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## An Explanation of Complete Colocation of Indiscernibles

### Abstract

The Principle of the Identity of Indiscernibles (PII) claims that objects that share all of the same properties are the same object. If this claim is denied, then, as is commonly believed, the denier must accept the possibility of objects completely overlapping in space. Michael Della Rocca argues that this possibility is absurd, and therefore PII should be accepted. He claims that the problem with collocated objects lies in the inexplicability of the distinctness of the objects. This inexplicability, he argues, is contrary to the brute fact method of demonstrating the distinctness of objects in counterexamples to PII. Without any other method for demonstrating distinctness of qualitatively indiscernible objects deniers of PII are simply begging the question when they posit the possibility of distinct indiscernibles. I argue in this paper that a clear understanding of the different ways that objects can be collocated removes the counterintuitiveness of collocation, and thereby supports the denial of PII.

# An Explanation of Complete Colocation of Indiscernibles

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## Abstract

The Principle of the Identity of Indiscernibles (PII) claims that objects that share all of the same properties are the same object. If this claim is denied, then, as is commonly believed, the denier must accept the possibility of objects completely overlapping in space. Michael Della Rocca argues that this possibility is absurd, and therefore PII should be accepted. He claims that the problem with collocated objects lies in the inexplicability of the distinctness of the objects. This inexplicability, he argues, is contrary to the brute fact method of demonstrating the distinctness of objects in counterexamples to PII. Without any other method for demonstrating distinctness of qualitatively indiscernible objects deniers of PII are simply begging the question when they posit the possibility of distinct indiscernibles. I argue in this paper that a clear understanding of the different ways that objects can be collocated removes the counterintuitiveness of collocation, and thereby supports the denial of PII.

The Principle of the Identity of Indiscernibles (henceforth PII), first formulated by Wilhelm Leibniz, states that there cannot be a multitude of objects sharing all of the same properties. The denial of PII (henceforth DPII), on the other hand, claims that objects can share all of their properties while still being distinct. Dating back to Immanuel Kant, many philosophers have attempted to produce counterexamples to PII. The most notable of these counterexamples was provided by Max Black in his dialogue “The Identity of Indiscernibles” (Black 1952). Though counterexamples like Black’s have caused a push towards DPII, some philosophers question their validity. By questioning either the indiscernibility or the distinctness of the objects, these philosophers claim that the counterexamples fail to demonstrate the possibility for distinct indiscernible objects. Many of the arguments concerning the indiscernibility of objects in the counterexamples are dealt with by Black. Regarding the distinctness of the objects, some philosophers have claimed that a brute fact can explain distinctness when there are no qualitative differences.

In addition to questioning the validity of counterexamples to PII, some philosophers claim that DPII implies the possibility of collocation. Because of problems associated with collocation, they argue that acceptance of PII is preferable. Michael Della Rocca is one such philosopher. In his essay “Two Spheres, Twenty Spheres” Della Rocca argues

that, in dealing with the problem of collocation, the denier of PII will undermine his own counterexamples. The impossibility of collocation, he argues, leads us to the conclusion that the non-identity, that is, distinctness of objects must have a qualitative explanation. Because, as it is commonly believed, non-qualitative explanations for non-identity are required for counterexamples to PII, therefore the solution to the problem of collocation makes counterexamples to PII untenable. My goal in this paper is twofold. First, I intend to show that we need not always have a qualitative explanation of non-identity, thereby demonstrating how Della Rocca's defense of PII fails. Second, I will provide an explanation for collocation that removes the problematic parts. Toward that end, I distinguish two types of complete collocation: *qualitatively significant collocation*, and *qualitatively insignificant collocation*. I will show that for qualitatively significant collocation non-identity is explicable, and is therefore unproblematic. I will also demonstrate that the only kinds of objects that can be in situations of qualitatively insignificant collocation are not the kinds of objects to which a number can be attributed, and for those kinds of objects collocation is also unproblematic.

PII can be defined in a few different ways, some of which include only intrinsic properties, others of which include both intrinsic and extrinsic properties. PII can also be defined so that it is, if true, necessarily true (true in all possible worlds), or again so that it is, if true, contingently true. I will follow Della Rocca in defining PII as including both intrinsic and extrinsic properties, and as, if true, necessarily true:

(PII): Necessarily, if  $a$  and  $b$  share all the same qualitative properties, then  $a = b$  (Della Rocca 2005).

Note that this definition excludes self-identity, which would make PII trivially true. With the addition of self-identity it would be clear that two objects cannot share all of their properties, since two objects that are identical to the same object are themselves identical. As to necessity, note that without this condition PII becomes a rather less interesting principle. It is easy to imagine worlds for which PII is true; claiming that PII can be true of particular worlds while not being necessarily true borders on triviality.

It is also necessary to define the terms that I will use in reference to collocation. Objects are *completely colocated* when they completely overlap, such that taking any part of one of the objects there will be an indiscernible part from one of the other objects in the same location at the same time. Objects are *partially colocated* when they share some of the same parts, but not all. Complete collocation can itself be divided into two types. Let us say that a case of complete collocation is *qualitatively significant* if there is a qualitative difference between the multitude of indiscernible colocated objects and a single one of those objects, and otherwise that the collocation is *qualitatively insignificant*.

To understand Della Rocca's argument it is important to first see how non-identity is explained in counterexamples to PII that do not contain colocation. In Black's dialogue he presents just such a counterexample. He tells us to consider a world containing only two iron spheres that are positioned two miles apart. The two spheres are alike in all of their intrinsic properties, and although, according to the example, they are located in separate places, their relational properties are the same. If the properties of each sphere were listed out, the two lists would be identical. Although it would seem that Black's two-sphere world disproves PII, many have objected to this kind of counterexample. Some who object attempt to show that the spheres are actually discernible, but, as Black shows in his dialogue, this approach is unlikely to succeed. Others have questioned the distinctness of the spheres rather than their indiscernibility. Among these philosophers are Ian Hacking, Katherine Hawley, and O'Leary Hawthorne. Hacking claims that any space described as containing multiple indiscernibles can also be described as containing a single object (Hacking 1975). Hawley argues that the two spheres can be redescribed as a single object extended through space (Hawley 2009). Finally, O'Leary Hawthorne, as a bundle theorist, argues that because universals can be multiply instantiated and objects are just bundles of universals it is possible that what is believed to be two spheres is actually a single group of universals instantiated in two locations (Hawthorne 1995). A common element in these arguments is the need for an explanation of the distinctness of the spheres, without which the defender of the two-sphere world begs the question when he says that there are two distinct indiscernible spheres. Because the spheres are qualitatively indiscernible the denier of PII must first demonstrate the distinctness of the spheres in some way other than indicating qualitative differences before he can claim that his counterexample is possible. Some deniers of PII attempt to do this by means of a brute fact of primitive individuation. Presented with the two-sphere world the believer in primitive individuation will say that sphere A is not sphere B and sphere B is not sphere A, and that is just the way it is. This is precisely the point at which Della Rocca wants to attack DPII. He argues that this brute fact approach founders on the problem of colocation. Proponents of a brute fact approach, he argues, have no means of avoiding intuitively unacceptable cases of primitive individuation, namely cases of complete colocation.

Black, in his dialogue, provides us with an example of just such an intuitively unacceptable example of colocation. If DPII were true, he notes, it would be impossible to know whether a given hand is, in fact, one hand or any other number of hands. If, by contrast, PII were true, a given hand could not be more than one. As seen above, DPII requires primitive individuation, which in cases of spatially dispersed objects allows for an explanation of distinctness without appealing to qualitative differences. When the objects are spatially dispersed there is at least some means of perceiving distinctness. However, when objects completely overlap, the requirement of primitive individuation also creates the possibility of imperceptibly distinct objects. Della Rocca tells us to consider a sphere on his desk. If DPII were true, then there could be any number of

spheres all colocated where he perceives one. Each of the spheres is distinct because it is primitively individuated. Della Rocca claims that to say that there are twenty spheres on his desk would be absurd. He argues that colocation is problematic because it appears to violate a conceptual truth, and asks the denier of PII how he intends to deal with the problem.

Before providing his own answer to the challenge, Della Rocca first describes three answers that he considers defeatist, in the sense that they, rather than dealing with the challenge, attempt to explain away the problem. The first of these simply claims that the reason dispersed objects are legitimate and colocated objects are not is inexplicable. I completely agree with Della Rocca in considering this answer to be unsatisfactory. The second of the defeatist answers claims that “our practice of individuating objects embodies the view that the former (no colocation) is legitimate and the latter (colocation) is not” (Della Rocca 2005). Della Rocca dislikes this answer on the grounds that it claims our individuating practices are determining the world, when it would be better to say that our individuating practices come from the way the world is. Rather than say that colocation is impossible because of our individuating practices, we should say that we individuate objects the way we do because colocation is impossible. The third answer focuses on the epistemic difference between colocated objects and dispersed objects. It is possible to know that multiple dispersed objects are more than one, but this is not true of colocated objects. This answer to the challenge, then, is that examples containing colocation are illegitimate because it is impossible to know that there are actually more than one object there. Della Rocca claims that this answer suffers from the same problems as the previous one. It would be better to claim that there is an epistemic obstacle because colocation is impossible, rather than the other way around. None of these answers is satisfactory for dealing with the challenge. A good answer is one that explains how colocation is either possible or impossible, rather than relying on assumptions to explain the problem away.

Della Rocca believes that there is a reasonable non-defeatist answer to his challenge. He claims that we need only accept the following conceptual truth in order to escape the problem of colocation:

- (1) There cannot be two or more indiscernible things with all the same parts in precisely the same place at the same time (Della Rocca 2005).

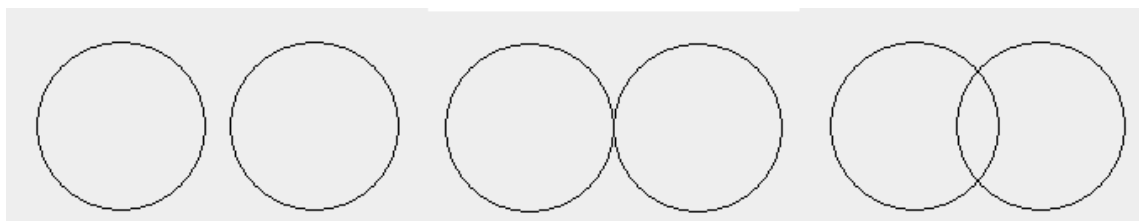
According to Della Rocca, this conceptual truth fixes the problems a denier of PII might have. It can be argued, however, that use of this conceptual truth is no different from some of the defeatist answers. I will deal with this problem after first explaining Della Rocca’s full position. In accepting (1) Della Rocca believes the denier will ultimately have to give up his objection to PII. Acceptance of PII brings forth the question: why is complete colocation unacceptable when partial colocation is fine? To

answer this, Della Rocca tells us to consider an example of partial colocation provided by Judith Thomson (Thomson 1998), wherein a Moscow shopkeeper has created a large statue LENIN out of a bunch of small lenin statues. Each of the lenins is partially collocated with LENIN since they share parts with LENIN. The relation between the statues is partial collocation because, given any lenin, there will be parts of LENIN that are not parts of that particular lenin. Della Rocca argues that the difference between cases of complete colocation and cases of partial colocation is that in the former we are unable to explain the non-identity of the objects, while in the latter we are able to understand the distinctness. Della Rocca believes that this indicates our need for some explanation of non-identity. The explanation, he argues, cannot be a brute fact, because, even when using primitive individuation, the non-identity of collocated objects is impossible to determine. Della Rocca believes that this is a death sentence for objections to PII. As we have seen, objections to PII appear to require a brute fact of non-identity and yet the non-identity of objects must have a qualitative explanation. Therefore, Della Rocca's argument implies that the denier of PII must either accept PII after all or accept the possibility of completely collocated indiscernibles. DP II, then, would not be compatible with acceptance of (1). If we wish to maintain DP II, we must find some way of either showing that Della Rocca's argument has an error or find a way to accept the possibility of collocated indiscernibles.

Contrary to Della Rocca, I will show in the next few paragraphs that (1) is actually compatible with DP II. Although this would seem to be a victory for deniers of PII, it is not clear that accepting (1) is the best way to solve the problem of colocation. Rather, it appears not much different from Della Rocca's defeatist answers. I will devote the remainder of the paper to showing how it is possible to hold both DP II and reject (1), thereby providing a better solution to the problem of colocation.

Della Rocca has made a large assumption in arguing that we always need a qualitative explanation for non-identity. It does not follow from the inexplicability of non-identity in collocated indiscernibles that non-identity must be explained in all situations via qualitative difference. That primitive individuation cannot demonstrate the non-identity of collocated indiscernibles does not imply that it cannot be used in cases involving dispersed objects. Della Rocca's assumption becomes clear when we observe his examples of partial colocation. Each of his examples includes multiple discernible objects. It should be clear that this kind of partial colocation is perfectly fine. After all, each of the objects in his examples is qualitatively different from the other objects. For example, any given lenin is qualitatively different from LENIN and all of the other lenins. What then do we make of situations of partial colocation of indiscernibles? Suppose we have a physical space containing two rings with the same radius, with the same mass, and made of the same kind of material. The two rings move towards each other, but instead of colliding they pass through each other, stopping shortly after they meet. The rings are then passing through each other at two locations along their

circumferences. This example is very similar to Black's two-sphere world, with the exception that the objects are not always completely separated.



Is this example also legitimate? The only thing that is different in this example from Della Rocca's examples is that the objects are indiscernible. A defender of Della Rocca might want to claim that the ring example is illegitimate because the non-identity can only be explained by a brute fact, but this is just to restate the position that indiscernibles can't be distinct. Whether or not a brute fact can actually demonstrate the non-identity of two indiscernibles is another debate. The current question is just whether or not non-identity must have a qualitative explanation.

The ring example shows that partially colocated indiscernibles are not problematic in the same way as completely colocated indiscernibles. This indicates that the inexplicability of non-identity in examples of complete colocation does not imply that the kind of explanation needed for non-identity must involve qualitative difference. In summary, Della Rocca is correct in arguing that there are situations of complete colocation that, if possible, would lead us to the inexplicability of the non-identity of completely colocated objects. Such a situation should be avoided if at all possible. Della Rocca, however, is wrong in assuming that the fact that partial colocation isn't problematic means that we need a qualitative explanation for non-identity.

Though there are problems with Della Rocca's argument, complete colocation is still problematic. Having seen the problem in Della Rocca's argument some might assume that we can just fall back on (1) to deal with colocation. However, as I mentioned above, (1) does not seem much different from Della Rocca's defeatist answers. (1) just denies the possibility of colocated indiscernibles, without providing any good reason to do so. Della Rocca believes that the difference between complete and partial colocation provides evidence for (1), but this does not provide us with particularly solid ground for asserting the truth of (1). Because it is not clear that (1) is true I will now endeavor to further rid DPII of the problems associated with colocation by properly defining the situation.

I gave definitions at the outset for complete and partial colocation as well as qualitatively significant and insignificant colocation. What I want to determine now is how, if possible, colocation could occur. To begin, let us consider qualitatively



significant colocation. Suppose that we have a space containing two completely collocated hydrogen atoms. If the atoms are significantly collocated, then we can expect there to be a total mass double that of a single hydrogen atom. In such a scenario it is possible to explain the non-identity of the atoms, since there is a qualitative difference between the existence of a single hydrogen atom and the existence of many at that location at that time. As for whether or not this type of colocation is physically possible, that is a question for physics to decide.

Qualitatively insignificant colocation, on the other hand, involves a multitude of objects creating a situation that is qualitatively indiscernible from the situation where there is only one object at that location. Considering once more a space containing some number of collocated hydrogen atoms, if the colocation is qualitatively insignificant, regardless of the number of collocated atoms, the mass would be that of a single hydrogen atom. Note that in such a situation it would be impossible to know whether there is a single hydrogen atom, or any other number. The distinction between qualitatively significant and insignificant colocation is an important point of difference that will help those troubled by the problem of colocation.

Note that not all objects can be in situations of qualitatively significant colocation. Considering once more our world containing two hydrogen atoms, because this example assumes physical laws and types of matter similar to our world, it is impossible for two atoms at that location to be in a qualitatively insignificant relation, otherwise they would not be hydrogen atoms. If they were hydrogen atoms, then we would observe either a cumulative mass and/or an interaction between the atoms. Cases of qualitatively significant colocation include any objects that have properties that when multiply instantiated at a location add together. These properties include mass, weight, electric charge, etc. Similar to qualitatively significant colocation not all objects can be in situations of qualitatively insignificant colocation. Objects that lack additive properties are unlike any material objects in our world. The only kinds of objects that can be insignificantly collocated can essentially be boiled down to geometric shapes that extend through space and time, but lack many other properties.

Imagine for a moment a world containing a primary object that is not composed of any smaller objects. This primary object is a cube that, due to the physical laws of that world, has no mass or any other properties that add together. If DPII were true in that world, then there could be qualitatively insignificant colocation. Any number of primary cubes could be collocated without a qualitative difference from a single cube. Similarly, imagine a 2 dimensional mathematical space, which contains a circle with radius 5. In this space, the circle could be in a situation of qualitatively insignificant colocation, since there are no properties belonging to circles that would add together. In addition to objects that lack summing properties there is another type of object that can be in situations of qualitatively insignificant colocation. In the definition of (1) Della

Rocca adds “made of all the same parts,” which introduces another type of object to the mix. We could have an example of qualitatively insignificant collocation with hydrogen atoms, but the objects that are collocated would not be atoms. The only way a space containing a single atom could have collocated objects is for there to be multiple objects all exemplifying the property of being that particular atom. These objects are not identical with the atom they exemplify, but instead are some other kind of object. They could have properties outside of the properties of the atom or they could be bare particulars. When collocated indiscernibles have properties that add together we do not have a problem with the explicability of non-identity. If Della Rocca wants to determine the number of iron spheres collocated on his desk, then he needs only measure the mass and compare his measurement to the mass of a single iron sphere of that size. Now all that is left to explain is how qualitatively insignificant collocation is unproblematic.

Now that we have seen the kinds of objects that can be in situations of qualitatively insignificant collocation, I will show that these objects provide us an answer to the problem of collocation. Suppose a man was attempting to find out how many reds were on his red shirt. How would he go about doing this? He could take sections of the shirt and count them as individual reds or he could consider the entire shirt as one red. None of the ways he can count the reds is more valid than any of the other ways, therefore attempting to determine the number is ultimately pointless. Now consider a circle on a two dimensional plane. Since circles are just the set of all points equidistant from a center point, what would it mean to say that our plane contains five of this particular circle? It would simply mean that there are five sets containing exactly the same items. According to set theory all of the sets are identical, and we are therefore left with a single set, indicating that there is, in fact, only a single circle on the plane. Suppose that, contrary to set theory, we believe that we can have multiple indiscernible sets, after all, this is exactly the point that DPII claims. I argue that this is the same situation as the reds on a shirt. It should be clear that counting the number of indiscernible sets would be absurd, and therefore counting the number of collocated circles would be equally pointless. All objects that can be in situations of qualitatively insignificant collocation are similar to this circle. We are not unaccustomed to things that do not lend themselves to counting. It should therefore not be problematic to include within the list those objects that can be insignificantly collocated. At this point there is nothing left to be metaphysically problematic about collocation. Qualitatively significant collocation allows us a means of explaining the non-identity of the collocated objects, while qualitatively insignificant collocation only occurs with objects that do not lend themselves to counting in the way we normally count physical objects.

Della Rocca makes a large assumption in claiming that distinct objects must always have a qualitative explanation of non-identity. Therefore, it is possible to hold both DPII and (1). However, (1) does not appear much different from Della Rocca’s

defeatist answers, indicating that a better answer should be provided. In the pursuit of a means of denying (1) I clarified the types of colocation and the objects that fall under each type. From the distinction between qualitatively significant and qualitatively insignificant colocation we found that the only kinds of objects that can be in situations of qualitatively insignificant colocation are not the kinds of objects that lend themselves to counting when collocated. If they had additive properties, then they might become countable, but that would make the colocation qualitatively significant. We are accustomed to things for which attributing a number is pointless, so it is not unappealing to add to that list the objects that can be in situations of qualitatively insignificant colocation. Since neither type of complete colocation is problematic, the denier of PII now has an answer to Black's example of the problem of colocation. I know I have only one right hand. If I had a multitude of them, then the mass would be greater than that of a single of my right hands. If, by contrast, I have a multitude of bare particulars all exemplifying the property of being my right hand, then it would be pointless to discuss such a situation as a collocated multitude. With an explanation of colocation in hand DPII no longer comes with the problem of colocation.

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