**Richard Gaskin**

University of Liverpool

**Identity and Reference in a Black Universe**

**1. Black and the identity of indiscernibles**

The principle of the identity of indiscernibles (PII) comes in various guises, stronger or weaker, more or less interesting. In general it states that objects with the same properties are identical. Formally we might represent PII as the statement:

 ∀*x*∀*y* (∀*F* (*Fx* → *Fy*) → *x* = *y*).

(There is no need for a biconditional rather than a one-way implication connecting ‘*Fx*’ and ‘*Fy*’, because the complement of any predicate referring to a universal will itself also refer to a universal.)[[1]](#footnote-1) If we combine this with its uncontroversial converse, Leibniz’s Law (the indiscernibility of identicals), that is

 ∀*x*∀*y* (*x* = *y* → ∀*F* (*Fx* → *Fy*)),

we arrive at a second-order definition of identity which looks like this:

 (Def. =) ∀*x*∀*y* (*x* = *y* ↔ ∀*F* (*Fx* → *Fy*)).

Now if, in these formulations, ‘*F*’, the predicate variable, is allowed to range over all properties without restriction, including properties such as *being identical to a*, then the formalization of PII and (Def. =) will be trivially true.[[2]](#footnote-2) This, one might feel, is undesirable in a definition.[[3]](#footnote-3) The interesting question is surely whether PII remains true when the range of ‘*F*’ is restricted in certain ways. For example: is it true when the relevant properties are allowed to include relations, so long as trivializing properties of the form *being identical to a* or *being distinct from b* are excluded? Is it true when the relevant properties are restricted to genuine universals, that is, to properties of a purely qualitative nature? For Leibniz, there was no ultimate difference between these options, since he contended that polyadic (relational) properties are reducible to monadic (non-relational) ones. Leibniz held PII in its strongest form, according to which individuals are bundles of pure monadic universals, and duplication of bundles is logically impossible.

In a justly famous paper (1952), Max Black imagines a dialogue between two speakers, *A*, who defends the identity of indiscernibles, and *B*, who attacks it. (Black himself, one infers, is on *B*’s side.) *B* describes an alleged counterexample to PII in the form which allows ‘*F*’ to range over relational properties that are allowed to incorporate reference to individuals, properties such as *being married to Caesar* and *being at a distance from London*, but disallows it from ranging over trivializing properties of the form *being identical to a* or *being distinct from b*. He then asks:

Isn’t it logically possible that the universe should have contained nothing but two exactly similar spheres? We might suppose that each was made of chemically pure iron, had a diameter of one mile, that they had the same temperature, colour, and so on, and that nothing else existed. Then every quality and relational characteristic of the one would also be a property of the other. Now if what I am describing is logically possible, it is not impossible for two things to have all their properties in common. This seems to me to *refute* the Principle. (Black 1952: 156)

This passage raises many questions. One that ought to strike us immediately is whether the scenario that Black’s speaker *B* describes is logically possible. You might say: it is all very well to visualize – or suppose that one visualizes – the two spheres in one’s mind’s eye, while intoning the commentary ‘And that’s all there is in the universe’. Going through these motions surely does not suffice to show that the scenario is genuinely conceivable, that is, logically possible. What would show that it was, or alternatively that it wasn’t?

 Another apparent difficulty with Black’s description is this. If we are allowed to help ourselves to properties of the form *being married to Caesar* and *being at a distance from London* then, provided we are able to discriminate referentially between the spheres, it would seem that we can easily find properties satisfied by one sphere but not the other, so that as a counterexample to PII Black’s scenario would fail. For suppose that we are able to distinguish between the spheres referentially – this will in fact turn out to be problematic – and that we call one of them ‘Castor’ and the other ‘Pollux’.[[4]](#footnote-4) And suppose that the spheres are located a mile apart. Then we can say that Castor has the property of being a mile away from Pollux, whereas Pollux does not have this property; and Pollux has the property of being a mile away from Castor, whereas Castor does not have this property.[[5]](#footnote-5) We are here exploiting a distinction between the spheres that Quine terms ‘weak discernibility’: simplifying slightly, two objects are weakly discernible just if they satisfy an irreflexive relation.[[6]](#footnote-6) (The spheres are, according to Quine’s nomenclature, absolutely discernible if there is a predicate with one free variable satisfied by the one and not the other.) But one might feel that this strategy trivialized the issue in much the same way as it does to say that Castor, but not Pollux, has the property of being identical to Castor, and that Pollux, but not Castor, has the property of being identical to Pollux. Is Black’s speaker *B* wrong to allow his opponent to appeal to relational properties that incorporate reference to individuals? For on that basis the purported counterexample to PII seems to collapse. It might then look as though the important question must be whether PII holds when the range of the properties that we are allowed to quantify over is restricted to pure universals.[[7]](#footnote-7)

If the mooted quick way against Black’s purported counterexample to PII fails, as these considerations seem to imply, surely it would be equally mistaken for a defender of the conceivability of the Black scenario to appeal to properties like *being identical to Castor* and *being a mile away from Pollux* in order to justify the assertion that we really do have two distinct spheres in the envisaged world, and not, say, one. Simon Saunders writes of the relation *being one mile away from* that “it is *because* this relationship holds [of, for example, Black’s iron spheres] that we may say that there are two [spheres] – that it is intuitively evident that there are two” (2003: 294). But here it is natural to object that the instantiation of the relation *being one mile away from* must supervene on an already presupposed distinctness of one sphere from another, assuming that there *are* two spheres; the spheres themselves surely cannot *constitute* that distinctness.[[8]](#footnote-8) After all, if what Black’s speaker *B* has managed to describe is in fact a world in which one sphere exists in a very tightly curved space[[9]](#footnote-9) – so that by travelling for a mile in a certain direction away from the sphere you find that you come back to it – then we evidently cannot appeal to properties like *being a mile away from Pollux* in order to establish the correctness of a two-sphere characterization of the scenario. That is because this property is equally instantiated in the one-sphere scenario: the single sphere, Pollux, is a mile away from itself. The sheer application of the relation *being a mile away from* does not require distinct relata. If, on the other hand, we reformulate matters so that the relevant relation *does* require distinct relata to be satisfied – if we talk instead about the relation *being one mile away from and non-identical with* – then while that property is indeed not instantiated in the one-sphere scenario, it would, one might think, be question-begging to assume that it, rather than its simpler congener, is what we find satisfied in the scenario that Black purports to describe. Perhaps he has *tried* to describe a two-sphere scenario, but the only *coherent* situation that can be extracted from his words is the one-sphere scenario. These are some of the thoughts and qualms to which reflection on Black’s scenario gives rise.

**2. Adams’s strategy**

In support of Black’s speaker *B* Robert Adams has advanced what he calls an “argument from the possibility of almost indiscernible twins” (1979: 17–19) that goes like this. First, we are asked to accept that “the possibility of there being two objects in a given spatiotemporal relation to each other is not affected by any slight changes in such features as the colour or chemical composition of one or both objects”. Then:

If we accept that intuition, we can infer the possibility of indiscernible twins from the uncontroversial possibility of *almost* indiscernible twins. No one doubts that there could be a universe like the universe of [Black’s] example in other respects, if one of the two globes had a small chemical impurity that the other lacked. Surely, we may think, the absence of the impurity would not make such a universe impossible. (Adams 1979: 17)[[10]](#footnote-10)

In effect Adams is saying: “Look, here is a world with two spheres that differ very slightly from one another chemically. That makes sense, doesn’t it? OK, now imagine *another* world in which we have two spheres that are just like the former ones, except that now they don’t differ at all. If the first scenario made sense, then so does the second, surely”. But what this argument fails to take into account, I suggest, is that the conceivability of the second scenario may depend more intimately on that of the first scenario than Adams acknowledges. As Adams presents matters, the conceivability of the first scenario is just a heuristic device; it merely helps us pedagogically to grasp the conceivability of the second scenario. But perhaps the connection is of a deeper, ontological nature. That is to say, perhaps we can *only* conceive of the distinct indiscernible spheres in Adams’s second scenario if we take ourselves to be presented with an instantaneous snapshot of a larger temporal picture in which the two spheres differ at other times. So, for example, we might suppose that we start, at an earlier time, with chemically discernible spheres, in the way Adams describes, but that then, as time passes, the chemical impurity in one of the spheres gradually disappears, and the two spheres become indiscernible. Or you could imagine watching a film of the two spheres: they might start off with a visible difference – this would obviously have to be something grosser than a mere chemical dissimilarity – but then gradually lose that difference, so that by the end of the film they are visually qualitatively indistinguishable – and, let us suppose, qualitatively indiscernible *simpliciter*. Well then, one might say against Adams, the spheres of this film are, to be sure, qualitatively indiscernible *at the end of the film*, but they are not indiscernible *tout court*, because when we take their causal histories into account we find that they differ. So the dialectical situation seems to be unfavourable to opponents of PII.

What makes it the case that the Black scenario really is conceivable, that is to say, that we really do have a world with *two* spheres in it (as opposed to, say, one)? Well, the above line of thought gives us a way of securing that: for we can suppose that, though the spheres are qualitatively identical *now*, as Black wants, they differ at another time. But then, plausibly, this latter proves too much, for if the spheres differ in their properties over time, they are no longer fit to provide a counterexample to PII. I have suggested that there will be a causal story to tell concerning how a given sphere moves from having a slight chemical impurity (say) to its having a constitution of chemically pure iron, or vice versa. The change will not come about simply by magic. Assuming, then, that there is such a story to tell, whether or not anyone is in a position to tell it, that story will be grounded in dispositional features of the sphere; normally, of course, it will also be relevant to point to features of the sphere’s environment and the way that this affects the sphere. However this works out in detail, there will be much more to say about the sphere in question than just that at a given instant it has such-and-such instantaneous properties, and so is qualitatively discernible or indiscernible from its duplicate. If one sphere has changed over time, from having a chemical impurity to lacking it, or vice versa, while the other sphere has remained chemically pure throughout, then the former sphere has causal dispositions that the latter sphere lacks, and that, I suggest, gives us the qualitative difference that we need in order to discount the envisaged scenario as a counterexample to PII.

 It seems to me, then, that the Adams strategy fails. Appealing to differences between Black’s spheres at another time sets up a requirement that these differences be grounded, not brute, and they will have to be grounded in different causal dispositions that the spheres actually have. So that it turns out that, at the instant when the spheres are supposedly indiscernible, they can be discerned by taking the wider temporal picture into account. And doing so will produce differences between the spheres *here and now*, and not simply at other times, because those other differences must be causally grounded in the spheres, guaranteeing a difference in their instantaneous properties. So Adams’s strategy fails because it disables Black’s world as a potential counterexample to PII.

Someone might respond to the argument I have given by saying that we can build into the Black scenario the feature that the spheres are qualitatively indiscernible *throughout their entire histories*. That is conceivable, is it not? Perhaps. Even so, the opponent of PII will hardly be able to make a parallel move for modality. That is, it must be the case that the two spheres differ qualitatively across possible worlds; otherwise there will be no reason to accept Black’s description of his scenario as involving *two* spheres.[[11]](#footnote-11) If it is logically impossible for the ‘two’ spheres to differ in their qualitative properties, then they must indeed be one. Now suppose that opponents of PII concede this point, but insist that merely modal differences between the spheres do not amount to qualitative differences between them. “Of course,” they might say, “if we really do have numerically two spheres in the Black scenario then it is logically possible for one of them to have a property that the other lacks. But it suffices to refute PII in any reasonable version of that doctrine to produce a case of two objects that coincide in their qualitative properties throughout their lives, but nevertheless are numerically distinct”. This is in effect *B*’s final argument in Black’s dialogue. *B* concedes that the two spheres can enter into different relations with a third object but affirms that, in the here and now, or even in the here and always, they have all their properties in common.[[12]](#footnote-12) How should we assess this line of thought?

**3. Hoy’s argument**

Ronald Hoy argues that we can differentiate qualitatively between Black’s two spheres – at an instant, indeed, so without considering any other times – by taking their different gravitational properties into account. A test particle introduced asymmetrically into the scenario, so located nearer one of the spheres than the other, would be affected differently by the two spheres, and it in turn would affect the two spheres differently (Hoy 1984: 291). This strategy is considered by Black’s representative *B* in his dialogue (1952: 162). *B* does not see it as a concession to *A*, but *A* does, and *A* is surely right. *B* in effect rejects the modal-difference argument canvassed at the end of the last section. His position is that, so long as the two spheres have the same properties here and now (or even throughout all eternity), PII is false. He concedes that the spheres are differentiated by their different modal properties, but thinks that, while that difference is just enough to ensure that we really do have two spheres, not one, it is not enough to disqualify Black’s scenario from working as a counterexample to PII. But this view can hardly be satisfactory. The modal differences between the spheres to which Hoy is drawing attention would not be brute, but would be grounded in the different causal properties of the two spheres. Plausibly, these differences will not be of a *general* nature, for they are dispositions to affect and be affected by a test particle located in a particular place, reference to which must be incorporated into the specification of the relevant property; but these specifications will not involve reference to individuals of a trivializing sort such as, for example, ensues upon our allowing the second-order quantifier of PII to range over properties that involve reference to the individual spheres themselves.

The illustration is an important one because it follows directly from the fact that the spheres are located in physical space. Once again, the Hoy point can be viewed as showing how a particular argumentative strategy against PII proves too much. In this case, the strategy against PII would involve insisting on the distinct spatial locations of the two spheres, in order to underwrite the coherence of the Black scenario. If the opponent of PII is then challenged to say what guarantees that in the Black scenario we really do have to do with *two* spheres, the reply might be that that is secured by the fact that they are located in different places in space. (This would be compatible with saying, as Black’s *B* wishes to say, that it is the non-identity of the spheres that constitutes the non-identity of the places they occupy. The point is just that, *if* the places are different, then so are the spheres.)[[13]](#footnote-13) But then, if they really are located in different places, they will have different gravitational properties: they will be differently disposed to affect other bodies, such as a test particle, that are introduced asymmetrically into their space. And again, it must be logically possible to introduce such a test particle asymmetrically into the spheres’ space: if it were not, that would just show that we did not have two spatially located spheres in the first place.[[14]](#footnote-14)

 Hoy’s point surely goes through quite irrespective of whether space is absolute or relative. Ian Hacking suggests that if space is absolute, that settles the matter against PII.[[15]](#footnote-15) That is because he thinks that, if space is absolute, then Black’s scenario is shown to be coherent, whereas if space is relative, there is room for a relativist like Leibniz to argue that Black’s description of his scenario is incoherent, and that there really is only one sphere in play. Against this, the defender of PII can say that if space is absolute, Black’s spheres differ absolutely in their spatial locations, so that PII is confirmed. It is only if space is relative that the Black scenario might seem to raise a problem for PII. Here I do not think it is an option simply to appeal, with Hacking, to an alternative description of the Black scenario, one that involves only one sphere located in a very tightly curved Riemannian space. So long as the description of the scenario that presupposes a Euclidean space is *coherent*, we have a counterexample to PII, even if there is an alternative description of what is in some sense the ‘same’ scenario under which PII would be preserved.[[16]](#footnote-16) However, there is no need for supporters of PII to worry about this point, because they can fall back on the Hoy defence. Of course, as I indicated in the last paragraph but one, the version of PII that is vindicated is not the pure form in which its second-order quantifier ranges only over utterly general entities: for the spatial positions that are appealed to will be individuals. That is so regardless whether space is absolute or relative: if space is absolute, the spheres are differentiated by their different absolute positions; if it is relative they are differentiated by their different relations to a test particle introduced asymmetrically into the scenario and located at a particular individual place. Either way, the properties that differentiate the spheres involve reference to individuals. But this restriction on the generality of PII – the fact that we are not defending it in the pure Leibnizian form – does not seem to pose a problem for the friend of PII, because, again, it does not have the trivializing effect that would ensue upon permitting quantification over properties that involve reference to, say, the individual spheres themselves. So while the Hoy strategy does not yield a defence of PII in the very strong form of that doctrine that some, and in particular Leibniz, have sought, it is, or can be made (by suitable restrictions on the range of the second-order quantifier), sufficiently robust to avoid the threat of triviality.

 Steven French contests Hoy’s claim that Black’s spheres, assuming that there really are two of them located in different places, can be distinguished qualitatively in terms of their differential causal dispositions to affect (and be affected by) a hypothetical test particle. He has three grounds. One is that to treat mass dispositionally “is to sail dangerously close to an operationalist position in which a fundamental confusion is made between a property and the means of testing for it” (French 1989: 149). Secondly, the “the introduction of a ‘test particle’ is equivalent to the introduction of an observational element by which the two [spheres] may be distinguished”, but that is illegitimate because (in effect) it makes Berkeley’s old mistake of automatically putting a perceiver into any imagined state of affairs (French 1989: 152). Thirdly,

If one is considering a possible world containing two ball bearings *only* then there is no test particle for them to affect and thus no way of distinguishing them. Dispositions are simply not possessed by objects in the same way that intrinsic properties are said to be since they are merely a form of subjunctive conditional . . ., and are only *realized* when some extraneous factor is introduced. The disposition to affect a test particle is only realized, and the test particle only actually affected, when it is actually introduced into the situation. Thus the ball bearings can only be distinguished when an extra-observational element is included but that is precisely what is ruled out by our initial premise. (French 1989: 152)

But none of these arguments is convincing. The first involves a simple confusion: to treat mass as a dispositional property is, just so far, to say nothing at all about our means of testing it or methods of measuring it. In Lockean terms, one might say that such a move construes mass as a power to affect other bodies (a tertiary quality),[[17]](#footnote-17) and not as a power to affect us perceivers (a secondary quality). A similar point applies to the second argument: there is nothing observational about a test particle, which is not a subject of experience or (as such) a measuring apparatus. The third argument is equally mistaken. French is of course right that dispositions ‘are only *realized* when some extraneous factor is introduced’, but that is irrelevant. Bodies *possess* dispositions in the *absence* of their realization. And whether the possession of a disposition amounts to no more than the truth of a subjunctive conditional is neither here nor there: even if that is all it is, still, if a subjunctive conditional is true of an object then that object has the corresponding property, and that is enough to differentiate it qualitatively from another object that lacks that property and of which the conditional is not true.[[18]](#footnote-18) In Quinean terms, the ball bearings of French’s scenario are absolutely discernible. So it is not correct that, as French says in the last quoted sentence, the ball bearings of his scenario ‘can only be distinguished when an extra-observational element is included’. Since we have mentioned Locke, it is perhaps worth adding that French’s mistake is an old one, going back (at least) to Locke’s discussion of secondary qualities, in which the powers to affect observers in various ways – secondary qualities are officially identified with these powers – and the activation of those powers are consistently confused.

**4. Fiction and discernibility**

It is, I think, instructive at this point to draw an analogy between thought experiments and fiction, and in particular between two ways in which a fictional or thought-experiment object can *have* a property. Drawing on Edward Zalta’s terminology,[[19]](#footnote-19) a fictional object such as Hamlet *encodes* various properties constructed for him by his author, such as being Prince of Denmark, prone to contemplation and delay, cruel to Ophelia, and so on. By contrast, the fictional character, Hamlet, *exemplifies* quite different properties, such as being the most discussed character in drama, well delineated by Shakespeare, and so on. (A similar distinction is made by Peter van Inwagen, 1977: instead of encoding he talks of *ascription*, and instead of exemplification he talks of *predication*.) So we might say, in Zalta’s terminology, that in Black’s scenario the property *being thought of by no one* is encoded in the spheres (in the story no one is there to think of them), while the property *being thought of by us* is exemplified by them (outside the story we think of them). Now Charles Cross argues (1995) that when we make this distinction the discernibility question splits into two questions, with two different answers. In the story, there are two spheres that are discernible by the property *being a mile away from Castor*, which Pollux satisfies but Castor does not. Or, putting it another way, we might say that *in the story* each sphere has a point of view on the other sphere that it does not have on itself: each sphere can, as it were, think “*That* sphere is a mile away from *me*, but I am not a mile away from myself”. We are entitled to use proper names and demonstratives here, and appeal to properties such as *being a mile away from Castor*, or *being a mile away from me*, which in another context might seem question-begging, because in the story it is simply a datum there are two distinct spheres which can be differentially referred to. *Outside the story*, by contrast, Cross argues that the sphere-characters set up by the story are indiscernible. That is because, whereas *in* the story the spheres are concrete objects, *outside* the story the sphere-characters are abstract objects, just like the character of Hamlet, whose encoded properties are just those that the story-teller has authorized, and Black has so told his story that the spheres are indiscernible. The general property *being a mile away from another sphere but not from itself* is true of both spheres, and from outside the thought experiment the use of proper names or demonstrative expressions in order to differentiate the spheres would be illegitimate, for there would be no basis on which to make the requisite distinction between the spheres – no way of tying the reference of such expressions down to determinately one of the spheres as opposed to the other. Hence, Cross argues, from one perspective – from inside the story – the spheres are discernible and so do not constitute a counterexample to PII, whereas from the other perspective – from outside the story – they are indiscernible and so do. It follows that our answer to the question whether Black’s scenario upsets PII must be a complex one.

This argument seems to me suggestive; but I do not think we can quite accept it as it stands. From inside the story the spheres are, according to Cross, weakly discernible, but no more than that. Surely, however, we can go further than Cross allows: inside the story the spheres are absolutely, not merely weakly, discernible *so long as* they are (represented as being) in space, as they indeed are (represented as being), for then they will be distinguished along the lines recommended by Hoy. By contrast, Cross is right about the outside perspective, because Black produces indiscernible characterizations of the spheres. But of course Black means to produce a description of *a real possibility*, not merely a piece of fiction whose truth to nature is neither here nor there. So it is actually the internal perspective that matters to the question of the truth of PII and to the question of the bearing of Black’s scenario on PII, not the external one. The issue is whether, assuming the coherence of the story, the spheres are discernible *inside* it. And the burden of my argument so far has been that, in securing the coherence of the story, you have to locate the spheres in space (in the story), and that that then provides a basis for distinguishing the spheres in qualitative terms – if not in *purely* qualitative terms, at least in terms that do not trivialize PII. Of course you could tell a story which simply presupposed the indiscernibility of two objects, and draw appropriate conclusions from that assumption, within the story. “Once upon a time there was a world in which there were two iron spheres that were completely indiscernible. And so, boys and girls, you see that in this world PII was false”. But that would not get us very far: the most it would yield would be that PII was false *in the story*. But that would not tell us whether PII was false *simpliciter*; the focus would then simply switch to the coherence of the story itself. Black’s thought experiment is meant to do more than merely tell a bed-time story. It is supposed to be a description of a *possible* scenario, and in that scenario the spheres are supposed to be *in space*. And these facts are what open the door to discernibility.

It seems to me, then, that in the face of Black’s supposed two-sphere scenario, defenders of PII are best advised to follow what Katherine Hawley, in a useful taxonomy of strategies, calls “the discerning defence” (2009: 108–111): that is, they should say that the purported two-sphere universe does not present a counterexample to PII because the two spheres are (bound to be) qualitatively as well as numerically discernible. That takes us to a version of PII that, assuming that space is relative, in agreement with Leibniz, treats spatio-temporal properties as reducible to other properties, for example gravitational ones. If space is absolute, Black’s spheres are, as we have said, absolutely distinguished by their distinct positions. This strategy does not require us to agree with Leibniz that relational can be reduced to monadic properties. There is no need to suppose that the gravitational properties which distinguish Black’s spheres are not genuinely relational. So the above is, as I have said, not a defence of PII in the strongest possible form of that doctrine, in which all properties are restricted to monadic ones. But if would be futile, in my view, to try to defend PII in the purely monadic form: most, perhaps all, physical properties are dispositional, dispositions are typically, perhaps always, relational,[[20]](#footnote-20) and these relations essentially involve individuals. I have suggested that, even though reference to individuals is unavoidable in our specification of properties that the second-order quantifier of PII is allowed to range over, it will not follow that PII is trivialized in the way that it would be if we permitted such relational properties as *being identical to Castor* to fall within the range of that quantifier. After all, to pick up on two of Black’s illustrative relational properties, it does not trivialize PII to allow the second-order quantifier to range over such properties as *being married to Caesar* and *being at a distance from London*, so long as we can find a way of admitting such properties while excluding ones along the lines of *being identical with Castor* and – at least where Castor’s identity with Pollux is *sub judice* – *being a mile away from Pollux*.

**5. The duplication argument**

Discussion of the Black scenario in the literature has revealed just how high the price would be if we sought to abandon PII: we would be committed to sanctioning brute, primitive haecceities, that is, radically individual properties (‘thisnesses’) of individuals with no qualitative reduct. On that basis, as Michael Della Rocca has pointed out (2005), we would have no grounds on which to disallow a raft of absurd possibilities: I am sitting, as I think, in front of my computer, but perhaps, it might be suggested, I in fact have before me not one but twenty computers, all indiscernible and occupying the same space and time. The possibility is absurd, but someone who rejects PII in the version I have been defending appears to have no basis on which to brand it as such. Again, perhaps in the place where my computer stands on my desk, there are in reality twenty indiscernible computers, while in the place where my printer stands there is just one printer. What would ground this difference? The haecceitist replies, absurdly, “Nothing”. But that seems a highly uncomfortable position to end up in. We may call this the ‘duplication’ argument. (Actually, it was anticipated by Black’s speaker *A*, and *B* implicitly concedes the point, though without realizing how devastating it is.)[[21]](#footnote-21)

Sidestepping the difficulty raised by the duplication argument, Hawley has offered the following consideration on behalf of the opponent of PII. She suggests that

Where the members of a pair [of indiscernibles] are identical as well as indiscernible, their sum has the same features as each member. Where the members of a pair are indiscernible but not identical, their sum has unmysterious features which are different from those of either member (greater mass, for example), at least where qualitatively significant duplication is concerned. And this amounts to a qualitative difference between the pairs. (Hawley 2009: 116).

But this move strikes me as unsatisfactory for two reasons. First, taking Hawley’s argument on its own terms, one may object that Black’s spheres are only entitled to have twice the mass of a single sphere if they really are – *already*, so to speak – two. The numerical difference must come first. The qualitative difference – a total mass of 2kg, say, as opposed to 1kg – is not doing any grounding work but itself supervenes on more fundamental metaphysical facts. (This resumes and develops a point that was aired in §1.) Hawley considers this objection, and replies that, if it goes through, we must say the same about qualitative differences too – that is, we must say that numerical difference comes first – but that would of course cut off the branch on which the defender of PII is sitting. However, this reply does not seem to me cogent. For the PII-theorist, there are two spheres in the Black universe, if indeed there *are* two spheres, *because* they differ qualitatively (in their gravitational properties, for instance, as we have explored). And obviously if there *are* two spheres, and each has a mass of 1 kg, then the total mass of the set-up will indeed be 2kg. But that does not mean that one can appeal to such facts as *evidence* of the coherence of the Black scenario, that is, to prove that we really do have two spheres, and not one. For just this point – namely whether the total mass of the set-up is 1kg or 2kg – is what is in question when we ponder the coherence of Black’s description, and so it cannot be appealed to as a given. Secondly, and more importantly, Hawley’s argument does not deal with the difficulty that we started with in this section, which was the question how to motivate the exclusion of Della-Rocca-style duplications. There are *no* qualitative differences between a scenario in which one computer sits on my desk and a would-be alternative scenario in which twenty indiscernible computers sit there, occupying exactly the same regions of space and time. Again, there are *no* qualitative differences between Black’s original scenario of two spheres, and a duplicate scenario in which each sphere is co-located with twenty, or twenty billion – or even, and this is now *really* getting ridiculous, a transfinite number – indiscernible spheres. However many indiscernible spheres we pack into the same places (and times) as Black’s two originals – be it two, twenty billion, א0, or more – the total mass of the set-up will still be a dismal and pathetic 2kg. The opponent of PII is still left high and dry in the face of the duplication argument.

**6. Compresence and the bundle theory of substance**

Do these reflections vindicate the bundle theory of substance? That depends on exactly what we take this theory to be. PII, in the version I am defending, states that objects with the same universal properties (relations included) are identical; the universal properties may be allowed to involve reference to individuals, such as points of space, so long as the trivializing kind of reference to individuals is avoided. But to say this much is not *eo ipso* to say that individuals are *no more than* bundles of universals. Everything depends here on what is involved in the idea of a *bundle*: what *is* a bundle? Certainly the bundle theorist should not identify bundles with sheer sets, for sets and individuals differ in crucial respects.[[22]](#footnote-22) Likewise for mereological sums and individuals. What about aggregates? This suggestion is no use to the bundle theorist either: if a bundle is understood to be a mere aggregate, then the bundle theory will be false, for an iron sphere is not simply an aggregate of the universals *made of iron*, *spherical* etc. No matter how complete we make this list of universals, there will always be a gap between the sheer aggregate or collection of those universals and an individuals composed of them. As John Hawthorne and J. A. Cover (1998: 205) note,

The Bundle Theory must of course distinguish between a list and a statement, or – moving now from the formal to the material mode – between the existence of universals *F*, *R*, *G* on the one hand and the state of affairs that is *F*’s being *R* to *G* on the other.[[23]](#footnote-23)

Further, a mere aggregate or set of universals will be, like the separate universals themselves, atemporal and aspatial.[[24]](#footnote-24) To get a spatio-temporal individual we need something more. What we need, in order to connect these universals up in the right way to form an individual that is tied down to spatio-temporal existence, is something like what Russell called a relation of *compresence*.[[25]](#footnote-25) Of course that is just a label for whatever relation or relations perform the task of bundling up some universals into a spatio-temporal individual: it does not take us very far simply to aver that the relevant universals must be *compresent*. What *is* it for a bunch of things to be compresent? A Lockean might reply that the things in the bunch must not only be universals but also inhere in a substratum, but that answer has always been plagued with unclarity, not to say absurdity: the substratum seems to be a thing-in-itself, something I know not what, something that *lacks* a nature of its own, and so is propertyless; and yet at the same time it also *has* the universal properties that inhere in it, and so is propertied after all.[[26]](#footnote-26) It is a coat-peg about which we can strictly say nothing empirical, not even that it is a coat-peg. The advantage of talking instead about compresence is that we are not led down this bemusing garden path.

Perhaps all we can say about the relation of compresence is that it is whatever turns a sheer aggregate of universals into an individual. If that is what the bundling operation is, then to that extent the bundle theory is vindicated. Of course, care will be needed in spelling out the details of the theory, so as to avoid the difficulties that confront the unsuccessful set-theoretic and mereological versions of the theory. For example, we need to avoid a Leibnizian superessentialism which makes all of a thing’s properties essential to it, and so prohibits the possibility of change. So we need to distinguish, within any given bundle, between essential and accidental properties.[[27]](#footnote-27) It will also be necessary to accommodate structural relations among properties that govern which bunches of universals can constitute bundles of compresent properties, and which not. For example, physical theory will not permit just any bunch of universals to be compresent. That is so even if the bunch in question is maximal, that is, even if it contains all universals that it consistently can. Bundles must indeed be complete in that sense; but the point is that physical theory may impose limitations on which complete collections of universals are capable of constituting bundles, and so individuals. But I see no difficulty in principle here for the bundle theory.

A distinction is sometimes made between ‘immanent’ and ‘transcendent’ universals, the former supposedly located in space and time, and the latter located rather in a ‘Platonic heaven’ outside space and time. Of course universals only get to be immanent once they have been bundled up with other universals and so compose an individual that is located in space and time. Prior to that they are transcendent. John Hawthorne has urged that the universals that make up any given bundle must, in advance of performing the bundling operation, be immanent rather than transcendent,[[28]](#footnote-28) but this involves a confusion – the familiar fallacy of composition, in fact. *Once* a bunch of universals has been bundled up to form an individual, that individual’s component universals count as immanent, by dint of the individual’s location in space and time: the universals ride piggy-back, as it were, on the spatio-temporal location of the individual they compose, and so get to count themselves as spatio-temporally located. But it does not follow that, prior to the performance of the bundling operation, they need to be so located. Just as a set, which is not spatio-temporally located, can have spatio-temporally located objects as its members, so, contrariwise, can a spatio-temporally located whole be made up of parts that are *not* spatio-temporally located,[[29]](#footnote-29) and that is what it makes best sense to say of the bundles of universals with which individuals are being identified. The relation of compresence is what that turns a bunch of transcendent universals into an individual; but the universals that make up that individual go on being, taken in themselves, transcendent. The property of immanence, which they also acquire on joining the club, is a function of club membership.

The ineluctable role of compresence means that the ontological ground level is not purely universal in nature, as Hawthorne wants: individuality, in the form of compresence, is there too.[[30]](#footnote-30) But PII in the version I have defended remains unchallenged: two individuals cannot share *all* their universal properties (these possibly including properties that involve reference to individuals so long as that reference is non-trivializing). In a sense you might say that the continuing validity of PII, alongside and notwithstanding the fundamental status of individuality in our metaphysics, is a reflection of the failure of the Lockean attempt to give a substantial account of individuality in the doctrine of substratum. Individuality is utterly thin, we might say: it amounts to no more than whatever it takes to tie down a bunch of universals in a relation of compresence – and there is nothing to say about the relation of compresence except that individuality is what it achieves. Given the thinness of this notion, there is simply not enough there to challenge the status of PII. If individuality were a more substantial notion we might be able to make sense of the possibility that two distinct individuals shared their properties and so topple PII, but because there is almost nothing to say about compresence and individuality, PII stays on its throne. Compresence amounts to just enough to compose individuals, but not enough to challenge PII.

As we have said, compresence cannot work its will on just any bunch of universals: among other things, the bunch has to be *complete*, that is to say, it has to contain all the universals that it consistently can – the addition of any further universal must precipitate inconsistency. Individuals will then be maximal bundles of compresent universals. This analysis obviously does not get rid of individuals, as Hawthorne seems to suggest (O’Leary-Hawthorne 1995), in the first place because if individuals *are* maximal bundles of compresent universals, then that is indeed what they are – we have not *got rid of* individuals but shown what it is for something to *be* an individual[[31]](#footnote-31) – and secondly because, as we have seen, the idea of compresence *is* essentially just the idea of individuality expressed in other terms.[[32]](#footnote-32) So it would again be a fallacy (and again the fallacy of composition) to argue, as Hawthorne does,[[33]](#footnote-33) that because a single universal can be multiply located a bundle of universals can also be multiply located.[[34]](#footnote-34) Of course, a sheer aggregate of universals *can* be multiply located. That is, given universals *F*, *G*, and *H* which can severally be multiply located, it does indeed follow that the *aggregate* of *F*, *G*, and *H* can be multiply located, because there is nothing more to the multiple location of the aggregate than the multiple location of its several components. (We might indeed take this to be definitional of the notion of an aggregate.) But it is a far cry from that to saying that a *maximal bundle of compresent universals* can be multiply located. After all, a maximal bundle of compresent universals is what an individual is; hence if such bundles could be multiply located, so could individuals. But individuals cannot be multiply located.[[35]](#footnote-35) It follows that Black may not be so easily dealt with: we cannot simply say in response to his thought experiment that all it shows is that universals, and bundles of universals, can be multiply located, so that there is no conflict with the bundle theory of substance.[[36]](#footnote-36) Black’s scenario, if it is coherent, *does* threaten the bundle theory, because if an individual is *no more than* a bunch of universals you would not expect it to be possible to have two indiscernible individuals. The solution to the bind, as we have seen, is to insist, on the one hand, that an individual is not just a bunch of universals, but a maximal bundle of compresent universals: compresence secures individuality, but is too insubstantial to challenge PII. Then, on the other hand, Black’s challenge is met by insisting that, if there really are two spheres, there will be some qualitative (at least gravitational) difference between them.

**7. Indiscernibility and reference**

Let us, finally, look at the reference problem which is raised by Black’s thought experiment, and which I have hinted at a couple of times. The spheres, we have said, will bear different relations to a test particle introduced asymmetrically into the scenario, but does that help us refer to determinately one of the spheres as opposed to the other? The particle has been introduced asymmetrically into the scenario, so it is nearer one of the spheres than the other, but *which* one is it nearer? After all, the test particle will only help us refer to determinately one of the spheres – with the aid of the description “the one nearer the test particle”, say – if we know where the test particle is. But do we? Well, the gravitational properties of the particle and the spheres will rule out a large number of possible locations, but unfortunately they will not individuate a unique location. In particular, and assuming for the moment that we can name the spheres, a scenario in which the particle bears a particular relation *R* to Castor and a different relation *S* to Pollux is physically indistinguishable from another scenario in which it bears *R* to Pollux and *S* to Castor. So it seems that the spheres’ different relations to different places are not going to help with the reference problem.[[37]](#footnote-37) The two scenarios that I have described are reflections of one another about an axis of symmetry – what Black calls “a kind of cosmic mirror” (1952: 160) – or radially symmetric about a point. And of course the problem is that we cannot name the spheres – at least not yet.[[38]](#footnote-38) It would appear that the Hoy move secures PII, but does not enable us to solve the reference problem.

Are we obliged to make sense of the cosmic mirror scenario, or is it an absurd duplication along Della Rocca lines? Suppose that it does make sense. Saunders, having noted that in the original Black scenario there is no basis on which one might refer to determinately one of the spheres as opposed to the other (2003: 295), suggests that the reference problem may be solved by the use of indexicals. Well, of course if we are permitted to use indexicals, that will, given further plausible assumptions, solve the reference problem. For indexicals relate their referents to an observer, and provided the observer is asymmetrical, as the human body is, that will break the deadlock. Obviously, if I, a human being, am in the same space as the spheres, I can refer determinately to one of them rather than the other by exploiting some asymmetry in the scenario – and given that my body is asymmetric there is bound to be at least one. But here it will be natural to object that the appeal to indexicality and the presence of an observer amounts to cheating. Are we not falling into the very confusion to which Berkeley so memorably succumbed when Hylas was not permitted to imagine an unperceived tree on the grounds that, in the very act of imagining it, he was perceiving it?[[39]](#footnote-39) I am trying to imagine Black’s scenario, that is to say, a universe containing nothing but two indiscernible iron spheres; I am trying to imagine a world without perceivers or imaginers in it. It can surely be no objection to that procedure that this lifeless world is the object of my lived and live speculations. In the sheer act of imagining Black’s world, I imagine it, but I do not thereby put myself into it. In telling the Black story (to revert to the Cross analogy), I do not thereby make myself an element of the story. Or so one might suppose.

But perhaps matters are not so straightforward. Perhaps, it might be said, the very act of imagining Black’s spheres *depends* on my surreptitiously smuggling myself into the scenario, so that although I *claim* to be imagining a world with nothing in it but the two iron spheres, in point of fact my ability to perform the imaginative feat requires me to locate myself – or some observer, perhaps a godlike being – spatially and temporally with respect to the spheres. After all, speaking for myself, when I think about Black’s scenario, I seem to be looking towards the spheres in my mind’s eye: they are over *there* (here I make a vague hand-waving gesture), and they are also contemporaneous with *me*, a subject existing in time (here I think that it’s a while since I had a cup of coffee, and that I’d quite like one *now*). I form a picture a bit like that of a planetary system, with just two planets in it and otherwise complete darkness, but I myself seem to be in the same space and time as the spheres, enjoying a spatio-temporal vantage point on them. So perhaps anyone’s claim to be imagining nothing more than the spheres, combined as it might be with a rejection of the Berkeley point, should be regarded as disingenuous. However that may be, as far as PII is concerned we may deal with the cosmic-mirror scenario in much the same way as we earlier suggested we might deal with Black’s spheres. Is it logically possible for the two universes to diverge qualitatively?[[40]](#footnote-40) Is it, for example, logically possible to introduce a test particle into one of the universes but not the other? In that case we have a modal difference between the universes grounded in distinct causal dispositions. But if this is not possible – if the universes are *logical* duplicates – then a version of the Della Rocca objection bites, and we are entitled to reject the proffered scenario as absurd: there is just one universe in play. But these moves, while vindicating PII, surely leave the reference problem untouched.

And is this a satisfactory resting place? Can there really *be* two spheres in Black’s world if it is not possible to distinguish them referentially? It might be said here that there is a damaging vagueness in the notion of reference, as I have deployed that notion so far.[[41]](#footnote-41) Should we think of reference in epistemic terms, according to which one refers to an object, using a name, only if one *knows which* object one is referring to?[[42]](#footnote-42) The difficulty with deploying that notion of reference here would be that, if we take referential discriminability to be essential to the coherence of the Black scenario, there is a threat that we will be saddled with much too strong a version of PII, in which the second-order quantifier is taken to range over all *knowable* properties. On the other hand, if one opted for an idealized, and purely semantic, conception of reference, then it might be held that Black’s world presents no difficulty for the thesis that referential discriminability is essential to the coherence of the Black scenario, because we can simply conceive of idealized names that refer differentially and determinately to the two spheres, even though these may (and presumably will) not be names we can ourselves employ, given that we have no way of distinguishing between the spheres.

My response to the issue raised in the last paragraph is that, while I favour the semantic conception of reference, according to which words have reference (so reference is not merely something that we *do* with words),[[43]](#footnote-43) I do not think, convenient though it would be for the position of linguistic idealism that I have elsewhere defended,[[44]](#footnote-44) that we can circumvent the reference problem simply by selecting the second of the above two options. For we cannot have any *a priori* confidence that it makes sense to suppose that the envisaged idealized names actually *succeed* in referring differentially and determinately to the spheres. What would ground or constitute their ability to do so? That is not something for which we can just legislate. It is all very well for me to *say* ‘Although I personally cannot differentiate the spheres and refer determinately to one of them as opposed to the other, I hereby conceive an ideal language in which there are two distinct names that achieve this feat (or that would enable a user of the language to achieve this feat)’. How do I know that these are more than just empty words? Perhaps the spheres simply *cannot* be differentiated referentially, no matter how idealized the language in which the referential task is conceived to be executed. What would make it the case that the two names in our hypothesized ideal language referred to the two spheres in one determinate way rather than the other way around? If it cannot be done, it cannot be done, even by an ideal language. Nor does it seem to me that employing arbitrary names and the method of supervaluation helps with the reference problem, though that is too large an issue for me to broach now.[[45]](#footnote-45) For the moment I must leave this as a problem for the linguistic idealist, and hope to address it on another occasion.[[46]](#footnote-46)

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1. Landini and Foster (1991: 44). [↑](#footnote-ref-1)
2. As was pointed out by Ayer (1969: 29). [↑](#footnote-ref-2)
3. This is contested by Brody (1980: 10–14). There is also the matter of impredicativity, discussed by Landini and Foster (1991: 44); I set that aside here. [↑](#footnote-ref-3)
4. Cf. Black (1952: 158). [↑](#footnote-ref-4)
5. Black’s speaker *A* tries this tactic at (1952: 157); cf. Cross (1995: 357). [↑](#footnote-ref-5)
6. Quine (1981: 129–133). [↑](#footnote-ref-6)
7. This is in effect *B*’s response to *A* at (1952: 157). [↑](#footnote-ref-7)
8. See MacBride (2006: 66); Hawley (2009: 109–110). [↑](#footnote-ref-8)
9. Cf. Hacking (1975). [↑](#footnote-ref-9)
10. Cf. Zimmerman (1997: 308); Rodriguez-Pereyra (2004: 74). [↑](#footnote-ref-10)
11. Cf. Zimmerman (1997: 306). [↑](#footnote-ref-11)
12. Black (1952: 162–163). In Black’s discussion the issue is confused with the quite separate question of the observability of the spheres, which I set aside here but will return to below. [↑](#footnote-ref-12)
13. Black (1952: 158). This is close to Legenhausen’s position, as I read him (1989: 632). But Legenhausen would say that it is the non-identity of the places they occupy that constitutes the non-identity of the spheres, not vice versa (p. 631). [↑](#footnote-ref-13)
14. Hoy’s point can of course also be applied to the two hemispheres of a single sphere, which some have thought present a stronger counterexample to PII than Black’s original two-sphere scenario. See Van Cleve (1985: 105–106, n. 5). [↑](#footnote-ref-14)
15. Hacking (1975: 251, 254–255). [↑](#footnote-ref-15)
16. Cf. Legenhausen (1989: 628–629); Denkel (1991: 214, n. 3); Landini and Foster (1991: 59). [↑](#footnote-ref-16)
17. Locke does not actually use this expression, but it is hovering on the tip of his tongue at *Essay* II, 8, 10 (1975: 135, 21–30) [↑](#footnote-ref-17)
18. Note here that French is surely wrong to suggest that treating mass (say) as a dispositional property is tantamount to reducing it to something else, much as one reduces temperature to mean kinetic energy (French 1989: 150). [↑](#footnote-ref-18)
19. Zalta (1988: 15–37, 105–114, 120–123). [↑](#footnote-ref-19)
20. Cf. Chalmers (2012: 348–349). [↑](#footnote-ref-20)
21. Black (1952: 155–156). Cf. also Legenhausen (1989: 635). [↑](#footnote-ref-21)
22. See Van Cleve (1985: 95–96). [↑](#footnote-ref-22)
23. Oddly, having acknowledged that sheer *aggregates* of universals are distinct from *bundles* of universals – so require something to tie them down if they are to constitute (what we ordinarily call) individuals – O’Leary-Hawthorne and Cover then proceed to ignore the point, arguing that, at the ontological ground level, the world consists *just* of universals, and does not include anything individual or individualizing. That is a mistake, as I shall suggest. Rather than dismissing the point they make in the sentence I quote with an ‘of course’, they should have reflected on its significance. [↑](#footnote-ref-23)
24. Cf. Hughes (1999: 154). [↑](#footnote-ref-24)
25. Russell (1963: 89–101, 110–123; 1992: 310–325); Casullo (1982: 591–594); Van Cleve (1985: 106, n. 7). [↑](#footnote-ref-25)
26. Anscombe (1981: 57); Legenhausen (1989: 633). [↑](#footnote-ref-26)
27. Making this distinction does not force us to say, *pace* Van Cleve (1985: 99–100), that individuals with the same essential properties are identical: they will be distinguished by having different accidental properties. [↑](#footnote-ref-27)
28. O’Leary-Hawthorne (1995: 191–192). [↑](#footnote-ref-28)
29. *Pace* Long (1970: 271–273). [↑](#footnote-ref-29)
30. So, rightly, Vallicella (1997: 93). [↑](#footnote-ref-30)
31. Vallicella (1997: 92–93). [↑](#footnote-ref-31)
32. Cf. Van Cleve (1985: 97). [↑](#footnote-ref-32)
33. O’Leary-Hawthorne (1995: 193); cf. Rodriguez-Pereyra (2004: 73–74). [↑](#footnote-ref-33)
34. See here again Vallicella (1997: 92). [↑](#footnote-ref-34)
35. Cf. Vallicella (1997: 94). For further arguments, see Hughes (1999). [↑](#footnote-ref-35)
36. Cf. also O’Leary-Hawthorne and Cover (1998: 210–212). [↑](#footnote-ref-36)
37. Cf. Zimmerman (1997: 305). [↑](#footnote-ref-37)
38. This is *B*’s objection to *A* at Black (1952: 159). [↑](#footnote-ref-38)
39. *The First Dialogue*, p. 232; *Principles*, §23. Cf. French (1989: 152). [↑](#footnote-ref-39)
40. This question is raised by *A* and *B* in Black’s dialogue (Black 1952: 161–162). [↑](#footnote-ref-40)
41. An objection along these lines was put to me by Manuel García-Carpintero at the conference where an earlier version of this paper was delivered. I hope I have his point right. [↑](#footnote-ref-41)
42. Cf. Evans (1982: 89–92), where he develops and discusses a thought experiment along Black lines. [↑](#footnote-ref-42)
43. See Gaskin (2008, esp. chs. 2 and 3). [↑](#footnote-ref-43)
44. Esp. Gaskin (2008, *passim*). [↑](#footnote-ref-44)
45. Cf. Hawthorne and Manley (2012: 169–171). [↑](#footnote-ref-45)
46. Many thanks to the conference participants, and to Michael Potter, for their comments on an earlier version of this paper. [↑](#footnote-ref-46)