).

Next, ask: are *F* and *G* externally independent of all the properties already in I?

If neither is, then they are both in P. Neither can be in I on pain of violating (I₂), and that guarantees that neither can be in M either on pain of violating (M₁).

Suppose that one, say *F*, is externally independent of all the properties already in I but the other, *G*, isn't. Then *G* cannot be in I on pain of violating (I₂). So *F* is not in I either because we have already established that neither can be in I unless the other is. The fact that neither is in I, guarantees that *F* cannot be in P (on pain of violating (P₂)) and that *G* cannot be in M (on pain of violating (M₁)). So *F* must be in M and *G* must be in P.

Suppose that both are externally independent of all the properties already in I. Then probably both are (b)-type members of M, though it could be that both are in I. For we already know that it cannot be that just one is in I, and that guarantees that if either is in P, it is in violation of (P₂) (since the other is not in I). (I₃) and (M₂) provide a way to distinguish these two possibilities. Ask: is there any property already in I, *I*^{*}, such that the property of being both *F* and *I*^{*} fails to be externally independent of some property already in I? If the answer is yes, then *F*

²⁵ (I₃) and (M₂) are not needed here; they are required only in the proofs of *n*-equilibrium for *n* > 1.

cannot be in I on pain of violating (I₃). So both are in M. If the answer is no, then both are in I; they cannot be in M on pain of violating (M₂).

In sum, the classification of any two properties that are internally independent of all the properties already in I is uniquely determined by their relations to the properties already classified.

Possibility 2:

One property, say *F*, is internally independent of all the properties already in I, and the other, *G*, is not.

Then, on pain of violating (I₁), *F* cannot be in I, unless *G* is also in I (and *F* is not internally independent of *G*). And *G* cannot be in P on pain of violating (P₁).

Next, ask: are *F* and *G* externally independent of all the properties already in I?

Suppose neither is. Then neither can be in I on pain of violating (I₂), and this guarantees that *F* cannot be in M on pain of violating (M₁). So *F* is in P and *G* is in M.

Suppose *F* is not externally independent of all properties already in I, but *G* is. Then *F* cannot be in I on pain of violating (I₂). And this guarantees that *G* cannot be in M without violating (M₁). So, since we already know it is not in P, *G* is in I. The classification of *F* depends on whether it is internally independent of all the members of I. We already know that it is internally independent of all properties already in I; it remains only to determine whether it is internally independent of *G*. If it is, then it cannot be in M on pain of violating (M₁); it must be in P. If it is not, it cannot be in P on pain of violating (P₁); it must be in M.

Suppose *F* is externally independent of all properties already in I, but *G* isn't. Then *G* cannot be in I on pain of violating (I₂). So, since we already know that *G* is not in P, it must be in M. And then *F* must be in M too: it cannot be in I because, as we already know, it is only in I if *G* is too, and it cannot be in P on pain of violating (P₂).

Suppose both *F* and *G* are externally independent of all properties already in I. Now, *G* cannot be in M. For if it were, *F* couldn't be in I (recall that *F* cannot be in I unless *G* is too). But then *G* would be guaranteed to violate (M₁). So *G* must be in I (we already know it is not in P). That just leaves the classification of *F*. This depends on its relations to the members of I. We already know that it is internally and externally independent of the properties already in I; it remains only to determine its relations to *G*. If *F* is both internally and externally independent of *G*, it is in M; it cannot be in I on pain of violating (I₁) and it cannot be in P on pain of violating (P₂). If it is internally but not externally inde-

pendent of G , then it is in P ; it cannot be in I on pain of violating (I_1) (and (I_2)) and it cannot be in M on pain of violating (M_1). And if it is externally but not internally independent of G , then it is in I ; it cannot be in P on pain of violating (P_1) and it cannot be in M on pain of violating (M_1). If it is neither internally nor externally independent of G , then it is in M ; it cannot be in I on pain of violating (I_2) and it cannot be in P on pain of violating (P_1).

Thus, the classification of any two properties, one of which is internally independent of all the properties already in I and the other of which isn't, is uniquely determined by their relations to the other properties and each other.

Possibility 3:

Neither F nor G is internally independent of every property already in I .

Then neither can be in P on pain of violating (P_1). Next, ask: are they externally independent of every property already in I ?

Suppose that neither is. Then neither can be in I on pain of violating (I_2). And we already know that neither is in P . So they are both in M .

Suppose that one, say F is, and the other, G , isn't. Then G cannot be in I on pain of violating (I_2). And then F cannot be in M on pain of violating (M_1). So F is in I and G is in M .

Suppose that both F and G are externally independent of every property already in I . Then it cannot be that both are in M on pain of violating (M_1). And we already know that neither is in P . So either they are both in I or one is in M and the other is in I . To decide, we must consider whether F is externally independent of G or vice versa. If either fails to be externally independent of the other, then it cannot be in I on pain of violating (I_2). So it is in M and so the other is in I . If, however, F is externally independent of G and G is also externally independent of F , then neither can be in M on pain of violating (M_1), so both are in I .²⁶

Thus, once again the classification of any two properties, neither of which is internally independent of all the properties already in I , is uniquely determined by their relations to the other properties. This completes the proof that any maximal eligible triple is in 2-equilibrium.

²⁶ But what if each fails to be externally independent of the other? Impossible. For we've already established that one has to be in I and every member of I is externally independent of every property.

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