COINCIDENCE AND MODALITY

Li Kang

A Thesis Submitted for the Degree of MPhil
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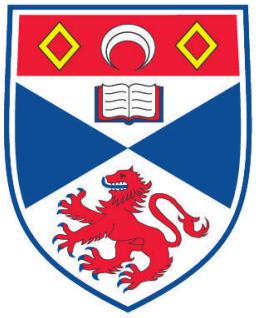

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Master of Philosophy

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Departments of Philosophy
University of St Andrews

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Abstract. How should we understand *de re* modal features of objects, if there are such features? Any answer to the question is connected to how we should think about coincident objects, objects which occupy the same spatio-temporal region and share the same underlying matter. This thesis is mainly about the connections between *de re* modality and coincidence. My interest in the connections is twofold: First, how do theories of *de re* modality interact with theories about coincidence? Details of interactions are discussed from chapter 2 to chapter 5. Second, do the considerations about *de re* modality offer reasons to favour a particular position about coincidence? And how does this answer contribute to current meta-ontological debate? These are raised in chapter 1 and are answered in conclusion.

I, Li Kang, hereby certify that this thesis, which is approximately 30,000 words in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

I was admitted as a research student in June, 2009 and as a candidate for the degree of Master of Philosophy in June, 2009; the higher study for which this is a record was carried out in the University of St Andrews between 2009 and 2011.

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My guess is that supervising someone who only had one year study in analytic philosophy and also happened to be a non-native speaker in English was not an easy task. This is why I am deeply indebted to my research supervisors, Prof. Katherine Hawley and Dr. Sonia Roca-Royes for their guidance, encouragement and patience.

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L. K.

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CHAPTER 1

Introduction

1.1. Modality and Coincidence

One of the main topics of this thesis is *de re* modality. What is *de re* modality? The name "*de re*", which means "of the thing" in Latin, gives some hint. Roughly speaking, *de re* modality concerns modal features of objects. For example, sometimes Socrates is taken to be essentially a human and accidentally a philosopher; if that is indeed the case, then **being essentially a human** and **being accidentally a philosopher** are the modal features of Socrates. Another example is that if the doctrine of necessity of identity is true, then all objects are necessarily self-identical; and **being necessarily self-identical** is a modal feature of all objects.

Standardly, *de re* modality is contrasted with *de dicto* modality, the kind of modality "of the words" (in Latin). The *de re*-*de dicto* distinction in modality[1] is characterized by Graeme Forbes as follows:

> A formula with modal ... operators is *de re* iff it contains a modal ... operator R which has within its scope either (1) an individual constant, or (2) a free variable, or (3) a variable bounded by a quantifier not within R's scope. All other formulae with modal ... operators are *de dicto*.
>
> Hence ... and '$\Box(\forall x)Fx$' are *de dicto*, while by (1), '$\Diamond Fa$', by (2), '$\Box Fx$', and by (3) '$(\forall x)\Box Fx$' and '$\Diamond(\exists x)(Fx\&\Diamond Gx)$', are all *de re*. (1985: 48-9)

[1]The *de re*-*de dicto* distinction is not just about modality. It also applies to, for example, propositional attitudes.

According to Forbes's definition, the *de re-de dicto* distinction is primarily a linguistic one, and the difference between the two is captured by a certain syntactic feature of sentence, that is the scope of a modal operator.

Nevertheless the linguistic distinction has the following metaphysical implication. Since *de re* modality is mainly about objects, the semantic values of *de re* modal sentences are underpinned by the potentialities and essences of objects. This is how the *de re-de dicto* distinction separates the potentialities and essences of objects from other modal facts. And the potentialities and essences of objects are thereby taken to be *de re* modal features of objects.

The thesis is not just about *de re* modality, it also concerns the debate about coincidence, in which the central question is whether distinct objects can occupy the same spatio-temporal region and share the same underlying matter. Let's call object x and object y *coincident objects*, if x and y are distinct, and x and y occupy the same spatio-temporal region and share the same underlying matter. Given this definition of coincident objects, the central question can also be presented as whether there are coincident objects. *Coincidentalists* think that there are, while *anti-coincidentalists* think that there are none.[2]

The classical scenario set for the debate is given by Allan Gibbard (1975), who asks us to consider, for example, a clay statue which is made by putting two small pieces together and is then destroyed by separating the two pieces. We have a statue and a lump of clay: Call the statue and the lump of clay "Goliath" and "Lump1" respectively. Coincidentalists and anti-coincidentalists would disagree about certain identity claims: coincidentalists think that Goliath and Lump1 are examples of coincident objects and thereby are committed to the claim that Goliath and Lump1 are numerically distinct. In contrast, anti-coincidentalists think that no objects occupy the same spatio-temporal region and share the same underlying matter, and since *ex hypothesi* Goliath and Lump1 do occupy the same region and have the same matter, anti-coincidentalists are committed to the claim that Goliath and Lump1 are identical.

[2]I borrow "coincidentalists" and "anti-coincidentalists" from Sider (2008). But the two sides are often labeled differently. For example, Fine (2003) uses "pluralists" and "monists"; and following Yablo, Bennett (2004b) uses "multi-thingers" and "one-thingers".

It is worthy clarifying that although the same question can be reformulated as region-centered, that is whether spatio-temporal regions contain more than one object, (if occupying the same region entails sharing underlying matter,[3]) the main issue here is about metaphysics of material objects rather than metaphysics of space-time.

It is also worthy clarifying my definition of coincidence. Firstly, according to my definition, coincidence is an irreflexive relation. Although some philosophers, e.g. Fine (2003), are more lenient regarding reflexivity, I find it strange to claim that an object coincides with itself. Secondly, often the debate is called "material constitution" rather than "coincidence". Goliath are said to be constituted by Lump1, and the central question is whether constitution relation is identity relation. But as Fine[4] correctly points out, coincidence is a one-to-one relation while constitution is not, thus the debate about coincidence and the debate about constitution, if there is one, cannot be reduced to each other. Moreover, names such as "Goliath", "Lump1" are normally thought as singular terms. Hence coincidence rather than constitution accurately characterizes the classical scenario. Thirdly, often coincidence is defined in terms of composition. For example, according to Sider:

> x and y are coincident iff $x \neq y$ and for some Xs, x and y are each composed of the Xs. (2008: 617, ft.8)

This definition may cause complexity. Fine remarks:

> There is an unfortunate tendency in the literature to define coincidents as things with the same parts. But this makes it too hard for things to coincide. Thus it might be denied that the statue coincides with the clay on the grounds that the statue (or the arm of the statue) is a part of the statue but not a part of the clay. (2003: 198, ft.5)

[3]However Fine thinks occupying the same region and sharing underlying matter can be different. The former is neither sufficient nor necessary for the latter: "Thus a loaf of bread and the bread that compose it are materially yet not spatially coincident ... a water-logged loaf of bread and the loaf of bread that is water-logged are spatially yet not materially coincident." (2003 : 198)

[4]"Although the point is often ignored, it is not a *piece* of alloy but the *alloy* itself that can properly be said to constitute or make up a statue." (Fine 2003: 206)

Thus if there is a debate about whether Goliath and Lump1 are coincident objects, then there is a similar debate about whether Goliath's arm and Lump1's arm-shaped part are coincident objects. This is how disagreement about paradigmatic coincident objects may lead to disagreement about the composition of those objects. Thus using composition does cause some inconvenience for discussing the classical scenario.

Finally, it is worthy mentioning that there are other kinds of coincidence. For material objects, there is a similar debate about temporal coincidence, that is the debate about whether distinct objects occupy the same spatial region and share the same underlying matter at a time. Furthermore, Fine (2003) thinks it also makes sense to ask whether distinct objects occupy the same spatio-temporal region and share the same underlying matter in every world they exist (if they exist in some world and exist in the same worlds). Nevertheless, coincidence is not confined to material objects, and similar problems can be raised for all material beings, e.g. events. Thus, there are also questions like whether distinct events occupy the same spatial-temporal region. In the thesis I will not discuss other kinds of coincidence directly. But since different kinds of coincidence share a similar structure, the discussion below, *mutatis mutandis*, applies to other kinds of coincidence.

De re modality and coincidence are thus the two main topics of the thesis. The reason for putting the two together is that the discussions about *de re* modality and the discussions about coincidence are entangled with each other. Since general *de re* modality subsumes the modal features of coincident objects, any specific view on *de re* modality would have an impact on the modal features of tentative coincident objects. And different accounts of *de re* modality may lead to different accounts about coincidence. Conversely, different views on coincidence may commit us to different views on modal features of tentative coincident objects, which is linked to accounts of general *de re* modality.

The thesis concerns the connections between *de re* modality and coincidence. Connections between the two are not hard to find, because robust modal intuitions about coincident objects are available. For example, in the Goliath and Lump1 case, there are strong intuitions such as "Goliath cannot survive being squashed" and "Lump1 can survive being squashed". Now suppose that the modal predicate "can survive being squashed" denotes the

modal property **being capable of surviving being squashed**, then Goliath and Lump1 have different modal properties: Goliath lacks but Lump1 has the property **being capable of surviving being squashed**. Given Leibniz's Law, that is no object both has and lacks the very same property, Goliath and Lump1 must be counted as distinct objects, and coincidentalism is true.

This is how coincidentalism is connected with a certain understanding of *de re* modality. Besides, coincidentalism is said to have the grounding problem: roughly, since coincident objects differ modally but not nonmodally, the modal features of coincident objects are ungrounded. It therefore seems that coincidentalism is also connected with ungrounded modality.

Furthermore, thinking that the predicate "can survive being squashed" denotes the property **being capable of surviving being squashed** causes trouble for making sense of anti-coincidentalism. As I showed above, this understanding, together with Leibniz's Law, implies that Goliath and Lump1 are distinct, which is incompatible with anti-coincidentalism. Due to the use of Leibniz's Law, the argument is traditionally called "the argument from Leibniz's Law". Hence for anti-coincidentalists who don't want to abandon Leibniz's Law, an alternative account of *de re* modality is needed in order to defend their view about coincidence. This is how anti-coincidentalism is connected with a certain understanding of *de re* modality.

The above connections as well as their further implications are scrutinized in the main body of the thesis. Put it in another way, the thesis concentrates on the details of the connections between modality and coincidence. By concentrating on those connections, I do not pick any particular side about *de re* modality nor about coincidence in the thesis. I believe the debates about both issues, if they can be resolved at all, can only be resolved by evidence. And my ambition in this thesis is just to provide objective evidence for different sides: I am not committed to arguing for any particular theory.

1.2. Meta-Ontology

Recently, the legitimacy of some metaphysical debates[5] is challenged from meta-ontological perspectives. It is argued that those debates should be dismissed due to certain metaphysical, or epistemic, or linguistic considerations. And the debate about coincidence is among them. According to Bennett (2009), there are three ways of trivializing the debate about coincidence. The metaphysical way of trivializing the debate is to argue that there is no matter of fact whether there are coincident objects. The epistemic way of trivializing the debate is to argue that in principle, no evidence can be found to resolve the debate between coincidentalism and anti-coincidentalism. The linguistic way of trivializing the debate is to argue that there is no real dispute between coincidentalists and anti-coincidentalists, rather their dispute is "merely verbal".

As I mentioned earlier, the primary interest of this thesis is the connection between modality and coincidence. This connection may shed some light on certain meta-ontological debates about coincidence.

Meta-ontological anti-realism about coincidence is the view that there is no matter of fact whether there are coincident objects. If meta-ontological anti-realism is true, since there is no corresponding matter of fact, in principle no evidence can be found in favour of coincidentalism or in favour of anti-coincidentalism. By contraposition, one way of arguing against meta-ontological anti-realism it to find such evidence. And the connections between modality and coincidence may be able to offer this kind of evidence. This is how certain connection between coincidence and modality can be used to defeat meta-ontological anti-realism about coincidence.

Meta-ontological skepticism about coincidence is the view that in principle, no evidence can be found in favour of one side over the other. This view is proposed by Bennett:

> There do not appear to be any real grounds for choosing between the competing positions about either composition or constitution. We are not justified in believing either side. These are basically cases of *underdetermination of theory by evidence*. (2009: 71)

[5]The most discussed debates are composition and the ontology of numbers. See Chalmers, Manley, and Wasserman(eds.), 2009.

As Bennett correctly points out, though both meta-ontological skepticism and meta-ontological anti-realism hold that no evidence can settle the debate about coincidence, a meta-ontological skeptic does not need to commit to meta-ontological anti-realism. It is possible that there is a matter of fact as to whether there are coincident objects while the fact is epistemically inaccessible. Nevertheless, the above strategy to defeat meta-ontological anti-realism can also be used to defeat meta-ontological skepticism, for both deny that the debate about coincidence can be resolved by evidence. In other words, if a certain connection between coincidence and modality is able to offer reason to choose coincidentalism over anti-coincidentalism, or *vice versa*; then meta-ontological skepticism about coincidence is false.

Linguistic deflationism about coincidence[6] is the view that the disagreement between coincidentalists and anti-coincidentalists is not substantive, rather it is "merely verbal". There are just *prima facie* conflicting utterances about the existence of coincident objects; but there are no corresponding incompatible propositions about the existence of those objects.

Unlike meta-ontological anti-realism and meta-ontological skepticism, if linguistic deflationism about coincidence is true, then my whole thesis is in danger. This is because by focusing on the connection between coincidence and modality I do presume that the disagreement between coincidentalists and anti-coincidentalists is substantive, and evidence plays important roles even if evidence fails to resolve the debate. On the contrary, the goal of linguistic deflationists, if there is one, is to resolve the debate about coincidence by making the two parties come to a verbal agreement. This has nothing to do with evidence. Therefore, it would be better if I could successfully argue against this particular way of trivializing the debate about coincidence.

Let's first see the primary reason for taking the debate about coincidence to be substantive. Use Goliath and Lump1 as an illustration, coincidentalists and anti-coincidentalists would utter (1) and (2) respectively:

(1) Coincidentalists:

a. Goliath exists.
b. Lump1 exists.

[6]Ref. Bennett, 2009; Hirsch, 2002a & 2005.

c. Goliath and Lump1 are not identical.

(2) Anti-coincidentalists: .

a. Goliath exists.
b. Lump1 exists.
c. Goliath and Lump1 are identical.

Given (1-a), (1-b), (2-a) and (2-b), it is natural to think that coincidentalists and anti-coincidentalists agree with the existence claims about Goliath and Lump1. Likewise, given (1-c) and (2-c), it is natural to think that they disagree about the identity claim between Goliath and Lump1. Since disagreement about identity is paradigmatically non-verbal, there is a substantive dispute.

Let's then see how, according to linguistic deflationists, the above disagreement is trivialized as a "merely verbal" dispute. There are two ways of doing that. One is to argue that the identity disagreement is actually verbal: the sentences such as "Goliath and Lump1 are not identical" and "Goliath and Lump1 are identical" can be true at the same time. Goliath and Lump1 are identical relative to a thing while they are not identical relative to another thing. However, this way of trivializing the debate about coincidence is too radical. I don't believe anyone would trade widely-accepted absolute identity just for the illegitimacy of the debate about coincidence.

The other way of trivializing the debate is to argue that coincidentalists and anti-coincidentalists actually verbally disagree with the existence claims; thus though (1-a) and (2-a), (1-b) and (2-b) are the same utterances, they are underpinned by different propositions. Coincidentalists link the existence claims to one fashion of existence while anti-coincidentalists link the existence claims to another fashion of existence. And thereby the identity claims such as (1-c) and (2-c) are just linked to different fashions of existence, which is the reason why coincidentalists' identity claims and anti-coincidentalists' identity claims may not be incompatible. This strategy is often called "quantifier variance", for under this interpretation, identity claims like (1-c) and (2-c) are attached to different domains of discourse.

I don't believe quantifier variance does a good job in trivializing the debate about coincidence; but I do admit that the above strategy is at

least *prima facie* defensible. And indeed, quantifier variance has been well-discussed in the current literature.[7] Though objections to quantifier variance do fit my current interest, that is to argue against linguistic deflationism, those objections are not necessary. By this I mean, besides utterances like (1) and (2), there might be other utterances offering reasons to think that the debate about coincidence is substantive. And if there are such claims, then even quantifier variance may not be able to trivialize the debate.

Indeed, coincidentalists and anti-coincidentalists not only say things about existence, but also things about reference. Again, use Goliath and Lump1 as an illustration, coincidentalists and anti-coincidentalists would utter (3) and (4) respectively:

(3) Coincidentalists:

a. "Goliath" refers.
b. "Lump1" refers.
c. The reference of "Goliath" and the reference of "Lump1" are not identical.

(4) Anti-coincidentalists:

a. "Goliath" refers.
b. "Lump1" refers.
c. The reference of "Goliath" and the reference of "Lump1" are identical.

Similar to (1) and (2), given (3-a), (3-b), (4-a) and (4-b), it is natural to think that coincidentalists and anti-coincidentalists agree with the certain reference claims about Goliath and Lump1. Likewise, given (1-c) and (2-c), it is natural to think they disagree with the identity claim between Goliath and Lump1. And since identity disagreement is paradigmatically non-verbal, there is a substantive dispute.

How could linguistic deflationists respond? They either need to deny the identity disagreement between coincidentalists and anti-coincidentalists is verbal, or deny that coincidentalists and anti-coincidentalists agree with

[7]See Hirsch, 2002a & 2002b & 2005 for the proposal of quantifier variance; see Bennett, 2009 and Sider, 2009, for the arguments against the proposal.

certain reference claims. If it is the former, then similar to the above case linguistic deflationists need to trade widely-accepted absolute identity for the illegitimacy of the debate about coincidence. If it is the latter, then they need to claim that, for example, "Goliath" refers relative to one thing in the coincidentalists' mouth while it refers relative to another thing in the anti-coincidentalists' mouth. That is, linguistic deflationists need to endorse an account, according to which, reference is relative! Relative reference seems more unorthodox and more problematic than relative identity. This is because not only are disagreements about reference, like disagreements about identity, paradigmatically non-verbal, but also we don't yet have an theory about relative reference. At least for linguistic deflationists who are happy with relative identity, Peter Geach's[8] theory can be borrowed to make sense of the claim. But for linguistic deflationists who are happy with relative reference, it is doubtful that their claim about relative reference makes any sense. Furthermore, recall that in the case (1) & (2), most linguistic deflationists are reluctant to endorse relative identity, and this is the reason why they search for an alternative and appeal to quantifier variance. If relative identity is not welcomed, then relative reference, which is worse than relative identity, should not be welcomed. In sum, linguistic deflationism about coincidence need to trade widely-accepted absolute identity or trade widely-accepted absolute reference just for the illegitimacy of the debate about coincidence. Since either way, the prize is too high, the debate about coincidence should be taken as substantive rather than merely verbal.[9]

1.3. Roadmap

The rest of the thesis is arranged as follows:

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[8]See Geach, P.T., 1980, *Reference and Generality* (third edition). Ithaca: Cornell University Press.

[9]Quantifier variance also appears in the meta-ontological debate about composition. However, relative reference cannot be used to bypass the discussion about quantifier variance in composition. This is because, in coincidence, subject terms, such as "Goliath", are singular terms; and in composition, subject terms, such as "table", in one theory has plural reference, such as atoms arranged in table-wise, while in another theory it has singular reference, such as a table. Since the relation between singular reference and plural reference is definitely not identity, linguistic deflationists about composition do not need to choose between relative identity and relative reference.

- CHAPTER 2 analyzes the standard objection to coincidentalism, the grounding problem. It also preliminarily discusses three possible ways for coincidentalists to avoid the problem.
- CHAPTER 3 continues the research on the grounding problem. It focuses on coincidentalists' first tentative answer to the grounding problem, and shows this answer leads to a dead-end.
- CHAPTER 4 also continues the research on the grounding problem. It concerns the second and the third tentative answer to the problem, and argues both answers fail.
- CHAPTER 5 shows the constraints on anti-coincidentalists' account about *de re* modality, as well as the results of those constraints.
- CONCLUSION summarizes the connections between coincidence and *de re* modality discussed from chapter 2 to chapter 5. Those connections reveal significant differences between coincidentalism and anti-coincidentalism, and thereby can be used to argue against certain dismissive meta-ontological attitudes towards the debate about coincidence.

My intention is to arrange the thesis in a coherent fashion. This is because, though each chapter has its own concentration, as reader will see, the contents of different chapters are tightly connected in one way or another. Nevertheless, there is one disadvantage of this way of arranging the thesis, that is, individual chapters are less readable as stand-alone papers. For readers who prefer to read chapters separately, the information about previous and following chapters can be found in *abstract* and *upshot* sections. And for readers with interest in specific topics, here is a rough guide:

- For those with an interest in THE GROUNDING PROBLEM, please read chapter 2, chapter 3, chapter 4, and section 5.4;
- For those with an interest in THE ARGUMENT FROM LEIBNIZ'S LAW, please read section 5.1, section 5.2 and section 5.3;
- For those with an interest in COINCIDENTALISM, please read chapter 2, chapter 3, and chapter 4;
- For those with an interest in ANTI-COINCIDENTALISM, please read chapter 5;
- For those with an interest in META-ONTOLOGY, please read section 1.2 and conclusion;

- For those with an interest in DE RE MODALITY, please read chapter 4, chapter 5;
- For those with an interest in IDENTITY AND INDISCERNIBILITY, please read chapter 3.

CHAPTER 2

The Grounding Problem

Abstract. Chapter 2 articulates the standard objection against coincidentalism, the grounding problem. I first analyze the grounding problem in terms of three steps and two assumptions. The analysis sheds light on how coincidentalists as well as anti-coincidentalists are constrained by the problem. I then articulate each step in turn. Correspond to the three steps of the grounding problem, three tentative answers for coincidentalists are developed.

2.1. The Grounding Problem

Coincidentalists think that there are coincident objects: the objects are numerically distinct, but occupy the same spatio-temporal region and share the same underlying matter. The paradigm case is Allan Gibbard's (1975) Goliath and Lump1: Consider a clay statue which is made by putting two small pieces together and is then destroyed by separating the two pieces. We have a statue and a lump of clay: Call the statue "Goliath" and the lump of clay "Lump1". Coincidentalists think that Goliath and Lump1 are distinct, and *ex hypothesi* Goliath and Lump1 occupy the same spatio-temporal region and share the same underlying matter. So there are coincident objects and coincidentalism is true.

There is one key move made above to reach coincidentalism. It is claimed that objects like Goliath and Lump1 are distinct objects. But are they indeed? Coincidentalists take the answer to be *yes*, because objects like Goliath and Lump1 have different modal features: Goliath lacks the modal property **being capable of surviving being squashed**, while Lump1 has the modal property **being capable of surviving being squashed**. This is supported by ordinary modal talk:

(1) Goliath cannot survive being squashed.

(2) Lump1 can survive being squashed.

After all, the most natural way to explain the data is to say that the one-place predicate "can survive being squashed" denotes a monadic property **being capable of surviving being squashed**, and conclude that Lump1 but not Goliath has this property. According to Leibniz's Law, one object cannot both have and lack the same property, thus Goliath and Lump1 are distinct objects. Modal features are used to differentiate coincident objects.

However, coincidentalists are said to face *the grounding problem*[1]: Briefly, given the modal differences between coincident objects, what grounds the modal features of these objects? The grounders cannot be the nonmodal features of the objects. Since coincident objects occupy the same spatio-temporal region and share the same underlying matter, there is no nonmodal difference between them. And if the grounders are indeed the nonmodal features, then there would be no modal difference between coincident objects. In this way, it is thought that coincidentalists are unable to answer the grounding question and thus are committed to the problematic view that modality is ungrounded.

The grounding problem is treated seriously by both parties in this dispute. Even Kit Fine, as a coincidentalist, admits:

> ... there are several arguments that my opponent might offer in favour of identity. The most powerful to my mind is the metaphysical argument: if a thing and its matter are not the same, then in what does the difference between them consist? (2003: 197)[2]

Thus the problem is supposed to act as a leverage in the debate about coincident objects. Due to its significance, it is worth asking whether the problem is indeed a knock-down objection from anti-coincidentalists, or put it in another way, whether coincidentalists can solve the problem. And if they can, it is also worth asking how the problem can be solved. I think the deep structure of the problem helps answer the above questions.

---

[1]See Bennett (2004b), Burke (1992), Heller (1990), Olson (2001), Sosa (1987), and Zimmerman (1995).

[2]Fine uses different terminology. For him Lump1 is Goliath's matter.

The following is my understanding of the the deep structure of the grounding problem. Firstly, three steps are made in order to reach the final charge:

(S1) There are coincident objects, and coincident objects differ modally from one another.
(S2) If there are modal differences between coincident objects, then the modal features of these objects are ungrounded.
(S3) Ungrounded modal features are problematic.

Blocking any one of the steps above would help solve the problem. Correspondingly, for coincidentalists, there are three different approaches to the grounding problem:

(R1) There are coincident objects, and coincident objects do not differ modally from one another.
(R2) Modal differences between coincident objects and grounded modality are compatible.
(R3) Ungrounded modal features are not problematic.

It is worth emphasizing that only showing (R1) or (R2) holds is not yet a satisfying answer to the grounding problem: coincidentalists are still required to explain the manner of modality's being ungrounded or grounded. And there might be other ways of leading to a similar conclusion. In other words, even if there is no modal difference between coincident objects, that is (S1) is blocked, the modal features of coincident objects might still be problematically grounded or problematically ungrounded. Likewise, even if the modal features of coincident objects are grounded, that is (S2) is blocked, these modal features might just be problematically grounded. Either way, there is a similar problem about the modal features. Hence, coincidentalists who want to block either (S1) or (S2) carry the burden of showing that the modal features of coincident objects are unproblematic grounded or unproblematically ungrounded.

Strategy	**Approach to the Grounding Problem**
The *1st strategy*:	(R1): To deny modal difference.
Blocking steps to avoid	(R2): To ground modality.
the grounding problem	(R3): To make sense of ungrounded modality.

TABLE 2.1.1 *Replies to the Grounding Problem - 1*

The three steps above do not complete the deep structure of the grounding problem, because as I mentioned earlier, the grounding problem is used as leverage in the debate between coincidentalists and anti-coincidentalists. In other words, the supposed role of the grounding problem is to offer a reason to prefer anti-coincidentalism to coincidentalism. Thus, anti-coincidentalists should not have similar problems. After all, since the final charge of the grounding problem is about the manner of modality's being ungrounded or grounded rather than coincident objects *per se*. In addition to (S1), (S2) and (S3), anti-coincidentalists need the following statements to be true:

(A1) Modality can be grounded if there are no coincident objects; and
(A2) Grounded modal features are not problematic.

If not, the grounding problem backfires. If (A1) does not hold, then given (S3), anti-coincidentalists also have problematically ungrounded modality. If (A2) does not hold, given (A1), then anti-coincidentalists have problematically grounded modality. Either way, anti-coincidentalists are not better than coincidentalists regarding the manner of modality's being ungrounded or grounded.

But there is a way for anti-coincidentalists to reformulate the grounding problem. In the case that (A1) does not hold, they can replace (S3) with

(S3') If there are coincident objects and modality is ungrounded, then modality is problematically ungrounded.

And argue that

(A3) If there are no coincident objects, then modality is unproblematically ungrounded.

When both coincidentalists and anti-coincidentalists admit ungrounded modality, the only way to show that one theory is better than its rival theory is to argue that one's modality is ungrounded in a good manner while the rival's modality is ungrounded in a bad manner.

It is interesting to notice that, coincidentalists and anti-coincidentalists, although with different goals (to avoid the charge for the former and to avoid backfire for the latter), are constrained in a similar way by the grounding problem. That is, in order to avoid the problem, both need to show:

(C) If there are no coincident objects, then either modality is unproblematically grounded or it is unproblematically ungrounded.

Given this general constraint, aside from blocking a step of the grounding problem, there is a different strategy for coincidentalists to answer the grounding problem. Suppose that coincidentalists fail to block all three steps, but succeed in showing their opponents also have the problem, then they can answer the problem by trivializing its role. It can be argued that the grounding problem is general; since everyone has it, the problem should not be used to argue against coincidentalism. Thus, the fourth approach to the grounding problem is to argue:

(R4) Anti-coincidentalists cannot make sense of (C), therefore they have the grounding problem.

Strategy	**Approach to the Grounding Problem**
The *1st strategy*: Blocking steps to avoid the grounding problem	(R1): To deny modal difference.
	(R2): To ground modality.
	(R3): To make sense of ungrounded modality.
The *2nd strategy*: Backfiring anti-coincidentalism	(R4): To argue that anti-coincidentalists themselves have a similar grounding problem.

TABLE 2.1.2 *Replies to the Grounding Problem - 2*

It is worth mentioning that blocking a step and attacking anti-coincidentalists are mutually independent strategies. This is why coincidentalists might be able to do both, which provides a third strategy for coincidentalists to answer

the grounding problem. Aggressive coincidentalists might want to ironically argue that the grounding problem actually serves as leverage to prefer coincidentalism. In order to do that, they need to show (i) coincidentalists do not have the grounding problem by appealing to (R1) or (R2) or (R3), and (ii) anti-coincidentalists do have the grounding problem by appealing to (R4). Thus, the three additional approaches of replying to the grounding problem are:

(R5) (R1) + (R4).
(R6) (R2) + (R4).
(R7) (R3) + (R4).

Strategy	**Approach to the grounding problem**
The *1st strategy*:	(R1): To deny modal difference.
Blocking steps to avoid	(R2): To ground modality.
the grounding problem	(R3): To make sense of ungrounded modality.
The *2nd strategy*:	(R4): To argue that anti-coincidentalists
Backfiring anti-coincidentalism	themselves have a similar grounding problem.
The *3rd strategy*:	(R5): (R1) + (R4).
A combination of the first	(R6): (R2) + (R4).
and the second strategy	(R7): (R3) + (R4).

TABLE 2.1.3 *Replies to the Grounding Problem - 3*

In total, for coincidentalists, there are three strategies to answer the grounding problem. The first strategy is to dismiss the grounding problem by arguing coincidentalists do not have it; the second strategy is to dismiss the grounding problem by arguing anti-coincidentalists also have it; the third strategy, which is a combination of the first and the second, is to favour coincidentalism by using the grounding problem as a leverage. Since there are three different ways of avoiding the grounding problem, there are seven different approaches coincidentalists could attempt in order to reply to the

grounding problem. Although, the discussion about (R5) to (R7) can be reduced to the discussion about (R1) to (R4).

Last but not least, from a wider perspective, the above grounding problem may not the only grounding problem. Although modal features are good at differentiating coincident objects, there might still be other equally eligible candidates for the same job. Indeed, coincidentalists also think that coincident objects differ in kind properties, such as **being a statue**, and evaluative properties, such as **being well-made**, **being Romanesque**.[3] And similar grounding problems can be raised for coincidentalists: what grounds the kind properties and evaluative properties of objects? Surely, the answer cannot be objects' spatio-temporal properties, or underlying matter, or any features grounded in spatio-temporal properties or underlying matter; because coincident objects differ in kind and evaluative properties, but differ in neither spatio-temporal properties nor underlying matter. But if the answer is not spatio-temporal properties and underlying matter, what else it could be? In this way, it is clear to see that there are grounding problems and the problem about modality is only one of them.

So exactly how many grounding problems are faced by coincidentalists? The number of the grounding problem(s) depends on the differences coincidentalists admit. For example, if modal differences are the only differences between coincident objects, then there is just one grounding problem. If modal, kind, and evaluative differences are the only differences between coincident objects, then there are three grounding problems. And if there are differences in other features of coincident objects, then there are also other grounding problems for those features.

Albeit there are different grounding problems for coincidentalists, all of them do share a basic structure. By this I mean, the above analysis, *mutatis mutandis*, applies to other grounding problems as well.

Nevertheless, coincidentalists do carry the burden of answering all of them, if they recognize the corresponding differences. This task can be completed in two ways. One is to give separate answers to different problems. The other one is to give an united answer, that is to privilege one feature to ground the rest, and then to give an answer to the grounding problem for the privileged feature. It is hard to judge which way is better to answer

[3]Ref. Fine (2003).

all the problems. In principle, if a reply like (R1), that is to eliminate the differences, works for one feature, then very likely it works for other features. If that is indeed the case, then coincidentalists can give separate answers to different problems by using the same strategy. The first way of answering the problems seems fine in this case. In contrast, if a reply like (R2) or (R3), that is to argue that the feature is grounded or ungrounded in an unproblematic manner, works for one feature, then coincidentalists can privilege this feature and ground other features in the privileged feature. The second way of answering the problems seems fine in this case.

The rest of chapter 2 is used to articulate the three steps of the grounding problem. By doing so, we will be able to see how the corresponding tentative replies, which are supposed to avoid the grounding problem for coincidentalists, are developed. Whether those partially-developed replies avoid the grounding problem for coincidentalists will be discussed in chapter 3 ((R1)) and chapter 4 ((R2) & (R3)). The issue whether anti-coincidentalists have the grounding problem will be considered in chapter 5 ((R4)).

2.2. The First Step

As I have shown above, the first step of the grounding problem is:

(S1) There are coincident objects, and coincident objects differ modally.

Coincidentalists might be suggested to block (S1) and avoid the grounding problem. To be more precise, the strategy is to argue:

(i) There are coincident objects; and
(ii) Coincident objects do not differ modally.

(i) sticks to coincidentalism, and (ii) denies modal differences between coincident objects. So far, so good.

Because of (ii), coincidentalists need to deny that objects like Goliath and Lump1 have different modal properties. But recall that having different modal properties was the reason for taking objects like Goliath and Lump1

to be distinct. Without this, it is doubtful whether objects like Goliath and Lump1 are distinct. So it is doubtful whether there are indeed coincident objects. In short, given (ii), what is the reason to think that (i) is true?

A less plausible reply is to insist on (i) without offering any explanation of why coincident objects are distinct. It is less plausible, because if it is licensed, I am also lisened to think that, for example, there are actually numerous overlapping laptops in front of me right now. It is just a brute fact that these overlapping laptops are numerically distinct; and no explanation of distinctness is need. This price might be too high for coincidentalists, after all most people would find themselves uncomfortable with indiscernible overlapping objects.[4] So it would be better if coincidentalists argue that:

(iii) Coincident objects are differentiated.

(iii) replaces the role modal differences play and offers reasons to think (i) is true.

One natural way of endorsing (iii) is to claim that coincident objects are not differentiated by modal features but by something else. And admittedly, there might be things other than modal features qualifying the job. As I mentioned, it has also been argued that coincident objects have different kind properties and different evaluative properties. Thus, coincidentalists might try to use kind or evaluative differences to differentiate coincident objects. However, this move does not exempt coincidentalists from the grounding problem. The original grounding problem about modality is simply diverted to similar problems about other features. For example, if kind differences are used to differentiate coincident objects, it still can be asked that what grounds, say, Goliath's **being a statue** and Lump1's **being a lump of clay**.

[4]Interestingly, a similar but different strategy is used by della Rocca (2005) to defend the Principle of Identity of Indiscernibles (a.k.a PII) , that is, if two things share all the same properties, then the two are identical. The classical counterexample of PII is Max Black's (1953) *two spheres*: a symmetric universe only contains two spheres which are qualitatively indiscernible but distinct. Della Rocca argues that if the opponents of PII grant counterexamples like the two spheres, then they should also grant crazy cases like *twenty spheres*: twenty distinct but completely overlapping spheres in one spatio-temporal region. By contraposition, if one wants to avoid crazy twenty spheres, then one also has to reject two spheres and no longer has counterexamples to PII.

That is how we are able to see the root of the grounding problem is not MODAL difference, but modal DIFFERENCE. Appealing to other differences does not really fix the problem. The real issue here is whether two objects can be differentiated without leading to differences. So the specific strategy of blocking the first step of the grounding problem(s) is to argue:

(ii–) Coincident objects do not differ in x-features; and
(iii–) Coincident objects are differentiated by x-features.

Arguing for both (ii–) and (iii–) at one time may seem to be puzzling and even insane. After all, without the differences in x-features, how two objects are differentiated by x-features? I do think that (ii–) and (iii–) are incompatible, and it is a right move to raise the above question. Nevertheless, this strategy is actually treated seriously by some philosophers. For example, Theodore Sider (2008) tries to use this to answer the grounding problem. So even for those who find puzzling at the first sight, it would be better to keep an open mind before a thorough and careful study.

Since the real issue here is about difference and differentiation, what the x-features are is less relevant to the outcome. Put it in another way, if a strategy works for a-features, then it can be borrowed for b-features, and *vice versa*. Thus for simplicity, I will stick to modal features of objects. *Mutatis mutandis*, the discussion below applies to other features as well. Now the task for coincidentalists is to make sense of:

(ii) Coincident objects do not differ modally; and
(iii+) Coincident objects are differentiated by modal features.

This is the partially-developed strategy to block the first step of the grounding problem. And whether this tentative answer works will be discussed in chapter 3.

2.3. The Second Step

The second step of the grounding problem is:

(S2) If there are modal differences between coincident objects, then the modal features of these objects are ungrounded.

The reason, according to anti-coincidentalists, is supposed to be straightforward: Briefly, since coincident objects occupy the same spatio-temporal region and share the same underlying matter, they do not differ nonmodally. Suppose that the modal features of coincident objects are indeed grounded in the nonmodal features of those objects, then since there is no nonmodal difference, there is no modal difference. Thus, if modality is grounded, there is no modal difference between coincident objects. By contraposition, if there are modal differences between coincident objects, then modality is ungrounded. Despite its intuitive appeal, the above argument need some clarifications:

(i) The first clarification is about the GROUNDING RELATION, which can be understood in two ways. According to a strong notion, the grounding relation is similar to determination; the grounders are (metaphysically) sufficient for the groundees. According to a weak notion, the grounding relation is similar to dependence; the grounders are (metaphysically) necessary for the groundees. Which one is used in the grounding problem? Surely it cannot be the weak one, because the weak notion does tolerate different groundees having same grounders.

Sometimes the grounding problem is presented in terms of supervenience. It has been argued that since coincidentalists fail to supervene the modal on the nonmodal, they have to accept ungrounded modality. This way of presenting the grounding problem might cause people to think that the grounding relation is one of supervenience relations. For example, Sider (1999) tries to answer the grounding problem by replacing strong supervenience with weak global supervenience[5]. Sider argues although coincidentalists fail to hold a strong supervenience relation between the modal and the nonmodal, they can still claim a weak global supervenience between the two. And if grounding is understood in terms of weak global supervenience, then coincidentalists could answer the grounding problem. However, Sider's answer does not work. Both Bennett (2004a) and Shagrir (2002) show that

[5]"... roughly: if there exists at least one nonmodal isomorphism between two possible worlds, then there exists at least one modal isomorphism between those worlds." (Sider, 2008: 614)

weak global supervenience is too weak to capture the idea of "grounding", and the grounding problem remains.[6]

But this does not mean that the grounding problem cannot be presented in terms of supervenience, because supervenience failure does imply grounding failure. Supervenience is used as an argumentation strategy, which is called "FIST" ("argument by appeal to a false implied supervenience thesis") by McLaughlin[7]. Roughly, since grounding is stronger than supervenience, the grounding of A in B implies the supervenience of A on B. By contraposition, the failure of the latter implies the failure of the former. Thus, supervenience failure rather than supervenience success is what really matters in the grounding problem. Because anti-coincidentalists already have strong supervenience failure, no matter how many other supervenience relations are hold between the modal and the nonmodal, coincidentalists still face the grounding problem.

(ii) The second clarification is about the GROUNDEES of the grounding relation, modal features of objects.

It is sometimes argued that coincidentalists can answer the grounding problem, because the modal differences between coincident objects can be grounded by using something like the following principle:

(GMD) There are properties ***F*** such that if ***F*** is instantiated at a spatio-temporal region, then both **essentially *F*** and **accidentally *F*** are also instantiated at the region.

Admittedly, the instantiations of **essentially *F*** and **accidentally *F*** might be grounded in the instantiation of ***F***; and in this way the modal difference between **essentially *F*** and **accidentally *F*** is grounded in a nonmodal property ***F***. But even so, the grounding problem remains unsolved, because the principle above does not tell which object in the region has **essentially *F*** and which has **accidentally *F***. Recall the second step of the problem, modal differences are used in order to show the modal features of objects

[6]Even Sider later admits that Bennett and Shagrir's criticisms are successful: "I grant Bennett and Shagrir's criticisms: if there really exist modal properties and relations, and if these are not "brute" (an assumption I will not question), then, I concede, these must strongly globally supervene on nonmodal properties and relations." (Sider, 2008: 614)
[7]Ref. McLaughlin and Bennett (2010).

are ungrounded. And whether modal differences themselves are grounded or not is just another issue.[8]

(iii) The third clarification is about the GROUNDERS of the grounding relation, nonmodal features of objects. Recall

(S2) If there are modal differences between coincident objects, then the modal features of these objects are ungrounded.

It is worth noticing that two claims are made in order to reach (S2)'s conclusion:

(G1) Modal features of objects are not grounded in nonmodal features of objects.

(G2) Nonmodal features are the only candidate grounders of modal features.

Thus there are two ways of blocking (S2). One is to show that the modal is grounded in the nonmodal. The other is to show that modal features are grounded in other features.

Let's consider nonmodal features first. Frankly, it is not clear what anti-coincidentalists mean by "nonmodal". The name itself suggests a negative understanding, that is, nonmodal features are not modal features. It is uncontroversial that this constraint is necessary. But it is controversial whether the constraint is sufficient. Or put it in other way, do anti-coincidentalists' nonmodal features include all features which are not modal? I think the most likely answer is *no*. It is contentious whether there are identity properties, such as **being *a*** (a is a particular). Suppose that there are identity properties, then identity properties are not modal. But anti-coincidentalists would want to keep identity properties out of their nonmodal features, for coincident objects do differ in their identity properties. Goliath but not Lump1 has the property **being Goliath**; Lump1 but not Goliath has the property **being Lump1**. Moreover, it is also contentious whether kind or evaluative properties are modal. If they are not, then coincident objects do

[8]For more information regarding this reply, see Rea (1997) and Zimmerman (1995).

differ nonmodally in this way. Thus, modal features of objects and anti-coincidentalists' nonmodal features of objects might not be complement to each other.

Nevertheless, the way in which the grounding problem is presented suggests a positive understanding of the nonmodal. Anti-coincidentalists think that coincident objects do not differ nonmodally, because they occupy the same spatio-temporal region and share the same underlying matter. Thus, no matter what nonmodal features are, they are grounded in objects' spatio-temporal properties and underlying matter.

Let's then consider candidate grounders. There are at least two general requirements on grounders. The first one comes from the grounding relation. As I have mentioned, the strong notion of the grounding relation asks for different grounders when groundees are different. But having corresponding difference is not sufficient for grounders. It is at least logically possible that for some grounders, and their groundees, not only do different groundees have different grounders, but different grounders also have different groundees. If having corresponding differences is sufficient for grounders, then the groundees also ground grounders. But the grounding relation is asymmetric, which means groundees can never ground their grounders. In these possible cases, what then makes the grounders different from their groundees? It might be suggested that the grounders and the groundees have different explanatory power: the grounders are able to explain their groundees, but not *vice versa*. I am not sure whether explanatory power is sufficient for separating the two, because the two might just have exactly the same explanatory power. And yet, this is necessary for things to count as grounders. It makes little sense if proposed grounders fail to explain their groundees. Thus, besides the corresponding differences, the grounders are also required to explain their groundees.

The above requirements are related to differences in groundees in one way or another. The differences in groundees ask for corresponding differences in grounders as well as explanations from their grounders. Hence the differences in groundees matter. And in the light of this statement, in the grounding problem modal differences play important roles in the above sense.

There are three modal modifiers: *essentially*, *accidentally*, and *possibly*. Given the modifiers and negation, there are six forms of modal predicates: *essentially F*, *accidentally F*, *possibly F*, *not essentially F*, *not accidentally*

F, and *not possibly F*. The three modifiers are systematically connected in the following ways:

- *O* is *essentially F*, iff, *O* is *F* and *O* is *not possibly non-F*;
- *O* is *accidentally F*, iff, *O* is *F* and *O* is *possibly non-F*;
- *O* is *not essentially F*, iff, *O* is *non-F* or *O* is *accidentally F*;
- *O* is *not accidentally F*, iff, *O* is *non-F* or *O* is *essentially F*.

Given the above connections, the modifier *possibly* is sufficient for characterizing all modal features. Now consider how many kinds of differences in modal features in terms of **possibly *F***. I think the all differences in modal features fall under one of the following:

- **Being possibly *F*** vs. **being possibly *G*** (***F*≠*G***)
- **Being possibly *F*** vs. **not being possibly *G***

The above use of "differences in modal features" may cause some confusion. By this I mean that it might be mistakenly taken as modal difference between objects, after all both are modal difference in some sense. The underlying reason, I think, is that modal difference can be understood in two ways. One is object-centered: modal difference is short for modal difference between objects. Thus, a ball's **being essentially round** and a rock's **not being essentially round** indicate a modal difference between the ball and the rock. So are a ball's **being essentially round** and a rock's **being accidentally square**, for an object's **being accidentally square** entails its **not being essentially round**. The other way of understanding modal difference is feature-centered: modal difference means difference in modal features, and different modal features are sufficient for this kind of difference. Thus different modal features such as **being essentially round** and **being accidentally red** indicate modal differences. It is worthy emphasizing that the object-centered and the feature-centered understanding are not equivalent. The latter subsumes the former, but not *vice versa*. This is because the object-centered one requires two incompatible modal features had by different objects, while the feature-centered one does not. Use the above example, **being essentially round** and **being accidentally red**

can be instantiated by an object or by different objects. Since the concentration here is the relation between modal features and their grounders and as I mentioned the relation is related to difference in the groundees, the feature-centered rather object-centered understanding should be adopted.

Some differences in modal features are easy to be explained in terms of the nonmodal. Suppose that one object O is $\boldsymbol{F}$ and another object O' is $\boldsymbol{G}$ ($\boldsymbol{F}\neq\boldsymbol{G}$). Since O is $\boldsymbol{F}$, O is **possibly** $\boldsymbol{F}$. Likewise since O' is $\boldsymbol{G}$, O' is **possibly** $\boldsymbol{G}$. Thus, the different modal features of O and O' are explained by their nonmodal features, **being** $\boldsymbol{F}$ and **being** $\boldsymbol{G}$.

However, some modal differences are difficult to explain. Suppose that a *non-F* object O is **possibly** $\boldsymbol{F}$ and another *non-F* object O' is **not possibly** $\boldsymbol{F}$. Then what grounds O has **being possibly** $\boldsymbol{F}$ and O' lacks **being possibly** $\boldsymbol{F}$, given both O and O' are **not** $\boldsymbol{F}$?[9]

[9] It is worth mentioning that some philosophers take the essential/accidental distinction to a global distinction. (For example, pan-essentialist think that if an object has a property, then it has the property essentially. For them, all properties are had essentially. Extreme haeccetists think that the connection between objects and their qualitative roles is loose. For them, if an object has a qualitative property, then it has it accidentally.) They think that: for all properties $\boldsymbol{F}$ and all objects O,

> If $\boldsymbol{F}$ is an essential property and O is $\boldsymbol{F}$, then O is **essentially** $\boldsymbol{F}$;
> If $\boldsymbol{F}$ is an accidental property and O is $\boldsymbol{F}$, then O is **accidentally** $\boldsymbol{F}$.

According to this view, the second kind of modal difference (**being possibly** $\boldsymbol{F}$ vs. **not being possibly** $\boldsymbol{G}$) is:

- Being **possibly** $\boldsymbol{F}$ vs. not being **possibly** $\boldsymbol{G}$ ($\boldsymbol{F}\neq\boldsymbol{G}$)

For it is not the case that for some $\boldsymbol{F}$, O is **essentially** $\boldsymbol{F}$ and O' is **accidentally** $\boldsymbol{F}$, then it is not the case that for some $\boldsymbol{F}$, O is not **possibly** ***non-F*** and O' is **possibly** ***non-F***. Thus, when consider the grounding relation between the modal and the nonmodal, they do not have the difficult case.

Despite the above convenience, the global notion of essential/accidental distinction has its own problem: it goes against with most of our modal intuitions. We are appealed to think that, there are some $\boldsymbol{F}$ such that both **essentially** $\boldsymbol{F}$ and **accidentally** $\boldsymbol{F}$ are instantiated. For example, we do think that a ball is **essentially round** and a round rock is just **accidentally round**. Or at least, philosophers who endorse a global essentially/accidentally distinction are invited to give an account of reconstructing modal intuitions.

For coincidentalists who think that one of the coincident objects is **essentially *F*** while the other is **accidentally *F***, the difficult cases turn out to be missions impossible. For not only are coincident objects both ***F***, but they also share all other nonmodal features, there is no way they can ground the modal in the nonmodal. Thus (G1) is right, which leaves challenging (G2) the only way of blocking (S2). Consider

(G2) Nonmodal features are the only candidate grounders of modal features.

In order to falsify the above claim, coincidentalists need to find other candidate grounders for modal features. And this is the partially-developed strategy to block the second step of the grounding problem. Whether this tentative answer works will be discussed in chapter 4.

2.4. The Third Step

The third step of the grounding problem is

(S3) Ungrounded modal features are problematic.

The reason why ungrounded modality is problematic is not modality's BEING UNGROUNDED. A thing's being ungrounded does not automatically entail it is problematically ungrounded. Even anti-coincidentalists have to admit some ungrounded features are not problematic; otherwise the grounding problem backfires.

The reason why ungrounded modality is problematic is MODALITY's being ungrounded. According to anti-coincidentalists, modality is notoriously mysterious, and thus need to be grounded in something else. And "something else" usually refers to nonmodal features of objects. Unlike modal features, nonmodal features are empirically discernible. It seems that since we have better epistemic access to things which are empirically discernible, it is permissible to take them (or at least some of them) as ungrounded.

However, empirical discernibility may not be the only way of showing that ungrounded features are not problematic. And if it is not, then the grounding problem can be viewed as an invitation rather than a charge.

Coincidentalists are invited to give an account, according to which, modal features of objects, though ungrounded, are ungrounded in an unproblematic manner.

There is indeed another way of making sense of ungrounded features. Consider *de dicto* modality, it is thought that *de dicto* modality is mysterious and thus need grounders. Nowadays, the standard treatment is reducing *de dicto* modality to possible worlds. But we also don't have any empirical access to possible worlds. If not empirical discernibility, what make(s) possible worlds good candidate grounders of *de dicto* modality?

For example, consider the modal proposition that it is possible that cows are purple. According to possible world semantics, the proposition is true iff there is a possible world in which cows are purple. Now someone might want to ask what makes cows in that possible world purple while in our actual world cows are brown? Moreover, she might think that except the colours of cows, that possible world and our actual world are indiscernible, and thus think that nothing could ground cows' being purple at one world and being brown at another. If it is indeed the case, does it entail that, for example, cows' being purple is problematic?

The answer is *no*. The ungrounded features can be well-explained by using the principle of plenitude. The rough idea is that every possible way is there: in some world, cows are brown; in some, cows are purple; in some, cows are green; etc.. Since every possible way is included, there is nothing fancy about purple cows, or brown cows.

Behind the above rough idea, there is a subtle distinction between the questions about Fa on the one hand, and the questions about $\exists xFx$ on the other. Since Fa entails $\exists xFx$, but not *vice versa*; Fa is stronger than $\exists xFx$. By contraposition, a satisfactory explanation of $\exists xFx$ may not be an explanation of Fa. The question about why some particular cows are purple may lack an answer, while the question about why there are some purple cows may not.

But there is a question about the principle of plenitude. It is not clear what it means. More precisely, in contrast with impossible ways, what are the possible ways? There is no conclusive answer to that question yet. But at the very least, the principle does ask for the principle of (re)combination, and David Lewis is explicit about this point:

> To express the plenitude of possible worlds, I require a principle of recombination according to which patching together parts of different possible worlds yields another possible world. Roughly speaking, the principle is that anything can coexist with anything else ... Likewise, anything can fail to coexist with anything else. (1986: 87-8)

Nevertheless, only applying the principle of (re)combination to individuals of worlds is not enough. Consider those purple cows, they are not (re)combinations of parts of worlds in the above sense; rather, if they are (re)combinations at all, they are recombined by properties. Thus, the principle of plenitude also requires a principle of recombination for properties.

However, a principle of recombination for properties, unlike its counterpart, is hard to form. It makes little sense to say that any property can coexist with any property, just consider being brown (allover) and being purple (allover). It also makes little sense to say that any property can fail to coexist with any property, just consider being purple and being coloured. Given that there are properties always fail to coexist, and there are properties never fail to coexist, what constrains the recombinations of properties? It is suspected that not only is primitive logical necessity required for this very purpose, but also logical necessity alone is not sufficient for the purpose. If that is true, then using a principle of plenitude may have a problematic consequence.

Even though those who use the principle of plenitude have the burden of replying to the above question, it would be too quick to conclude that the principle itself is indefensible. Especially, in the above case, the principle showed its ability of making sense of ungrounded features. So maybe we should suspend this particular charge at the current stage, and try to see whether a similar principle can make sense of ungrounded *de re* modality for coincidentalists.

Actually, a principle of plenitude has already been suggested to coincidentalists, as a blocker of the grounding problem. Karen Bennett (2004b) argues coincidentalists could try to make sense of ungrounded modality by claiming that

> ... every region of spacetime that contains an object at all contains a distinct object for every possible way of distributing 'essential' and 'accidental' over the non-sortalish properties actually instantiated there. A certain principle of plenitude holds; there is an object for each possible combination of modal properties ... And precisely because each region is full in this way, there is nothing in virtue of which any particular object has the modal properties it does. There is nothing special about Lump1 in virtue of which it has that property and Goliath does not. It's just that *all the modal bases* are covered. (2004b: 354-5)

Bennett is explicit about her use of this principle of plenitude. And for her, applying the principle to coincidence is (re)combining modal properties. With the principle, it is easy to answer the grounding problem: Goliath and Lump1 exemplify two different ways of combining modal properties. Besides the two ways, there are other ways of combining modal properties; and other combinations are also exemplified, though by other objects, in the same spatio-temporal region. Thus the two combinations exemplified by Goliath and Lump1 are not fancy at all, they are just two among the many. In this way, the principle of plenitude makes sense of ungrounded modal features. And this is the partially-developed answer to block the third step of the grounding problem.

The above recipe is just a start of answering the grounding problem.

As I mentioned before, the principle of plenitude might commit to some primitive modal features, e.g. logical necessity. In the *de dicto* modality case, the commitment comes from the recombination of properties. There are properties never fail to coexist and there are properties always fail to coexist. Coincidentalists who use Bennett's recipe have a similar source of the commitment. In their place, modal properties are (re)combined, and there are modal properties always/never fail to coexist. Bennett herself notices that it makes little sense to combine modal properties like **being accidentally coloured** and **being essentially grey** together. Thus certain modal features are needed to constrain the (re)combination.

And yet, there are certain modal features might be wanted as further constraints. Suppose that there are n nonmodal properties instantiated in one spatio-temporal region, if unrestrictedly (re)combined, then there are 2^n objects in that region. Though given the above restriction, the number of objects is less than 2^n; there are still, using Bennett's characterization, "an awful lot of objects". Thus, Bennett suspects some coincidentalists wish for a more chaste version of the recipe, according to which,

> The only metaphysically possible combinations of modal properties are those that correspond to the sorts of things that we standardly recognize. (2004b: 356)

For coincidentalists as such, they will need further principles to constrain the (re)combination. And according to the further principles, it also makes little sense to combine modal properties like **being accidentally statue-shaped** and **being essentially grey** together (in Goliath and Lump1 case).

Now regarding the constraints on (re)combination, it is natural to raise the following questions. Are these constraints themselves grounded or ungrounded? Moreover, in what manner are these constraints being grounded or ungrounded? If the constraints themselves generate similar grounding problems, then coincidentalists are still haunted by the problem.

Different constraints may have different answers to the questions. The use of logical necessity, for example, may be justified in the current case. This is because, so far, no alternative account of this kind of necessity has been proposed. In other words, it is not clear how to reduce logical necessity to other things. Since everyone has primitive logical necessity, if it is a problem, both coincidentalists and anti-coincidentalists would have it.

On the contrary, the constraint from kinds is utterly mysterious. Suppose that principles are formed for this purpose, which I doubt, it is still puzzling why modal properties like **being accidentally statue-shaped** and **being essentially grey** cannot be combined together in Goliath and Lump1 case, while modal properties like **being essentially statue-shaped** and **being accidentally grey** can. Bennett also thinks that the chaste version of the recipe has a very similar grounding problem, though at a different place. The chaste version, therefore, fails to give a satisfactory answer to the grounding problem.

In this way, we are able to see the side-effect of Bennett's recipe, that is to admit that there are "an awful lot of" (close to 2^n) objects in a single spatio-temporal region. By side-effect, I mean that not everyone is happy with this kind of abundance. Furthermore, the large amount of objects may pose a difficulty for semantics: if there are so many objects in a single region, how do coincidentalists pick, for example, Goliath and Lump1 among them? Coincidentalists who use Bennett's recipe are invited to offer a mechanism for picking reference.

So far, Bennett's recipe seems defensible, at least in its metaphysical aspect. Although the recipe has some odd consequences regarding the number of objects, those odd consequences are not sufficient for knocking down the recipe. There might be coincidentalists who are willing to trade the number of objects for an answer to the grounding problem.

But is the recipe indeed a successful reply to the grounding problem? I think the answer to the question depends on how the grounding problem is understood. At the end of section 2.1, I mentioned that the grounding problem is not just about *de re* modality, if modal differences are not the only differences between coincident objects. In other words, if there are other differences between coincident objects, then there are other grounding problems awaiting for answers.

I do believe that Bennett's recipe offers an excellent answer to the grounding problem about *de re* modality. But even so, it is not yet clear how her recipe helps to answer other grounding problems. But if Bennett's recipe helps, it helps in either of the following two ways: one is to apply the same strategy to different topics, the other is to ground other features in unproblematically ungrounded modal features.

Some coincidentalists, e.g. Kit Fine, would like to accept that there are kind differences and evaluative differences between coincident objects. Thus, for them, there are also grounding problems about kind and evaluative features. It is relatively easy to ground evaluative features in kind features, for evaluative features are normally relative to respects, and in some sense, kinds can be taken as respects. But, still, there is a grounding problem about kind features: what grounds, for example, Goliath's **being a statue** and Lump1's **being a lump of clay**?

Let's first consider whether applying the same strategy to a different topic helps. That is, whether the principle of plenitude helps coincidentalists make sense of ungrounded kind features. As I said before, to apply the principle of plenitude is to (re)combine certain things together. What, then, are (re)combined in the current case? Surely it cannot be kind properties themselves, for coincidentalists would not allow one thing to be both a statue and a lump of clay. The only things can be combined here are certain non-kind properties on the one hand, and kind properties on the other.

Is the (re)combination restricted? If it is not, that is any non-kind features can be combined with any kind features, then there are odd combinations. There are not just a statue and a lump of clay in the Goliath and Lump1 case; there is a car coincide with both Goliath and Lump1 if **being a car** is a kind property. I don't believe any coincidentalist is willing to accept this kind of absurd claims.

Thus, the (re)combination must be restricted. A followed-up question is how. By noticing that there are significant non-kind differences between a car and a statue, coincidentalists might want to propose a certain principle, according to which, kind features are entailed by corresponding non-kind features. But this option is not open to coincidentalists, otherwise Goliath and Lump1 should share their kind features.

I have no idea how the restriction could be done through one principle or a set of principles. If my hunch is right, then the (re)combination is utterly mysterious. Moreover, even if I am wrong, and there are such principles, what could coincidentalists say about the ontological status of those principles? It is still mysterious why those principles but not others hold. It then seems that the principle of plenitude is not able to make sense of ungrounded kind features directly.

Let's then consider the second way, that is, whether coincidentalists can ground kind features in unproblematically ungrounded modal features. According to Bennett's recipe, if modal features of objects are ungrounded in an unproblematic fashion, then there are close to 2^n objects in a single spatio-temporal region. Now a worthwhile question is how many kinds of objects in one spatio-temporal region? Since coincidentalists as such would not allow one object belongs to more than one kind, there are at most 2^n kinds of objects. Since coincidentalists as such accept kind difference between coincident objects, there are at least 2 kinds. Hence the number of kinds is between 2 and 2^n.

If the number of kinds equals to the number of objects in a region, then there are close to 2^n kinds in a single region. Unlike close to 2^n objects, admitting close to 2^n kinds seems to be a bullet coincidentalists cannot bite. This is because kind is more or less type-wise. And it is odd to think that any two distinct but nonmodally indiscernible objects do not share a kind-membership.

Hence the number of kinds is smaller than the number of objects. In this case, either only some privileged objects have kind membership, or different objects share their kind membership. If it is the former, then not only are some objects kindless, but also only limited combinations of modal properties can generate kinds. If it is the latter, then again only limited combinations of modal properties can generate kinds, which is mysterious and thus leads to a grounding problem. It should be evident by now that the coincidentalists cannot ground kind features in unproblematically ungrounded modal features.

Since both ways do not work, Bennett's recipe fails to make sense of ungrounded kind features of coincident objects. Thus, if coincidentalists want to avoid the grounding problem about kind features, they need to reject kind features radically. They may say that kinds are not part of metaphysical reality, rather they are part of our concepts. Alternatively, coincidentalists could just bite the bullet and admit there is a grounding problem about kind feature; but at the same time, they argue that anti-coincidentalists have the very same problem.

Thus it is not yet clear whether the grounding problem about kind features poses difficulties for Bennett's strategy. Nevertheless, the discussion about kind features does show one strategy of arguing against Bennett's recipe, even though it has proved its efficacy of making sense of ungrounded modal features. In chapter 4, I use this strategy to argue that Bennett's recipe fails to solve the grounding problem about trans-world relations. Since compared with kind features, trans-world relations are much more difficult to reject; coincidentalists including those who use Bennett's recipe, are haunted by the grounding problem about trans-world relations. Moreover in chapter 5, I show that anti-coincidentalists can easily avoid the same problem. Hence,

the grounding problem is very real for coincidentalists, and even Bennett's recipe cannot give a satisfactory answer.

Upshot

For coincidentalists, there are three tentative ways of avoiding the grounding problem. The first is to differentiate coincident objects by modal features without leading to modal differences. The second is to find other eligible grounders for *de re* modality. The third is to make sense of ungrounded modality.

Whether the three tentative answers indeed work will be discussed in the following chapters. Chapter 3 criticizes the first answer, and chapter 4 criticizes the second and the third.

For anti-coincidentalists, their account of *de re* modality is constrained by the grounding problem. They need to show that modality is either unproblematically grounded or unproblematically ungrounded. Nevertheless, anti-coincidentalists' account of modality is also constrained by the argument from Leibniz's Law. Both constraints will be discussed in chapter 5.

CHAPTER 3

Differentiation and Difference

Abstract. One approach to the grounding problem is to block its first step. I have shown in section 2.2 that replies of this sort need to differentiate coincident objects by modal features and to avoid modal differences between coincident objects. The strategy is attempted by Theodore Sider (2008), whose answer to the grounding problem is the focus of this chapter. I first present Sider's answer; I then form two independent arguments to show Sider's attempt fails; at last, I generalize one of objections and conclude that for coincidentalists, blocking the first step of the grounding problem leads them to a dead-end.

3.1. Sider's Attempt

In section 2.2 I showed that if coincidentalists want to block the first step of the grounding problem, they need to argue:

(i) Coincident objects do not differ modally; and
(ii) Coincident objects are differentiated by modal features.

As I mentioned earlier, arguing for (i) and (ii) at the same time is a *prima facie* puzzling strategy. Nevertheless, Theodore Sider (2008) does take the strategy seriously, and attempts to offer a recipe of this kind for coincidentalists.

More specifically, Sider admits that strong global supervenience relation[1] is held between modal features and nonmodal features of objects:

[1]"...roughly: any nonmodal isomorphism from a possible world to a possible world is a modal isomorphism." (Sider, 2008: 614)

> I grant Bennett and Shagrir's criticisms: if there really exist modal properties and relations, and if these are not "brute" (an assumption I will not question), then, I concede, these must strongly globally supervene on nonmodal properties and relations. (2008: 614)

And because of strong global supervenience of the modal on the nonmodal, Sider denies any modal difference between coincident objects. More precisely, according to Sider,

> Strong global supervenience prohibits the existence of a modal property had by one of Lump1 and Goliath but not the other. (2008: 615)

And

> In addition to requiring that nonmodally indiscernible objects have the same modal properties, strong global supervenience also requires that nonmodally indiscernible pairs of objects stand in the same modal relations. (*ibid.*)

The above literature evidence shows that Sider does intend to argue (i), the claim that coincident objects do not differ modally. What about (ii)? Again, let Sider speaks for himself:

> But the coincidentalist does not want to utterly forsake modality. (It was modality, after all, that led the coincidentalist to distinguish Lump1 from Goliath in the first place.) (*ibid.*)

As should be evident, Sider also intends to argue for (ii) at the same time. Thus Sider indeed tries to answer the grounding problem by blocking its first step.

Then what is Sider's specific recipe? Sider argues that the grounding problem can be answered if modal properties are replaced by certain modal relations,

i.e. **opposite-possibly *F*** and **same-possibly *F***, since these modal relations are able to differentiate coincident objects without leading to any modal difference between coincident objects.

Let's take a close look at Sider's substitutes for modal properties. Sider first defines binary modal modifiers *same-possibly* and *opposite-possibly* as follows:

> x and y are *same-possibly F* iff x and y are identical or coincident, and everything to which either is identical or coincident is *possibly F*.
> x and y are *opposite-possibly F* iff x and y are coincident and exactly one is *possibly F*. (2008: 617)

Sider then suggests that binary modal predicates such as *same-possibly F* and *opposite-possibly F* denote binary modal relations **being same-possibly *F*** and **being opposite-possibly *F***. And these modal relations rather than modal properties are used to account for modal features of objects.

According to Sider, his modal relations are analogous to the relation **being opposite-handed** and the relation **being same-handed**. Though the instantiations of these relations are normally accompanied with the instantiations of certain properties, i.e. **being left-handed** and **being right-handed**; the instantiations of these relations do not require the instantiations of corresponding properties. Consider a pair of simply-designed, indiscernible gloves, my left hand can wear either of them, which suggests that there is no matter of fact about which glove is left-handed. In other words, the property **being left-handed** is not instantiated by either of the gloves. The same moral goes for the property **being right-handed**. Nevertheless, the pair of gloves does instantiate the relation **being opposite-handed** together and each glove instantiates the relation **being same-handed** to itself, if **being opposite-handed** and **being same-handed** are relations. Apply this reasoning to the relation **being same-possibly *F*** and the relation **being opposite-possibly *F*** , they can be instantiated without the instantiations of the property **being possibly *F*** and the property **not being possible *F***. And this is the key reason why modal relations can replace modal properties and account for modal features of objects.

According to Sider's definition, Goliath and Lump1 bear an opposite-possibly relation, **opposite-possibly surviving being squashed**, since

one is possibly surviving being squashed and the other is not possibly surviving being squashed. An amorphous lump which does not coincide with anything bears a same-possibly relation, **same-possibly surviving being squashed** to itself, for it is possibly surviving being squashed.

Since there is no monadic property **possibly *F***, but only binary relations **opposite-possibly *F*** and **same-possibly *F***, the semantic assignments of "possibly *F*" are governed by the modal relations **opposite-possibly *F*** and **same-possibly *F***. More specifically, according to Sider:

> If x and y are **opposite-possibly *F***, then every monadic assignment must count one of x and y as being possibly *F*. If x and y are **same-possibly *F***, then every monadic assignment must count both x and y as being possibly *F*. (2008: 619)

How do Sider's modal relations answer the grounding problem? Or put it in another way: how do these modal relations fulfill requirements (i) and (ii)? Opposite-possibly relations are used to differentiate coincident objects: according to the definition of *opposite-possibly F*, only coincident objects can bear opposite-possibly relations. Since coincidence relation is irreflexive, so are opposite-possibly relations. Irreflexive relations are able to distinct their relata. Thus, opposite-possibly relations offer reasons to think coincident objects are indeed distinct. The first requirement is supposed to be fulfilled.

What about the other requirement, which does not permit any modal difference between coincident objects? Firstly, since there are only modal relations, there is no modal property that one of the coincident objects lacks and the other one has. Secondly, Sider takes his modal relations to be symmetric. Coincident objects x and y are **opposite-possibly *F*** iff y and x are **opposite-possibly *F***, x and y thus do not differ in opposite-possibly relations they bear with each other. And the second requirement is supposed to be fulfilled.

3.2. Against Sider I

Many questions can be raised against Sider's account. For example, it can be asked how ordinary modal claims such as "Goliath cannot survive being

squashed" is reconstructed. The constraint from **being opposite-possibly surviving being squashed** is that only one of Goliath and Lump1 is possibly surviving being squashed, but the relation does not tell which one is possibly surviving being squashed. Does that mean there are also claims like "Goliath can survive being squashed"?

Moreover, it can also be asked about Sider's opposite-possibly relations. Some philosophers[2] think that relata are metaphysically prior to relations, so the instantiations of irreflexive relations depend on the existence of numerically distinct objects. If this is right, then Sider cannot use irreflexive relations to show that there are distinct objects. Rather, in order to show the instantiations of irreflexive relations, the existence of distinct objects are required.

Though thought-provoking, the above questions are not knock-down objections to Sider's account. For the first question, Sider has offered an elaborated answer in his paper. Briefly, Sider denies that ordinary names like "Goliath" and "Lump1" have determinate reference, and thinks the assignments of names are coordinated with the assignments of monadic modal predicates. In this way, "Goliath" and "possibly surviving being squashed" will not be assigned together, and thus the sentence "Goliath can survive being squashed" is never true.[3] And as for the second one, Sider could just deny the assumption that relata are metaphysically prior than relations.

There might be plausible ways of replying to the above questions. But these questions and their answers should come only if it has been proved that Sider's answer is successful. By this I mean that, if there are still modal differences between coincident objects, then the first step of the grounding

[2]The issue is implicitly discussed in the debate about the Principle of the Identity of Indiscernibles. See French (2008), Hawley (2009) and Saunders (2006).

[3]"First, let monadic assignments assign referents to names. Second, when names are "penumbrally connected" to monadic modal predicates (as 'Lump1' and 'Goliath' are connected to 'possibly survives being squashed'), require assignments to coordinate what they assign to names with what they assign to monadic modal predicates. Thus, a monadic assignment must assign to 'Lump1' whichever of our two objects it assigns as the thing that possibly survives being squashed, and it must assign the other of the two objects as the referents of 'Goliath'. As a result, sentences like 'Lump1 possibly survives being squashed' and 'Goliath does not possibly survive being squashed' turn out supertrue, despite the fact that neither 'Lump1' nor 'Goliath' has "determinate" reference; each denotes different things in different monadic assignments." (Sider, 2008: 620-621)

problem is not blocked. Thus, modal differences between coincident objects alone are sufficient for knocking down Sider's recipe.

Now, the most significant question is whether Sider succeeds in avoiding modal differences.

Given that Sider's modal relations are symmetric, it is tempting to follow Sider and think that coincident objects do not differ in modal relations, since coincident objects do not differ in the relations they bear with each other. Thus, Goliath bears **opposite-possibly surviving being squashed** to Lump1; and Lump1 also bears **opposite-possibly surviving being squashed** to Goliath. Furthermore, both Goliath and Lump1 lack **possibly surviving being squashed**, because there are no modal properties at all. Now, how could there be a difference?

Unfortunately for Sider, there are indeed modal differences. And the differences are not difficult to find: If x and y are coincident, then according to Sider, an opposite-possibly relation is used to differentiate them. In other words, x and y bear an opposite-possibly relation to each other. Nevertheless, as I have shown above, opposite-possibly relations are irreflexive, so for any object, it does not bear any opposite-possibly relation to itself. That is why x does not bear the same opposite-possibly relation it bears to y, to itself. Thus, x and y bear different modal relations to x, and there are modal differences between coincident objects.

Use Goliath and Lump1 as an illustration: according to Sider, Goliath and Lump1 stand in **opposite-possibly surviving being squashed**. However, Goliath and Goliath do not stand in **opposite-possibly surviving being squashed**. Therefore, Goliath and Lump1 bear different modal relations to Goliath, and there is a modal difference between Goliath and Lump1.

The very same objection can be reformulated reversely. And surprisingly, we can borrow Sider's own words against himself:

> In addition to requiring that nonmodally indiscernible objects have the same modal properties, strong global supervenience also requires that nonmodally indiscernible pairs of objects stand in the same modal relations. So the posited modal relations between Lumpl and Goliath must also hold between any

> pair of objects indiscernible from Lumpl and Goliath. Indeed, since the pair <Lumpl, Goliath> is nonmodally indiscernible from the pair <Goliath, Lumpl>, the posited relations must be symmetric as between Lumpl and Goliath. (Sider, 2008: 615)

By using the same reasoning, we can get:

> ... since the pair <Goliath, Lump1> is nonmodally indiscernible from the pair <Goliath, Goliath>, the posited relations must be reflexive.

But not only, according to Sider's definition, are opposite-possibly relations are irreflexive, but Sider also cannot afford to take all modal relations to be reflexive. Irreflexivity, after all, was the reason to think that coincident objects are indeed distinct. Though formed in different ways, both versions show that from Sider's point of view, difference and differentiation are actually not compatible with each other.

According to Quine (1976), there are three grades of discernibility:

> A sentence in one variable *strongly discriminates* two objects if satisfied by one and not the other. A sentence in two variables *moderately discriminates* two objects if satisfied by them in one order only. A sentence in two variables *weakly discriminates* two objects if satisfied by the two but not by one of them with itself. (1976: 116)

The three grades above can be borrowed to analyze Sider's account. Suppose the simplest scenario about coincidence[4], that is only two objects coincide with each other, then

[4]For the reason of this supposition, see the next section.

(i) Since Sider denies all monadic modal properties and only accepts modal relations between objects which occupy the same spatio-temporal region and share the same underlying matter[5], there is no modal sentence in one variable satisfied by one of the coincident objects but not the other. Thus the two coincident objects are not strongly discernible.

(ii) Since Sider's modal relations are symmetric, there is no modal sentence in two variables satisfied by two objects in one order but not in its reverse. That is to say, by using opposite-possibly and same-possibly relations, the two coincident objects are not moderately discernible. So far, so good.

(iii) However, since Sider's opposite-possibly relations are irreflexive, there are indeed modal sentences in two variables satisfied by the two but not by any of them with itself. That is to say, coincident objects are weakly discernible by opposite-possibly relations.

In light of the above analysis, it is not hard to see that Sider manages to lower the grade of discernibility from strong to moderate by rejecting modal properties. and from moderate to weak by endorsing symmetric modal relations. And yet, coincident objects are discernible in a weak sense; and as I have shown, there are modal differences between these weakly discernible objects.

A diehard[6] may wish to disclaim the differences I found. She may say, for example, that

> Yes, Goliath bears **opposite-possibly surviving being squashed** with Lump1. And although you are right about Lump1 does not bear the same relation with Lump1, there is nothing that I should worry about. Because Lump1 also bears **opposite-possibly surviving being squashed** with Goliath, Lump1 and Goliath bear the same relation!

[5]See Sider's definitions of *opposite-possibly* and *same-possibly*.
[6]Thank Sonia for raising the issue.

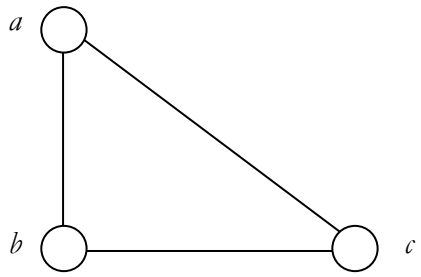

FIGURE 3.2.1. *Three Spheres in a Triangle*

I think the diehard is right about Lump1 and Goliath bear the same relation, **opposite-possibly surviving being squashed**. But bearing the same relations does not entail that there is no difference in relations. I realize that this claim is a bit of puzzling, so I slow down and explain from the start.

Given a relation and its relata, there are two candidates for accounting the difference in relations, one is *bearing* ***R*** *simpliciter* (***R*** is a relation) and the other is *bearing* ***R*** *to a*. If the former is used to account for the difference in relations, then

(DR1) two objects differ in relations iff the two bear different relations.

If the latter is used to account for the difference in relations, then

(DR2) two objects differ in relations iff the two bear different relations to the same objects.

Now the question is which one. Suppose, for *reductio*, that the former rather than the latter is used for accounting for difference in relations, that is (DR1) is right while (DR2) is wrong. Consider an universe where there are exactly three spheres, a, b, c; these spheres are qualitatively identical, and they are arranged in a right triangle: a is 3 miles from b, b is 4 miles from c, and c is 5 miles from a. (See Figure 3.2.1)

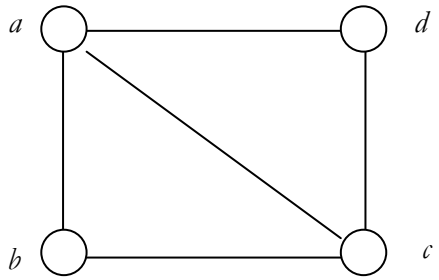

FIGURE 3.2.2. *Three Spheres in a Rectangle*

According to (DR1), a and b differ in relations, for a but not b bears the relation **being 5 miles from**, and b but not a bears the relation **being 4 miles from**. So far, so good.

But suppose that later in the universe, a fourth sphere d, which is qualitative identical with a, b, and c, is added. d is 4 miles from a, 5 miles from b, and 3 miles from c. Now the four spheres are arranged in a rectangle. (See Figure 3.2.2)

According to (DR1), a and b now do not differ in relations, for both a and b bear the relation **being 3 miles from**, the relation **being 4 miles from**, and the relation **being 5 miles from**. The original difference between a and b is eliminated by adding an object! But neither a, nor b, nor c has moved. If there is a difference between a and b in the right triangle, shouldn't there also be a similar difference between a and b in the rectangle? After all, the rectangle does contain the right triangle.

Unlike (DR1), (DR2) offers plausible explanations: in the earlier right triangle situation, a and b differ in relations, because they bear different relations to c: a but not b bear **being 5 miles from** c, b but not a bear **being 4 miles from** c. In the later rectangle situation, a and b also differ in relations. Similar to the triangle case, bearing different relations to c is sufficient for thinking that a and b differ in relations. Moreover, the added object, d, can also be used for showing that a and b differ in relations: a but not b bear **being 4 miles from** d, b but not a bear **being 5 miles from**

d. Hence adding *d* does not eliminate differences between *a* and *b*, rather it adds differences between the two objects.

This is why I think that (DR2) is better in accounting for difference in relations. That is objects' difference in relations is better understood as their bearing different relations to the same objects. If I am right about this point, then the diehard's objection is undermined.

There is another objection. The diehard would be knocked-down if she grants the existence of fusions of coincident objects. Now if the fusion of Goliath and Lump1 exists, let's call it Goli-Lum, then Goli-Lum has the modal feature **having its components being opposite-possibly surviving being squashed**. But neither Goliath nor Lump1 has the modal feature. And yet, since Goli-Lum and Lump1 (or Goliath) occupy the same spatio-temporal region and share the same matter, according to the definition of coincidence, Goli-Lum and Lump1 (or Goliath) are coincident objects. But these two coincident objects have different modal features, which is the price Sider's strategy cannot afford.

It is should be clear by now that coincident objects bear different modal relations to the very same thing, and thus differ in modal relations. This is why the grounding problem can be reformulated for Sider: for any two coincident objects x and y, what grounds that y but not x bear **opposite-possibly *F*** to x, given that x and y occupy the same spatio-temporal region and share the same underlying matter?

3.3. Against Sider II

The above objection, though devastating, is not Sider's only problem related to modal differences. His opposite-possibly relations also commit him to a dualistic view about coincidence. In other words, in order to avoid modal differences, Sider needs to say that (i) there are coincident objects, but (ii) there is no case in which three objects coincide with one another.

Proof. Suppose for *reductio* that there is a case in which object x, y, z are coincident with one another and they do not differ modally with one another.

Since x and y are coincident, there is an opposite-possibly relation, say **opposite-possibly** $\boldsymbol{G}$, borne by x and y. Meanwhile, since y and z are modally indiscernible, x and z bear **opposite-possibly** $\boldsymbol{G}$ with each other. Similarly, since x and y are modally indiscernible, y and z also bear **opposite-possibly** $\boldsymbol{G}$ with each other.

Now according to the definition of *opposite-possibly*, either x is *possibly* G, or x is not *possibly* G.

Suppose that x is *possibly* G, since x and y are **opposite-possibly** $\boldsymbol{G}$, y is not *possibly* G. Likewise, since x and z are **opposite-possibly** $\boldsymbol{G}$, z is not *possibly* G; since y and z are **opposite-possibly** $\boldsymbol{G}$ and y is not *possibly* G, z is *possibly* G. Thus, if x is *possibly* G, then z is and is not *possibly* G.

Suppose that that x is not *possibly* G, since x and y are **opposite-possibly** $\boldsymbol{G}$, y is *possibly* G. Likewise, since x and z are **opposite-possibly** $\boldsymbol{G}$, z is also *possibly* G; since y and z are **opposite-possibly** $\boldsymbol{G}$ and y is *possibly* G, z is not *possibly* G. Thus, if x is not *possibly* G, then z is and is not *possibly* G.

Either way, z is and is not *possibly* G. The suppositions lead to a contradiction.

Therefore, if coincident objects do not differ modally, then there is no case in which more than two objects coincide with one another. □

Sider might be willing to restrict the number of coincident objects to "2" in every case of coincidence. But this commitment is problematic, because it is easy to find cases, even cases about statues, in which more than two objects coincide with one another:

Case 1. Mona Lisa stamp: (i) First consider a picture of Mona Lisa, coincidentalists would say that there is one picture of Mona Lisa and one piece of paper, the former but not the latter essentially has a certain pigment arrangement; and the picture and the piece coincide with each other. (ii) Then consider a stamp; coincidentalists would say that there is a stamp and one piece of paper, the former but not the latter is essentially shaped with perforations; the stamp and the piece coincide with each other. (iii) Finally, consider a Mona Lisa stamp, normally coincidentalists would say that there are a picture of Mona Lisa, a stamp and a piece of paper coincide with one another.

For the picture and the stamp are not identical: a picture of Mona Lisa is not essentially shaped with perforations, and a stamp does not essentially have the pigment arrangement for Mona Lisa.

Case 2. World Cup: Similarly, first consider 2010 World Cup (which is not cup-shaped); then consider an alloy cup; at last, consider 1962 World Cup (which is cup-shaped). A piece of alloy, a trophy and a cup coincide with one another.

Case 3. Performance Artist: Similarly, first consider a person; then consider a statue; at last consider a performance artist who is statue-shaped. A person, a body and a statue coincide with one another.

Case 4. Statue-shaped Weight: Similarly, first consider a statue-shaped alloy; then consider an alloy weight; at last, consider a statue-shaped weight which is made of alloy. One statue, one piece of alloy, and one weight coincide with one another.

Case 5. Statue-shaped Coin: Similarly, first consider a statue-shaped alloy; then consider an alloy coin; at last consider a statue-shaped coin. A coin, a statue and a piece of alloy coincide with one another.

Given the above cases, how could Sider keep his dualistic commitment if he is willing to make one? The only way is to reject the existence of some objects above. But which objects are rejected? I think any positive answer to that question involve some arbitrariness. Coincident objects are thought to be distinct because they are linked to different modal intuitions. To reject some but not all coincident objects above, a contrast within modal intuitions is needed. By this I mean, only some modal intuitions are treated seriously, they indicate opposite-possibly relations borne by coincident objects, while other modal intuitions are ignored. But what make the ignored intuitions the less privileged? And what are the metaphysics of these modal intuitions? It is really hard to make good sense of the dualistic picture, and I think this problem is sufficient to undermine Sider's account.

3.4. Generalization

I think either of the above arguments is able to show that Sider fails to block the first step of the grounding problem. But it might be suggested that

the failure of opposite-possibly relations and same-possibly relations does not mean the failure of other modal relations. So now, I generalize my first objection to all modal relations and thereby suggest the approach to block the first step is a dead-end.

According to Sider's definitions of *opposite-possibly* and *same-possibly*, if two objects bear a modal relation, then they are either identical or coincident. This means his modal relations are always borne by objects occupying the same spatio-temporal region and sharing the same underlying matter. So let's first consider the BINARY MODAL RELATIONS BETWEEN OBJECTS WHICH OCCUPY THE SAME REGION AND SHARE THE SAME MATTER. Is any relation as such able to differentiate coincident objects without leading to modal differences? The answer is *no*.

Suppose that there are only modal relations between objects occupy the same spatio-temporal region and share the same underlying matter. Suppose further that coincident objects do not differ modally. If two objects occupy the same spatio-temporal region and share the same underlying matter, whether they are either identical or coincident, then they do not differ modally. Thus,

(i) For all object x, y and all modal relations R, if x and y bear R to each other, then x and y occupy the same spatio-temporal region and share the same underlying matter. According to the supposition, x and y do not differ modally. So x and x also bear R to each other. The posited relations are reflexive.

(ii) For all object x, y and all modal relations R, if x and y bear R to each other, then x and y occupy the same spatio-temporal region and share the same underlying matter. According to the supposition, x and y do not differ modally. x and y bear R to each other, and x and y do not differ modally, so x and x bear R to each other. x and x bear R to each other, and x and y do not differ modally, so y and x also bear R to each other . Thus, if x and y bear R to each other, then y and x bear R to each other. The posited relations are symmetric.

(iii) For all object x, y, z, and all modal relations R, if x and y bear R to each other, y and z bear R to each other, then x, y and

> z occupy the same spatio-temporal region and share the same underlying matter. According to the supposition, x, y and z do not differ modally. x and y bear R to each other, and there is no modal difference between y and z, so x and z also bear R to each other. Thus, if x and y bear R to each other, y and z bear R to each other, then x and z bear R to each other. The posited relations are transitive.

Given reflexivity, symmetry and transitivity, no matter what the relations are, they are equivalence relations. However equivalence relations are not sufficient for numerical diversity. Consider identity relation, it is an equivalence relation. Suppose, for *reductio*, that equivalence relations are sufficient for numerical diversity, then identity relation is also sufficient for numerical diversity. But this is a contradictory claim. How can the relata of identity relation be both identical and distinct? Therefore, coincidentalists cannot appeal to the modal relations between objects occupying the same spatio-temporal region and share the same matter .

But what about BINARY MODAL RELATIONS BETWEEN OBJECTS WHICH OCCUPY DIFFERENT REGIONS AND HAVE DIFFERENT UNDERLYING MATTER? The answer is *no*.

Recall that under this approach, coincident objects are differentiated by a modal relation. The only way of differentiating coincident objects of using this kind of relation is to show that coincident objects bear different modal relations to a third object. But if coincident objects bear different modal relations to other objects, then they differ modally. Thus, coincidentalists cannot appeal to modal relations between objects occupying different spatio-temporal regions and having different matter.

What about BINARY MODAL RELATIONS WITHOUT RESTRICTION ON THE SPATIO-TEMPORAL REGION AND UNDERLYING MATTER OF RELATA? The answer is *no*.

Suppose relations as such work, then for any two coincident objects, either they are differentiated by relations between objects occupying the same region and sharing the same matter, or by relations between objects occupying different regions and having different matter. If it is the former,

then a binary relation between objects occupying the same region and sharing the same matter can be reformulated. The reformed relation is able to do the work. Likewise, if it is the latter, then a reformed relation between objects occupying different regions and having different matter can do the work. But I have shown above, there are no such relations, so the supposition is false. Coincidentalists cannot appeal to binary modal relations with no restriction on the spatio-temporal region and the underlying matter of relata.

Now it is clear that all binary modal relations are not able to differentiate coincident objects without leading to modal differences. But what about N-ARY RELATIONS ($n > 2$)? The answer is still *no*.

Suppose that coincident objects x, y are differentiated by one n-ary relation ($n > 2$). At least one of the relata is neither x nor y, otherwise a binary relation can be reformulated to do the job; and I have shown that binary relations are not eligible. Furthermore both x and y are the relata of this relation; otherwise the relation is not even relevant and how could it differentiates x and y? Thus, if coincident objects x, y are differentiated by the n-ary relation, then they can also be differentiated by a ternary relation $<x, y, <z_1, z_2, ..., z_k>>$, and neither x nor y appears in $<z_1, z_2, ..., z_k>$.

However if the ternary relation above is able to differentiate x and y, then the similar relation $<x, x, <z_1, z_2, ..., z_k>>$ is also able to differentiate x and x. Meanwhile, since there is no modal difference between coincident objects, the latter relation is indeed borne by x and $<z_1, z_2, ..., z_k>$. And x and x are indeed differentiated. This is a contradiction, thus the supposition is false.

Suppose that coincident objects x, y are differentiated by n-ary relations ($n > 2$). For the same reasons I stated above, which are to avoid binary relations to be reformulated and to be relevant to x and y, there is a relation borne by x, y and some other object among the differentiators. The relation can be reformulated as $<x, y, <z_1, z_2, ..., z_k>>$ (neither x nor y appears in $<z_1, z_2, ..., z_k>$). Now, which relation(s), with the help of this one, can differentiate coincident objects? The possible candidates are $<x, x, <z_1, z_2, ..., z_k>>$ and $<y, x, <z_1, z_2, ..., z_k>>$. But both would lead to modal differences between coincident objects. Therefore, n-ary modal relations cannot differentiate coincident objects without modal differences.

This ends the generalization.

Upshot

Sider's modal relations fail to block the first step of the grounding problem. Furthermore, no modal relation can differentiate coincident objects without leading to modal differences. The first tentative way to avoid the grounding problem fails.

Chapter 3 focus on only one way of replying to the grounding problem. Thus, the failure of this reply does not entail that coincidentalists cannot answer the grounding problem. For readers who have interests in other ways of replying, please see relevant sections in chapter 2, chapter 4, and chapter 5.

CHAPTER 4

Modality and Trans-World Relations

Abstract. Chapter 2 shows that for coincidentalists, there are three ways of avoiding the grounding problem. Chapter 3 criticizes the first way, and shows it leads to a dead-end. Chapter 4 deals with the second and the third way, and argues that the grounding problem is very real for coincidentalists. This upshot is reached in an indirect fashion: By noticing a certain coordination between *de re* modality and trans-world relations, I first attempt to block the second step of the grounding problem by grounding *de re* modality in trans-world relations. I then argue that the attempt fails, for trans-world relations cannot be unproblematically ungrounded. Finally, I show that coincidentalists have an unsolvable grounding problem about trans-world relations, for those relations can neither be unproblematically grounded nor be unproblematically ungrounded. Hence, even if coincidentalists, e.g. those who use Bennett's recipe, succeed in showing they don't have a grounding problem about modal features of objects, they still face a similar problem about trans-world relations.

4.1. Grounding Modality

As I showed in chapter 2, the second step of the grounding problem is that if there are modal differences between coincident objects, then modality is ungrounded. One approach to the grounding problem is to block the step, that is, to argue modal differences and grounded modality are compatible. And the best way of showing the compatibility is to find the eligible grounders of modal features.

Since there are modal differences between coincident objects, no matter what the grounders of modal features are, coincident objects also differ in those grounders. The reason is the generalization of why coincidentalists cannot ground the modal in the nonmodal when there is no nonmodal difference. Suppose coincident objects do not differ in the grounders, then they do

not differ in the groundees, i.e. modal features. By contraposition, if coincident objects differ in modal features, then they also differ in the grounders of modal features.

The grounders of modal features are either monadic properties or n-adic relations. If they are monadic properties, then there is a property Goliath has and Lump1 lacks, or Goliath lacks and Lump1 has, which grounds the fact that Lump1 but not Goliath could survive being squashed. If they are n-adic relations, then there is a relation and there is an object such that only one of Goliath and Lump1 bear the relation to the object. And the relation grounds the different modal features had by Goliath and Lump1.

It is worth reiterating that offering the grounders of modality might be a vulnerable answer to the grounding problem. Because there are differences between coincident objects in the grounders of modality, a similar question can be raised: what grounds the grounders of modality? Surely the grounders of modality can also be grounded in further grounders and the further grounders can be grounded in even further grounders. But the tracing must stop somewhere. In other words, if modality is grounded, then there are ultimate grounders. These grounders ground modal features of objects, but they themselves are not grounded in anything. Coincidentalists using the strategy still have to accept some ungrounded features of objects. And if these features are ungrounded in a problematic fashion, then coincidentalists are still haunted by the grounding problem.

Good news for coincidentalists: that a thing is ungrounded does not automatically entail it is problematically ungrounded. Even anti-coincidentalists have to admit that some ungrounded features are not problematic. The above moral applies to them too: either modal features of objects are ungrounded, or they are grounded by some ungrounded features. Either way, there are ungrounded features. If an anti-coincidentalist does insist that all ungrounded features are problematic, then she has a similar grounding problem. In that case, since every theory has the problem, no theory really has the problem.

Hence, there are two tasks for the coincidentalists who want to block the second step of the grounding problem: (i) they need to show in what are

modal features grounded; (ii) second, they need to argue that the (ultimate) grounders of modal features are ungrounded in an unproblematic way.

Now I attempt to produce a recipe for coincidentalists in fulfillment of the above requirements.

Given possible worlds talk, there are trans-world relations between individuals in different possible worlds. One noticeable phenomenon is that *de re* modality is coordinated with trans-world relations, which can be captured by the following scheme[1]: for all objects o, o^*, for all properties F, and for all relevant trans-world relations TWR,

(S) o is essentially F iff o is F and for all o^* such that $oTWRo^*$, o^* is F.
o is accidentally F iff o is F and there is o^* such that $oTWRo^*$, and o^* is not F.

There are several clarifications regarding the above scheme:

(i) The scheme assumes possible world talk, which might need a defense. Here I neither challenge nor defend the talk. My potential audience is the group of people who are willing to accept possible world talk. Due to the use of possible worlds in metaphysics, epistemology, philosophy of language, formal semantics, etc., the talk has already gain some currency among the contemporary philosophers.

(ii) Those who agree with the use of possible world talk may still disagree about the nature of possible worlds. Modal realists, e.g. David Lewis, think that possible worlds are concrete, while modal ersatzists take possible worlds to be abstract. The coordination characterized by the above scheme is neutral about the nature of possible world.

(iii) The quantification above includes both actual objects and possible objects, a.k.a. possibilia. If not, there is no resource for thinking of objects in different possible worlds.

(iv) The trans-world relation, TWR, is not just any relation between objects in different worlds. For example, though similarity relation can hold between objects in different worlds, it is not a trans-world relation in the

[1]Some philosophers are explicit about the coordination, e.g. David Lewis, 1986 and L. A. Paul, 2006a & 2006b.

above sense. Only some relations between objects in different worlds are trans-world relations in this sense. For example, according to modal realism with overlap, one individual can wholly present at different worlds, so there are trans-world identity relation between objects in different possible worlds. And trans-world identity is the paradigmatic trans-world relation. But trans-world relations do not just include trans-world identity. This is because some philosophers, e.g. Lewis, deny trans-world identity relation, and offer counterpart relation[2] as an alternative. The substitute of trans-world identity is also counted as trans-world relation. Though there are various trans-world relations, the scheme above is neutral about the nature of trans-world relations.

(v) The scheme is also neutral about the logical features as well as metaphysical features of trans-world relations. That is the scheme itself does not require trans-world relations to be reflexive, nor symmetric, nor transitive. Also, the scheme does not inform us whether trans-world relations are qualitative or internal.

One way of explaining the coordination is to say that *de re* modality is grounded in trans-world relations. An F-object is essentially F, because it is not trans-worldly related to any *non-F* object. And an F-object is accidentally F, because it is trans-worldly related to some *non-F* object. There are also other ways of explaining the coordination. It might be suggested that trans-world relations are grounded in *de re* modality, or both *de re* modality and trans-world relations are grounded in other features.

The first explanation to the coordination offers coincidentalists a tentative solution to the grounding problem. Coincidentalists might want to argue that modal features of objects are grounded in trans-world relations. And trans-world relations ground the fact that Lump1 but not Goliath could survive being squashed: Lump1 but not Goliath is trans-worldly related to some squashed objects.

As I argued, finding grounders for modal features is just a start, since coincidentalists also need to show that the grounders themselves do not have a similar grounding problem. One way of doing that is to find something else to ground trans-world relations, and show it is not problematic for the grounders of trans-world relations to be ungrounded. But this is less relevant

[2]Lewis's counterpart relations are underpinned by similarities relations. But this does not mean that similarities relations themselves are trans-world relations.

to the current discussion. Given the transitivity of the grounding relation, if trans-world relations are just media, why not appeal to the grounders of trans-world relations directly, which falls under the third way of explaining the coordination?Another way of blocking the grounding problem for trans-world relations is to argue that trans-world relations are ungrounded in an unproblematical fashion. Let's see whether trans-world relations can be unproblematically ungrounded.

4.2. Trans-World Relations: Unproblematically Ungrounded?

In section 2.4, I showed two ways of making sense of ungrounded features. One is appealing to empirical discernibility. The reason why the nonmodal features of objects are good candidate grounders of the modal features of objects is that the former are empirically discernible while the latter are not. The difference in epistemological status privileges one over the other. The other way is appealing to the principle of plenitude. Since every possible way is there, no fuss should be made about some ways among them. The principle of plenitude has already helped make sense of the candidate grounders of *de dicto* modality, possible worlds. Furthermore, it has been used by Karen Bennett (2004b) to defend ungrounded *de re* modal features of objects.

Are these two points able to help coincidentalists make sense of ungrounded trans-world relations? Since we do not have empirical access to transworld relations, empirical discernibility does not apply to this case. Then what about the principle of plenitude?

As I showed in section 2.4, the principle of plenitude is rooted in (re)combination. Now a natural question is: if the principle applies to ungrounded trans-world relations, what are elements (re)combined? Coincidentalists cannot (re)combine objects in different possible worlds, for them if o and o^* are in different worlds, then either o is trans-worldly related to o^*, or not; o and o^* cannot be both trans-worldly related and not trans-worldly related. Otherwise, given the coordination, one object is both essentially F and accidentally F, and the modal differences between coincident objects are just illusions.

Notice that the whole proposal here is to ground an object's modal features in the trans-world relations it bears to other objects in other worlds. What matters in this scheme is not the identities of other objects, but rather

the corresponding nonmodal features of those objects. And nonmodal features of objects are grounded in the spatio-temporal properties and underlying matter of objects. Since coincidentalists already think that distinct objects can occupy the same spatio-temporal region and share the same underlying matter, spatio-temporal regions might be what are (re)combined. Moreover, no matter what are (re)combined, the (re)combining relation needs to be somehow related to trans-world relations between objects, the relations proposed to ground *de re* modality. If not, the strategy would be irrelevant to the current discussion.

By noticing all of the above points, I develop a recipe for coincidentalists: I first define transworld relations TWR^R between an object in one possible world and a spatio-temporal region in a different possible world in terms of trans-world relations between objects in different worlds, TWR:

(TWR^R) For any object o and any spatio-temporal region r, o and r are TWR^R- related, iff, o is TWR-related to some object occupying r.

I then apply the principle of plenitude to TWR^R:

(PP) For all spatio-temporal region r, if it is occupied by some object, then it is occupied by distinct objects for all possible ways of TWR^R-related to other regions.

The formulation above is not precise, because not everyone who accept possible worlds talk is a modal realist. For modal ersatzists, who think possible worlds are not concrete, it makes little sense to say spatio-temporal regions in possible worlds. But this does not mean that the recipe, if works, is not available for modal ersatzists. Just like they have substitutes for concrete possible worlds and concrete possible individuals, modal ersatzists have substitutes for spatio-temporal regions. The above recipe can be amended to adopt ersatzists' taste. If modal ersatzists want to copy the above recipe, we can amend (TWR^R) and (PP) as:

($*TWR^R$) For any (actual or possible) object o, and any (real or ersatz) spatio-temporal region r, o and r are $*TWR^R$- related, iff, o is

TWR-related to some object which occupies r or is represented occupying r.

(*PP) For all (real or ersatz) spatio-temporal region r, if it is or is represented being occupied by some object, then it is occupied by distinct objects for all possible ways of $*TWR^R$-related to other regions, both real and ersatz.

But modal ersatzists may want to privilege real spatio-temporal regions, as they do with respect to the actual world. They may only want to admit platitudinous objects in the actual world. And this wish is not difficult to realize. All they need to do is to amend ($*TWR^R$) and (*PP) as:

($**TWR^R$) For any actual object o, and any ersatz spatio-temporal region r, o and r are $**TWR^R$- related, iff, o is TWR-related to some possible object which is represented as occupying r.

(**PP) For all real spatio-temporal region r, if it is occupied by some object, then it is occupied by distinct objects for all possible ways of $**TWR^R$-related to other ersatz regions.

So there are at least three ways of concretizing the recipe.

How does this recipe help coincidentalists answer the grounding problem? The complete answer is: Goliath and Lump1 have different modal properties, Goliath cannot survive being squashed whilst Lump1 can. Since modal features of objects are grounded in transworld relations, Goliath cannot survive being squashed because Goliath is not transworldly related to any squashed object. Likewise, Lump1 can survive being squashed because Lump1 is transworldly related to some squashed objects. Transworld relations ground *de re* modality, but they themselves are not grounded in anything. Furthermore, transworld relations are ungrounded in an unproblematic way, because a certain principle of plenitude holds here. Besides Goliath and Lump1, in the spatio-temporal region coincidence occurs, there are awful a lot of objects which exhaust all the possible ways of transworldly relating to objects with versatile nonmodal features.

The key of the above answers is the principle of plenitude. Without the principle, there is little coincidentalists could say about why ungrounded

features themselves are not problematic. Nevertheless, the same principle might also cause problems for those who use it. By this I mean, the number of objects might be too much even for coincidentalists.

Recall that in section 2.4, one consequence of Bennett's recipe is to accept that a very large number of objects exist. If there are n properties instantiated in a spatio-temporal region, then the coincidentalists' number of objects (in that region) might be very close to 2^n. 2^n might already be a very large number for some. But if n is a natural number, then no matter how large 2^n is, there are still finite objects in any spatio-temporal region.

The same problem is more severe in my recipe. For most who accept possible worlds talk, there is an infinite number of possible worlds. And if there is indeed an infinite number of possible worlds, then there is also an infinite number of spatio-temporal regions for modal realists, and infinite number of substitutes of spatio-temporal regions for modal ersatzists. Now according to my recipe, there are distinct objects for every possible way of trans-worldly related to (real or ersatz) spaito-temporal regions, so there are at least $2^{\aleph_0}$ objects in a spatio-temporal region, if it contains some object. $2^{\aleph_0}$ equals $\aleph_1$, which is the cardinality of the continuum. In English, the price of endorsing my recipe is to accept the existence of unaccountably infinite objects in a single spatio-temporal region. In Bennett's recipe, accepting close to 2^n objects is already quite disturbing. But comparing with $\aleph_1$, 2^n is only one drop in the ocean. I do not believe anyone would feel comfortable with unaccountably infinite objects in one spatio-temporal region. It is then hard to see how the principle of plenitude could help coincidentalists make sense of ungrounded trans-world relations.

The failure of this particular strategy also casts doubt on coincidentalists' second way of avoiding the grounding problem. It is now obscure how the appropriate grounders can be found for *de re* modality. Coincident objects share all their nonmodal features, thus all nonmodal features of coincident objects are not suitable for the job. Moreover my recipe tries to appeal to the nonmodal features of objects which are trans-worldly related to coincident objects. But taking those features as the grounders of modal features of coincident objects, as I argued, leads to an intolerable commitment about the number of objects. Now it seems that for coincidentalists, the nonmodal features of both actual and possible objects cannot help with grounding the modal features of objects.

Similar to the third way of avoiding the grounding problem (see section 2.4), even if coincidentalists find the appropriate grounders and avoid the grounding problem about *de re* modality, which I doubt, it is still not clear whether coincidentalists as such are free from the grounding problem. This is because coincident objects might also differ in other features, and if they do, there are similar grounding problems about those features. It is just unclear whether a successful solution to the grounding problem about *de re* modality also applies to other grounding problems.

4.3. Trans-World Relations: Grounded?

The failure of grounding *de re* modality in trans-world relations, unfortunately, poses a problem for coincidentalists. Unlike nonmodal features of objects, the reason why trans-world relations may serve as the grounders of modal features is that coincident objects do differ in those relations. For coincidentalists who accept possible worlds talk, Lump1 but not Goliath is trans-worldly related to some squashed object. Moreover, as I mentioned, coincident objects' differences in a certain feature may lead to a grounding problem about the feature. Thus, given coincident objects' difference in trans-world relations, coincidentalists may also have a grounding problem about trans-world relations. That is they may be asked what grounds, for example, Lump1's being trans-worldly related to some squashed object and Goliath's not being trans-worldly related to some squashed object.

The grounding problem about trans-world relations is very similar to the grounding problem about *de re* modality; its goal is to show that coincidentalists have to accept ungrounded trans-world relations, and ungrounded trans-world relations are problematic. To avoid the problem, coincidentalists need either to show that trans-world relations are unproblematically ungrounded, or to show that they are unproblematically grounded. Since trans-world relations cannot be unproblematically ungrounded (see section 4.2), if coincidentalists fail to ground trans-world relations, then they have a grounding problem about trans-world relations.

Can coincidentalists ground trans-world relations? Recall the coordination between *de re* modality and trans-world relations:

(S) o is essentially F iff o is F and for all o^* such that $oTWRo^*$, o^* is F.
o is accidentally F iff o is F and there is o^* such that $oTWRo^*$, o^* is not F.

The coordination suggests two ways in which trans-world relations might be grounded: one is to ground trans-world relations in *de re* modality, and the other is to ground both trans-world relations and *de re* modality in other features.

Unfortunately, for coincidentalists, trans-world relations cannot be grounded in *de re* modality. The reason is straightforward: two objects can share all their modal features but differ in the trans-world relations they bear. Consider an object x, let F_e be the conjunction of all x's essential features and F_a be the conjunction of all x's accidental features, then x is essentially F_e and is accidentally F_a. According to the coordination, all objects which x is trans-worldly related to are F_e, and some objects which x is trans-worldly related to are not F_a. So far, so good. Suppose that there is an object y such that (i) y is not trans-worldly related to x, and (ii) y and x are qualitatively identical. Now consider another object x', (i) x' is trans-worldly related to y plus all objects x trans-worldly related to, and (ii) x' and x are qualitatively identical. *Ex hypothesi*, x', like x, is essentially F_e and accidentally F_a. Hence, x and x' share their modal features while differ in the trans-world relations they bear. If trans-world relations are indeed grounded in *de re* modality, then objects like x and x' should be trans-worldly related to the same objects. This is how we see that grounding trans-world relations in *de re* modality leads to a contradiction.

What about other features? It is extremely hard to find the appropriate grounders. Objects bearing different trans-world relations may just share all their nonmodal, modal, and kind features. Due to the lack of the corresponding differences, nonmodal, modal, and kind features cannot ground trans-world relations. But if all the above fail to do the job, what can ground trans-world relations?

There is indeed one candidate grounder haven't been discussed yet. According to some philosophers[3], trans-world relations are underpinned by identity properties, a.k.a thisnesses or haecceities. One advantage of identity

[3]E.g. Plantinga (2003).

properties is that there are indeed corresponding differences if two objects bear different trans-world relations. Hence, for any object o_1, o_2,

> o_1 is trans-worldly related o_2, iff, both o_1 and o_2 share their identity property.

And o_1 but not o_3 is trans-worldly related o_2 is grounded in the fact that o_1 but not o_3 share its identity property with o_2.

Admittedly, trans-world relations may be grounded in identity properties. But this does not soften the grounding problem about trans-world relations for coincidentalists. This is because identity properties are also notoriously mysterious, and if ungrounded, they are ungrounded in a problematic fashion. Thus they are not suitable for ultimate grounders. Moreover, from the coincidentalists' point of view, identity properties also cannot be grounded. If they are grounded by the nonmodal features or the modal features of objects, then given the transitivity of the grounding relation, trans-world relations are also grounded in the nonmodal features or the modal features of objects. But as I showed above, trans-world relations cannot be grounded in such features. If they are grounded by trans-world relations, then the coincidentalists' answer to the grounding problem about trans-world relations is circular, and thus unsatisfactory. Thus, identity properties cannot solve the grounding problem about trans-world relations for coincidentalists.

It now seems that coincidentalists cannot ground trans-world relations. Moreover, as I argued in section 4.2, coincidentalists also fail to show that trans-world relations can be unproblematically ungrounded, they have to accept those relations are ungrounded in a problematical fashion; and the grounding problem about trans-world relations is very real for coincidentalists.

This conclusion has an unfortunate implication for the replies to the grounding problem about *de re* modality. For even if coincidentalists successfully avoid the grounding problem about *de re* modality, they still have a very similar problem about trans-world relations. This is why, from a broader perspective, Bennett's recipe (discussed in 2.4), though succeeded

in making sense of ungrounded modal features, fails to eradicate the grounding problem.

Upshot

Coincidentalists are not able to ground *de re* modality in trans-world relations and avoid the grounding problem (about *de re* modality). Nevertheless, coincident objects' differences in trans-world relations lead coincidentalists to another grounding problem, that is coincidentalists have to take trans-world relations to be problematically ungrounded. And the unsolvable grounding problem about trans-world relations jeopardizes all the ways of avoiding other grounding problems. Hence, the grounding problem is very real and coincidentalists' last hope of replying to the problem is to argue that anti-coincidentalists also have the problem. Whether anti-coincidentalists indeed have the grounding problem will be discussed in section 5.4.

CHAPTER 5

Anti-Coincidentalism

Abstract. Chapter 2 shows how anti-coincidentalists are constrained by the grounding problem: in order to gain advantage by charging coincidentalists with the grounding problem, they need to show themselves do not have similar problems. In chapter 5, I first discuss another constraint on anti-coincidentalism, which comes from the argument from Leibniz's Law. I then show, given both constraints, how anti-coincidentalists' account about *de re* modality is developed.

5.1. The Argument from Leibniz's Law

The classical argument against anti-coincidentalism is the argument from Leibniz's Law, which appeals to both ordinary linguistic intuitions and to the Principle of Indiscernibility of Identicals. The argument got this name because the Principle of Indiscernibility of Identicals is one direction of Leibniz's Law. The argument usually starts from a pair of conflicting linguistic intuitions in the form of:

(1) s is p.
(2) t is not p.

where s and t are singular terms which refer to tentative coincident objects, and p is a predicate. Then the argument moves from linguistic intuitions to metaphysical claims:

(3) $\boldsymbol{x}$ has the property $\boldsymbol{F}$.
(4) $\boldsymbol{y}$ does not have the property $\boldsymbol{F}$.

where $\boldsymbol{x}$, $\boldsymbol{y}$ and $\boldsymbol{F}$ are the referents of s, t and p respectively. The metaphysical claims indicate that object $\boldsymbol{x}$ and object $\boldsymbol{y}$ differ in $\boldsymbol{F}$ property. After

that, the argument introduces the Principle of Indiscernibility of Identicals, that is:

(PII) If $\boldsymbol{x}$ is identical to $\boldsymbol{y}$, then for every property $\boldsymbol{F}$, object $\boldsymbol{x}$ has $\boldsymbol{F}$ if and only if object $\boldsymbol{y}$ has $\boldsymbol{F}$.

Or equivalently (by contraposition):

(PII') If there is at least one property that $\boldsymbol{x}$ has and $\boldsymbol{y}$ does not, or vice versa, then $\boldsymbol{x}$ and $\boldsymbol{y}$ are distinct.

It is entailed by (3), (4), and (PII') that:

(Con.) $\boldsymbol{x}$ and $\boldsymbol{y}$ are not identical.

And (Con.) is incompatible with anti-coincidentalism.

Similar to the grounding problem, the argument from Leibniz's Law can be plugged with modal intuitions. Given the Goliath and Lump1 case, the argument can start from the conflicting modal intuitions:

(1-a) Lump1 can survive being squashed.
(2-a) Goliath cannot survive being squashed.

which support:

(3-a) **Lump1** has the property **being capable of surviving being squashed**.
(4-a) **Goliath** does not have the property **being capable of surviving being squashed**.

Together with (PII'), (3-a) and (4-a) entail:

(Con.-a) **Lump1** and **Goliath** are not identical.

As with the grounding problem, the argument from Leibniz's law can apply beyond *de re* modality; other features can also be plugged into the argument. As Fine (2003) mentions, there are conflicting intuitions about kind properties, such as "Goliath is a statue", "Lump1 is not a statue"; there are conflicting intuitions about evaluative properties, such as "Goliath is badly-made", "Lump1 is not badly-made", "Goliath is Romanesque", "Lump1 is not Romanesque"; there are conflicting intuitions about constitutional conditions, such as "Goliath is made of the piece of alloy", "Lump1 is not made of the piece of alloy"; and there are also conflicting intuitions about mereological conditions, such as "the hand is part of Goliath", "the hand is not part of Lump1". The above intuitions suggest that coincident objects may also differ in the corresponding features. And those differences are equally capable of showing the non-identity between coincident objects.

Notice that the argument from Leibniz's Law is also the start of the grounding problem, that is, coincident objects have different features and thus they are distinct. Some might think that the grounding problem can be used to argue against the argument from Leibniz's Law as a *reductio*. However, the grounding problem, if successfully charged, only shows the problematic consequences of thinking coincident objects have different features. Those consequences themselves shed no light on how to tackle the argument from Leibniz's Law. And if there is no way of tackling the argument, then the grounding problem, if it is a bullet at all, should be the bullet bitten by everyone.

Indeed, the argument from Leibniz's Law is a very strong argument against anti-coincidentalism. If (3), (4) and (PII') are true, then (Con.) cannot be false. But anti-coincidentalists cannot accept (Con.), which is incompatible with their position. So they need to take at least one of (3), (4) and (PII') to be false. But which one(s)? (3) and (4) are supported by robust intuitions (1) and (2). If (3) or (4) are rejected, then it seems anti-coincidentalists commit to counter-intuitive claims. Furthermore, the Principle of Indiscernibility of Identicals is widely accepted by philosophers. It is hard to make sense of claiming that an object both has and lacks the very same property. It seems that the argument from Leibniz's Law does cause a serious trouble.

Luckily for anti-coincidentalists, there is a weak link in the above argument. Although, it makes little sense to argue that (Con.) is not entailed by (3), (4) and (PII') because validity does hold here; and it makes little sense to argue against the Principle of Indiscernibility of Identicals; it does make sense to challenge the link between linguistic intuitions such as (1) and (2) on the one hand, and metaphysical claims such as (3) and (4) on the other. Indeed, in order to reach the final conclusion about coincident objects, coincidentalists need:

(i) the terms s and t (in "s is p" and "t is not p" respectively) refer to the corresponding coincident objects, otherwise, the linguistic intuitions, no matter how robust they are, are irrelevant to the cases about coincidence, and thus are irrelevant to the dispute between coincidentalism and anti-coincidentalism;

(ii) the predicate p signifies the same property in "s is p" and "t is not p". If not, the metaphysical claim about $\boldsymbol{x}$ and $\boldsymbol{y}$ would be: $\boldsymbol{x}$ has the property $\boldsymbol{F}$; $\boldsymbol{y}$ does not have the property $\boldsymbol{F^*}$; and property $\boldsymbol{F}$ is not property $\boldsymbol{F^*}$. This metaphysical claim, together with the Principle of Indiscernibility of Identicals, are not sufficient to show $\boldsymbol{x}$ and $\boldsymbol{y}$ are distinct.

Accordingly, there are two lines for anti-coincidentalists to answer the argument from Leibniz's Law, which is called respectively by Fine (2003: 209) "referential shift" and "predicational shift". The former line is to argue that singular terms like s and t do not refer to coincident objects. $\boldsymbol{x}$ and $\boldsymbol{y}$, though distinct, either occupy different spaito-temporal region and differ in underlying matter, or are just non-material objects. The alternative line is to argue that predicates like p do not signify different properties in the argument, and the antecedent of the Principle of Indiscernibility of Identicals is not satisfied.

I will show how anti-coincidentalists flesh out referential shift and predicational shift in section 5.2 and section 5.3 respectively. Similar to the previous discussion about the grounding problem, I will concentrate on the argument plugged with *de re* modality, but *mutatis mutandis*, the discussion applies to the argument plugged with other features.

5.2. Referential Shift

As I mentioned above, two specific views can be characterized by the name "referential shift". The first one is to argue that the singular terms in the argument from Leibniz's Law refer to objects in a different spatio-temporal regions or with different underlying matter. The second one is to argue that (at least some) singular terms in the argument refer to abstract objects. Let's consider the second one first.

The target of the second strategy is the nature of the objects to which the singular terms refer in the argument from Leibniz's Law. It might be argued that the singular terms in the argument have non-standard referents, e.g. senses; and the non-standard referents rather than the standard referents are the candidates bearers of the corresponding properties. This strategy is *prima facie* feasible. If non-standard referents are what the linguistic intuitions are about, then the best the argument from Leibniz's Law can show is that there is more than one abstract object, and this is compatible with anti-coincidentalism about concrete objects.

Despite its *prima facie* feasibility, the strategy should not be considered seriously by anti-coincidentalists. First, if the strategy is right about the nature of objects in the argument from Leibniz's Law, then abstract objects rather than material objects are the bearers of modal features, kind features, etc.. If that is the case, then material objects only have their modal features and kind features derivatively. However, *de re* modal features and kind features are the paradigmatic features had directly by objects. It makes little sense to claim, for example, Goliath (a material object) itself is not capable of surviving being painted black, or is not a statue.

Second, consider parsimony. One virtue of anti-coincidentalism is it contains less objects in ontology. But if anti-coincidentalists take bearers of modal properties to be abstract, it is then hard to see the difference between the two positions regarding parsimony. Anti-coincidentalists admit the existence of two abstract objects and one concrete object, while coincidentalists admit the existence of two concrete objects. If coincidentalists do not admit the existence of the corresponding abstract objects, they even have less objects in their ontology. Given the above two considerations, I view this

strategy as a merely possible answer to the argument from Leibniz's Law, and will no longer consider it.

The other strategy under the label of referential shift is to argue that the intuitions are not about objects occupying the same spatio-temporal region or sharing the same underlying matter. But before giving an answer under this approach, let's first detour to della Rocca's (1996) recipe for undermining the argument from Leibniz's law.

Della Rocca argues that when the arguments from Leibniz's Law are plugged with modal properties, these arguments are question-begging. Consider one argument from Leibniz's Law:

(1) Goliath is essentially a statue.
(2) Lump1 is not essentially a statue.
Therefore,
(3) Goliath and Lump1 are not identical.

Della Rocca notices that the argument above is analogous to Kripke's classical case:

(4) Molecular motion is essentially molecular motion.
(5) Heat is not essentially molecular motion.
Therefore,
(6) Molecular motion and heat are not identical.

The argument (1) – (3) and the argument (4) – (6) have a similar form, moreover, our intuitions support the premises in both arguments. The only difference between the two is that in the Goliath and Lump1 case, it is unclear whether Goliath and Lump1 are identical, while in the heat and molecular motion case, we have a strong intuition against the conclusion (6).

If someone wants to save her intuitions about (4), (5) and (6), she needs to challenge the validity of the argument (4) – (6). And suppose she succeeds in doing that, then due to the similarity between the two arguments, the strategy might also be able to challenge the validity of the argument (1) - (3).

Actually, Kripke does offer a way of breaking down the argument (4) - (6). The answer is built on the distinction between two uses of properties. According to Kripke, we need to distinguish properties' use of fixing the reference of singular terms from properties' use of giving the meaning of singular terms. Consider the term "Phosphorus" and the property **being the heavenly body which appears in the morning**. The relations between the term and the property are: the latter is used to fix the reference of the former; but the latter does not give the meaning to the former; otherwise, beside Phosphorus, no object could be the heavenly body appears in the morning, and this is unacceptable.

To apply the above distinction to the heat and molecular motion case, we first need to find the property which is used to fix the reference of "heat". Let's say the property is **being sensed by sensation S**. We then need to claim the relation between molecular motion and **being sensed by sensation S** is that molecular motion is what in fact sensed by sensation S. Thus, molecular motion and heat are identical. Furthermore, since the property **being sensed by sensation S**, like the property **being the heavenly body which appears in the morning**, is used to fix the reference of term "heat", it does not give the meaning that producing sensation to S to the term "heat". With the subtle distinction between uses of properties, we now have two ways of interpreting (5). It depends on whether "heat" is a rigid designator. If "heat" is rigid, then (5) is understood as:

(5') It is possible that heat is not molecular motion.

But if "heat" is not rigid, (5) could be understood as:

(5") It is possible that something that is not heat, but is identified in the same way as heat is, is not molecular motion.

Or more precisely:

(5"') It is possible that something that is not heat, but is identified by the property **being sensed by S**, is not molecular motion.

If (5"') or (5") explains the modal intuition (5), then "heat" in (5) does not refer to heat, rather it refers to something sharing the identifying property with heat. So, even if (5) holds, it is irrelevant to heat at all. And the only conclusion could be drawn from the argument is that something which is not the heat, is not molecular motion. The conclusion is compatible with (6), and this is how intuitions about (4), (5) and (6) are all kept.

Della Rocca suggests that given the similarity between (1) - (3) and (4) - (6), a similar answer is available for anti-coincidentalists to break down the argument from Leibniz's Law. More specially, it can be argued that

(2) Lump1 is not essentially a statue.

can be understood in the following two ways:

(2') It is possible that Lump1 is not a statue.

when "Lump1" is rigid. And

(2") It is possible that something that is not Lump1, but is identified as Lump1 is, is not a statue.

when "Lump1" is not rigid. Similarly, (2") and (1) together only show that something other than Lump1 is not identical with Goliath. And the conclusion is compatible with (3).

Does della Rocca block the argument from Leibniz's Law? I think the answer depends on which general view of *de re* modality is adopted. If an anti-coincidentalist denies the existence of *de re* modal features, and think *de re* modal intuitions like (2) are underpinned by *de dicto* modal fact like (2"), then there is no way (3) can be concluded from (2) and (1). On the contrary, if an anti-coincidentalist admit the existence of *de re* modal features, and think that *de dicto* modal facts like (2") are sufficient for objects like Lump1 to have certain modal features, then the argument from Leibniz's Law left unscathed. In other words, even if "Lump1" is not rigid and refers to something else in (2"), in (2) "Lump1" could still be rigid and, again, Goliath but not Lump1 has the modal property **being essentially a statue**. Thus,

della Rocca's gloss works for anti-coincidentalists only if anti-coincidentalists are willing to radically deny objects have *de re* modal features.

Now some may think that della Rocca offers a third reply to the argument from Leibniz's Law. Maybe he does offer a third solution to the argument plugged with modal intuitions. But as I mentioned earlier, like the grounding problem, the argument from Leibniz's Law is not just about *de re* modality. Rather it can also be plugged with kind features, evaluative features, etc.. And since della Rocca's strategy shed no light on how to break other arguments from Leibniz's Law, I do not consider he has successfully answered the argument from Leibniz's Law in general.

But della Rocca does give some hint on how to shift reference, and this may help anti-coincidentalists answer the argument from Leibniz's Law. Recall one argument from Leibniz's Law is:

(7) Goliath cannot survive being squashed.
(8) Lump1 can survive being squashed.
Therefore,
(9) Goliath and Lump1 are not identical.

Anti-coincidentalists could try to argue that (7) and (8) are understood as:

(7') There is an object $\boldsymbol{x}$, such that it is identified in the same way that Goliath is and it cannot survive being squashed.
(8') There is an object $\boldsymbol{y}$, such that it is identified in the same way that Lump1 is and it can survive being squashed.

The conclusion can be drawn from (7') and (8') is just:

(9') $\boldsymbol{x}$ and $\boldsymbol{y}$ are not identical.

And this claim is compatible with anti-coincidentalism. Figure 5.2.1 shows what the argument from Leibniz's establishes if referential shifts occur. According to anti-coincidentalists of this kind, DISTINCT OBJECTS CAN BE IDENTIFIED IN THE SAME WAY; and this is why, for example, Goliath and $\boldsymbol{x}$,

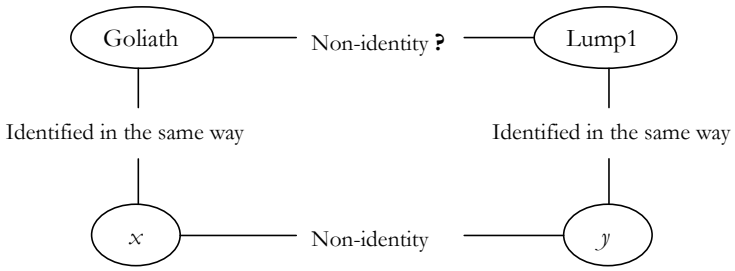

FIGURE 5.2.1. *Referential Shift 1*

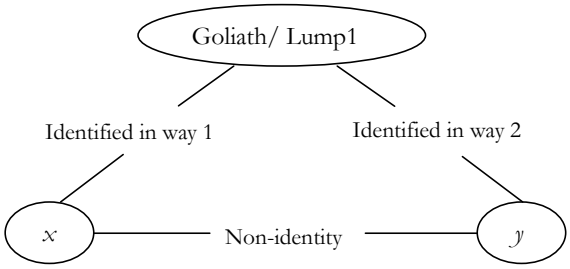

FIGURE 5.2.2. *Referential shift 2*

Lump1 and $\boldsymbol{y}$, can be distinct. Although the argument of Leibniz's Law successfully shows $\boldsymbol{x}$ and $\boldsymbol{y}$ are distinct, it fails to show that Goliath and Lump1 are also distinct. After all, unlike identity relation, non-identity relation is not transitive.

Since anti-coincidentalists think that Goliath and Lump1 are identical, what really happens, according to anti-coincidentalists who use referential shift, is like what figure 5.2.2 characterizes. And there is a consequence of the strategy. Consider Goliath and Lump1, according to anti-coincidentalist,

they are identical; and given referential shift, this very same object is identified in different ways. Thus, for anti-coincidentalists who endorse referential shift, not only can distinct objects be identified in the same way, but also DIFFERENT IDENTIFYING CONDITIONS CAN ATTACH TO THE VERY SAME OBJECT.

This consequence has a further implication. Standardly, identifying conditions are linked to *de re* modal features of objects. More precisely, an object is identified by certain properties because those properties are essential to the object. But anti-coincidentalists who use referential shift have to reject the standard view; otherwise, different identifying conditions lead to different modal properties, and the argument from Leibniz's Law reappears. Thus, anti-coincidentalists need to cut off the connection between identifying conditions and modal features of objects. And it is tempting to think that the disconnection makes little sense, and referential shift does not work well.

Nevertheless, I think that anti-coincidentalists can reply to the above charge. Consider pan-essentialism, according to this view, for all properties and all objects, if a property is had by an object, then the property is essentially had by the object. If pan-essentialism is true, and identifying conditions are underpinned by modal features of objects, then an object is identified by all the (nonmodal) features it has. But surely requiring all (nonmodal) features is too demanding. We don't know all the (nonmodal) features of most objects, if all the (nonmodal) features are required for the purpose of identifying, then most objects are left unidentified. Or consider haecceitism, according to which, for all properties (except identity properties) and all objects, if a property is had by an object, then the property is accidentally had by the object. If haecceitism is true, and identifying conditions connect to the modal features of objects in the above way, then no (nonmodal) property could be used to identify objects. Hence, besides anti-coincidentalists' referential shift, there are at least two theories do not agree with the connection between identifying conditions and *de re* modality. And this may offer a motivation to reject the connection.

Furthermore, pan-essentialism is congenial to anti-coincidentalism with referential shift. Recall one argument from Leibniz's Law is:

(7) Goliath cannot survive being squashed.
(8) Lump1 can survive being squashed.
Therefore,

(9) Goliath and Lump1 are not identical.

What would pan-essentialists say about this argument? Since any property had by an object is essential to the object, so is Goliath's shape property. Thus, Goliath cannot survive being squashed, and (7) is true. Likewise, Lump1's shape property is also essential to Lump1, and (8) is false. Since one of the premises is false, the argument from Leibniz's Law is not sound, and (9) cannot be concluded.

However, we do have robust intuitions to support (8), so it would be better if pan-essentialists could offer an explanation to it. And pan-essentialists could just borrow referential shift, and claim that there is another understanding of (8). That is when "Lump1" is not rigid, (8) can be understood as:

(8') There is an object $\boldsymbol{y}$, such that it is identified in the same way that Lump1 is and it can survive being squashed.

If object $\boldsymbol{y}$ is squashed, then $\boldsymbol{y}$ can survive being squashed, and (8') is true. In this way, modal intuitions are saved. What about the argument from Leibniz's Law? Well, if (8) is replaced with (8'), then the argument from Leibniz's Law is not valid, and again (9) cannot be concluded. No matter which gloss of (8) is adopted, from pan-essentalists' perspective, the argument from Leibniz's Law fails to establish its goal.

Compared with pan-essentialism, haecceitism is less congenial to anti-coincidentalism with referential shift. According to haecceitists, except identity properties, any property had by an object is accidental to the object, thus both Goliath and Lump1 can survive being squashed. Since (7) is false and (8) is true, the argument from Leibniz's Law is invalid. So far, so good. But we also have strong intuition to support (7). And like pan-essentialists, it would be better if haecceitists could offer an explanation. But unlike pan-essentialists, they cannot use referential shift to give an alternative understanding to (7). Suppose "Goliath" is not rigid, then (7) can be understood as:

(7') There is an object $\boldsymbol{x}$, such that it is identified in the same way that Goliath is and it cannot survive being squashed.

However, since shape properties are not identity properties, for haecceitists, they are accidental to all objects which have it. It is then hard to make sense of the claim that something cannot survive being squashed. And referential shift fails to save modal intuitions for haecceitists.

There might be other ways of explaining modal intuitions for haecceitists. But my concentration here is not haecceitism *per se*. All I intend to show is that anti-coincidentalism with referential shift is perfect with pan-essentialism. Although anti-coincidentalists of this sort don't have to commit to pan-essentialism, combining the two accounts provides a good way of breaking down the argument from Leibniz's Law. Furthermore, there is an additional benefit of the alliance for anti-coincidentalists. That is pan-essentialists can easily ground modal features in nonmodal features of objects, and thereby avoid the grounding problem. This issue will be discussed in section 5.4.

Last but not least, unlike della Rocca's recipe, the above answer to the argument from Leibniz's Law is not just confined to the argument with modal intuitions. In other words, it can be used to break down any argument from Leibniz's Law. For example, consider one argument plugged with intuitions about evaluative features of Goliath and Lump1[1]:

(10) Goliath is Romanesque.
(11) Lump1 is not Romanesque.
Therefore,
(12) Goliath and Lump1 are not identical.

Anti-coincidentalists could argue that the robust intuition about (11) is understood as:

(11') There is an object $\boldsymbol{y}$, such that it is identified in the same way that Lump1 is and it is not Romanesque.

What (10) and (11') show is that Goliath and $\boldsymbol{y}$ are distinct, which is compatible with anti-coincidentalism.

[1]I pick this one from Fine (2003).

5.3. Predicational Shift

The standard answer to the argument from Leibniz's Law is predicational shift. It is argued that the same predicate refers to different properties in two utterances in the argument from Leibniz's Law.

It is a common linguistic phenomenon that the same predicates refer to different properties in different utterances. Consider:

(1) The doctor is green at her job.
(2) The patient looks green.

The meaning of the predicate "green" varies in different utterances. This suggests that, "green" signifies different properties, i.e. **being inexperienced**, and **being unhealthy**, in the above utterances. Moreover, since the predicate refers to different properties in two utterances, the negation of one utterance does not entail the assertion of the other. Consider a very experienced doctor who is sick and looks pale, then it is false that the doctor is green at her job, while it is true that the doctor, as a patient herself, looks green. Under this interpretation, it is legitimate to say the doctor is both green and not green. The conflicting linguistic intuitions are due to the different properties rather than the difference in certain properties.

The same kind of interpretation might be available for anti-coincidentalists. Anti-coincidentalists could argue that the conflicting linguistic intuitions are the results of different properties of one object rather than differences in properties between coincidental objects. Indeed, this proposal has been well developed by several anti-coincidentalists[2]. Here, I show how David Lewis's recipe undermines the argument from Leibniz's Law in this way.

Lewis endorses modal realism with counterpart theory. According to this view, (i) possible worlds, just like our actual world, are concrete; and (ii) concrete objects, both actual and possible, are world-bound. In other words, no concrete object wholly presents at more than one world; and the relations between objects in different worlds are counterpart relations rather than trans-world identity. Furthermore, Lewis thinks that *de re* modality is underpinned by trans-world relations in the following way:

[2]See Gibbard, A., 1975, "Contingent Identity", *Journal of Philosophical Logic*, 4: 187–221. Gupta, A., 1980, *The Logic of Common Nouns*, New Haven: Yale University Press. Lewis, D., 1971, "Counterparts of Persons and their Bodies", Journal of Philosophy, 68: 203–211.

> An object is essentially F, iff, all counterparts of the object are F;
> An object is accidentally F, iff, some counterparts of the object is not F.

Consider one argument from Leibniz's Law:

(3) Goliath cannot survive being squashed.
(4) Lump1 can survive being squashed.
Therefore,
(5) Goliath and Lump1 are not identical.

According to Lewis's counterpart theory, premises (3) and (4) are underpinned by (6) and (7) respectively:

(6) All counterparts of Goliath are not squashed.
(7) Some counterparts of Lump1 are squashed.

Furthermore, Lewis's counterpart relations are underpinned by similarity relations. In other words, an object is a counterpart of another object because the two objects are similar in some respect. And since objects can be similar in many respects as well as dissimilar in many respects, when different respects are stressed, different counterpart relations are invoked. For example, one way of interpreting (6) and (7) is:

(6') All statue-counterparts of Goliath are not squashed.
(7') Some lump-counterparts of Lump1 are squashed.

If (3) and (4) are underpinned by (6') and (7'), then Goliath and Lump1 can be identical. This is because the counterpart relation in (6') and the counterpart relation in (7') are different, and this argument from Leibniz's Law should thereby be viewed as invalid.

Although Lewis is a modal realist, it is worth mentioning that his recipe is also able to help ersatzist anti-coincidentalists undermine the argument from Leibniz's Law. Modal realists and modal ersatzists disagree with the nature of possible worlds. And because of this disagreement, they think differently

about the relata of counterpart relations, if they accept counterpart relations at all. Modal realists think that the relations are between concrete objects in different worlds, while modal ersatzists think that the relations are between concrete objects in the actual world and abstract objects in a possible world[3]. But the nature of relata does not prevent ersatzists from grounding their counterpart relations in similarity relations. And it makes perfect sense for them to explain (3) and (4) in terms of (6') and (7').

Furthermore, Lewis's way of answering the argument from Leibniz's Law about *de re* modality can be extended to other arguments from Leibniz's Law. For example, consider again the argument:

(8) Goliath is Romanesque.
(9) Lump1 is not Romanesque.
Therefore,
(10) Goliath and Lump1 are not identical.

What anti-coincidentalists could argue is that (8) and (9) could be understood as:

(8') Goliath is Romanesque as a statue.
(9') Lump1 is not Romanesque as a lump of clay.

(9') can be made sense of in the following way: "Romanesque as a lump of clay" is similar to "Baroque as a glass of water" or "green as blood". It just does not make any sense for something to be Romanesque as a lump of clay. If a thing is Romanesque, it can only a Romanesque as a statue, or a picture, etc.. Since nothing is Romanesque as a lump of clay, neither Goliath nor Lump1 is Romanesque as a lump of clay. Thus (9') is true. Moreover, since **being Romanesque as a statue** and **being Romanesque as a lump of clay** are different properties, (10) cannot be concluded from (8) and (9).

[3]Some ersatzists may also think there are counterpart relations between abstract objects in different possible worlds. But this issue is less relevant here, because the concentration here is the debate about concrete coincident objects.

5.4. Anti-Coincidentalism and the Grounding Problem

It is now clear that anti-coincidentalism can survive from the argument from Leibniz's Law either by using referential shift or by using predicational shift. But as I mentioned in chapter 2, there is another constraint on the view, if anti-coincidentalists wish to take advantage by charging coincidentalists with the grounding problem. That is anti-coincidentalists need to show they do not have a similar grounding problem. So far, there are three known grounding problems for coincidentalism: the grounding problem about modal features, the grounding problem about kind features, and the grounding problem about trans-world relations. Coincidentalists can answer the grounding problem about modal features by using Bennett's recipe; they can avoid the grounding problem about kind features by rejecting substantive kind features; however, they fail to give a satisfactory answer to the grounding problem about trans-world relations.

Let's first consider whether anti-coincidentalists have the grounding problem about modal features and the problem about trans-world relations.

Anti-coincidentalists with referential shift can offer a very easy answer to the grounding problem about modal features. As I mentioned in section 5.2, pan-essentialism and anti-coincidentalism with referential shift are congenial with each other. According to pan-essentialism, for any object o, and any property F,

If o is F, then o is essentially F.

This claim offers anti-coincidentalists a great advantage of grounding modal features of objects in their nonmodal features. Anti-coincidentalists could just say that o's **being essentially *F*** is underpinned by o's **being *F***. And in this way, anti-coincidentalists with referential shift could easily avoid the grounding problem about modal features.

Are anti-coincidentalists with referential shift able to answer the grounding problem about trans-world relations? Recall that according to pan-essentialists, when we utter "o is not essentially F", what we mean is not that the rigid designator of o does not have the property **not being essentially *F***. Rather, we just mean that there is another object o', which is identified in the same way as o is, and o' is not essentially F. Due to the

different treatments of different types of modal intuitions, when allied with pan-essentialists, even if anti-coincidentalists accept possible worlds talk in general, they may wish to deny the following coordination between *de re* modality and trans-world relations: for all objects o, o^*, for all properties F, and for all trans-world relations TWR,

(S) o is essentially F iff o is F and for all o^* such that $oTWRo^*$, o^* is F.
o is accidentally F iff o is F and there is o^* such that $oTWRo^*$, o^* is not F.

For different types of utterances, i.e. utterances with modifier "essentially" and utterances with the modifier "accidentally", are not treated differently in (S). Moreover, it would cause serious trouble if anti-coincidentalists of this sort do accept (S). This is because, as I showed above, anti-coincidentalists already admit that certain grounding relation holds between nonmodal features and modal features of objects, which leads to the following coordination:

(S') o is F iff o is essentially F.

(S) and (S') together entail a coordination between nonmodal features of objects and trans-world relations: for all objects o, o^*, for all properties F, and for all trans-world relations TWR,

(S") o is F iff for all o^* such that $oTWRo^*$, o^* is F.

Given (S"), as already illustrated in chapter 4, there are three possible explanations. The first one is that trans-world relations are grounded in nonmodal features of objects. The second one is that nonmodal features of objects are grounded in trans-world relations. And the third one is that both nonmodal features and trans-world relations are grounded in something else. The first explanation does not work, because o's **being** $\boldsymbol{F}$ does not give a restriction on how many other F-objects o trans-worldly relates to. Moreover, it seems that anti-coincidentalists would not endorse the second explanation, even if it is available. For nonmodal features of objects are empirically discernible,

and thus are perfect for grounding other features; while trans-world relations are notoriously mysterious, and thus need to be grounded. It makes little sense to ground those objects that do not need to be grounded in those that do need to be grounded.

Now it is clear that anti-coincidentalists with referential shift are well-motivated to reject the coordination between *de re* modality and trans-world relations. And they can make a further move, that is to reject substantive trans-world relations. And without substantive trans-world relations, there is no grounding problem about trans-world relations in the first place.

Some might suspect that the same strategy could be borrowed by coincidentalists to avoid the grounding problem about trans-world relations. That is, coincidentalists could just deny there are substantive trans-world relations, and because there are no such relations, there is no grounding problem about trans-world relations. Unfortunately, this recipe only works well for anti-coincidentalism with referential shift. From pan-essentialists' point of view, the potentialities of objects are confined by their actual, nonmodal features. And since actual, nonmodal features of objects are worldbound, so are modal features of objects. Hence, it it rather strange for anti-coincidentalists with referential shift to accept trans-world relations between objects in different worlds. On the contrary, coincidentalists think that the potentialities of objects are not confined by objects' actual, nonmodal features; otherwise, Goliath and Lump1 should share all their modal features. And since modal features of objects are not worldbound, it is rather strange for coincidentalists to deny trans-world relations between objects.

Anti-coincidentalists with predicational shift are also able to answer both the grounding problem about modal features and the grounding problem about trans-world relations.

According to Lewis's recipe, *de re* modality is grounded in trans-world relations. Thus, if the grounding problem about trans-world relations is solved, so is the grounding problem about modal features.

From Lewis's point of view, trans-world relations are counterpart relations; furthermore, counterparts relations are underpinned by similarity relations. Since similarity relations are grounded in the features of their relata, and here the relevant features are nonmodal features, the ultimate grounders of both trans-world relations as well as modal features of objects

are the nonmodal features of certain objects. And this is how Lewisian anti-coincidentalists answer the two grounding problems.

As should be clear by now, both styles of anti-coincidentalism do not have the grounding problem about modal features and the problem about trans-world relations. Let's then consider whether anti-coincidentalists have the grounding problem about kind features.

Two options are open for anti-coincidentalists regarding objects' kind features. One is to think that kind features are restrictive: one object can only belong to one kind, (or one kind in the same hierarchy). Thus, Goliath (a.k.a. Lump1) is a statue but not a lump of clay. The other is to think that kind features are cumulative: one object can belong to different kinds, (or different kinds in the same hierarchy). Thus, Goliath (a.k.a. Lump1) is both a statue and a lump of clay.

Either way, anti-coincidentalists are able to ground the kind features of objects in their non-kind features. They could claim that if two objects are qualitative identicals, then the two objects belong to the same kind(s). According to this claim, there are no objects sharing non-kind features while differing in kind features. Hence no counter-examples can be raised to refute the grounding relation between kind features and non-kind features.

Some might think that cumulative kind is a better option for anti-coincidentalists, because we do think that Goliath (a.k.a. Lump1) is also a lump of clay. But intuitions as such can be reconstructed for those who prefer restrictive kind by using referential shift. That is, "Goliath is a lump of clay" is understood as something which is identified in the same way as Goliath is, is a lump of clay. There might be other reasons to prefer one option to the other. But the issue is less relevant to our current concerns. Since both can help anti-coincidentalists answer the grounding problem about kind features.

In sum, the grounding problem about modal features, the grounding problem about trans-world relations, and the grounding problem about kind features do not backfire on anti-coincidentalism.

Upshot

Anti-coincidentalists are able to undermine the argument from Leibniz's Law, by either using referential shift or using predicational shift. One way to develop referential shift is to endorse pan-essentialism; and one way to develop predicational shift is to endorse David Lewis's counterpart theory.

Moreover, anti-coincidentalists are able to answer the grounding problem. This is bad news for coincidentalists because not only do they fail to avoid the grounding in every possible way, (see chapter 3 and chapter 4), but they also cannot trivialize the role of the grounding problem by arguing that anti-coincidentalists also have it. Thus the grounding problem is very real for coincidentalists.

Conclusion

Given the discussion from chapter 2 to chapter 5, what has been established? The answer may sound like a platitude. That is coincidentalists do have the grounding problem (see chapter 2, chapter 3, chapter 4, and section 5.4), and anti-coincidentalists can undermine the argument from Leibniz's Law (see section 5.1, section 5.2, and section 5.3). But in the process of reaching this answer, I argued that both Bennett (2004b) and Sider (2008) fail to solve the grounding problem for coincidentalists; I also developed referential shift for anti-coincidentalists to answer the argument from Leibniz's Law.

Furthermore, the discussions from chapter 2 to chapter 5 show that there are tight connections between coincidence and *de re* modality. Given the argument from Leibniz's Law, coincidentalists prefer to think that modal predication is constant, that is an object is never both essentially F and not essentially F; while anti-coincidentalists prefer to think the opposite, that is an object can be both essentially F and not essentially F. Given the grounding problem, coincidentalists need to take the modal features of objects and trans-world relations to be ungrounded; while anti-coincidentalists are capable of grounding both in nonmodal features of objects.

Due to the above differences regarding *de re* modality, some might prefer coincidentalism to anti-coincidentalism for the intuitive appeal of the constancy of modal predication. Others might prefer anti-coincidentalism to coincidentalism for grounded modal features.

It might be thought that there is a stand-off between coincidentalism and anti-coincidentalism. I agree. For me, it is understandable if coincidentalists trade constancy of modal predication for grounded modality; and it

is also understandable if anti-coincidentalists trade grounded modality for constancy of modal predication.

It might further be thought that given the stand-off between coincidentalism and anti-coincidentalism, no evidence is found to settle the debate about coincidence. And because there is no such evidence, we should endorse either meta-ontological anti-realism or meta-ontological skepticism about coincidence. But I disagree.

In general, the stand-off between two opposing views does not entail that no evidence is capable of settling the dispute. It just might be the case that some evidence is underestimated while other evidence is overestimated.

But there is a better way of arguing against meta-ontological anti-realism and meta-ontological skepticism about coincidence. Given the connections between coincidence and modality, if there is no matter of fact whether there are coincident objects, then there is no matter of fact whether modal predication is constant nor any matter of fact whether modal features of objects are grounded. In other words, if meta-ontological anti-realism is true, then this anti-realistic view should expand to the metaphysical and semantic debate about *de re* modality. Likewise, meta-ontological skepticism about coincidence should also expand to the debate about *de re* modality. However, the debate about *de re* modality, together with many other metaphysical debates, are free from meta-ontological suspicion. Targeting the debate may just make those meta-ontological dismissive attitudes pervasive. And this may go too far.

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