A Combinatorial Theory of Compossibility in Leibniz's Metaphysics

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THESIS

Submitted as partial fulfillment of the requirements
For the degree of Doctor of Philosophy in
Philosophy in the Graduate College of the
University of Illinois at Chicago, 2021

Chicago, Illinois

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Dedicated to my wife, Chaeyoung, and my parents, Dongwoon and Eunjung.

ACKNOWLEDGMENTS

I would first like to thank my advisors at Seoul National University: Jinho Kang, Sungil Han, and Sukjae Lee. Special thanks to Sukjae; he made me realize my passion and love for the history of philosophy and trained me to work on Leibniz.

At the University of Illinois at Chicago, I would like to thank my committee members. I start by thanking my advisor, John Whipple. Throughout my entire time at UIC, John has always been supportive in many ways. He has carefully read many different versions of this project and given me many valuable comments.

I would also like to thank Daniel Sutherland, Nick Huggett, and Justin Vlasits for serving on my committee. Thank you for the supports and critical feedback throughout the dissertation process. Daniel and Nick in particular have been served almost as co-advisors to me. I have learned a lot from them.

I would also like to thank Jeffrey McDonough, my external committee member. Thanks to his invitation, I was able to spend my fellowship year (2020-21) at Harvard University and work closely with him. His critical but supportive comments made me develop the project further.

Some parts of the dissertation have been presented at Chicago Modern Philosophy Roundtable, the Leibniz Society of North America, The Australasian Seminar in Early Modern Philosophy, St. Andrews Kant Colloquium, and the University of Illinois at Chicago. I would like to thank all the audiences at these conferences; special thanks to Ralf Bader, John Carriero, Yual Chiek, Kyoung Min Cho, Nicholas Currie, Dylan Flint, Ursula Goldenbaum, Lukas Hilgert, Kristen Irwin, Taylor Kloha, Michael LeBuffe, Sukjae Lee, Samuel Levey, Tsuyoshi Matsuda,

ACKNOWLEDGMENTS (continued)

Daniel Moerner, Nico Müller, Bertin Ortega-Polito, Areins Pelayo, Arnaud Pelletier, Jan Levin Propach, Nicholas Stang, and John Whipple.

Finally, I would like to thank my family for their continuing support and love: Dongwoon Kim, Eunjung Kwon, and Suyoung Kim. And special thanks to my wife, Chaeyoung Paek.

JYK

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LIST OF ABBREVIATIONS

A:	*Sämtliche Schriften und Briefe*, eds. the Academy of Sciences of Berlin, Series I-VIII, 1923. Cited by series, volume, and page.
AG:	*Philosophical Essays*, trans. R. Ariew and D. Garber, Hackett, 1989.
BH:	*Die Leibniz-Handschriften der Königlichen öffentlichen Bibliothek zu Hannover*, eds. E. Bodemann.
C:	*Opuscules et fragments inédits de Leibniz*, eds. L. Couturat, Paris, Félix Alcan, 1903. Reprint, Hildesheim, Georg Olms, 1966.
DSR:	*De Summa Rerum: Metaphysical Papers, 1675-1676*, eds. and trans. G.H.R. Parkinson, Yale University Press, 1992.
G:	*Philosophische Schriften und Briefe*, eds. C. I. Gerhardt, 1890. Cited by volume, and page.
GLW:	*Briefwechsel zwischen Leibniz und Christian Wolf*, eds. and trans. C.I. Gerhardt, Hall, 1860.
Grua:	*Textes Inédits*, eds. G. Grua, Presses Universitaires de France, 1948.
H:	*Theodicy: Essays on the Goodness of God, the Freedom of Man, and the Origin of Evil*, eds. A. Farrar trans. E.M. Huggard, Open Court, 1985.
L:	*Philosophical Papers and Letters*, trans. L. Loemker, D. Reidel, 1969.
LA:	*The Leibniz-Arnauld Correspondence*, eds. and trans. S. Voss, Yale University Press 2016.
LC:	*The Labyrinth of the Continuum*, eds. and trans. by T.W. Arthur, Yale University Press, 2001.
LR:	*The Leibniz-Des Bosses Correspondence*, eds. and trans. Brandon C. Look and Donald Rutherford, Yale University Press, 2007.
LS:	Leibniz on God and Religion, eds. and trans. Lloyd Strickland, Bloomsbury Publishing, 2016.
MP:	*Leibniz: Philosophical Writings*, eds. and trans. by Mary Morris and G. H. R. Parkinson, Dent (Everyman's Library), 1973.

LIST OF ABBREVIATIONS (continued)

NE: *New Essays on Human Understanding*, eds. and trans. by P. Remnant and J. Bennett, Cambridge University Press, 1996. Cited by pages of A VI.vi., which are given marginally in this book.

P: *Leibniz Logical Papers: A Selection* eds. and trans. by G. H. R. Parkinson, Oxford University Press, 1966.

S: *Monadology and Other Philosophical Essays*, ed. And trans. P. and A.M. Schrecker, Bobbs-Merrill, 1965.

W: *Leibniz: Selections*, eds. and trans. by P.P. Wiener, Scribner's, 1951.

SUMMARY

Many contemporary metaphysicians think that for any two distinct things, it is always possible for them to coexist with one another. Leibniz gives a somewhat different answer: two distinct things are able to coexist with one another only when they are compossible. God cannot create all possible substances together because not all of them are compossible. But what is the basis within Leibniz's philosophy for the incompossibility of substances? This has been one of the most hotly contested issues in the recent secondary literature. Four kinds of interpretations have been presented. Logical interpretations maintain that compossibility is ultimately nothing but logical consistency. Advocates of logical interpretations argue that two possible substances are compossible just in case their complete concepts are logically consistent. In contrast, lawful, cosmological, and packing interpretations assume that possible substances are logically independent of one another. They maintain that any two possible substances are per se compossible. However, God is precluded from actualizing all possible substances by some non-logical constraints.

The literature has long been dominated by variations of those four approaches. In this dissertation, however, I show that there is one important issue that has been largely overlooked: the compossibility relation is intransitive. Intransitivity will be problematic for all the above interpretations since they all seem to agree that the compossibility relation is transitive. According to logical interpretations, each possible substance is compossible with and only with its world-mates; thus, compossibility is an equivalence relation (reflexive, symmetric, and transitive). According to lawful, cosmological, and packing interpretations, the compossibility relation is trivially transitive since any two possible substances are per se compossible. However, there are passages where Leibniz suggests that the compossibility relation is intransitive.

If compossibility is intransitive for him, then none of those four approaches is on the right track. This indicates that we need a new approach to the puzzle of compossibility.

In my dissertation, I present a novel interpretation of compossibility. My alternative has the following features: (1) It uses combinatorial principles to solve the problem of compossibility; God calculates all the possible combinations and the sum of the perfection of each combination by simple mathematical principles. But (2) the combinatorial principles I am relying on are non-Humean. Thus, I deny that everything can be combined with everything else. The intransitivity of compossibility is in fact a natural consequence of non-Humean combinatorialism. Moreover, (3) my view can provide solutions to important puzzles of compossibility. More specifically, it can explain both that (i) Spinozistic necessitarianism is logically impossible and that (ii) the World-Apart scenario is logically possible for Leibniz. Thus, my work will reveal in a rigorous manner what Leibniz has in mind when he says that his metaphysics is nothing but the "Divine Mathematics."

I. LEIBNIZ AND THE “PUZZLE” OF COMPOSSIBILITY

1. Introduction

Many contemporary metaphysicians think that for any two distinct things, it is always possible for them to co-exist with one another. Leibniz gives a somewhat different answer: two distinct things are able to co-exist with one another *only when they are compossible*. But what is the basis within Leibniz’s philosophy for the incompossibility of substances? This has been one of the most hotly contested issues in the recent secondary literature. Roughly put, interpretations of compossibility have been dominated by two camps. The first camp offers *the logical interpretation*, according to which distinct substances are compossible just in case there is no contradiction from their co-existing. Among others, Benson Mates and Nicholas Rescher defend such an interpretation. The second camp offers the *lawful interpretation*. According to this view, compossibility cannot be explained merely by logical consistency; it must be consistency under the general laws of nature. Jan Cover and John O’Leary-Hawthorne recently revive and defend this view. More recently, however, James Messina and Donald Rutherford suggest *the cosmological interpretation*, and Jeffrey McDonough suggests *the packing interpretation*. In this chapter, I examine those four influential interpretations.

The structure of the chapter is as follows. In the following section, I show why the concept of compossibility is so important for Leibniz’s philosophy and where the whole controversy regarding it begins. In the next four sections, I explain and evaluate those four readings I mentioned; I provide textual and philosophical reasons *for* and *against* each interpretation. Finally in section 7, I indicate a broader issue for all the interpretations considered and offer one new objection against all of them. Despite their differences, all four interpretations seem to agree that the compossibility relation is transitive. But I provide textual evidence suggesting that Leibniz takes the compossibility relation intransitive.

2. Compossibility and the Best Possible World

Leibniz argues that God has created the best of all possible worlds. The actual world is just one among infinitely many possible worlds; God has created this world, but God could have chosen a different one. Commentators generally agree that this thesis is at the heart of Leibniz's whole philosophical system. However, there is a fundamental difficulty here. The best of all possible worlds thesis seems to imply that there are merely possible substances that God does not bring into existence. But why doesn't God create all the possible substances?

This is mysterious primarily because Leibniz argues that existence itself is good:

> After due consideration I take as a principle the harmony of things: that is, that the greatest amount of essence that can exist, does exist. It follows that there is more reason for existing than for not existing, and that all things will exist, if that can come about (A VI.iii 472/DSR 21).

This passage suggests that God should create the greatest amount of essence that can exist, given that existence is better than non-existence. Of course, God cannot create a round square since its essence is contradictory; according to Leibniz, even God cannot do contradictory things. But there are many *possible* substances God could have created, such as King Arthur of Great Britain or Amadis of Gaul.[1] Since existence is always better than non-existence for any possible substance, God seems to have a good reason to create every possible substance. Thus, Leibniz's view on the goodness of existence, along with the fact that God is good and powerful, seems to lead him toward Spinozistic necessitarianism, the position that every possible substance necessarily exists.

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[1] These are Leibniz's own examples (A VI.iv. 1654/AG 94).

But Spinozistic necessitarianism is something that Leibniz explicitly wanted to avoid.[2] Leibniz gives at least two different reasons against it. The first reason is philosophical, or commonsensical in some sense. Leibniz writes, "[n]or can we really deny that many stories, especially those called novels, are thought to be possible, though they might find no place in this universal series God selected" (A VI.iv. 1653-4/AG 94). In so saying, he claims that it makes little sense to deny that there are merely possible things. Leibniz concedes that he was tempted in the direction of Spinozistic necessitarianism in his early years, but that "the consideration of possibles, which are not, were not, and will not be, brought me back from this [Spinozistic necessitarian] precipice" (A VI.iv. 1653/AG 94).

The second and more important reason is a theological one. He argues that to accept Spinozistic necessitarianism "would eliminate all beauty from the universe and all choice among things, not to speak of other considerations by which the contrary can be proved" (A VI.iv. 1654/AG 94-5). For Christian philosophers, God's creation should be a voluntary action that shows God's power and wisdom. But if all the possible substances necessarily exist, God plays no much role in the sense that God does not *voluntarily* choose what to create. It was because of this heretical implication that Leibniz was anxious to avoid Spinozistic necessitarianism.

In fact, it is now conventional wisdom that his opposition to Spinozistic necessitarianism is Leibniz's ultimate motivation for using the concept of compossibility.[3] In general, there is nothing wrong here; it is true that Leibniz uses the concept of compossibility to show that there are unactualized substances. Strictly speaking, however, Leibniz criticizes not just necessitarianism but also a weaker claim, *actualism* ("everything is actual"). To see this clearly, let us distinguish two parts of necessitarianism:

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[2] Leibniz emphasizes that he does not endorse Spinozistic necessitarianism several times. Most notably, *on Freedom* (1689?; A VI.iv. 1653-9/AG 94-8).

[3] Almost everyone starts their discussions on compossibility from Spinozistic necessitarianism. For instance, D'Agostino (1976), Messina and Rutherford (2009), McDonough (2010), and Chiek and Brown (2016).

(1) Every existing substance *necessarily* exists.
(2) Every *possible* substance exists.

Necessitarianism ("every *possible* substances *necessarily* exists") is the conjunction of (1) and (2). And (2) is in fact nothing but the doctrine of actualism, according to which every possible substance exists; in other words, there are no merely possible substances. So when Leibniz argues that there are unactualized substances, he criticizes (2) in the strictest sense.

What Leibniz says in *Causa Dei* (his Latin summary of the *Theodicy*) confirms this point:

> It would be incompatible with his freedom if there were only one possible objective of the will, that is, if only one aspect of the universe were possible. For in this case there would no longer be any choice nor any possibility of praising the wisdom and goodness of Him who acts.
>
> 22. Therefore, those who maintain that only the actual—what God actually has chosen—is possible are mistaken, or at least express themselves awkwardly. This was the error of Diodorus the Stoic, according to Cicero, and among Christian thinkers that of Abelard, Wycliff, and Hobbes (G VI. 441-2/S 118).

In this passage, Leibniz explicitly points out what the erroneous doctrine is: "only the actual is possible," which is nothing but (2). Strictly speaking, actualism is the view which "would eliminate all beauty from the universe and all choice among things" (A VI.iv. 1654/AG 94-5). The fact that there are unactualized possible substances is irrelevant to whether actual substances necessarily exist or not.[4] We shall return to why this subtle distinction can be relevant to the topic in section 6.

In any case, Leibniz must deny that every possible substance exists. On the other hand, he still needs to argue that God should create as much as he can. How can he manage to do both simultaneously? In response to this question, Leibniz suggests that not all possible substances are compossible; in other words, "not all things which are possible *per se* can exist together with other things" (A VI.iii. 581/DSR 105). He says,

> Thus, the universe is only a certain collection of compossibles, and the actual universe is the collection of all existing possibles, that is to say, those which form the richest composite. And since there are different combinations of possibilities, some of them better than others, there are many possible universes, each collection of compossibles making up one of them (G III. 573//L 662).

It is impossible to create all the possible substances "since they get in one another's way" (A VI.iv. 1651/AG 29); in other words, some possible substances are *incompossible* with each other.

Thus, compossibility is supposed to allow him to accept his central theses without endorsing Spinozism. And this indicates that any successful interpretation of compossibility should satisfy the following requirement:

Anti-Spinozism: God cannot create all the possible substances; in other words, there are non-actualized possible substances.

Given that this requirement is one of the very reasons Leibniz initially endorses the concept of compossibility, it is a little surprising that not every influential interpretation we shall see can satisfy it; this might indicate how difficult it is to solve the puzzle of compossibility. But first, let us look at one interpretation that can satisfy *Anti-Spinozism* in the next section.

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[4] Of course, Leibniz also denies (1) since he believes that actual substances are contingent beings.

3. **The Logical Interpretation**

In a passage from 1671 to 1672, Leibniz says, "[c]ompossibles are those, one of which being given, it does not follow that the other is negated; or, those of which one is possible, the other being assumed" (A VI.ii. 498/DSR 138n). And around the 1690s, he more explicitly defines compossibility as follows: compossible is "that which does not imply a contradiction with another" (A VI.iv. 867). These passages suggest that compossibility is nothing but logical consistency. Two possible substances are compossible with each other *iff* there is no contradiction from their existing together; in other words, two possible substances are incompossible with each other *iff* their co-existence implies a logical contradiction. This is the core thesis of the logical interpretation. Most notably, Mates and Rescher defend this view:

> A pair of individual concepts, A and B, are compossible if no contradiction follows from the supposition that there are corresponding individuals for both of them—that is, if the statements 'A exists' and 'B exists' are consistent with one another (Mates 1986, 75).
>
> [D]ifferent individuals can be logically incompossible, so that the actualization of one saturated manifold of compossible individuals logically precludes that of any other. The very description of any one possible world logically excludes other circumstances (Rescher 1996, 137).

The logical interpretation seems to be well-supported by Leibniz's definitions of compossibility. But the challenge is to explain how distinct substances can logically exclude one another. Mates and Rescher draw on Leibniz's complete concept theory to explain it. According to Leibniz, each possible substance is uniquely represented by a complete individual concept (hereafter, CIC), which "is sufficient to contain and to allow us to deduce from it all the predicates of the subject to which this notion is attributed" (A VI.iv. 1540/AG 41). Since a CIC is complete, it contains not only monadic but also relational predications.[5] For example, the CIC of Noah contains all the relational predications, such as he is the father of Ham. Given this, it is not hard to make sense of a logical contradiction between individuals. Suppose that the CIC of Noah does not contain any relational predication with David Lewis. Then it would be logically contradictory to suppose their co-existing in the same world; if Lewis exists in the world where Noah exists, then the CIC of Noah should contain a relational predication such that Lewis is one of his worldmates (by the completeness of his individual concept). Therefore, Noah and Lewis would be incompossible.

Furthermore, Mates and Rescher take Leibniz's Universal Expression Thesis seriously, according to which "each singular substance expresses the whole universe in its own way, and that all its events, together with all their circumstances and the whole sequence of external things, are included in its notion" (A VI.iv. 1541/AG 41). And it seems that for Leibniz, the universal expression holds not just in our actual world but in each possible world. In *Theodicy*, he says,

> For it must be known that all things are connected in each one of the possible worlds: the universe, whatever it may be, is all of one piece, like an ocean: the least movement extends its effect there to any distance whatsoever, even though this effect becomes less perceptible in proportion to the distance (G VI. 107/H 128).

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[5] Precisely speaking, Mates denies that CICs contain relational predications while Rescher accepts it; Mates argues that the CIC of a substance includes only its 'simple' properties (Mates 1986, 219-20). But the difference between them is not huge since Mates accepts that all relational predications are reducible to monadic predications. For this, see Chiek (2016, 97-100). The reducibility of relations for Leibniz is a controversial issue, but I will bracket it for simplicity's sake.

Two important implications are given about this tight interconnectedness. First, it is impossible for a possible substance to be *detached* from its world, for every true predication of that world is already inscribed in its CIC. Second, it is also impossible for a possible substance to be *attached* to other worlds. Remember that a CIC is complete; it contains *all* and *only* true predications of its world.[6] Therefore, there would be a logical contradiction if we attach it into other worlds. "[N]o substance can—even in hypothesis—be pried loose from its world-environment and transposed into some other possible world" (Rescher 1979, 49-50). Each substance is *world-bound*.[7]

This is the core idea of the logical interpretation. The advantage of this view is that it elegantly explains why God did not create more. It is impossible even for God to attach more substances to the actual world since it would imply a logical contradiction. Our actual world is the best God could do; God cannot do better simply because it is logically impossible.

Despite this clear advantage, the logical interpretation has faced serious objections. Most notably, it conflicts with the *Ontological Independence of Substance*, according to which each substance is ontologically independent of other substances (except for God). In the *Discourse of Metaphysics*, Leibniz explicitly claims that "each substance is … independent of all other things, except for God" (A VI.iv. 1550/AG 47). For Mates and Rescher, however, every substance depends upon its world-mates since there is a tight conceptual linkage between compossible substances.

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[6] This point in fact can be controversial; it depends on how to understand the notion of "completeness" in the complete concept theory. Mates (1972, 109) and Adams (1994, 72-4) speculate a possibility that a CIC includes world-indexed predications. For instance, the CIC of Noah could contain both <he is the father of Ham at W_1> and <he is not the father of Ham at W_2>. Since those two predications are not contradictory, there are no internal problems with containing both of them into a single CIC. Strictly speaking, therefore, it is possible that a CIC contains true predications of more than one world. Adams says, "the individual concept of an individual that exists in more than one possible world could be complete—complete with respect to *world-indexed* predications" (Adams 1994, 73). However, there is no textual evidence that Leibniz seriously considers the "world-index" strategy. For simplicity's sake, therefore, I will not take it seriously in this chapter. But I will come back to this issue in Chapter V.

[7] Strictly speaking, again, it follows only when we ignore the world-index strategy.

Many commentators have pointed out this problem.[8] The very meaning of "substance" is defined in terms of ontological independence: something is a substance *because* it is ontologically independent of other things. It will be helpful to look at the traditional Scholastic formula; Jorge Gracia explains,

> It…meant that a substance was, from its own essence, independent, i.e., that it did not receive its being except through its own essence or form. […] But for their formal causation they do not depend on anything else, since there is no reference to other substances or being in their definition. In this way they differ from accidents which are always defined in terms of another and, therefore, are dependent [per se] on something else (Gracia 1982, 268).

In the light of Gracia's explanation, we can see more clearly why the logical interpretation is at odds with *Ontological Independence*. According to Mates and Rescher, each CIC contains every relational predication; for instance, Ham's CIC contains that Noah is his father. According to the logical interpretation, therefore, each individual concept contains explicit references to other substances or beings. This implication conflicts with *Ontological Independence*.

Mates is fully aware of this problem. He claims that "with his doctrine of the 'universal interconnection of things,' he [i.e., Leibniz] cannot accept this traditional conception (of substance) completely" (Mates 1986, 221). Mates is clearly right at this point; (his understanding of) the universal interconnectedness cannot be fully consistent with the traditional conception of substance. We should choose either of them exclusively. The controversy is which one we should give up; while Mates (and maybe Rescher) is willing to give up the latter, other commentators want to give up the former rather than the latter.

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[8] For example, Cover and Hawthorne (1999, 87), Messina and Rutherford (2009, 965), McDonough (2010, 141), Brown and Chiek (2016, 6-7), and Bender (2016, 70-1).

Unfortunately, it is not easy to figure out whether Leibniz endorses the traditional conception of substance. Leibniz famously argues that there are no causal interactions between monads, i.e., individual substances. So when he talks about "independence," he usually emphasizes causal independence rather than ontological independence among substances. Since it is possible to be causally independent without being ontologically independent with one another, advocates of the logical interpretation can say that Leibniz does not endorse the traditional conception of substance; they can argue that for Leibniz, the conception of substance is defined solely in terms of causal independence.[9]

However, there is an indirect way to show that Leibniz accepts *Ontological Independence*. To see this clearly, we need to look at the second objection which is closely related to the first one. As many commentators point out, the logical interpretation is at odds with the following doctrine of Leibniz:

World-Apart: for any substance *x*, God can create *x* without creating other substances.

In fact, most commentators seem to think that *World-Apart* is equivalent to *Ontological Independence*; so they usually do not deal with them separately. But I disagree with them; they are not equivalent claims. To be specific, *Ontological Independence* does not imply *World-Apart*. For present purposes, however, we can bracket the difference between me and other commentators without any loss; for I agree with them that *World-Apart* implies *Ontological*

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[9] For instance, Lærke (2016, 132-4).

Independence.[10] Hence if Leibniz accepts *World-Apart*, then he should accept *Ontological Independence*, too. So the real debate is about *World-Apart* rather than *Ontological Independence*.

Unlike *Ontological Independence*, there is some textual evidence that seems to support *World-Apart*. In the *Discourse* and the *New System,* Leibniz claims:

> We also see that every substance has a perfect spontaneity (which becomes freedom in intelligent substances), that everything that happens to it is a consequence of its idea or of its being, and that nothing determines it, except God alone. And that is why a person of very exalted mind, revered for her saintliness, was in the habit of saying that the soul must often think *as if there were nothing but God and itself in the world [comme s'il n'y avoit que Dieu et elle au monde]* (A VI.iv. 1581/AG 64; emphasis added).

> This is what makes every substance represent the whole universe exactly and in its own way, from a certain point of view, and makes the perceptions or expressions of external things occur in the soul at a given time, in virtue of its own laws, *as if in a world apart, and as if there existed only God and itself [comme dans un monde à part, et comme s'il n'existoit rien que Dieu et elle]* (G IV. 484/AG 143; emphasis added).

In these passages, Leibniz claims that a substance is something that can be thought of *as if* there existed only God and that substance. He thus seems to argue that God can create a substance without creating others.

Although the above passages seem to support the doctrine, it is controversial whether Leibniz really endorses *World-Apart* as I described above. For instance, one might argue that what substances are "world-apart" from is the *causal influence* of other substances. Thus, one could argue that these world-apart passages show merely the causal isolation of substances and nothing else.[11] Moreover, we should read these passages more carefully because Leibniz uses the qualifier "as if." Leibniz's use of the qualifier might indicate that he did not consider the world-apart scenario seriously. Adam Harmer considers this possibility:

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[10] In Chapter II, I will explain the relation between *Ontological Independence* and *World-Apart* in detail.

> Leibniz's use of the qualifier "as if" makes it unclear to what extent he is considering the scenario as possible and to what extent he is using it merely as a heuristic or illustrative device. If it is merely a device, and not in some sense possible, then it would no longer be obvious that World-Apart involves ontological independence (Harmer 2016, 49).

If the world-apart scenario is merely a heuristic device, then it would be hard to say that Leibniz really accepts *World-Apart*. For the same reason, Olli Koistinen and Arto Repo argue that "it is rather doubtful that Leibniz means this [i.e., the world-apart scenario] as a real possibility" (Koistinen and Repo 1999, 212).

However, several commentators point out that there are passages that are harder to make consistent with the logical interpretation.[12] In the *Leibniz-Des Bosses Correspondence* (1706-1716), Leibniz and Des Bosses discuss the world-apart scenario even though they did not use the term "world-apart." In the correspondence, Des Bosses raises the following objection to Leibniz's philosophy:

> If all monads have their perceptions from their own stores, so to speak, and without any physical influence of one on another, and, further, if the perceptions of each monad correspond precisely to all the other monads that God has already created and to their perceptions and the perceptions are regulated by representing them, then *God could not have created any of those monads that exist in this way without producing all the others that now exist in the same way* (G II. 493/LR 333-5; emphasis added).

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[11] For instance, Lærke (2016, 132-4) tries to defend the logical interpretation in this way.

[12] See Messina and Rutherford (2009, 965), Brown and Chiek (2016, 6-7), and Harmer (2016, 52-6). Especially Harmer (2016) provides a detailed analysis of the World-Apart doctrine.

Des Bosses' understanding of Leibniz's philosophy is quite similar to that of the logical interpretation. According to the logical interpretation, in conjunction with the Universal Expression thesis, the complete concept theory makes the world-apart scenario logically impossible. If the CIC of Noah contains that he is the father of Ham, then it is impossible that Noah exists while Ham does not. The same thing is the case for all the existing substances in the actual world; thus, *God must create all substances in the actual world if he creates any*. Des Bosses' objection in the above is basically the same: according to his understanding of Leibniz's philosophy, the world-apart scenario is impossible even for God. Des Bosses argues that this implication is problematic.

Leibniz's reply to this objection is succinct but insightful. He says,

> The response is easy and has already been given: he could do it absolutely, but not hypothetically, because he decided to act always most wisely and most harmoniously (G II. 496/LR 339).

His response is significant, at least for two reasons. First, Leibniz says that the answer to Des Bosses' objection is easy and has already given.[13] In saying so, Leibniz seems to say that one would not raise the objection if he correctly understood his philosophy. Thus, Leibniz seems to think that Des Bosses' understanding of it is simply wrong. Second, and most importantly, Leibniz explicitly says that the world-apart scenario is *absolutely but not hypothetically possible*. In order to understand this reply correctly, we need to know Leibniz's distinction between absolute and hypothetical necessity.

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[13] In Chapter II, I will show that Leibniz indeed gave the answer to Des Bosses around 10 years ago.

Leibniz, like his predecessors, makes a distinction between them and employs it in his philosophy. The following basic formulation of the distinction might be good enough for our purpose:

Absolute (Metaphysical-, Logical-, Geometrical-) Necessity: *x* is absolutely necessary *iff* its negation involves a contradiction.

Hypothetical (Moral-) Necessity: *x* is hypothetically necessary *iff not-x* does not involve a contradiction but *x* must be the case *because of* God's will.[14][15]

We can find the distinction in the *Theodicy:*

> They say that what is foreseen cannot fail to exist, and they say so truly; but it follows not that what is foreseen is necessary, for *necessary truth* is that whereof the contrary is impossible or implies contradiction. Now this truth which states that I shall write tomorrow is not of that nature, it is not necessary. Yet supposing that God foresees it, it is necessary that it come to pass; that is, the consequence is necessary, namely, that it exist, since it has been foreseen; for God is infallible. This is what is termed a *hypothetical necessity* (G VI. 123/H144).
>
> I will show that God himself, although he always chooses the best, does not act by an absolute necessity, and that the laws of nature laid down by God, founded upon the fitness of things, keep the mean between geometrical truths, absolutely necessary, and arbitrary decrees (G VI. 37/H 61).

Leibniz emphasizes that hypothetical necessity is not inconsistent with contingency. He says that hypothetical necessity "does not destroy the contingency of things and does not produce the absolute necessity that contingency cannot allow" (G III. 400/AG 193). This is, in fact, not a weird idea. For instance, we believe that an object traveling faster than light is physically impossible but metaphysically possible, assuming that Einstein's relativity theory is correct. The same thing is the case here; the only difference is that *the hypothesis* is Divine creation for Leibniz and other Christian philosophers.

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[14] Here, I follow Harmer's formulation (Harmer 2016, 53).

[15] Physical necessity is also a hypothetical one. But Leibniz argues that physical necessity is just a special case of or a consequence of moral necessity. He says, "in my little book I have explained physical necessity as a consequence of moral necessity" (G II. 450/LR 255). And you can find his explanation in the *Theodicy* §§345-51.

Let us reconsider what Leibniz says in the light of this formulation. He says that the world-apart scenario is absolutely possible but hypothetically impossible. Notably, this means that the world-apart scenario involves no logical contradiction; it is logically possible for God to create a substance without its world-mates. God did not do that simply because doing it is not a wise and harmonious action; thus, it is merely a hypothetically impossible scenario given God's wisdom and benevolence. If so, Leibniz's reply is at odds with the logical interpretation, for the logical interpretation entails that the world-apart scenario is logically impossible. So far as I am aware, there seem no easy and natural ways for the logical interpretation to reconcile with this passage. I will come back to this issue in detail in section 2 of Chapter II.

4. The Lawful Interpretation

Advocates of the lawful interpretation reject the core idea of the logical interpretation, namely that compossibility is just the relation of logical compatibility. They think that it is a more demanding relation. Ian Hacking says,

> To say that things are compossible when they do not impede each other is very different from saying that they are logically consistent. Compossibility is a more demanding relation than mere consistency; for one thing to impede another is more a matter of laws of nature than of logic. Compossibility must be something like consistency under general laws of nature (Hacking 1982, 193).

Thus, the core thesis of the lawful interpretation is that *two or more things are compossible just in case there is some general law of nature under which their co-existence does not imply a contradiction.* Although the lawful interpretation has more distinct variations than the logical one, all its advocates share this thesis. Most recently, Cover and Hawthorne illustrate and defend a version of the lawful interpretation well and make it a real competitor. For simplicity's sake, therefore, I focus on their version of the lawful interpretation.[16]

In the last section, I argued that the logical interpretation is not consistent with two important doctrines: *Ontological Independence* and *World-Apart*. Cover and Hawthorne take this problem very seriously. They place a good deal of weight on the world-apart passages we have seen. In their view, God can create any set of possible substances; thus, any two possible substances are *per se* compossible. Sebastian Bender explains it very nicely: "in principle God can combine each substance with every other substance and thus generate possible worlds by a simple combinatorial principle" (Bender 2016, 71).[17] It is not hard to see why this approach is compatible with *Ontological Independence* and *World-Apart*. Since God can create any set of possible substances, it is trivially true that God can create sets that contain only one possible substance. Unlike the logical interpretation, therefore, the lawful interpretation fits very well with *World-Apart* and *Ontological Independence*.

As we have seen, advocates of the logical interpretation argue that relational predications of *x* are either literally included in the CIC of *x* or logically derivable from intrinsic monadic predications of *x*. Since neither of them can be compatible with Cover and Hawthorne's view, they need to give an alternate explanation of the complete concept theory. According to them, the individual concept of a substance contains only intrinsic monadic predications. Relations or relational facts just *supervene on* intrinsic monadic facts of the relata. They say that "relational truths about the world supervene on the global monadic facts" (Cover and Hawthorne 1999, 85).[18] Once the individual concept of a substance is unhooked from relations with its world-mates, God can create any collection of possible substances without committing a logical contradiction.

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[16] For other versions of this approach, see Hacking (1982) and Koistinen and Repo (1999).

[17] Bender calls this "Humean combinatorialism" since everything can be combined with everything else. Wittgenstein (1921), Lewis (1986), and Armstrong (1989) are famous examples of it. I largely agree with Cover and Hawthorne that we should use a combinatorial principle in order to solve the puzzle of compossibility. However, throughout the dissertation, I will argue that a relevant combinatorial principle for Leibniz should be *non-Humean*.

The initial worry their interpretation faces is that their view seems at odds with the following doctrines of Leibniz:

World-Bound Individuals: every possible substance is world-bound, i.e., no possible substance can exist in more than one world.

Superessentialism: all the properties of *x* (including relational properties) are essential to *x*.[19]

Cover and Hawthorne are well aware of this worry and try to answer it. So let us see how they answer each of them. First, let us consider World-Bound Individuals (hereafter, WBI). Cover and Hawthorne claim that although Leibniz scholars generally accept WBI, there is no direct textual evidence for it:

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[18] Since Leibniz's view on relations is itself a highly controversial issue, I will largely bracket it for now. But at least I admit that Cover and Hawthorne's view of it is not implausible; for, as they argue, it "captures the intuitive idea behind Leibniz's saying that intrinsic denominations are the basis or foundation of extrinsic relational ones, that relations or relational facts "result" or "arise" from states of the relata" (Cover and Hawthorne 1999, 83). I will come back to this issue in Chapters IV and V.

[19] One more issue is whether any possible world should be a maximal compossible collection. Cover and Hawthorne argue that a possible world does not need to be maximal; some worlds might be maximal, but others might not. I will bracket this issue since it is not directly relevant to our purpose here. I will come back to this issue in Chapter IV.

> So far as we are aware, Leibniz never explicitly enunciates or argues for WBI. If the texts are not unambiguous on this latter question, they are—as is clear in the representative texts already cited—at least suggestive (Cover and Hawthorne 1999, 93).

Despite this, however, they admit that there is a clear reason why many scholars are willing to accept WBI. This is because superessentialism (in conjunction with *the principle of identity of indiscernibles*) entails WBI, and there seems to be some textual evidence for superessentialism. Hence if Leibniz accepts superessentialism, then he must also accept WBI. Cover and Hawthorne are well aware of this fact. Thus, the real issue is more about superessentialism rather than WBI.[20]

Superessentialism is famously attributed to Leibniz by both Leibniz scholars and contemporary metaphysicians. Teresa Robertson says, "although Leibniz famously held this view [superessentialism], it nearly goes without saying that this view has had relatively few adherents" (Robertson, 2020). Influential Leibniz scholars, such as Fabrizio Mondadori and Benson Mates, have also argued that Leibniz is a superessentialist.[21] According to them, Leibniz holds that every property of a substance is essential to it. First, let us see why many people believe that Leibniz endorses superessentialism. Consider the following passages:

> It also follows that this would not have been our Adam but another, if he had undergone other events, for nothing keeps us from saying that he would be another. He is therefore another (A II.ii. 49/LA 67-9).

> It indeed seems to us that this square of marble brought from Genoa would have been entirely the same if it had been left there, because our senses enable us to judge only superficially, but at bottom because of the connection of things, the entire universe with

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[20] I will elaborate more about my position on WBI in Chapter V.

[21] Mates (1972) and Mondadori (1973). Also, see Look (2013).

> all its parts would be entirely otherwise, and would have been another from the beginning if the least thing in it took place otherwise than it does (A II.ii. 49/LA 69).

Although these passages *prima facie* support superessentialism, Cover and Hawthorne claim that Leibniz in fact endorses what they call “strong essentialism” rather than superessentialism; they say that this is “a weakening of superessentialism in the direction of a strong essentialism, away from any absolute necessity of a particular environment, toward a proper moral or hypothetical necessity of the actual-world environment” (Cover and Hawthorne 1999, 99).

Again, their strategy is to appeal to the distinction between absolute and hypothetical modality. From the above passages, we can extract the following counterfactual scheme:

(CNI) for any possible substance *x* and any property *P* of *x*, if *x* hadn’t had *P*, then *x* would have not existed.

The question is which modality is really used in (CNI). If it were absolute modality, then Leibniz would be a superessentialist. If it were a hypothetical one, then Leibniz would not be. And there is at least one passage that shows that it is hypothetical:

> Thus all human events could not fail to occur as in fact they did occur, once the choice of Adam is assumed; but not so much because of the individual concept of Adam, although this concept contains them, *but because of God’s plans*, which also enter into this individual concept of Adam, and which determine that of this entire universe, and consequently both that of Adam and those of all the other individual substances of this universe, each individual substance being an expression of the whole universe, of which it is a part in accordance with a certain relationship, through the connexion that exists between all things, because of the interrelationships between God’s decisions or plans (A II.ii. 73-4/LA 57; emphasis added).

By citing this passage, Thomas Feeney claims that "this passage suggests, the connection between Adam and everything else is not generated by Adam directly, or even by Adam's essence, but by the unity that God's intentions would have only if, in creating Adam, God also creates certain other substances and no others" (Feeney 2016, 165). Thus, Feeney argues that for Leibniz, a substance could not have been otherwise not just because of its essence but mainly because of God's decisions. If so, Leibniz might not be a superessentialist.[22]

So I do not believe that those worries are really problematic for the lawful interpretation. Unfortunately, however, this view faces one serious problem. Let us recall that one of the primary purposes of using compossibility is to avoid Spinozistic necessitarianism. But if any two possible substances are *per se* compossible, why then does God not create all the possible substances in order to maximize the amount of essence? For advocates of the lawful interpretation, the most natural answer to this question is to argue that it is impossible to subsume the collection of all possible substances under a general law of nature. What Cover and Hawthorne claim is basically in this line; they say that "while substances may be compossible *per se*, they may not be compossible when certain axioms are thrown in" (Cover and Hawthorne 1999, 137).

As many commentators have already pointed out, however, Leibniz argues that God can find a lawful manner among *any* collection of things.[23] In the *Discourse*, he says:

> [L]et us assume, for example, that someone jots down a number of points at random on a piece of paper, as do those who practice to find a geometric line whose notions is constant and uniform, following a certain rule, such that this line passes through all the points in the same order in which the hand jotted them down. […] Thus, one can say, *in*

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[22] I will argue in detail that Leibniz is not a superessentialist in Chapter III. For now, it seems suffice to show a possibility that he might not be a superessentialist.

[23] For example, Messina and Rutherford (2009, 966), Bender (2016, 72), and Lærke (2016, 130).

> *whatever manner God might have created the world, it would always have been regular and in accordance with a certain general order* (A VI.iv. 1396/AG 39; emphasis added).

If any collection of possible substances can be subsumed under some law, then all the possible substances are not just *per se* compossible; they are compossible, period. Thus, the lawful conception of compossibility is trivial and cannot avoid Spinozism.

At this point, any advocate of the lawful interpretation, including Cover and Hawthorne, has two possible responses to avoid this problem. The first option is to restrict the laws responsible for compossibility relations; in other words, not all but only some *privileged* or *natural* laws of nature are responsible for compossibility. The second one is to show that God had a clear reason to create the actual world rather than the world containing all the possible substances (let us call it "Spinozistic world"). But as James Messina and Donald Rutherford rightly point out, "[n]either of these responses gets around the main difficulty" (Messina and Rutherford 2009, 966).

The first option is Cover and Hawthorne's official response; they say that "[w]e take it that the relevant facts about laws that determine incompossibility results are *fairly specific facts about which laws operate*, rather than some general facts about lawfulness" (Cover and Hawthorne 1999, 137; emphasis added). It is not surprising that most commentators are not satisfied with this response. First, Cover and Hawthorne do not clarify what these "fairly specific facts" are. Furthermore, there is no textual evidence that Leibniz relies on some specific laws of nature in explaining incompossibility. Second, it seems that there are no non-arbitrary or non-question begging ways to distinguish between privileged and non-privileged laws. Sebastian Bender claims that "this strategy is unconvincing since the question immediately arises which laws are relevant for facts about compossibility and which are not" (Bender 2016, 72). Messina and Rutherford also point out that Cover and Hawthorne's account of compossibility "does not so much explain God's choice as presuppose it" (Messina and Rutherford 2009, 966).

So it seems clear to me that the first option cannot save the lawful interpretation. The best they can do is choose the second one and show that the actual world is better than the Spinozistic world even though it is possible. The challenge is the fact that existence is always better than non-existence for Leibniz. So we know that the Spinozistic world is better than the actual world in that it contains more substances.[24] But Leibniz has two criteria of perfection: variety and simplicity (or harmony). So advocates of the lawful interpretation can argue that the harmony of the actual world would trump the diversity of the Spinozistic world. They can thus argue that there is a trade-off between harmony and diversity.

However, many commentators—most notably David Blumenfeld—argue that Leibniz repeatedly claims that the actual world has the greatest variety together with the greatest order.[25] For this reason, Blumenfeld claims that "the trade-off thesis is wrong" (Blumenfeld 1995, 386).[26] If so, the second option also cannot avoid the threat of Spinozism. But it is in fact controversial whether the mentioned passages really entail that there is no trade-off for Leibniz. Hence, I do not want to claim that this option is problematic just because it is incompatible with the no-trade-off idea. Unfortunately, however, there are more drawbacks beyond this.

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[24] The tricky thing here is that the actual world also contains infinitely many substances. Before Cantor, philosophers and mathematicians did not have good resources to compare sizes of infinite aggregates. Leibniz was not an exception; he did not have a rigorous way to make a comparison between infinite things. Although Leibniz's view on so-called the "Galieo's paradox" has been discussed a lot in the literature (e.g., Russell (1903), Levey (1998, 2008, and 2015), Brown (2005), Nachtomy (2011), van Atten (2011), Harmer (2014), and Schechtman (2019)), it seems that commentators largely bracket this issue when dealing with the problems of compossibility. I believe that Galieo's paradox might cause some additional problems to Leibniz's project of compossibility. But if it is a problem, then it is a problem for everyone rather than a problem for any particular interpretation. For the purpose of the dissertation, therefore, I will largely bracket the issues of infinity.

[25] See Blumenfeld (1995); also, Messina and Rutherford (2009, 967) and McDonough (2010, 141-3).

[26] For simplicity's sake, I will largely bracket it here. But I will show that my alternative interpretation of compossibility fits well with no trade-off idea in Chapter IV.

First, this option cannot be a palatable one for the actual advocates of the lawful interpretation. At this point, given the consideration of the first option, we admit that any collections of possible substances can be subsumed under some laws of nature. And this implies that any collections of possible substances are *per se* compossible. But if this is the case, lawfulness plays very little role in explaining incompossibilities among possible substances.[27] Needless to say, advocates of the lawful interpretation firmly believe that lawfulness should come into the picture somehow. But now it seems to play only, if any, a minor role in the picture.

More seriously, many commentators rightly point out that a successful interpretation should show that it is *absolutely* impossible for God to create all the possible substances.[28] But the lawful interpretation cannot do this since they now admit that strictly speaking, God could create all the possible substances. And this makes their view vulnerable to Messina and Rutherford's criticism: accepting the lawful interpretation is "limited to explaining compossibility in terms of what God would not choose to do, as opposed to what he cannot do" (Messina and Rutherford 2009, 969; my emphasis). Consequently, Cover and Hawthorne's view fails to provide a satisfying conception of compossibility.

5. The Cosmological Interpretation

Thus far, we have seen that both the logical and lawful interpretations have serious worries. Yet, despite their difficulties, the secondary literature on this issue has long been dominated by variations of those two approaches. Most recently, however, Messina and Rutherford, and McDonough suggest their alternatives and show that their views have some advantages which other interpretations do not have. So it is worthwhile to take a look at them briefly.

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[27] I especially want to thank John Whipple for pointing it out.

[28] For instance, Futch (2008, 74), Messina and Rutherford (2009, 967), and Griffin (2013, 104).

Let us look at Messina and Rutherford's cosmological interpretation first. They argue that it is wrong to explain membership in a world in terms of compossibility; rather, they believe that the proper way to frame the issue of compossibility is "to begin with the notion of a world, as an abstract relational structure according to which God conceives of possibilities of existence" (Messina and Rutherford 2009, 969). Thus, they try to solve the problem by focusing on the conditions under which a set of possible substances can constitute a world since they believe that "the notion of a world is conceptually prior to the notion of compossibility" (Messina and Rutherford 2009, 969). They suggest that two or more possible substances are compossible if and only if God can conceive of them as belonging to the same world.

But exactly when can God conceive a set of possible substances as constituting a world? They argue that for Leibniz a set of possible substances can be conceived as constituting a world if and only if *they are related with respect to a common spatiotemporal order*:

> In Leibniz's view, all and only those substances are compossible that are conceived by God as related within the spatiotemporal and causal structure of a world. They must, in other words, be substances that condition each others' existence, relative to a common order of coexistence and succession. Whatever things cannot conceived by God in this way are incompossible (Messina and Rutherford 2009, 971).

Thus, they use the concept of spatiotemporal order to explain incompossibilities among possible substances. Consequently, their view becomes that *two or more possible substances are compossible if and only if they are related with respect to a common spatiotemporal order*.

They argue that their view can satisfy both *Anti-Spinozism* and *World-Apart*. Their answer to *Anti-Spinozism* seems straightforward. They maintain that "not all possible are compossible, because God cannot conceive of all possible as belonging to the same world" (Messina and Rutherford 2009, 969) since not every possible substance can be related with respect to a common spatiotemporal order. In contrast, their solution for *World-Apart* needs more explanation. First of all, they admit that it is not easy for them to satisfy *World-Apart* since "every substance is conceived by God as belonging to a single possible world" (Messina and Rutherford 2009, 972). Thus, they agree with the logical interpretation that every possible substance is *world-bound*. In order to satisfy *World-Apart*, however, they focus on the distinction between "what God can do absolutely and what God can do in meeting the objective of actualizing *a world*" (Messina and Rutherford 2009, 973). They argue that we can "draw a sharp line between the way in which two different sorts of properties — those designated by intrinsic and extrinsic denominations — are contained in the complete concept of a possible substance" (Messina and Rutherford 2009, 973). In so saying, they basically argue that Leibniz draws a distinction between the *thin* and the *thick* individual concepts.[29]

How can this distinction solve the problem? They explain that if God chooses to create *a world*, then he must consider the thick individual concepts and create all the possible substances belonging in that possible world. Thus, it is logically impossible even for God to create *a world* in which only one possible substance exists. However, if God considers only the thin individual concepts, then "nothing in Leibniz's complete concept theory precludes God from actualizing a substance apart from its worldmates" (Messina and Rutherford 2009, 973). Therefore, they argue that absolutely speaking, God could create a single possible substance without creating its worldmates; what God could not do is just to make it as *a world*.

Are their solutions successful? One thing they did really well is to set the proper goals for a successful interpretation of compossibility. As they show, a successful reading should show that God *absolutely* could not create all the possible substances, while God *absolutely* could create a single possible substance without creating other possible substances. Neither the logical nor the lawful interpretation can satisfy both. Unfortunately, the cosmological interpretation does not seem to do better than them; it has at least two serious drawbacks.

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[29] There is a number of commentators who support this distinction. For instance, Brown (1987), Cover and Hawthorne (1999), and Nachtomy (2007). We shall come back to this point in Chapter III.

As we have seen, they argue that absolutely speaking, God could create a single substance without creating its worldmates. Likewise, their view implies that absolutely speaking, God could create all the possible substances. Even though they do not explicitly say this, their view implies that if God considers only the thin individual concepts, nothing precludes God from actualizing all the possible substances. In this sense, they agree with the lawful interpretation that all possible substances are *per se* compossible. The only thing God could not do is to create them as *a world*. If this is the case, however, is there a good reason why God must create them as *a world*?[30]

Messina and Rutherford seem to be aware of this problem:

> Although all possible cannot be created by God as a single world, it might be objected that nothing prevents God from actualizing many spatiotemporally disjoint worlds. […] Leibniz explores this issue in texts composed during his most intense engagement with Spinoza's philosophy (1676-77). Whether or not he arrives at a compelling reason for rejecting this scenario, he is firm that God chooses to create only one from among an infinity of possible worlds (Messina and Rutherford 2009, 976 n.23).

In this passage, they claim that Leibniz firmly believes that God chooses to create *only a world* no matter whether he successfully defends it or not. In so saying, they argue that as a commentator, they can use it just as a given fact or a maxim. In some sense, they seem right.

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[30] A similar objection has been suggested in a slightly different form by Michael Griffin (2013, 102-4). He points out that the cosmological interpretation cannot provide a good reason why God would not have created more than one possible world.

Why didn't God create not only the best world but also the second-best world? At some level, every commentator in the literature simply assumes that God creates only one world.[31]

At first glance, therefore, their answer seems convincing. In fact, however, they are using the term "world" ambiguously here. In one sense, "world" refers to "a compossible collection of possible substances." In the other sense, it refers to "a collection of spatiotemporally related possible substances." Therefore, we in fact have two different claims here:

(OOW$_1$) God creates only one compossible collection of possible substances.
(OOW$_2$) God creates only one collection of spatiotemporally related possible substances.

But almost every instance, Leibniz uses the term "world" to refer to the former. In the *Theodicy*, for instance, he writes: "I call 'World' the whole succession and the whole agglomeration of all existent things" (G VI. 107/H 128). Given so, it is evident that Leibniz firmly believes (OOW$_1$). Hence, it is by and large justified that commentators in the literature accept it as a given fact. But Messina and Rutherford cannot save their view by using (OOW$_1$); In their view, all the possible substances can constitute a compossible collection in the strictest sense. So if they accept (OOW$_1$) not (OOW$_2$), then God would create all the possible substances.[32] In contrast, if they accept (OOW$_2$) not (OOW$_1$), then God would create the actual world. Thus, these two principles do not give the same answer in the cosmological framework.[33] So they need textual evidence for (OOW_2) independently of that for (OOW_1). But I believe that it would be difficult to find such evidence.

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[31] But this does not mean that we cannot answer this question. For instance, advocates of the logical interpretation might answer this question by saying that God didn't do that because creating two mutually incompossible sets of possible substances is not a good or wise decision. Note: even though they rely on God's choices to answer this question, this does not affect their notion of compossibility itself. For them, the notion of compossibility is still defined only by logical notions; so the incompossibility among possible substances is still a logical matter.

[32] For the sake of argument, I am here assuming that creating all the possible substances is better than creating only a proper subset of them.

Of course, there remains one possible way they can take. They can simply argue that God could create all the possible substances but *would not choose to do so* because the spatiotemporal unity matters. In other words, God did not do that because creating the actual world is better than creating all the possible substances. But this response is not satisfactory. As I said, they rightly point out that a successful interpretation of compossibility should show that it is *absolutely* impossible for God to create all the possible substances. But their view cannot do this if they admit that strictly speaking, God could create all the possible substances. Michael Futch rightly argues that on the cosmological interpretation, "Leibniz is not entitled to the proposition that not all possible can co-exist, but only to the much weaker proposition that not all possible can co-exist as a single world" (Futch 2008, 74). As Griffin (2013, 104) points out, this makes their view vulnerable to the same criticism they argue against Cover and Hawthorne: accepting their interpretation is "limited to explaining compossibility in terms of what God would not choose to do, as opposed to what he cannot do" (Messina and Rutherford 2009, 969).

Moreover, it needs to be pointed out that their view crucially relies on the concept of spatiotemporal order. As Paul Rateau points out correctly, the spatiotemporal order should be explained by the relations among substances rather than explain them. He says, "it is not time and space to differentiate things and make the numerical identity of a world; on the contrary, things make it possible to differentiate one time from another, one space from the other, and make the unity and singularity of a world" (Rateau 2011, 45). Rateau argues, therefore, that their reading should be explained by Leibniz's more fundamental notions even if they are on the right track.[34]

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[33] And this is not the case according to other frameworks, since other commentators (correctly) believe that the spatiotemporal order should be grounded upon the relations of compossible substances, not *vice versa*. Thus, other commentators believe that only compossible collections of possible substances can be related to the same spatiotemporal order. There cannot be such things as spatiotemporally-disjoint but compossible collections of possible substances. I believe that this reflects a deeper problem of the cosomological view. And as we shall see, this relates to my second objection to the cosmological view.

Rateau convincingly shows that Messina and Rutherford's interpretation is, at best, incomplete.[35] In my opinion, however, this problem is more serious than mere incompleteness. For Leibniz, space and time should be explained in terms of relations of entities; space and time are well-founded phenomena grounded in diverse relations of entities. And at the fundamental level, relations of entities, in turn, should be explained by relations of possible substances. But the primary relation possible substances can have is nothing but compossibility. Leibniz writes, "space, just as a common time, is taken to be nothing more than a certain order of compossibles" (G VI. 467). Hence, space and time are something that should be explained by the compossibility relation, not *vice versa*.[36]

6. The Packing Interpretation

Lastly, let us look at McDonough's packing interpretation. His idea is that for Leibniz, the right kind of puzzle of compossibility is something similar to optimization of packing. Remember that God tries to pack as much essence as possible into the world. McDonough suggests that God's creative action is similar to a traveler who tries to pack as many items as possible into a single carrier or a tiler who tries to cover as much space as possible with given tiles. To support his reading, McDonough cites the following passage from *On the Ultimate Origination of Things* (1697):

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[34] To be fair, Messina and Rutherford acknowledge this point; they say, "a full account of the cosmological interpretation would require discussion of how Leibnizian substances (including soul-like monads) can be understood as spatiotemporally ordered (Messina and Rutherford 2009, 971).

[35] Rateau (2011) in fact tries to suggest a full account of his version of cosmological interpretation by using perceptions and appetites of monads. Although I will not be able to deal with his view properly in this dissertation, I believe that his view is also not entirely free from my general worry against any version of cosmological view; spatiotemporality should be explained by compossibility, not *vice versa*.

[36] Of course, this does not mean that advocates of the cosmological view cannot find a good ground for compossibility by Leibniz's more fundamental notions. I just mean that considering the explanatory order in Leibniz metaphysics, spatiotemporality plays no role in that case.

> It is obvious that of the infinite combinations of possibilities and possible series, the one that exists is the one through which the most essence or possibility is brought into existence … the situation is like that in certain games, in which all spaces on the board are supposed to be filled in accordance with certain rules, where at the end, blocked by certain spaces, you will be forced to leave more places empty than you could have or wanted to, unless you used some trick. There is, however, a certain procedure through which one can most easily fill the board… And so, assuming that at sometime being is to prevail over nonbeing, or that there is a reason why something rather than nothing is to exist, or that something is to pass from possibility to actuality, although nothing beyond this is determined, it follows that there would be as much as there possibly can be, given the capacity of time and space (that is, the capacity of the order of possible existence); *in a word, it is just like tiles laid down so as to contain as many as possible in a given area* (G VII. 303-4/AG 150-51; emphasis added).

As we can see, Leibniz himself often uses "packing" or "tiling" analogies to describe God's creative action. What McDonough tries to do is to use this analogy directly in order to solve the puzzle of compossibility.

To make his strategy more intuitive, he assumes that "(i) creation involves the realization of extended, corporeal substances and (ii) is finite in both total volume and number of constituents" (McDonough 2010, 143). Given these two assumptions, it is not hard to see that the packing analogy can suggest a beautiful solution to the puzzle of compossibility. According to McDonough's view, "the best of all possible worlds will […] be the world that instantiates the most efficient packing of substances… it will be the world that is optimally 'stuffed' full of corporeal substances taking into consideration each possible substance's own perfection as well as how it fits together with every other possible substance" (McDonough 2010, 146). It also suggests an elegant way to avoid Spinozism. God cannot create all the possible substances *because* there is not sufficient space. Furthermore, his view satisfies *World-Apart*, for it is easy for God to create a single possible substance in space.[37]

Unfortunately, however, the two assumptions he made are problematic. As McDonough himself notes, (possible) worlds are neither finite nor corporeal in Leibniz's mature metaphysics.[38] But McDonough convincingly shows that the infinity of worlds itself is not a big problem to his view since we can measure the perfection of an infinite corporeal world not by the sum of the perfection of each substance in the world but rather by its *density* of perfection. He says that "[o]n this way of determining relative perfection, the best of all possible worlds will be the infinite world with the highest "density" of perfection—the world that has the greatest amount of being 'stuffed' into every finite region" (McDonough 2010, 149).

The real threat to his view is the corporeality assumption. In Leibniz's mature metaphysics, all genuine substances are immaterial and unextended. So it is hard to figure out how to apply the packing approach to his mature idealistic metaphysics since Leibniz says that a mind "does not impair the course of things… because minds have no volume" (A VI.iii 581-

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[37] Strictly speaking, this is the case only when he assumes that space is big enough to contain any arbitrary possible substance. But as I shall argue, McDonough should assume that space is not big enough to contain any *two* arbitrary possible substances to avoid the intransitivity problem. For this, see footnote 47 of this chapter and section 2 of Chapter III.

[38] It is controversial whether Leibniz holds that there are not only immaterial substances but also corporeal substances in his metaphysics. Most commentators generally agree that there are only immaterial substances in Leibniz's mature metaphysics, while he might accept the existence of corporeal substances in his so-called "middle years." But some commentators think that Leibniz continues to hold the existence of corporeal substances even in his mature metaphysics. For this debate, see Adams (1994), Phemister (2005), Garber (2009), and Whipple (2017). In this dissertation, I will simply bracket this issue; my view on compossibility is independent of whether substances are corporeal or not.

2/DSR 105). Thus, applying the packing strategy into immaterial worlds is hard since immaterial substances cannot get into one another's way.

Also, the packing interpretation cannot satisfy *Anti-Spinozism* without the corporeality assumption. Since immaterial substances do not impair the course of other immaterial substances, it is possible for God to create all the possible substances simultaneously. And McDonough admits that it seems "inescapable that the best world must contain every possible substance" (McDonough 2010, 154) if such a world is possible for Leibniz. Therefore, the packing interpretation without the corporeality assumption implies that the actual world must contain every possible substance. In other words, he admits that his interpretation cannot satisfy *Anti-Spinozism*.

Surprisingly, however, he argues that this implication is not problematic since it does not make Leibniz a necessitarian. He says,

> For the relevant threat of necessitarianism is rooted in the idea that if God were to create every possible world, then there would be no sense in which he could have created otherwise — that he would be not just morally, but logically, locked into creating the actual world assuming that he creates at all. But on the nonparsimonious way of individuating worlds, that conclusion does not follow since at the moment of creation God still confronts infinitely many metaphysically and morally distinct alternatives (McDonough 2010, 159).

In one sense, he is totally correct. The mere fact that the actual world contains every possible substance does not imply necessitarianism; as McDonough points out, God still could have done otherwise. Strictly speaking, therefore, his interpretation implies only actualism, not necessitarianism. As I argued before, however, Leibniz argues against not just necessitarianism but also actualism. Thus, no matter whether his view implies necessitarianism or not, it cannot satisfy *Anti-Spinozism*.

In fact, McDonough is aware of this point well; he admits that Leibniz appears to reject actualism solidly in many passages (McDonough 2010, 154). But he argues that “Leibniz could have embraced the consequence that the best of all possible worlds contains every possible substance and still avoided, by any of several different routes, the specter of a Spinozistic necessitarianism” (McDonough 2010, 160). But this response is not satisfactory. First, the very same thing can be said by advocates of the lawful interpretation. Not only the packing interpretation, but also the lawful interpretation (also maybe the cosmological interpretation) make Leibniz an actualist only, not a necessitarian. Moreover, as McDonough himself admits, Leibniz’s anti-actualism is textually well-warranted; Leibniz explicitly confesses that “the consideration of possibles, which are not, were not, and will not be, brought me back from this precipice [i.e., necessitarianism]” (A VI.iv. 1654/AG 94). Given that Leibniz definitely wants to have mere possibles in his metaphysics, the actualist reading of Leibniz is historically incorrect.

Although McDonough suggests a number of ways to avoid this difficulty, he concedes that applying his packing strategy to Leibniz’s mature metaphysics “stretches Leibniz’s favored analogies of arranged tiles and stacked stones to the breaking point” (McDonough 2010, 161).[39]

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[39] In his most recent paper (McDonough, 2021), McDonough suggests a new version of the “idealistic” packing strategy and claims that his idealistic packing view comes very close to Messina and Rutherford’s cosmological interpretation. Since I believe that a complete treatment of McDonough’s new view deserves its own paper, I will bracket the issue here. For now, I want to point out one thing. McDonough argues that his new view can be regarded as a version of cosmological interpretation. But there is one important difference between McDonough’s and Messina and Rutherford’s cosmological views. McDonough argues that possible substances are *not* world-bound, while Messina and Rutherford argue that they are. This issue is crucial with regard to the intransitivity problem. In my opinion, the world-bound individuals doctrine is incompatible with the intransitivity of compossibility. Therefore, the intransitivity of compossibility is a real threat to Messina and Rutherford’s, while it might not be to McDonough’s new reading.

7. Intransitivity of Compossibility

In the previous section, I argue that the packing interpretation is not satisfactory. However, I believe that McDonough's packing analogy provides some valuable insights into the issues of compossibility. So let us take a look at it a little more. McDonough emphasizes that Leibniz continues to use his packing or tiling puzzle analogy from at least *On the Secrets of the Sublime* in 1676 to *On the Ultimate Origination of Things* in 1697. However, McDonough seems to concede that his packing strategy cannot be entirely coherent with Leibniz's mature idealistic metaphysics. If the packing or tiling strategy is on the right track, then this conflict is mysterious. McDonough provides two possible pictures to explain away the mystery. According to the first picture, Leibniz was not careful enough to retool the puzzle of compossibility in order to fit his mature idealistic metaphysics. In short, Leibniz was not fully consistent. According to the second one, Leibniz was consistent; McDonough's tiling strategy rather shows that Leibniz "continues to hold onto the possibility that the created world contains not only immaterial minds but also extended corporeal substances or bodies" (McDonough 2010, 161). But neither of the two pictures is attractive.

In fact, however, there is one more alternative picture. The problem here is that the following two facts seem inconsistent with one another:

(i) Leibniz continues to use tiling puzzle analogies when he explains God's creation or compossibility.
(ii) McDonough's packing strategy is at odds with Leibniz's idealistic metaphysics.

Generally, I agree with McDonough that (i) provides keen insights into the problem of compossibility. The fact that Leibniz keeps using puzzle or game analogies shows something; it shows that we can try to solve the compossibility problem in a game-like or puzzle-like manner. But we should note that there are different *kinds* of puzzles. It might be the case that (i) and (ii) are inconsistent merely because McDonough's packing strategy does not use the *right* kind of puzzle which Leibniz has in mind.

In order to see this, I show that there are various kinds of puzzles, and we can compare each interpretation—not only the packing but also the logical and lawful readings—with a different kind of puzzle.[40] The kind of puzzle McDonough has in mind is clear; given that he thinks the puzzle of compossibility is a kind of packing problem, he is considering Conway's puzzle (Figure 1) or a similar kind of tiling puzzle:

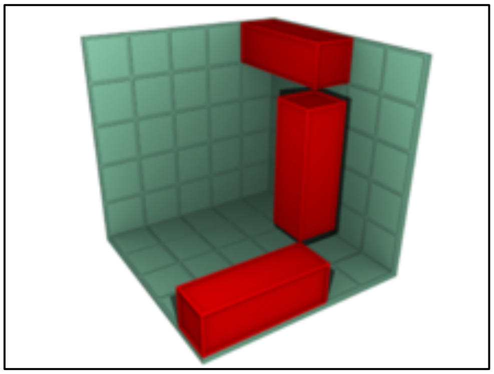

Figure 1. Conway puzzle[41]

Setting aside details, the objective of Conway's puzzle is to pack as many objects as possible in a single container without overlapping them. Remember that Leibniz says, "it is just like tiles laid down so as to contain as many as possible in a given area" (G VII. 304/AG 151). Considering this passage, it is hard to deny that Conway's puzzle is one of the most natural candidates as a model for Leibniz's real puzzle of compossibility.

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[40] Unfortunately, it is not easy to find an appropriate puzzle analogy to the cosmological interpretation.

[41] The figure is from Wikipedia [https://en.wikipedia.org/wiki/Conway_puzzle]. The author of the picture (ZeroOne) grants anyone the right to use it for any purpose.

However, Conway's puzzle is not the only kind of tiling puzzle. There is another type of tiling puzzle with which we are quite familiar: *Jigsaw puzzle*. A jigsaw puzzle is a puzzle that requires the assembly of interlocking pieces in order to produce a complete picture. And we can make a good analogy between a jigsaw puzzle and the logical interpretation. A jigsaw puzzle is created by painting a picture and then cutting that picture into small pieces. This means that the right place of each piece has already been predetermined by the whole picture. Every single piece of a picture is demanded to complete the picture and no two pieces from different pictures can be assembled; in other words, each piece is *picture-bound*.[42] The purpose of the puzzle master (i.e., God) is to complete infinitely many pictures (i.e., possible worlds) and choose the best one.

Even the lawful interpretation can be compared very well with a certain kind of puzzle: *LEGO*®. LEGO consists of interlocking bricks, which can be assembled in many ways to construct various objects. One fascinating fact about LEGO is that any two standard bricks can be assembled and interconnected with each other (*per se compossibility*). Of course, each LEGO set has a designated model that bricks of the set are supposed to build and contains the instruction manual (*specific laws of nature*). But the real beauty of LEGO is to have the freedom to re-combine LEGO bricks and create new things with them. Ideally, a great LEGO builder (i.e., God) can collect all the LEGO bricks in the world and create a beautiful thing without leaving any single brick (*the threat of Spinozism*).[43]

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[42] Someone can argue that if two different pieces from two different pictures are qualitatively identical, then they might not be picture-bound since they are interchangeable. This raises an interesting philosophical question about the individuation of a jigsaw piece. First, we need to ask whether interchangeability really means that pieces are not picture-bound. Note that, by definition, a jigsaw puzzle is created by (i) painting a picture first and (ii) then cutting that picture into pieces. Given that, we can think that each piece of a jigsaw is individuated by its original picture token. Let us call it "origin essentialism for jigsaw pieces." According to this origin essentialism, the mere fact that two different pieces from two different pictures are interchangeable does not mean that they are not picture-bound. But is this a right metaphysical position? Although I believe it is plausible, there can also be competing positions (e.g., jigsaw piece functionalism). This issue looks worth considering further, but I will not dwell on it here. In fact, I can safely bypass this issue for the purpose of the dissertation. Note that my goal is to make an analogy between the jigsaw puzzle and the logical view. In order to do that, there is nothing wrong with assuming that every piece is qualitatively distinct from every other piece since all the possible substances are qualitatively distinct from each other in Leibniz's metaphysics.

Thus, the mere fact that Leibniz continues to use tiling analogies does not support any reading conclusively. Even the logical and lawful interpretations can be compared very well with certain kinds of tiling puzzles. In fact, however, McDonough convincingly argues that neither a jigsaw nor LEGO is the right kind of puzzle when Leibniz uses tiling analogies. After citing a well-known passage from *On the Radical Origination of Things*, he says:

> Leibniz's geometrical "packing" or "tiling" analogy does little to suggest either the logical or lawful responses to the puzzle of incompossibility that have been favored by his commentators. For in it there is no hint that the existence of one substance might per se entail the existence or nonexistence of any other particular substance. […] Nor is there any suggestion that considerations of maximization and order must be traded off against one another as the lawful solution suggests (McDonough 2010, 143-4).

I agree with McDonough's diagnosis here; the passages McDonough relies on show that neither the logical nor the lawful interpretation provides the right picture of compossibility.

However, the packing interpretation might also fail to provide the right picture of it. The following interesting passage seems to show that neither of four views considered captures the right puzzle of compossibility:

> Let it be that there are seven possible beings *ABCDEFG*, all equally perfect and with equal claims to existence and that the following six incompatibilities obtain: *A* with *B*, *B*

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[43] Again, it is hard to find a puzzle analogy to the cosmological interpretation. On the one hand, the cosmological interpretation can be regarded as a jigsaw in the sense that Messina and Rutherford endorse WBI. On the other hand, their view is similar to LEGO since they believe that strictly speaking, every possible substance is *per se* compossible.

> with *D*, *D* with *G, G* with *C, C* with *F*, and *F* with *E*. Then two of them could be made to exist together in fifteen ways: *AC, AD, AE, AF, AG, BC, BE, BF BG, CD, CE, DE, DF, EG, BG*. Again, three of them could be realizable as follows: *ACD, ACE, ADE, ADF, AEG, AFG, BCE, BEG,* and *BFG*. But four could be realized in only one single way *ACDE*. It is this that would be chosen [by God] among all the other possibilities since it is this that one obtains the most possible. In consequence, this quartet *ACDE* would exist in preference to the rest. *BFG*, for example, would be excluded, because taking any one of these excludes having four things all-told (A VI.iv. 2231-2/Grua 285-6).[44]

I believe that this passage can provide us with fresh insights into how to solve the problem of compossibility. Most notably, this seems to show that for Leibniz, the compossibility problem is a kind of *one-player combinatorial game*; the goal of the player (i.e., God) is to find out the perfect one among a number of different combinations. But as I said, the mere fact that Leibniz is using game or puzzle analogies does not conclusively support any reading. However, this passage seems to contain an important hint which implies that all the interpretations we have seen might not be on the right track.

For the present purposes, the most important point in the above passage is that the compossibility relation is intransitive in this model. According to the model in the passage, *A* is compossible with *C,* and *C* is compossible with *B*. If the compossibility relation is transitive, therefore, *A* should be compossible with *B*. But Leibniz explicitly says that *A* is incompossible with *B* in this model. Thus, this passage indicates that the compossibility relation is intransitive for Leibniz.[45]

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[44] I will show more textual evidence that Leibniz keeps using this "combinatorial" idea in explaining compossibility in Chapter IV.

[45] In fact, Michel Fichant has already pointed it out. In analyzing the same passage, he says:

> In other words, *compatibility is not an equivalence relation*. So, it is reflexive (A is compatible with A), symmetric (if A is compatible with B, then B is compatible with A), *but it is not transitive*. In the schema presented in the text, A is compatible with C, C is compatible with B, but A is incompatible with B (Fichant 1971, 45).

This implication seems problematic for all the readings considered; for, despite their differences, all of them, *prima facie*, seem to imply that the compossibility relation is transitive.[46] According to the logical interpretation, each possible substance is compossible *with and only with* its world-mates. In other words, compossibility is an equivalence relation (reflexive, symmetric, and transitive); the compossibility relation provides a complete partition of the collection of all possible substances into disjoint equivalence classes. On the other hand, according to the lawful, cosmological, and packing interpretations, the compossibility relation is trivially transitive (also reflexive and symmetric); for, according to them, any two possible substances are *per se* compossible with one another.[47] Thus, the above passage seems to show that none of them captures the right kind of puzzle of compossibility.

8. **Conclusion**

Let me summarize what we have discussed in this chapter. First, I have examined four different interpretations—the logical, the lawful, the cosmological, and the packing interpretations—and

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But Fichant dismisses the passage's significance since he thinks that the schema Leibniz gives here is too "*abstract and incomplete*" (Fichant 1971, 32) to be relevant to Leibniz's real metaphysical view. However, I firmly object to this diagnosis. Throughout the dissertation (especially in Chapter IV), I will show that the "combinatorial" schema is one of the most crucial keys to solve the problem of compossibility. We shall return to this point in Chapter IV.

[46] But see footnote 47 of this chapter and section 2 of Chapter III. I will examine in detail how the intransitivity problem can be dealt with.

[47] To be fair, the lawful interpretation has one plausible way to solve the intransitivity problem. Suppose that there are three distinct possible substances A, B, and C and that there are only two specific laws of nature L_1 and L_2. Also, suppose that A and B can be subsumed under L_1 and B and C can be subsumed under L_2 and that A and C cannot be subsumed under any specific law. Then, according to the lawful interpretation, A and B are compossible and B and C are compossible, but A and C are not compossible. Then intransitivity holds for the lawful interpretation. The advocates of the packing view can also argue that their view can be compatible with *Intransitivity* if they accept that space is not big enough to contain any two arbitrary possible substances. For now, I will not delve into this issue further; in Chapter III, I will examine various ways to deal with the intransitivity problem.

showed that each of them faces serious difficulties. As many commentators have already pointed out, an ideal interpretation of compossibility should satisfy all the following requirements:

Ontological Independence: each possible substance is ontologically independent of other substances, except for God.

World-Apart: for any substance *x*, God can create *x* without creating other substances.

Anti-Spinozism: God cannot create all the possible substances.

Idealism: Any interpretation of compossibility should be coherent with Leibniz's mature idealistic metaphysics.

The central issue in the secondary literature has been that there is no interpretation that satisfies all of them. In this chapter, I have made things worse. I have added one more requirement:

Intransitivity: The compossibility relation is intransitive.

In sum, the current situation is as follows:

TABLE I
SUMMARY OF THE EXISTING READINGS

	The Logical Reading	**The Lawful Reading**	**The Cosmological Reading**	**The Packing Reading**
Ontological Independence	X	O	O	O
World-Apart	X	O	O	O
Anti-Spinozism	O	X	X	O
Idealism	O	O	?	X
Intransitivity	X	?	X	?

As you can see, none of them satisfies all the requirements. This is a little frustrating; the compossibility problem has long been a hot issue among Leibniz scholars, and many commentators have tried but failed to solve it. If so, one might think that it is simply impossible to satisfy all the requirements; it might be the case that Leibniz was not fully consistent or he did not sincerely endorse some of the above requirements. In fact, many commentators nowadays are trying to explain away some of the requirements instead of solving the puzzle directly. Should we give up finding a direct solution? I do not think so. I believe that there still is a possible interpretation that has not been fully developed by other commentators. So it might be worth considering to see whether this alternative can satisfy all the above requirements. From the next chapter, I will start developing such an alternative.

II. ONTOLOGICAL INDEPENDENCE, WORLD-APART, AND HUMEAN COMBINATORIALISM

1. Introduction

As we have seen in the previous chapter, *Ontological Independence* ("each possible substance is ontologically independent of other possible substances except God") or *World-Apart* ("God can create a single possible substance without creating other possible substances") has been a controversial issue among commentators. Advocates of the logical interpretation have tried to deny that Leibniz endorses those principles while others are willing to accept them. However, most commentators agree with the following two things: (1) *Ontological Independence* and *World-Apart* are equivalent claims, and (2) *World-Apart* (or *Ontological Independence*) implies *Humean Combinatorialism*, according to which every possible substance can be combined with every other possible substance (except God). In this chapter, I will show that neither of them is correct. To be specific, I will argue that *Ontological Independence* does not imply *World-Apart* and that neither *Ontological Independence* nor *World-Apart* implies *Humean Combinatorialism*.

The structure of this chapter is as follows. In section 2, I will analyze the "world-apart" passages and show that Leibniz has meant at least three different things by using the term "world-apart." Importantly, I will argue that Leibniz accepts the ontological version of it, *i.e.*, *World-Apart*, in the *Leibniz-Des Bosses correspondence*. In sections 3 and 4, I will show that there are two different conceptions of ontological dependence in the history of philosophy and that Leibniz accepts what I will call the "definitional" account of ontological dependence. Given this, *Ontological Independence* and *World-Apart* are not equivalent claims. Finally, in section 5, I will argue that neither *Ontological Independence* nor *World-Apart* implies *Humean*

Combinatorialism. By doing so, I will show that it is possible to accept *World-Apart* and/or *Ontological Independence* without endorsing *Humean Combinatorialism*.

2. The Varieties of "World-Apart"

There is no doubt that Leibniz describes every single substance as a world apart [monde à part] several times. Most famously, Leibniz writes, "each substance is like a world apart, independent of all other things, except God" (A VI.iv. 1550/AG 47) in the *Discourse on Metaphysics* (1686). But the exact meaning of "world-apart" has been controversial among commentators. As we have seen in the previous chapter, some argue that "world-apart" passages have a clear ontological implication; thus, it is metaphysically possible for God to create a single substance without creating other substances. In contrast, other commentators argue that "world-apart" passages merely show the causal isolation of substances and nothing else. In the previous chapter, I confirmed that there is at least one passage showing that Leibniz endorses the ontological version of "world-apart" (thus, *World-Apart*). But this does not mean that Leibniz always claims *World-Apart* whenever he writes that each substance is like a world apart. Recently, some commentators have argued that Leibniz has in mind at least three different versions of "world-apart" in his philosophy. Before going further, I will explain the differences among them and argue that Leibniz accepts the ontological version of "world-apart" (thus, *World-Apart*) at least in the *Leibniz-Des Bosses Correspondence*.

Although many commentators have already felt that there are different versions of "world-apart" in Leibniz's philosophy, Adam Harmer (2016) has differentiated them most clearly. According to him, there are three different types of "world-apart"[1]:

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[1] The following discussion in this section is in debt to Harmer (2016). I agree with him on many points, but it will become clear that we have some important disagreements.

Causal World-Apart: every possible substance is causally isolated from all the other possible substances except for God.

Phenomenal World-Apart: the truth of a possible substance's phenomena does not depend on any other possible substances except for God.

Ontological World-Apart (i.e., *World-Apart*): God can create a single possible substance without creating other possible substances.

Now let us see where we can find textual evidence for each of these theses. The *Discourse on Metaphysics* might be a good place to start since most readers might first have become familiar with the term "world apart" from the following passage in DM §14:

> […] each substance is like a world apart, independent of all other things, except for God; thus, all our phenomena, that is, all the things that can ever happen to us, are only consequences of our beings (A VI.iv. 1550/AG 47).

Here Leibniz seems to mean the causal isolation of substances when he says that each substance is like a world apart. Everything that can happen to us is only a consequence of our beings; there are no causal interactions among created substances. Thus, Leibniz endorses *Causal World-Apart* here. And as you can see, this passage supports neither *Phenomenal* nor *Ontological World-Apart*. The mere fact that all our phenomena are only consequences of our beings does not guarantee that the phenomena we have are truthful; the perceptions in my dream are consequences of myself, but they are false. Also, the possibility that other substances do not exist is not mentioned at all in this passage; but it is logically possible that substances are causally isolated but modally inseparable.

However, this does not show that Leibniz accepts only *Causal World-Apart*. In DM §14, we can also find textual evidence for *Phenomenal World-Apart:*

> And since these phenomena maintain a certain order in conformity with our nature or, so to speak, in conformity with the world which is in us, an order which enables us to make useful observations to regulate our conduct, observations justified by the success of future phenomena, an order which thus allows us often to judge the future from the past without error, this would be sufficient to enable us to say that *these phenomena are true without bothering with whether they are outside us and whether others also perceive them* (A VI.iv. 1550/AG 47; my emphasis).

In this passage, he argues that the truth of our phenomena does not depend on the conformity to an external world; rather, it depends on the order in conformity with our nature.[2] This supports that Leibniz accepts *Phenomenal World-Apart*; but it supports neither *Causal* nor *Ontological World-Apart*. It is weird but logically possible to say that perceptions themselves come from the causal interactions with other substances in the world, but the truth of our perceptions does not depend on an external world. Moreover, it is consistent to say that the truth of our perceptions does not depend on other substances, but substances themselves are modally inseparable.

Then where can we find textual evidence for *Ontological World-Apart* in the *Discourse*? Harmer argues that the following passage is the closest we can get in the *Discourse* (Harmer 2016, 46):

> We also see that every substance has a perfect spontaneity (which becomes freedom in intelligent substances), that everything that happens to it is a consequence of its idea or of its being, and that nothing determines it, except God alone. And that is why a person of very exalted mind, revered for her saintliness, was in the habit of saying that the soul must often think *as if there were nothing but God and itself in the world [comme s'il n'y avoit que Dieu et elle au monde]* (A VI.iv. 1581/AG 64; emphasis added).

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[2] Thus, Leibniz seems to deny the correspondence theory of truth. Whether he really denies the correspondence theory is an interesting question, but I will not delve into it here since it is not a primary concern in this chapter. For this, Ishiguro (1991) is a good place to start.

Moreover, we can find a similar passage in the *New System* (1695):

> This is what makes every substance represent the whole universe exactly and in its own way, from a certain point of view, and makes the perceptions or expressions of external things occur in the soul at a given time, in virtue of its own laws, *as if in a world apart, and as if there existed only God and itself [comme dans un monde à part, et comme s'il n'existoit rien que Dieu et elle]* (G IV. 484/AG 143; emphasis added).

These passages seem to support *Ontological World-Apart*, but, as we have seen in the previous chapter, the fact that Leibniz uses the qualifier "as if" makes us reluctant to say that he really endorses it. We need more direct statements of it.

Fortunately, as I argued in the previous chapter, we can find them in the *Leibniz-Des Bosses correspondence* (1706-1716). In his letter on 6 April 1715, Des Bosses argues that if Leibniz's philosophy were true, then "God could not have created any of those monads that exist in this way without producing all the others that now exist in the same way" (G II. 493/LR 335). In response, Leibniz writes to Des Bosses,

> The other objection is this: if all monads have their perceptions from their own stores, so to speak, and without any physical influence of one on another, and, further, if the perceptions of each monad correspond precisely to all the other monads that God has already created or to their perceptions, then God could not have created any of those monads that now exist without having produced all the others, etc. *The response is easy and has already been given: he could absolutely, but not hypothetically* (G II. 496/LR 337-9).

As I have already argued, Leibniz explicitly argues that the world-apart scenario is absolutely possible but hypothetically impossible. Thus, it is logically possible for God to create a substance without its worldmates; God did not do that simply because doing it is not a wise and good action.

And Leibniz has really given the same response to Des Bosses before. Des Bosses once asks the following question to Leibniz: what happens if there is only one substance in the world? In his letter on 11 March 1706, Leibniz answers,

> You say that one substance, if we should suppose one alone, would have infinite actions at the same time, since nothing impedes it. I reply that even when it is impeded, it exerts infinite actions at the same time; for, as I have already said, no impediment destroys an action completely. And it is not surprising that any substance exerts infinite actions with the help of infinite parts exercising different motions, for any substance represents the whole universe in some way, according to how it is related to it, and any part of matter is affected in some way by every other. But it should not be thought on this account that, since it exerts infinite actions, it exerts every action whatsoever and every action equally, for each and every substance is of a determinate nature. *However, that there should exist one substance alone from among these is something that does not agree with divine wisdom; thus, it does not happen, although it could happen* (G II. 307/LR 37; my emphasis).

In the last part of this answer, Leibniz argues that the world-apart scenario is not going to happen *because it does not agree with divine wisdom*, although it still could happen. Even though he uses slightly different words here, I believe this answer is basically the same as the previous one: the world-apart scenario is absolutely possible but hypothetically impossible. Thus, Leibniz had indeed given the same response to Des Bosses about ten years ago. And I think that these passages are clear evidence that Leibniz endorses not only *Causal* and *Phenomenal* but also *Ontological World-Apart* as many other commentators do.[3]

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[3] For instance, Messina and Rutherford (2009, 965), Brown and Chiek (2016, 6-7), and Harmer (2016, 52-6)

3. Two Conceptions of Ontological Independence

In the previous section, we have seen that Leibniz accepts three different versions of "world-apart," and one of them is *Ontological World-Apart*; some passages in the *Leibniz-Des Bosses correspondence* seem to have a clear ontological indication. Since *Ontological World-Apart* is a directly relevant one for this chapter, I will simply call it (again) *World-Apart* and focus on it. The next question we are going to ask is about the relation between *World-Apart* and *Ontological Independence*, according to which each possible substance is ontologically independent of other possible substances except God. As I have said, most Leibniz scholars think that they are equivalent claims and so do not deal with them separately.[4] In this section, however, I argue that they are not equivalent.

To see the difference between those two claims, we should know what "ontological dependence" or "ontological priority" means for Leibniz. Unfortunately, however, it is not easy to find passages where Leibniz explains this explicitly. As far as I see, Leibniz never tries to give a definition or explanation of what "ontological dependence" is. So we need some indirect ways to find it. First, let us see why most commentators have thought that they are equivalent. Answering this question is not difficult. This is because the following had been the dominant account of dependence:

(ME-Dep) x ontologically depends on y if and only if x cannot exist without y.

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[4] As far as I know, the only exception is Cover and Hawthorne (1999).

This account tries to explain ontological dependence in terms of modal and existential concepts. So we can call this the "modal/existential" approach. As many philosophers have already pointed out, this approach has had a long history.[5] Aristotle in the *Metaphysics* says,

> Some things then are called prior and posterior in this sense. others in respect of their nature and substance, i.e. those which can be without other things, while the others cannot be without them (Aristotle 2014, 3462; Met 1019a 1-4).

In this passage, Aristotle argues that the priors can exist without other things while the posteriors cannot exist without the priors. Thus, he seems to define ontological priority or dependence by using notions of modality and existence.

It is hard to deny that the modal/existential approach is a natural way to understand the concept of ontological dependence. And it had long been the "standard" understanding of dependence in the Anglo-American tradition. For instance, in the entry under "Dependence" in the *Handbook of Metaphysics and Ontology*, Peter Simons says that something is "ontologically dependent on something else when the first cannot exist unless second exists" (Simons 1991, 209). Not only contemporary philosophers, but historians also have often used the modal/existential approach to explain ontological dependence for historical figures. For example, Gonzalo Rodriquez-Pereyra (2008, 80) tries to defend the modal/existential approach in explaining Descartes' conception of ontological dependence.

Thus, the modal/existential approach has been a natural and popular account of dependence. And I believe that Leibniz scholars have at least implicitly used (ME-Dep) for Leibniz's conception of ontological dependence. This would explain both why they have not dealt with *Ontological Independence* and *World-Apart* separately and why they take them to be equivalent. For if (ME-Dep) were the right conception for Leibniz, then *Ontological Independence* and *World-Apart* would become equivalent. According to *World-Apart*, each possible substance is like a world apart; this means that *it can exist without any other possible substances except God*. According to *Ontological Independence*, on the other hand, each possible substance is ontologically independent of any other possible substances except God. Following (ME-Dep), this means that *each possible substance can exist without any other possible substances except God*. Therefore, *Ontological Independence* and *World-Apart* would become the same doctrine if (ME-Dep) were the right one for Leibniz.

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[5] For instance, Fine (1995a) and Tahko and Lowe (2020).

So the question is whether the modal/existential approach is the right account of ontological dependence for Leibniz. After Kit Fine's seminal works (1994, 1995a), however, it has been well known that the modal/existential approach is not the only account of ontological dependence in the history of philosophy, and the modal/existential approach has many difficulties. Fine's famous example is Socrates and the set whose sole member is Socrates. If Socrates exists, so does {Socrates}; thus, Socrates cannot exist without {Socrates}. (ME-Dep) then demands us to say that Socrates ontologically depends on {Socrates}. But we do not want to say that Socrates depends upon the set. Sets ontologically depend on their members, not *vice versa*. One more famous difficulty is the case in which the 'dependee' is a necessary existent. For instance, consider Plato and the number 5. Given that 5 necessarily exists (as Platonists argue), Plato cannot exist without the number 5. But we do not want to say that Plato depends on 5. They are two entirely distinct things.

The difficulties of the modal/existential approach are especially disturbing when we interpret Scholastic philosophers and/or so-called "rationalists" such as Descartes, Spinoza, and Leibniz. Recently, Anat Schechtman writes:

> Of particular interest would be cases in which a created substance cannot exist without another created substance, or without a mode. […] In fact, many readers, including Spinoza and Leibniz, have alleged that there are such cases. They point to the fact that a substance cannot exist without some mode or other; or that a body —a corporeal substance—cannot exist without the bodies surrounding it (on pain of vacuum), and without the bodies that are its parts. These are just a few of the most popular examples (Schechtman 2016, 183).

As she points out, such philosophers think that a substance cannot exist without its (principal) mode or attribute. More generally, a substance cannot exist without having its essential properties. But we obviously do not want to say that substances ontologically depend on modes or properties.

I believe the above discussion shows that there is something deeply unsatisfactory in the modal/existential approach of ontological dependence.[6] The problem for this approach is that it is not sufficiently fine-grained. We want to say that sets depend on their members and that properties depend on substances, but not the other way around. The modal/existential approach requires us to say that the other way is also the case. Thanks to Fine (1995), fortunately, it is now well known that there is at least one more natural account of ontological dependence in the history of philosophy. By claiming the "definitional" approach of dependence, Fine explains,

> It is this analogy with definition that makes it so natural to talk of understanding in connection with dependence. We understand a defined term (what it means) through the terms by which it is defined. Similarly, we understand a defined object (what it is) through the objects upon which it depends (Fine 1995, 275).

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[6] Of course, some philosophers have tried to develop more sophisticated versions of the modal/existential approach. For this, see Tahko and Lowe (2020).

Why does {Socrates} depend on Socrates but not *vice versa*? According to the definitional approach, this is because we should understand what {Socrates} is through Socrates while we do not need to understand {Socrates} in understanding who Socrates is. Although there are subtle variations of this approach and different philosophers use different names for it,[7] they all share the following core ideas: (i) for any entity, the nature (or essence, real definition, substantial form) of that thing provides *the* explanation of what it is, and (ii) if the nature of *x* contains some relation or reference to another entity *y* (and not the other way around), then *x* ontologically depends on *y*. Why do modes depend on substances? Because "[w]hat enables us to see modes for "what they really are" and distinguish them from substances is that we consider them as "in substances"" (Schechtman 2016, 189).

The definitional approach of ontological dependence or priority has also had a long history.[8] Fine points out that the central idea of the definitional account is rooted in Book VI.4 of Aristotle's *Topics* and *Metaphysics*, 1028a35. More importantly, it had been the "standard" understanding of ontological dependence among Scholastic philosophers. As we have seen in Chapter I, Jorge Gracia explains the standard Scholastic formula of it as follows:

> It…meant that a substance was, from its own essence, independent, i.e., that it did not receive its being except through its own essence or form. […] But for their formal causation they do not depend on anything else, since there is no reference to other substances or being in their definition. In this way they differ from accidents which are

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[7] It is called the "essential" by Tahko and Lowe (2020), and the "nature-based" approach by Schechtman (2016).

[8] One could argue that strictly speaking, dependence should be distinguished from priority for the following reason. Suppose that there are two entities *x* and *y*. Also, say that *x* is a substance but *y* is an accident of another substance, *z*. If so, we might be able to say that *x* is ontologically prior to *y* while there is no dependence relation between *x* and *y*. I admit that this is a valid point. But as you can see from Aristotle and Fine, most philosophers have not distinguished them. Therefore, I take ontologically priority and dependence to be the same thing in this chapter for simplicity's sake. See Bennett (2017, 137-9 and 158-60) more about the relation between them.

> always defined in terms of another and, therefore, are dependent [per se] on something else (Gracia 1982, 268).

According to his explanation, a substance is independent since there is no reference to other substances or beings in its own (real) definition or essence or form. In other words, *x* ontologically depends on *y* if and only if there is some reference to *y* by *x*'s (real) definition (or essence or form).

The fact that the definitional approach was the popular view for scholastic authors might be significant. Admittedly, there are obvious and important differences between scholastic and early modern philosophy. But it is still fair to say that some central features in an early modern figure's philosophy can be better understood against the background of the scholastic philosophy. For instance, Schechtman (2016) convincingly argues that the definitional approach is the best candidate for Descartes' conception of ontological dependence. She suggests the following formula:

(D-Dep) *x* ontologically depends on *y* if and only if (1) there is some relation R such that xRy, and (2) xRy by *x*'s nature but not by *y*'s nature (Schechtman 2016, 192).

The similarity between Gracia's and her formulation is evident given that she thinks of "the nature of a given entity as that which defines it" (Schechtman 2016, 188). The only significant difference between them is that according to Gracia's, dependence can be symmetrical while it is not according to Schechtman's. As we shall see, Leibniz seems to think that the dependence relation should be asymmetrical; so I believe that Schechtman's is a better candidate for Leibniz's conception of dependence. But finding out a more appropriate formulation is not the purpose of this chapter. For now, we only need to know whether Leibniz accepts the modal/existential or the definitional approach of ontological dependence.

4. Leibniz on Ontological Dependence and World-Apart

In the previous section, we have seen that there are two importantly distinct conceptions of ontological dependence (or ontological priority) in the history of philosophy. Which one does Leibniz really endorse? As I said, Leibniz does not say much about ontological dependence. So we need to find indirect ways to figure it out. We should first notice that the definitional approach had been the standard view in the scholastic period. Despite differences, it is hard to deny that his scholastic predecessors heavily influence some central themes in Leibniz's philosophy. For this reason, Cover and Hawthorne (1999, 26) argue that Leibniz's view is more likely to be the definitional rather than the modal/existential approach, at least in his early career. I believe that this reason is convincing, but we might need more direct evidence.

Fortunately, there is a passage where we can glimpse Leibniz's view on ontological dependence. In commenting on Spinoza's *Ethics*, Leibniz writes interesting remarks on the concept of dependence:

> But he has not explained what the term 'prior by nature' means, and so this proposition cannot be demonstrated from what precedes it. But it seems that by 'something prior to another thing by nature' he means that through which the other thing is conceived. Yet I confess that I find some difficulty in this too, for it seems that what is posterior not only can be conceived through what is prior, but also the prior through the posterior. 'To be prior by nature' can be defined in this way, however: as that which can be conceived without the other being conceived, while the other thing cannot, on the contrary, be conceived without the concept of the former. But to tell the truth, to be prior by nature is a little more general even than this. For example, the property of the number 10 to be 6+4 is posterior to that of being 6+3+1, because this latter property is closer to the first

> property of all [*omnium primae*]; ten is 1+1+1+1+1+1+1+1+1+1. Still it can be conceived without the second property, and what is more, it can be proved without it. I add another example. In a triangle the property that the three internal angles equal two right angles is posterior in nature to the property that two internal angles are equal to the exterior angle of the third. Yet the former can be understood without the latter and, indeed, can be demonstrated without it, though not as easily (A VI.iv. 1766-7/G I. 140-1/L 197).[9]

The above is his comment on Proposition 1 in Spinoza's *Ethics*, according to which substance is by nature prior to its affections; in other words, affections ontologically depend on its substance.

In this passage, Leibniz raises three interesting questions against Spinoza. First, Leibniz points out that Spinoza does not explain the meaning of 'prior by nature,' which is nothing but the concept of ontological priority or dependence.[10] Without knowing the precise meaning of it, Leibniz argues, we could not know whether Proposition 1 follows from preceding Definitions of *Ethics*. Given the context, however, Leibniz admits that it can be understood as follows: *x is ontologically prior to y if and only if y can be conceived through x*. But Leibniz immediately objects to this formulation. He says, “it seems that what is posterior not only can be conceived through what is prior, but also the prior through the posterior” (A VI.iv. 1767/G I. 140/L 197). By saying so, he points out that the relation of priority or dependence should be asymmetrical; thus, he thinks that something cannot be both prior and posterior to something else. But it is possible that *x* can be conceived through *y* and *y* can be conceived through *x*. According to the above formulation, therefore, something can be both prior and posterior to something else. Leibniz is arguing that this is problematic.

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[9] The translation is revised; Loemker's translation is a little misleading.

[10] It is relatively clear that Leibniz considers 'priority by nature' as a concept of ontological dependence. But it is not clear whether Leibniz has a univocal notion of ontological dependence; he might have different kinds of ontological dependence relations. If so, we should further ask whether Leibniz uses the same ontological dependence relation when he says, "each substance is … independent of all other things, except for God" (A VI.iv. 1550/AG 47). Whether Leibniz is an ontological dependence *pluralist* or *monist* is an interesting question. Although I cannot deal with this issue properly here, I want to point out that the above passage seems to show that Leibniz might be an ontological dependence monist. In this passage, Leibniz comments on Proposition 1 in *Ethics,* "substance is by nature prior to its affections." For reductio, suppose that Leibniz is an ontological dependence pluralist. Then, by 'priority by nature,' he must mean some particular ontological dependence relation; given that it is the relation between substance and affections, we naturally expect that it is *inherence* or *instantiation*. But Leibniz also says that 10's being 6+3+1 is prior by nature to being 6+4. But it is clear that being 6+3+1 and being 6+4 can be in neither *inherence* nor *instantiation* relation. In general, if Leibniz is an ontological pluralist, it is mysterious that Leibniz uses the same ontological dependence relation in both cases without justification. In contrast, Leibniz does not need any justification for using the same ontological dependence relation in both cases if he is an ontological monist. Thus, it is more charitable and reasonable to assume that he is an ontological monist. (I want to thank Kristin Irwin, Daniel Moerner, and John Whipple for pushing me in this direction.)

As Leibniz notices, however, it is not difficult to solve this problem. We can make it asymmetrical by slightly revising the given formulation. Leibniz himself suggests such a revision: “as that which can be conceived without the other being conceived, while the other thing cannot, on the contrary, be conceived without the concept of the former” (A VI.iv. 1767/G I. 140-1/L 197). This can be streamlined as follows:

(C-Dep) *x* is ontologically prior to *y* if and only if (1) *x* can be conceived without *y* being conceived and (2) *y* cannot be conceived without *x* being conceived.

Note that the concept of conception plays a central role in this formulation. According to Leibniz’s understanding, Spinoza defines the concept of ontological priority (or, dependence) in terms of conception.[11] I will call this the “conception” approach. The first thing we should notice is that the conception approach is, at the core, not that different from the definitional one on the assumption that to conceive of something is, requires, or is in some way strongly tied to thinking of its definition/essence/nature and *vice versa*. By and large, both share the same crucial idea: *if y is needed in order to explain (or conceive) what x is (but not the other way around), then x ontologically depends on y.*[12]

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[11] Whether Leibniz’s understanding of Spinoza’s view is correct is an interesting question. Spinoza scholars argue that Spinoza has three different ways (or kinds) of ontological dependence relations: inherence, conception, and causation. But scholars disagree about whether Spinoza believes that these three kinds of ontological dependence relations are in fact identical or at least co-extensive. Della Rocca (2008) and Newlands (2010) argue that this is the case. If so, Leibniz’s understanding of Spinoza would be largely correct. In contrast, Melamed (2012) and Schechtman (2018) argue that these three different ontological dependence relations are neither identical nor co-extensive. If so, (C-Dep) would be incorrect; Spinoza would accept the following conditional only: “If *x* can be conceived without *y* being conceived and *y* cannot be conceived without *x* being conceived, then *x* is ontologically prior to *y*.” If this is really the case, Leibniz’s objection in this passage does not work. As you shall see, both his counterexamples to

Leibniz's attitude towards (C-Dep) is ambivalent. He seems to think that it is not entirely wrong but still not fully satisfactory; he says, "to tell the truth, to be prior by nature is a little more general even than this" (A VI.iv. 1767/G I. 141/L 197).[13] He comes up with two counterexamples to (C-Dep). First, consider two properties of number 10: being 6+4 and being 6+3+1. According to Leibniz, being 6+3+1 is prior to being 6+4 since the former is closer to being 1+1+1+1+1+1+1+1+1+1. But being 6+4 can be conceived without being 6+3+1 conceived. Thus, (C-Dep) cannot capture the priority relation between 6+4 and being 6+3+1. Second, in a triangle, the property that two internal angles are equal to the exterior angle of the third is prior to the property that the three internal angles equal two right angles. But the latter can be conceived without the former being conceived. Thus, (C-Dep) cannot capture the priority relation between them. Therefore, (C-Dep) is not entirely satisfactory; it is at best coarse-grained.

Even though he does not express it explicitly, we can find important hints about Leibniz's conception of ontological priority or dependence. First of all, as I said, he does not think that the

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(C-Dep) are intended to show that the converse of the above conditional is not working. Given that, this controversy among Spinoza scholars is quite relevant here. But for the purpose of the dissertation, I will not delve into it further for now.

[12] For this reason, Fine does not hesitate to say that the conception approach is quite similar to the definitional one (Fine 1995, 276). As I shall argue soon, however, these two approaches are not identical. But we need to note that Fine's purpose is to have some historical support (or root) for his own approach, rather than to do justice to Spinoza's (or Leibniz's).

[13] Interestingly, Leibniz used conception to explain ontological priority in his early years. In the *Elements of Natural Law*, Leibniz writes that x is prior by nature to y if it is "able to be more clearly conceived than [y], [y] not more than it" (A VI.i. 483).

basic idea behind (C-Dep) is entirely wrong; he just points out that conception is not the right concept to explain ontological priority. Basically, he argues that the ontological priority relation cannot be defined well by how we think, conceive, and understand things; rather, it should be defined by *what they really are*. In other words, he argues that it should be based on essences, forms, or *real* definitions rather than nominal definitions. He writes, “In my opinion, the difference is that *the real definition displays the possibility of the definiendum and the nominal does not*” (NE 295; my emphasis). “This is why *definitions* for me are *real* when we know that what is defined is possible; otherwise they are only *nominal*, and we shouldn’t rely on them” (A II.ii. 66/LA 95).

Bearing this in mind, take a look at Leibniz’s counterexamples closely. First, note that Leibniz seems to think that it is a given fact that being 6+3+1 is prior to being 6+4. He explains that this is because the former is closer to “the first property of all” [*omnium primae*], which is 1+1+1+1+1+1+1+1+1+1. What does he mean by “the first property of all”? It is well known that Leibniz tries to define natural numbers by the number 1 and addition. Leibniz writes, “that one and one make two is not strictly speaking a truth, but rather the definition of *two*” (NE 409). In the *New essays*, for example, he famously argues:

> That *two and two are four* is not quite an immediate truth. Assume that ‘four’ signifies ‘three and one.’ Then we can demonstrate it, and here is how.
>
> *Definitions.* (1) *Two* is one and one.
> (2) *Three* is two and one.
> (3) *Four* is three and one.
>
> *Axiom.* If equals be substituted for equals, the equality remains.
>
> *Demonstration.* 2 and 2 is 2 and 1 and 1 (def. 1) 2 + 2
> 2 and 1 and 1 is 3 and 1 (def. 2) 2 + 1 + 1
> 3 and 1 is 4 (def. 3) 3 + 1
> 4

> Therefore (by the Axiom)
> 2 and 2 is 4. Which is what was to be demonstrated (NE 413-4).

It is now generally conceded that the above proof of Leibniz's is inadequate since he implicitly relies on the law of association.[14] But for our purpose, to know what Leibniz tries to achieve is good enough. As the above passage shows, he tries to define natural numbers recursively as follows:

$2 =_{df} 1 + 1$

$3 = 2 + 1 =_{df} 1 + 1 + 1$

$4 = 3 + 1 = 2 + 1 + 1 =_{df} 1 + 1 + 1 + 1$

…

$10 = 9 + 1 = 8 + 1 + 1 = 7 + 1 + 1 + 1 = \ldots =_{df} 1+1+1+1+1+1+1+1+1+1$

…

Given this, we can see that 10's being 1+1+1+1+1+1+1+1+1+1 is nothing but the very definition of 10; thus, it is *what 10 really is*. So being 1+1+1+1+1+1+1+1+1+1 is prior by nature to any other properties of 10. And being 6+3+1 is prior by nature to being 6+4 since the former is closer to 10's primary *real* definition, being 1+1+1+1+1+1+1+1+1+1. Of course, we can conceive 10's being 6+4 without conceiving being 6+3+1, but it is irrelevant to what is ontological prior to what. According to Leibniz, what really matters are real definitions (*i.e.*, essences or natures).

In the triangle example, Leibniz seems to have Euclid's proposition 32 of book I in mind[15]:

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[14] This flaw had already been known to mathematicians and philosophers in the 18th century. Gottfried Martin (1985) argues that this flaw is one of the important reasons why Kant thinks arithmetic is synthetic not analytic.

[15] I especially want to thank Nick Huggett for pointing it out.

Proposition I.32: In any triangle, if one of the sides be produced, the exterior angle is equal to the two opposite interior angles, and the three interior angles of the triangle are equal to two right angles.

Strictly speaking, in the Euclid (or Euclid-like) system, one demonstrates that the three interior angles of a triangle are equal to two right angles by using the fact that the exterior angle is equal to the two opposite interior angles. Consider the following picture:

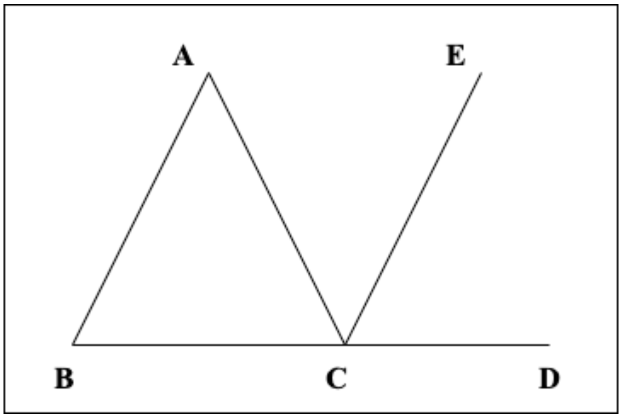

Figure 2. A triangle in the Euclid system

We have a triangle *ABC* here. By using proposition 31 of book I ("through a given point to draw a straight line parallel to a given straight line"), draw *CE* parallel to the line *AB* through the point *C*. Then, by proposition 29 of book I ("a straight line falling on parallel straight lines makes the alternate angles equal to one another, the exterior angle equal to the interior and opposite angle, and the interior angles on the same side equal to two right angles"), we know that $\angle BAC$ is equal to $\angle ACE$, and that $\angle ABC$ is equal to $\angle ECD$. But we know that $\angle ACD$ is equal to $\angle ACE + \angle ECD$; subsequently, $\angle ACD$ is equal to $\angle BAC + \angle ABC$. Therefore, the exterior angle of the third angle is equal to the two opposite interior angles.

Then, by common notion 2 (“if equals are added to equals, the wholes will be equal”), we know that $\angle ACD + \angle ACB$ is equal to $\angle BAC + \angle ABC + \angle ACB$. Hence, $\angle ACD + \angle ACB$ is equal to the three angles of the triangle. But by proposition 13 of book I (“when a straight line that stands on another straight line makes two angles, either it makes two right angles, or it makes angles that together are equal to two right angles”), $\angle ACD + \angle ACB$ is equal to two right angles. Therefore, the three internal angles of the triangle are also equal to two right angles. So, given the deductive structure of the Euclidean system, Leibniz seems to think that in a triangle the property that two internal angles are equal to the exterior angle of the third is prior in nature to the property that the three internal angles equal two right angles. If (C-Dep) is the proper conception, we should not be able to conceive the latter without conceiving the former. But Leibniz points out that we can. Consequently, he argues, (C-Dep) is not good enough.[16]

Admittedly, it could be controversial whether Leibniz’s two examples are really counterexamples to Spinoza’s view or whether Spinoza really endorses (C-Dep).[17] But I am not going to delve into the accuracy of Leibniz’s interpretation of Spinoza here. For this chapter, the more important thing is the fact that the (real) definitional approach captures Leibniz’s conception of ontological priority or dependence better than the modal/existential approach. According to Leibniz, 10’s being 6+3+1 is ontologically prior to being 6+4. But the modal/existential approach cannot capture this because 10's being 6+3+1 and being 6+4 are never separable. Likewise, it cannot capture that the property that the three internal angles equal two right angles is posterior by nature to the property that two internal angles are equal to the exterior angle of the third, for these two properties are never separable. In contrast, it is not hard to see that Leibniz's approach is quite similar to the definitional one. Like the definitional approach, Leibniz seems to think that the priority relation should be based on what things really are.

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[16] Someone might criticize me as follows: “your explanation cannot be right. Leibniz explicitly writes that the ontological priority question is irrelevant to how we can conceive or demonstrate. But your explanation here depends on how we demonstrate in the Euclid system.” But this possible objection fails to notice that we can distinguish between *non-canonical* and *canonical* demonstrations. This distinction is analogous to that between nominal and real definitions. We can define things in as many ways as we can conceive, but there is only one real definition for each. Likewise, we can prove things in various ways, but there is only one canonical proof for each. And this canonical proof shows the *real* order of justification. Leibniz writes: “in the natural order the statement that a thing is what it is, is prior to the statement that it is not something else; for we are not concerned here with the sequence of our discoveries, which differs from one man to another, but with the connection and natural order of truths, which is always the same” (NE 412). Interestingly, Tyler Burge (2000) shows that Frege, following Leibniz (and rationalists in general), has such a distinction, too.

[17] See footnote 11 of this chapter.

For the above reason, I believe that Leibniz accepts the definitional account of ontological dependence. If so, we should rethink the relation between *World-Apart* and *Ontological Independence*. I have already shown that if Leibniz took the modal/existential account, these two would become equivalent claims. But this is not the case according to the definitional account. To be specific, *Ontological Independence* does not imply *World-Apart*. Strictly speaking, the mere fact that *x* and *y* are ontologically independent of each other does not guarantee that they are separable from each other. It is logically possible to say that *x* (or *y*) exists whenever *y* (or *x*) exists even though *x* and *y* are independent of each other; there might be some substantial bond or union which makes them inseparable. This fact has already been pointed out by many philosophers.[18] Fine famously says,

> It would appear to be possible that two philosophers could agree on all of the relevant modal facts and yet disagree on the relationships of dependence. They might agree, for example, that persons and minds were distinct, that the one could only exist with the other, and so on; and yet one might think of persons as embodied minds and hence as dependent upon minds, while the other might think of minds as abstractions from persons and hence as dependent upon persons (Fine 1995, 272).

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[18] For instance, Fine (1995, 272) and Schechtman (2016, 193-4).

In the modal/existential approach, it is almost impossible to figure out the dependence relation between necessarily coexistent things, for two things can be independent only when one could exist without the other. In contrast, in the definitional approach, we can say that *x* (e.g., a person) and *y* (e.g., a mind) are two independent substances, but one could only exist with the other. Thus, in general, it is possible that *x* and *y* are independent of each other, but *x* (or *y*) cannot exist without *y* (or *x*). Given that, we can see that *Ontological Independence* does not imply *World-Apart* for Leibniz.

5. **The Gap between World-Apart and Humean Combinatorialism**

In the previous section, I argued that *Ontological Independence* and *World-Apart* are two distinct claims for Leibniz. Many commentators have incorrectly thought that they are equivalent, for they fail to figure out the right conception of ontological dependence for Leibniz. Needless to say, it is quite important to grasp the concept correctly in understanding Leibniz's whole metaphysics. However, if we focus only on Leibniz's theory of compossibility, this mistake might not be a fatal one. For *World-Apart* does imply *Ontological Independence* while the other way around is not the case. It is not hard to figure out; there is no better evidence than the fact that two things are separable to see that they are independent of each other.[19] In this sense, therefore, *World-Apart* is a stronger claim than *Ontological Independence*. And as we have seen, there is substantial evidence that Leibniz accepts *World-Apart*. Given that, the subtle difference between them is not that important in understanding Leibniz's theory of compossibility. Therefore, in discussing this topic, we can focus on the stronger claim, *World-Apart*.

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[19] One could argue that *World-Apart* might not imply *Ontological Independence*, too. For instance, some scholastic philosophers endorse a view of real accidents where an (real) accident could exist without a substance. If so, they could argue that a real accident depends upon its substance but could exist without it. For them, therefore, *World-Apart* might not imply *Ontological Independence*. Although I believe this possibility is worth considering more, I can safely bracket it in the present context. For it is quite clear that Leibniz would not endorse a view of real accidents given his views on substances and accidents. For this, see Clatterbaugh (1973), and Whipple (2010).

However, there is one more gap in the secondary literature, which is much more critical than the one between *World-Apart* and *Ontological Independence*. It is a gap between *World-Apart* and *Humean Combinatorialism*, according to which every possible substance can be combined with every other possible substance (except God). I call this "Humean" since it follows Hume's famous dictum: there are no necessary connections (and no necessary disconnections) between distinct entities.[20]

As we saw in the previous chapter, all the camps except the logical interpretation are willing to accept *Humean Combinatorialism*; they all argue that strictly speaking, every possible substance is *per se* compossible with every other possible substance.[21] This is because they place a good deal of weight on the world-apart passages. Leibniz writes that God could create a single possible substance without others. If so, they argue, then God could create any collection of possible substances. Almost every commentator agrees with this conditional.[22] Thus, almost everyone thinks that they are a package deal. If one accepts *World-Apart*, then one also accepts *Humean Combinatorialism*.

However, this inference is not valid; *World-Apart* does not imply *Humean Combinatorialism*. Hence accepting *Humean Combinatorialism* is not justified by the world-apart passages. The gap between them is not difficult to appreciate. To see this clearly, consider the following situation:

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[20] Hume famously says, "there is no object, which implies the existence of any other if we consider these objects in themselves" in *A Treatise of Human Nature,* Book I, Part III, §VI. His dictum plays an important role in many debates, especially contemporary analytic metaphysics. For instance, Wittgenstein (1921), Lewis (1986), and Armstrong (1989).

[21] Cover and Hawthorne (1999), Messina and Rutherford (2009), and McDonough (2010). But as we have seen in Chapter I, they all argue that not all possible substances are compossible *in their restricted sense*.

[22] As far as I know, Abraham (1972) and Harmer (2016) are the only two exceptions. Harmer points out that a gap between what he calls "basic ontological independence" and "strict ontological independence," which correspond to *World-Apart* and *Humean Combinatorialism,* respectively.

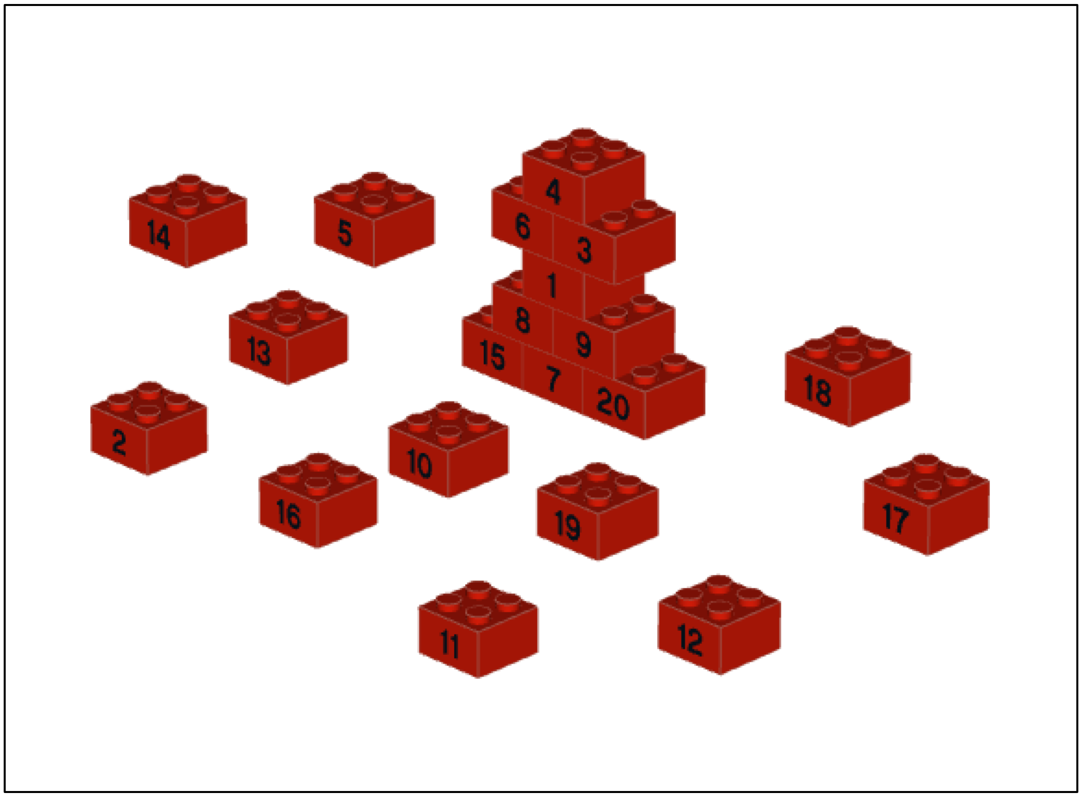

Figure 3. LEGO and FEGO bricks (Created by the author using http://www.ldraw.org/)

Consider the above picture. There are twenty 2x2 bricks here. All the bricks look similar; they are indiscernible merely by sight. In fact, however, there are two different kinds of bricks: LEGO and FEGO. Some of them are LEGO bricks, while the others are FEGO ones. Both LEGO and FEGO are interlocking bricks, which can be assembled and dissembled in many ways to construct various objects. Any two LEGO bricks can be assembled and interconnected with each other, and the same thing is also the case for FEGO. Importantly, however, LEGO and FEGO are incompatible; we cannot interconnect a LEGO brick with a FEGO one. In other words, a LEGO brick is compossible with and only with LEGO bricks, while a FEGO brick is compossible with and only with FEGO bricks.

Now the situation is as follows. We have no information about which one is which: LEGO or FEGO. But we know that some bricks have already been assembled: bricks 1, 3, 4, 6, 7, 8, 9, 15, and 20. Let us call this assembled collection of bricks "*B*." Now consider the following question. Given all the information we have at this point, which one can we answer with certainty?

(1) Brick 4 can be detached from *B*.
(2) Brick 10 can be attached to *B*.

The answers are: "Yes" for (1) and "No" for (2). How can we be sure about (1)? We, of course, do not know whether bricks in *B* are LEGO or FEGO. But we know that all the bricks in *B* are the same kind; they are either all LEGO or all FEGO. So we can be sure that any combination among them (bricks 1, 3, 4, 6, 7, 8, 9, 15, and 20) is possible no matter whether they are LEGO or FEGO.[23] So yes, we can be sure that brick 4 can be detached from *B*. In contrast, (2) cannot be justified by the information we have. To know (2), we should know that brick 10 and *B* are of the same kind. But we simply do not know at this point whether brick 10 and B are of the same type or not.

The lesson from the example is clear. If we know that any combination of *compossible* substances is possible and that some possible substances have already assembled together, the only thing we can know is that a substance can be detached from the assembled collection, for we already know they are compossible. In contrast, we cannot know whether another substance can be attached to the collection since we do not know whether they are compossible or not. Now let us return to the relation between *World-Apart* and *Humean Combinatorialism*. As I mentioned, commentators frequently argue that *World-Apart* entails that any two possible substances are *per se* compossible.[24] But this is not correct. What *World-Apart* shows is, at best, that if there is a possible world constituted by possible substances x_1, x_2, …, and x_n, then God can create x_i alone for any arbitrary *i*. This claim is natural and innocuous because we already know that x_1, x_2, …, and x_n are compossible with each other by the fact that they constitute a possible world. Thus, what *World-Apart* shows is, at best, that any combination *within* x_1, x_2, …, and x_n are possible if we already know that they are compossible with each other. As you can see, this is not a strong claim at all.

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[23] Of course, I assume here that bricks in *B* are not glued together. But this assumption seems not problematic at all.

In contrast, *Humean Combinatorialism* argues more than that: it argues that if there is a possible world constituted by possible substances x_1, x_2, …, and x_n, then not only (1) God can create x_i alone for any arbitrary *i* but also (2) God can add any arbitrary possible substance *y* to the possible world constituted by x_1, x_2, …, and x_n. Thus, *Humean Combinatorialism* is stronger than *World-Apart*. And the second part of it cannot be justified because we do not know whether *y* is compossible with x_1, x_2, …, and x_n. To add *y* to the world, *y* should be compossible with each and every member of the world. But we simply do not have the relevant information.

World-Apart shows that it is always possible for God to detach a possible substance (or substances) from a possible world that has already been made. But this does not entail that it is always possible to attach a possible substance *y* to a possible world that has already been made. Thus, *World-Apart* does not show that any combination of *possible* substances is possible. In one of his letters to Bourguet, Leibniz writes:

> *Not all possibles are compossible. Thus, the universe is only a certain collection of compossibles*, and the actual universe is the collection of all existing possibles, that is to

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[24] Cover and Hawthorne (1999, 137) and McDonough (2010, 137-8).

> say, those which form the richest composite. And since there are different combinations of possibilities, some of them better than others, there are many possible universes, each collection of compossibles making up one of them (G III. 573/L 662; my emphasis).

In contrast, *Humean Combinatorialism* entails that both detaching and attaching are always possible since it argues that any combination among possible substances is possible. Given this, we can see that *Humean Combinatorialism* implies *World-Apart* but not *vice versa*. Therefore, *Humean Combinatorialism* is not justified by the world-apart passages. Furthermore, since *World-Apart* implies *Ontological Independence* but does not imply *Humean combinatorialism*, it is logically impossible that *Ontological Independence* implies *Humean Combinatorialism*. Hence, *Ontological Independence* also does not imply *Humean Combinatorialism*. Neither *Ontological Independence* nor *World-Apart* implies *Humean Combinatorialism*.

6. **Conclusion**

In this chapter, I first show that we can find textual evidence for *World-Apart* in the *Leibniz-Des Bosses correspondence*. Many commentators have already argued that Leibniz accepts *World-Apart* based on these passages. But they have not noticed the subtle differences between it and other related claims: *Ontological Independence* and *Humean Combinatorialism*. Most of them have thought that they are a package deal. But I argue that they are not; the logical relationships among them are more complicated than that. If I am right, then the followings are true:

World-Apart ⇒ *Ontological Independence*
Humean Combinatorialism ⇒ *World-Apart*
Humean Combinatorialism ⇒ *Ontological Independence*

But ***not***:

Ontological Independence $\Rightarrow$ *World-Apart*
World-Apart $\Rightarrow$ *Humean Combinatorialism*
Ontological Independence $\Rightarrow$ *Humean Combinatorialism*

The correct understanding of their relations is quite crucial since this shows that it is logically possible to accept *World-Apart* and/or *Ontological Independence* without endorsing *Humean Combinatorialism*. So now it is clear that Leibniz scholars have four different interpretative options:

(i) Leibniz rejects them all.
(ii) Leibniz accepts *Ontological Independence* only.
(iii) Leibniz accepts *Ontological Independence* and *World-Apart*, but not *Humean Combinatorialism*.
(iv) Leibniz accepts them all.

As seen in Chapter I, advocates of the logical interpretation chose (i). The standard logical interpretation (most notably, Mates' version) is, in fact, compatible with neither, so (i) is the only possible choice for them. In contrast, advocates of other interpretations (most notably, Cover and Hawthorne) chose (iv). But I believe (ii) and (iii) are more promising than (i) and (iv). And if what I argued in section 2 of this chapter is correct, we should choose (iii) between these two since we have evidence to believe that Leibniz accepts *World-Apart*. Thus, (iii) is the logical space where I will develop my new interpretation of compossibility. In the next chapter, I will start developing such an alternative view.

III. THE POSSIBILITY OF INTRANSITIVE COMPOSSIBILITY

1. Introduction

In the first chapter, I argued that for Leibniz, the compossibility relation is intransitive. In fact, the intransitivity of compossibility is historically and philosophically a natural idea. Fabrizio Mondadori (2003) shows that compossibility is an intransitive relation between properties or individuals for many scholastic philosophers. But it is not difficult to figure out why most commentators have thought that compossibility is transitive for Leibniz. As we saw in Chapter I, almost every commentator endorses either the logical interpretation or a version of Humean Combinatorialism. But since either of them implies that compossibility is transitive, commentators have generally agreed with this point. In Chapter II, however, I show that there is logical space for an alternative view, which is neither the logical interpretation nor a version of Humean Combinatorialism. Given this, the intransitivity of compossibility is still a valid option.

The primary purpose of this chapter will be to do some groundwork for a new interpretation I will develop in the next chapter. In section 2, I will explain why the existing interpretations of compossibility we have seen do not sit well with the intransitivity of compossibility. In sections 3 and 4, I will show that there is, in fact, one existing interpretation, which is compatible with the intransitivity of compossibility and other requirements: Margaret Wilson's so-called "hybrid" view. Admittedly, many commentators have rightly pointed out that Wilson's view is nothing but a complicated version of the logical interpretation. However, commentators have not noticed that Wilson (1993) presents two slightly different interpretations of compossibility. I will argue that one of them can be meaningfully distinguished from the standard logical interpretation and that it is compatible with the intransitivity of compossibility.

By doing so, I will show that it can be an appropriate ground for a successful interpretation of compossibility. One crucial feature of it is to deny that Leibniz is a superessentialist ("for any *x*, all the properties of *x* is essential to *x*"). Since this feature is pivotal to my view, I will argue against the superessentialist reading of Leibniz in sections 5 and 6.

2. Relations and Laws

As Mondadori (2003) rightly points out, Leibniz is in fact not the first person who uses the term "compossibility." His scholastic predecessors had started using the term "compossibility" and discussed it a lot before him. And they generally agree that two things are compossible if and only if they jointly involve no *repugnantia*. And a *repugnantia* is, arguably, nothing but an *oppositio contradictoria*.[1] Thus, two things are compossible if and only if they jointly involve no contradiction. This conception of compossibility is similar to that of the logical interpretation; both argue that compossibility is explained by logical consistency.

Interestingly, however, Mondadori (2003) shows that most scholastic philosophers regard compossibility as an intransitive relation. John Major and Jerónimo Pardo explicitly rejected the idea of the transitivity of compossibility.[2] They entertained the possible view that any two things which are compossible with the third are compossible with each other ("*quecunque sunt compossibilia uni tertio sunt compossibilia inter se"*) and rejected it since they believe that it leads to an absurd conclusion. John Major argues:

> Against this (view), it is argued as follows: this makes <Socrates runs> and <Socrates does not run> compossible with each other. Therefore, this thesis is wrong. The reason is clear: <Socrates runs> is compossible with <a cane stands in the corner>, and <Socrates

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[1] Mondadori (2003, 312).

[2] I found Major's and Pardo's texts in Mondadori (2003, 321 fn.27), but translations are mine.

> does not run> is compossible with the same, <a cane stands in the corner>; therefore, (according to this view), those two become compossible with one another (Maior 1519, lib. I, f. 82r).[3]

In this passage, John Major argues that the compossibility relation is not transitive. He compares three different states of affairs (or, propositions) — <Socrates runs>, <A cane stands in the corner>, and <Socrates does not run>. As Major points out, the first is compossible with the second and the second is compossible with the third. If compossibility is transitive, <Socrates runs> should be compossible with <Socrates does not run>. But this is absurd. Major concludes, therefore, the compossibility relation is not transitive. For the same reason, Pardo concludes, "some two things which are compossible with the third are not compossible with one another" (Pardo 1505, f. 57r).

Likewise, the consistency relation is not transitive. For example, consider the following three propositions:

P: *x* is (entirely) blue.
Q: *x* is extended.
R: *x* is (entirely) red.

In this example, *P* is consistent with *Q*, and *Q* is consistent with *R*. If the consistency relation is transitive, then *P* should be consistent with *R*. But they are not consistent with each other. This is the exact reason why John Major argues that compossibility is intransitive.

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[3] The original text is: "Contra hoc arguitur sic: Sortes currit et Sortes non currit sunt compossibiles; ergo male dictum est. Antecedens patet: Sortes currit est compossibilis huic, baculus stat in angulo, et Sortes non currit est compossibilis isti, baculus stat in angulo; ergo iIle due sunt compossibiles inter se"

Thus, the logical conception of compossibility itself is not the reason why the logical interpretation cannot satisfy *Intransitivity*.[4] Then what is it? Let us reconsider the logical reading's explanation of (in)compossibility among possible substances. First of all, advocates of the logical interpretation suggest that two possible substances are compossible if and only if no contradiction follows from their complete individual concepts (hereafter, CIC); Benson Mates says, "a pair of individual concepts, A and B, are compossible if no contradiction follows from the supposition that there are corresponding individuals for both of them" (Mates 1986, 75).

But how can there be a contradiction between CICs? As we have seen in Chapter I, each CIC contains not only monadic but also relational predications. And according to the logical interpretation, relational predications are the fundamental basis for (in)compossibility between possible substances. Advocates of it argue that if the CIC of Lewis does not contain any relational predication with Armstrong, then supposing their co-existing in the same world would be a contradiction. F. B. D'Agostino points it out well:

> If it is part of the complete individual concept of one substance A that it stands in a certain symmetric relation R to every other substance, *and* if it is part of the complete individual concept of another substance B that it does not stand in the relation R to any other substance, then A and B are clearly incompossible substances (D'Agostino 1976, 96-7).

Thus, relations are quintessential parts for the logical interpretation; and this has been pointed out repeatedly by Jaakko Hintikka (1972), D'Agostino (1976), Massimo Munai (1992), and Ohad Nachtomy (2006). Nachtomy says, "only relational predicates can account for the compatibility and incompatibility among concepts of individuals" (Nachtomy 2006, 89). This claim has been well-received and firmly believed by almost every advocate of the logical interpretation, but it has started with Hintikka (1972) and D'Agostino (1976). Inspired by Hintikka (1972), D'Agostino announces that relational predicates (with negations) "seem to be necessary and sufficient conditions for solving the incompossibility problem" (D'Agostino 1976, 97) within a logical framework. Let us call this claim *the Hintikka-D'Agostino view*.

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[4] Gregory Fitch (1979, 30) also points it out.

According to the Hintikka-D'Agostino view, relational predications play a necessary role in the logical interpretation. But the Hintikka-D'Agostino view makes compossibility transitive, for each CIC contains all relations it has only with its worldmates. Consequently, the logical interpretation implies that the compossibility relation is transitive. Strictly speaking, the Hintikka-D'Agostino view could still be consistent with the intransitivity of compossibility if one endorses the world-index strategy.[5] Suppose that there are only three individuals A, B, and C, and the following are all the relations they have with each other: A has relation R_1 with B at W_1, B has relation R_1 with A at W_1 and relation R_2 with C at W_2, and C has relation R_2 with B at W_2. If so, A is compossible with B, B is compossible with C, but A is not compossible with C. Thus, the compossibility relation can be intransitive even within the Hintikka-D'Agostino framework.

As I said in Chapter I, however, there is no reason to think that Leibniz seriously considers the world-index strategy. Moreover, the world-index strategy is at odds with one of the doctrines that almost every advocate of the logical view is willing to accept: superessentialism. Say that the CIC of A contains P at W_1 and $\sim P$ at W_2. According to the world-index strategy, there is nothing wrong with this supposition. However, it is directly contradictory with superessentialism. For, according to it, for any substance x and any property P of x, if x had not had P, then x would not have existed.[6] For these reasons, I think that we can bracket the world-index strategy here.[7] So it is not unfair to say that the logical interpretation is not getting along with the intransitivity of compossibility.

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[5] For this, see footnote 6 of Chapter I.

[6] In sections 5 and 6 of this chapter, I will discuss superessentialism in detail.

Thus far, we have seen why the logical interpretation is at odds with the intransitivity of compossibility. On the other hand, it is easy to see why other interpretations conflict with intransitivity. As we have seen in Chapter I, the lawful, cosmological, and packing interpretations all seem to agree that every possible substance is *per se* compossible with every other possible substance. Therefore, the compossibility relation seems to be trivially transitive for them. But this diagnosis is a little unfair since they distinguish between *per se* compossibility and more restricted conception of compossibility. For instance, the cosmological interpretation argues that things are (restrictedly) compossible only when they are related with respect to a common spatiotemporal order, while the lawful one argues that things are (restrictedly) compossible only when they can be subsumed under some specific laws of nature. Given that, their more restricted notions of compossibility might be intransitive even though they should admit that the *per se* compossibility relation is transitive.

Now consider whether their restricted notions of compossibility are compatible with intransitivity. First, it seems that the packing view can argue as follows: Suppose that there are three things, *A, B,* and *C*; *A* and *C* are quite large, but *B* is relatively small. If so, *A* might pack with *B, B* might pack with *C*, but *A* might *not* pack with *C*. This example seems sufficient to show that the packing view is compatible with intransitivity.

This response is fair enough but not without issues. First, it works only when the container (i.e., space) is finite and too small to contain any two arbitrary possible substances. I believe that Leibniz would not be happy with this result. Second, this response relies on, again, the corporeality assumption. We have already seen that this assumption is problematic, but it is hard for the packing view to satisfy *Anti-Spinozism* without it. Now we can say that without it, it is hard to satisfy not only *Anti-Spinozism* but also *Intransitivity*. So the fundamental issue comes down again to McDonough's problematic assumptions.

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[7] Again, however, I will argue that the world-index idea is in fact not entirely wrong in Chapters IV and V.

The lawful and cosmological interpretations also seem to have a way to solve the intransitivity problem. Suppose that there are three distinct possible substances *A, B*, and *C* and that there are only two specific laws of nature L_1 and L_2. Also, suppose that *A* and *B* can be subsumed under L_1 and *B* and *C* can be subsumed under L_2 and that *A* and *C* cannot be subsumed under any specific law. Then, according to the lawful interpretation, *A* and *B* are compossible, and *B* and *C* are compossible, but *A* and *C* are not compossible. Similarly, suppose that *A* and *B* are related with respect to spatiotemporal order O_1 and that *B* and *C* are related with respect to O_2 but that *A* and *C* are not related with any spatiotemporal order. Then, according to the cosmological interpretation, *A* and *B* are compossible, and *B* and *C* are compossible, but *A* and *C* are not compossible.

If the above reasoning is correct, then the lawful and cosmological interpretation might be able to solve the intransitivity problem. But note that the above reasoning depends on the following hidden assumption: *the same thing can be subsumed under multiple laws of nature, or the same thing can be related with respect to multiple spatiotemporal orders*. Is this assumption convincing enough? First, look at the cosmological case. According to the above model, *B* is in spatiotemporal orders O_1 and O_2 while *A* is only in O_1 and *C* is only in O_2. But what does this mean? Intuitively, we think that the spatiotemporal relation by itself is transitive; if *A* and *B* are spatiotemporally related with each other and *B* with *C*, then also *A* and *C* should be spatiotemporally related with one another. Thus, there are, in fact, not two distinct spatiotemporal orders O_1 and O_2; *A, B*, and *C* are related with respect to *one* common spatiotemporal order.

But don't be too rash. Messina and Rutherford might be able to solve it by appealing to the branching-time case. Consider the following picture:

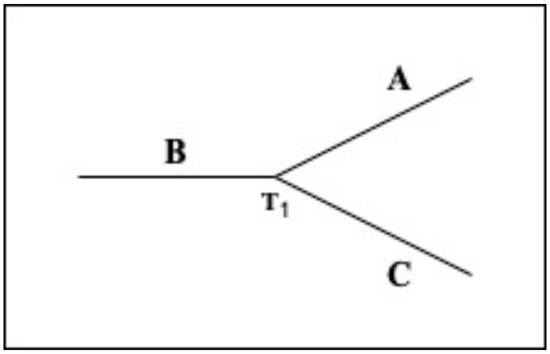

Figure 4. Branching-time

Suppose that time is branching into two different directions after T_1 and that *A*, *B*, and *C* are temporally located as in the picture. If this is the case, we might be able to consistently say that *A* and *B* are spatiotemporally related with each other and *B* with *C,* but not *A* with *C*. Thus, it seems that the cosmological view can satisfy *Intransitivity* by appealing to the possibility of branching time.

But the problem is that they cannot appeal to the branching-time case. First, suppose that time is branching in a single possible world. If so, the advocates of the cosmological interpretation cannot say that *A* and *C* are not spatiotemporally related with each other, for they have argued that two and more substances are in the same possible world if and only if they are related with respect to a common spatiotemporal order. In their view, therefore, the mere fact that *A* and *C* are in the same world guarantees that they are spatiotemporally related with each other. Furthermore, Michael Futch (2005) convincingly argues that Leibniz does not accept the possibility of branching time in a single possible world. He claims, "there can, for Leibniz, be no three moments of time where two moments are connected to the first but not to each other" (Futch 2005, 61).

However, there is one more way to understand the possibility of branching time: two different possible worlds share the exact same history until T_1 but diverge after that. Simply put, the situation is nothing but the following picture:

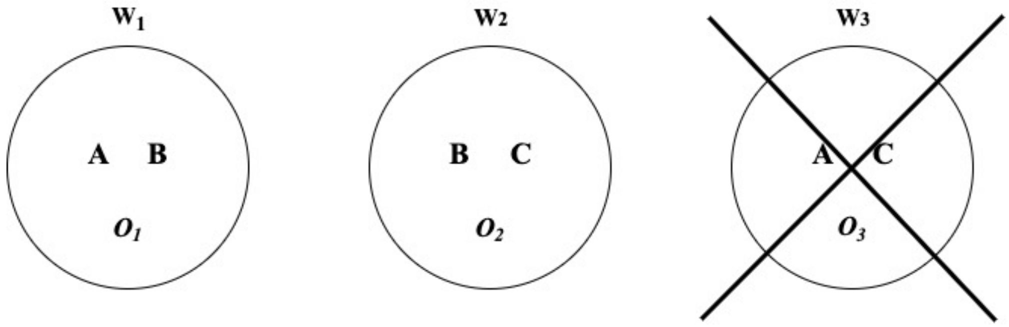

Figure 5. The intransitivity of compossibility in the cosmological interpretation

In this case, W_1 and W_2 are entirely distinct possible worlds; they just happen to have the same history until T_1. Thus, in this understanding of the branching-time case, advocates of the cosmological interpretation can argue that *A* and *B* are spatiotemporally related with each other in W_1 and *B* with *C* in W_2, but there is no such possible world in which *A* and *C* are related with each other. If so, they can solve the intransitivity problem.

Unfortunately, however, they cannot use the above model. Note that in the above case, *B* is in both W_1 and W_2. But as we have seen in Chapter I, Messina and Rutherford firmly believe that every possible substance is world-bound; in other words, no possible substance can be in more than one possible world. Since the *World-Bound Individuals* (WBI) is one of the core theses of Messina and Rutherford's cosmological interpretation, they cannot use the above model. Given these considerations, the hidden assumption for the cosmological case is not easy to accept. Consequently, the cosmological interpretation cannot solve the intransitivity problem.

How about the lawful one? Intuitively, there is nothing wrong with saying that the same thing can be subsumed under different laws of nature. It seems that I could have existed even in a possible world where its laws of nature are entirely different from ours. Admittedly, some philosophers think that a law of nature is essential to or, at least, necessary for an entity. Thus, they think that it is impossible for me to exist in a possible world where its laws of nature are different from ours; I could have existed only in possible worlds which share the same law of nature with the actual world.[8] We can call this “nature essentialism.” If this is right, then the lawful interpretation cannot solve the intransitivity problem since its law of nature is essential for each possible substance.

However, nature essentialism is not a popular view; most metaphysicians think that it is metaphysically possible for us to be subsumed under completely different laws of nature. And I believe that there is no compelling evidence that Leibniz is a nature essentialist. If so, advocates of the lawful interpretation can truly satisfy *Intransitivity* by appealing the following situation.

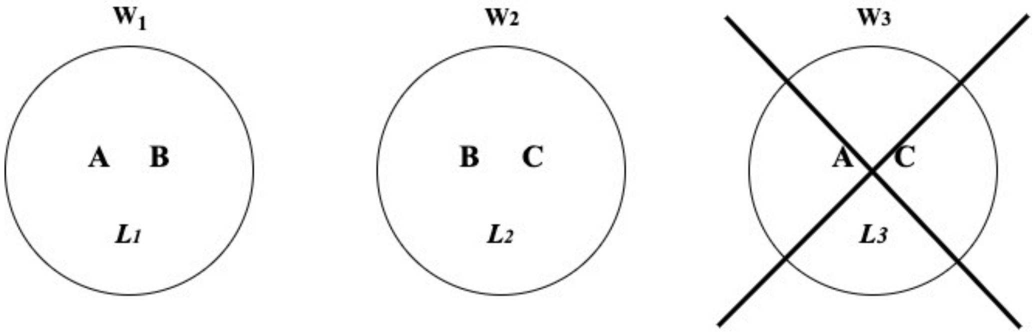

Figure 6. The intransitivity of compossibility in the lawful interpretation

If we assume that Leibniz is not a nature essentialist, there is nothing wrong with the above model. Unlike the cosmological interpretation, Cover and Hawthorne do not accept WBI; so *B* can be in both W_1 and W_2. And the intransitivity of compossibility naturally follows from this model. So far, so good. Even though the *per se* compossibility relation is transitive, advocates of the lawful interpretation can argue that their restricted notion of compossibility is intransitive.

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[8] For instance, see Ellis (2002).

But the problem is, again, that Cover and Hawthorne cannot make sense of their restricted notion of compossibility. As we have seen in Chapter I, Leibniz argues, "in whatever manner God might have created the world, it would always have been regular and in accordance with a certain general order" (A VI.iv. 1396/AG 39). If any collection of possible substances can be subsumed under some law, then all the possible substances are not just *per se* compossible; they are compossible even in their restricted sense.[9] Therefore, it is hard to make sense of the claim that *A* and *C* cannot be subsumed under any law since Leibniz argues that any collection can be subsumed under some law of nature. Considering this, we can see that the lawful interpretation is also not free from the intransitivity problem.

3. Margaret Wilson's Hybrid Interpretation

In the previous section, I showed why the existing interpretations we have seen do not easily account for the intransitivity of compossibility; intransitivity either raises an additional, and serious problem (the logical and cosmological ones) or emphasizes the fundamental problems they already have (the lawful and packing ones). In fact, however, there is one more notable interpretation in the literature I have been (intentionally) ignoring so far: Margaret Wilson (1993)'s logical/lawful "hybrid" reading of compossibility.[10] We have seen that the concepts of logical consistency and lawfulness by themselves are not incompatible with intransitivity. Hence, we might expect that this interpretation can do better. In this section, I consider whether Wilson's view can solve intransitivity and other problems.

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[9] As I said, this is one of the most serious problems for the lawful interpretation. I will not repeat the argument in detail here. For this, see section 4 of Chapter I.

[10] As far as I know, Messina and Rutherford (2009) might be the ones who first used the term.

In proposing her view, Wilson indicates her motivations explicitly. She argues that the logical interpretation is "*basically* correct" (Wilson 1993, 121), but "there are also some textual grounds for thinking that lawfulness must come into the picture somehow" (Wilson 1993, 121). As she says that the logical reading is basically correct, she follows the logical conception of compossibility: two things are compossible with each other if and only if they jointly involve no contradiction. But she also believes that there is "good textual reason to suppose that Leibnizian incompossibility has *something* to do with laws" (Wilson 1993, 127). She points to some passages that indicate the importance of lawfulness for the (in)compossibility relation. In one of the *Leibniz-Arnauld correspondence*, Leibniz writes:

> I conceive an infinity of possible ways of creating the world, according to the different plans God could have formed; and that each possible world depends on certain principal plans or ends of God, which are proper to it; that is, on certain primitive free Decrees (conceived within a scheme of possibility) or laws of the general order of that of the possible universes to which they are suitable and whose concept they determine, as well as the concepts of all the individual substances that are to enter this same universe (A II.ii. 73/LA 101).

In this passage, Leibniz seems to say that creating each possible world depends upon certain laws of the general order. Wilson takes this passage to give a compelling reason for thinking that the compossibility relation is somehow connected with lawfulness.

Thus, Wilson tries to combine the advantages of both logical and lawful interpretations. But the following question immediately pops up: how can we distinguish her view from other versions of the lawful interpretation? As we saw in Chapter I, the core thesis of the lawful interpretation is that *two or more things are compossible just in case that there is some general law of nature under which their co-existence does not imply a contradiction*. Given this characterization, Wilson's view seems to be just another version of the lawful interpretation.

However, there is one crucial difference between her view and other lawful interpretations. Unlike other advocates of the lawful reading, Wilson argues that each complete individual concept (CIC) of a possible substance contains the laws of its world; she says, "each individual substance concept contains in itself a set of world laws in a quite determinate way" (Wilson 1993, 131). She provides textual evidence for this claim:

> […] as there are an infinity of possible worlds, there are also an infinity of laws, some proper to one, some to another, and *each possible individual of any world contains in its concept the laws of its world* (A II.ii. 47/LA 65; my emphasis).

As we can see, Leibniz seems to indicate that each individual concept contains the laws in itself. Based on it, Wilson explains the incompossibility among substances as follows:

> If we think of laws as *facts* (of certain kind), then individual substance concepts imply these possible facts. Then incompossibility can be (partly) explained as follows. Possible substance S and T will be (analytically) *incompossible* if the complete concept of S contains a fact, F, concerning the laws of nature of any world in which S might find itself, and the complete concept of T contains a fact that is (directly) logically inconsistent with F (Wilson 1993, 131).

Then she gives one example; suppose that the CIC of S contains the "fact" that $e = mc^2$, while the CIC of T includes the "fact" that $e= 2mc$. Then S and T are impossible because $e = mc^2$ is directly inconsistent with $e = 2mc$.

Wilson's view fundamentally agrees with the logical interpretation that the logical compatibility between possible substances themselves (or their CICs) is the basis for the incompossibility between them; she just tries to find the right place for lawfulness in the logical framework. In this sense, her view is importantly different from other versions of the lawful interpretation; advocates of the lawful interpretation believe there is no direct logical inconsistency between substances themselves (or their individual concepts). And this is because they think that laws of nature are not contained in individual concepts of substances. According to the lawful interpretation, laws are external to substances. This crucial point has been stressed out by Wilson herself and many others. When proposing their lawful interpretation, Cover and Hawthorne emphasize that the laws of nature, which play a crucial role in their view, are not internal to monads themselves; in other words, these laws are not contained in the individual concepts.[11] In contrast, as they rightly point out, the crucial feature of Wilson's view is that "the facts about laws that figure in the generation of incompossibility results are, for Leibniz, written into the individual substances themselves" (Cover and Hawthorne 1999, 134).

It is well received that Wilson's view can be clearly differentiated from the lawful interpretation. But the problem is that her view is not quite different from the standard logical interpretation. As many commentators point out, Wilson's account is, in fact, a complicated variation of the logical interpretation. Messina and Rutherford say that "Wilson's hybrid reading remains close to the logical interpretation of Mates and Rescher, and it faces the same challenges that we noted regarding their account" (Messina and Rutherford 2009, 968). Gregory Brown and Yual Chiek claim that Wilson's account "agrees with the logical interpretation in making compossibility a matter of logical consistency, but it thus also runs afoul of the main objection to the logical interpretation, namely, its apparent inability to accommodate those passages that suggest that the concepts of individual substances are ontologically independent of one another" (Brown and Chiek 2016, 10).

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[11] See Cover and Hawthorne (1999, 108). Russell (1937, 66-7) also emphasizes that laws are not internal to possible substances themselves.

As a matter of fact, Wilson's account faces the exact same challenges that we identified regarding the logical interpretation. As other commentators argue, her view implies that each substance is world-bound to its world. Just like the logical interpretation, therefore, her account cannot satisfy *World-Apart* and *Ontological Independence*. Also, her account implies that each substance can be compossible with and only with its world-mates since they are world-bound. Therefore, Wilson's view cannot satisfy *Intransitivity*, too. Given that, her view cannot be a satisfactory alternative.

4. **The Wilson-Sleigh Interpretation**

As mentioned, many commentators have rightly pointed out that Wilson's view runs afoul of the main objections to the logical interpretation. Just like the standard logical interpretation, her view cannot satisfy *World-Apart*, *Ontological Independence,* and *Intransitivity*. However, I disagree with their diagnosis. Other commentators seem to think that the logical conception of compossibility itself is the reason why Wilson's view faces the problems of the logical interpretation. For instance, Sebastian Bender argues that "incompossibility cannot be explained in terms of mere logical inconsistency, since this is incompatible with the Independence Requirement" (Bender 2016, 72-3) after explaining Wilson's view.[12] But this is not correct. In section 2, I argued that the logical conception itself does not make compossibility transitive. I argued that the Hintikka-D'Agostino view and superessentialism are the main reasons why the logical interpretation cannot satisfy *Intransitivity* and other requirements. Hintikka-D'Agostino view and superessentialism together imply that each individual concept should contain every relational predication it has with (and only with) its every worldmate; consequently, they make compossibility an equivalence (reflexive, symmetric, and transitive) relation.

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[12] By the "Independence Requirement," Bender means *World-Apart*.

Not surprisingly, Wilson seems to accept both superessentialism and the Hintikka-D'Agostino view in her paper. Regarding superessentialism, she says, "I assume for present purposes a 'superessentialist' interpretation" (Wilson 1993, 125 n.22). And she seems to agree that relational predicates are essential parts of her view. Lawfulness plays just an "additional" role in her account; after spending the first half of her paper explaining the Hintikka-D'Agostino view, she claims "the synthetic (lawful) approach to compossibility has to help itself to relational predicates" (Wilson 1993, 126). In so saying, she seems to accept almost every tenet of the logical interpretation but additionally try to find a place for lawfulness in the logical framework. In this sense, it is correct to say that her view is just a complicated version of the logical interpretation.

However, her attitude towards superessentialism and the Hintikka-D'Agostino view is a little more complex than it appears. In fact, She wants to be neutral about them. She claims that the issues about them are dauntingly complex and controversial, so she wants to avoid committing herself to "any view on the subject, as much as possible" (Wilson 1993, 125). Thus, she accepts superessentialism and the Hintikka-D'Agostino view just for her purpose to show that lawfulness is compatible with the (standard) logical interpretation; she does not sincerely accept them. As a hint, she says that "as I shall explain later, even logical incompossibility may not strictly require irreducible relational predicates after all, given certain tenets of Leibniz's metaphysics" (Wilson 1993, 126).

In the last part of her paper, she really presents one more interpretation of compossibility, which does not require relational predications. She explains it as follows:

> It also suggests the interesting point, in relation to the notion mentioned above, that incompossibility requires irreducible relational predicates. Once one allows substances to contain propositions, one can provide examples of incompossibility that do not rely on relational predicates — not even on "laws." For instance, if (substance) *S* is *p*; and *T* is *q*; and *T* "contains" the proposition 'if anything is *p*, nothing is *q*,' *S* and *T* are analytically incompossible (Wilson 1993, 132).

I believe that this interpretation is interesting and significant for many reasons. Most importantly, this shows that the Hintikka-D'Agostino view is wrong. The Hintikka-D'Agostino view argues that relational predicates are essential for any logical interpretation. However, the above model convincingly shows that no relational predicates are needed for the incompossibility among possible substances. And Wilson points out that Robert Sleigh plays an important role in coming up with this interpretation. She says,

> I owe this point (down to the exact phrasing, as far as I can recall) to Robert Sleigh, who raised it in discussion. If Sleigh's suggestion is, as I think, compelling, it perhaps deserves an essay in itself, given the prominence in the interpretive literature of the contrary assumption — that analytic compossibility requires irreducible relations (Wilson 1993, 132 n.41).

For this reason, I call it *the Wilson-Sleigh interpretation of compossibility*.[13]

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[13] Interestingly, Rescher suggests a similar example. He suggests, "I am a green individual and I am the only green individual that is also perfectly round" (Rescher 2007, 9). Besides details, we can see that Rescher's example is nothing but Sleigh's. But as Wilson points out, Rescher "does not draw the same conclusion from the example as did Sleigh" (Wilson 1993, 132). In contrast, Rescher argues that the example shows that "individuating conceptions are so constituted as to include—or "internalize"—relational properties" (Rescher 2007, 9). In fact, however, the difference between Sleigh's and Rescher's view is not that significant; for Rescher emphasizes that these relational properties relates the individual

Unfortunately, other commentators have failed to notice subtle but important differences between Wilson's and Wilson-Sleigh's readings; most of them have even failed to notice that there are two different interpretations in Wilson's paper. As Wilson seems to agree, however, I think that the Wilson-Sleigh reading is compelling and deserves our attention. To be specific, I argue that the Wilson-Sleigh view does not face the problems of the (standard) logical interpretation while maintaining its advantages; in other words, it can satisfy *World-Apart*, *Ontological Independence*, and *Intransitivity,* along with *Anti-Spinozism* and *Idealism*.

Before doing that, I slightly modify the Wilson-Sleigh interpretation for my purpose. First, I want to retain the main insight of Wilson's view. In explaining the Wilson-Sleigh interpretation, she says that incompossibility among substances needs neither relational predicates nor laws if we allow substances contain propositions like "if anything is *p*, then nothing is *q*." But I find no good reason not to regard these propositions as laws; it seems to me that "if anything is *p*, then nothing is *q*" is a law-like proposition. So we can maintain Wilson's main insight even in the Wilson-Sleigh's view: *the laws are written into individual concepts of substances*.[14] Each individual concept has *its individual law*, such as "if anything is *p*, then nothing is *q*."

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to others but "never as identified particulars but only sub ratione generalitatis, that is, via the mediation of quantifiers and thus generically rather than as specifically identified items" (Rescher 2007, 9). In this sense, even Rescher admits that individual concepts do not need to contain relational predications in the robust sense.

[14] Wilson might argue that these propositions should not be called as "laws" since they are not laws of nature such as $e = mc^2$ or $e=2mc$. However, Leibniz never says that the laws contained in the individual concepts are (physical) laws of nature like $e = mc^2$. Let us reconsider the textual evidence Wilson herself uses:

> I believe, therefore, that there are only a few primitive free decrees, which may be called laws of the universe, which govern the sequences of things […] And as for the objection that the possible are independent of God's decrees, I grant it of actual decrees (although the Cartesian do not agree with this) but I maintain that the possible individual concepts contain some possible free decrees. […] as there are an infinity of possible worlds, there are also an infinity of laws, some proper to one, some to another, and each possible individual of any world

Second, I want to emphasize that (my version of) the Wilson-Sleigh interpretation denies that Leibniz is a superessentialist. Strictly speaking, the Wilson-Sleigh interpretation itself is compatible with superessentialism. As I said, the Wilson-Sleigh interpretation shows that the Hintikka-D'Agostino view is wrong. But this only implies that the Wilson-Sleigh interpretation does not need relational predicates in individual concepts; it does not imply that relational predicates are not in them. For my purposes, however, it is important that relational predicates are *not* contained in individual concepts. Contrary to superessentialism, I tentatively suggest that only monadic, primitive, and intrinsic properties (*i.e.*, attributes or perfections) and individual laws are necessary for possible substances. In the same way, I argue that strictly speaking, individual concepts *per se* contain only monadic intrinsic attributes and individual laws.[15] One might think that this claim directly contradicts with the claim that a CIC "is sufficient to contain and to allow us to deduce from it all the predicates of the subject to which this notion is attributed" (A VI.iv. 1540/AG 41). But it does not; in the following sections, I shall argue in detail against the standard understanding of superessentialism and the conceptual containment theory.

Now let us see how this interpretation can satisfy the requirements I mentioned. Suppose that there are four possible substances *ABCD*, and each has its own individual concept. And let

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> contains in its concept the laws of its world (A II.ii. 46-7/LA 63-5).

In this passage, Leibniz argues that there are only a few primitive free decrees, and they can be identified with the laws of the universe. In this sense, each possible individual concept contains laws of the universe, which are nothing but primitive free decrees. And I see no reason why these primitive decrees should be identified with physical laws such as $e = mc^2$. This identification is rather strange given that physical laws are not fundamental but "subordinate maxims" (A II.ii. 5/LA 5) or derivative orders of substances for Leibniz; physical laws are not "primitive" in any sense. McDonough (2008) points it out very well. He says, "for Leibniz, although there must be metaphysically robust primitives that ground the laws of nature, the laws of nature do not themselves add anything on the side of ontology" (McDonough 2008, 683).

[15] But I will slightly modify it in section 6 of this chapter.

"IC(*x*)" stand for the individual concept of *x*. The individual concepts of *ABCD* are as follows:

IC(*A*) = {*p, q*, and law: "if anything is p, then nothing is r"}
IC(*B*) = {*q, r*, and law: "if anything is q, then nothing is s"}
IC(*C*) = {*q, t*, and law: "if anything is t, then nothing is u"}
IC(*D*) = {*s, t*, and law: "if anything is t, then nothing is v"}

It is easy to show that the Wilson-Sleigh interpretation can satisfy *Anti-Spinozism*. In this example, it is logically impossible for all *ABCD* to exist in the same world since *A* & *B*, and *B* & *D* are incompossible with each other. All the logically possible combinations are: *A, B, C, D*, *AC*, *AD*, *BC, CD,* and *ACD*. In any case, therefore, there have to be unactualized substances. Also, this interpretation can satisfy *Intransitivity*. *A* is compossible with *C*, *C* is compossible with *B*, but *A* is incompossible with *B*.

And it seems evident that the Wilson-Sleigh interpretation can satisfy *World-Apart*. As I said, each *A, B, C,* and *D* (alone) is a logically possible combination. Thus, for any possible substance *x*, it is absolutely possible for *x* to be like a "world apart" in this example. And as we saw in Chapter II, the mere fact that it satisfies *World-Apart* implies that it also satisfies *Ontological Independence*. But it can be shown more directly. In the previous chapter, I argue that Leibniz endorses the definitional conception of ontological dependence just as his scholastic predecessors. Schechtman suggests a useful formula:

(D-Dep) *x* ontologically depends on *y* if and only if (1) there is some relation R such that xRy, and (2) xRy by *x*'s nature but not by *y*'s nature (Schechtman 2016, 192).

This formula clearly indicates that *A, B, C,* and *D* in our example are ontologically independent of each other. In their ICs, there are no references or relations to other possible substances; all they have are intrinsic and monadic predicates and their individual laws, and laws themselves also do not directly refer to (or, related with) other entities.

So I believe that the Wilson-Sleigh interpretation has succeeded in giving good solutions to many puzzles. Moreover, this interpretation can help us better understand the relation between (primitive) individual laws and (derivative) laws of possible worlds. I suggest that laws of worlds supervene on fundamental laws and primitive intrinsic properties of given possible substances. For example, we can figure out some laws of world *ACD* in the above example. Given the profiles of inhabitants, we can know that nothing can be *r; u*, or *v* in this world. Likewise, we can know that nothing can be *s* or *u* in world *BC*. Theoretically, if we know all the relevant information about intrinsic properties and individual laws of inhabitants, we can figure out the laws of its world; in this sense, Leibniz writes that "in whatever manner God might have created the world, it would always have been regular and in accordance with a certain general order" (AG 39). Laws of nature or general orders are only hypothetically necessary for possible substances, while primitive individual laws are absolutely necessary for them.[16]

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[16] One caveat: I am not claiming that the Wilson-Sleigh view is the only (non-standard) logical interpretation that does not depend on relations in the robust sense. There can be multiple ways of doing it. For instance, Jeffrey McDonough, in his paper (2010, 158-9) and our personal conversation, suggests one more possible way: Suppose that Leibniz accepts, say, moderate essentialism. And say that there are two possible substances, Judas (with sin) and Judas* (without sin); they are intrinsically identical but accidentally differ. McDonough suggests that God cannot create them both simultaneously, on pain of violation of *the principle of identity of indiscernibles* (PII). In this sense, McDonough argues, Judas and Judas* are incompossible.

There are three things I want to point out about this strategy. First, it is noteworthy that McDonough's approach is also incompatible with the superessentialist reading of Leibniz. I believe that a non-superessentialist reading of Leibniz is necessary for developing the right interpretation of compossibility. I will deal with this issue in the next section.

Second, whether his strategy really works or not depends on the modal strength of PII: either the weak PII ("no two *existing* substances are intrinsically similar") or the strong PII ("no two *possible* substances are intrinsically similar"). If Leibniz accepts the strong PII, McDonough's suggestion does not work. In the example, Judas and Judas* share the exact same essence. If this is the case, they are the same entity by the strong PII. And if so, Leibniz would say that (i) creating Judas alone, (ii) creating Judas* alone, and (iii) creating Judas and Judas* are all the same action. If so, creating both Judas and Judas* is as possible as creating Judas alone. On the other hand, his suggestion could work if Leibniz accepts the

5. **Against the Superessentialist Reading of Leibniz**

In the previous section, I show that the Hintikka-D'Agostino view is wrong; having relational predicates in individual concepts is not necessary for there being logical incompatibility among possible substances. According to the Wilson-Sleigh interpretation, relational predicates are not needed if individual concepts contain laws. And I also show that, unlike the standard logical interpretation, the Wilson-Sleigh interpretation can satisfy *World-Apart*, *Ontological Independence*, and *Intransitivity* along with *Anti-Spinozism*. I believe that this makes the Wilson-Sleigh interpretation better than other existing interpretations. However, someone might point out that this interpretation is at odds with superessentialism. If Leibniz is really a superessentialist, therefore, the Wilson-Sleigh interpretation will have trouble. But I argue that he is not a superessentialist.

In Chapter I, I have already dealt with superessentialism briefly. Now let me extend it further. As I said before, many Leibniz scholars and contemporary metaphysicians believe that Leibniz is a superessentialist; they believe that Leibniz holds that every property of a substance is essential to it. And their beliefs seem to be justified by the following passages:

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weak PII only. The modal strength of PII for Leibniz is an interesting and controversial issue. So I will not try to criticize McDonough's suggestion based on the strong PII. (For the debate on different versions of Leibniz's PII, see Rodriguez-Pereyra (2014).)

However, there is still a problem in McDonough's suggestion even if Leibniz only accepts the weak PII. In this framework, two numerically distinct possible substances are incompossible only if (and if) they share the exact same essence. But if so, his strategy implies that *incompossibility* is transitive even though it does not imply that *compossibility* is transitive. Suppose that *a* and *b* are incompossible and that *b* and *c* are incompossible. In this framework, this means that *a* and *b* share the same essence and *b* and *c* share the same essence. If so, by the transitivity of sameness, *a* and *c* share the same essence. Thus, this framework makes incompossibility transitive. But as I shall argue in Chapter IV, we have a good reason to believe that both compossibility and incompossibility are intransitive for Leibniz. If I am right, therefore, McDonough's approach eventually does not work no matter whether Leibniz accepts the strong or the weak PII. (I want to thank Jeffrey McDonough for his interesting suggestion and conversations about it.)

> It also follows that this would not have been our Adam but another, if he had undergone other events, for nothing keeps us from saying that he would be another. He is therefore another (A II.ii. 49/LA 67-9).

> But someone else will say, why is it that this man will assuredly commit this sin? The reply is easy: otherwise it would not be this man (A VI.iv. 1576/AG 61).

> It indeed seems to us that this square of marble brought from Genoa would have been entirely the same if it had been left there, because our senses enable us to judge only superficially, but at bottom because of the connection of things, the entire universe with all its parts would be entirely otherwise, and would have been another from the beginning if the least thing in it took place otherwise than it does (A II.ii. 49/LA 69).

And as I said, we can extract the following counterfactual scheme from the above passages:

(CNI) For any possible substance *x* and any property *P* of *x*, if *x* hadn't had *P*, then *x* would have not existed.

Given that he accepts (CNI), it seems natural to regard Leibniz as a superessentialist. However, there are at least two logical gaps from (CNI) to superessentialism.

First, (CNI) tells us, at best, that every property of a substance is *merely necessary* for it. Of course, contemporary (modal) metaphysicians used to define essence in terms of necessity. For them, an essential property is nothing but a necessary property. According to this 'modal' conception, an essential property of an object is a property that it *must* have, while an accidental property of an object is a property that it actually has but *could* lack.[17] Since this modal conception had been a dominant view in the (second half of) 20th century, Leibniz commentators had also used it when they attributed superessentialism to Leibniz. For instance, Mondadori defines an essential property as: "… a property Φ is essential to an individual *a* just in case *a* could not exist without Φ" (Mondadori 1973, 85). Brandon Look says that superessentialism is the doctrine that "for any individual substance, x, and for any property P of x, necessarily, if x exists, then x has P" (Look 2013). Under this modal understanding of essentialism, it seems a quite short step from (CNI) to superessentialism.

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[17] There are well-known difficulties with this "basic" modal conception of essence, but they are not our concern here. Regarding them, see Robertson (2020).

After Kit Fine's seminal work, however, we have come to think that "the contemporary assimilation of essence to modality is fundamentally misguided" (Fine 1994, 3). In contrast, Fine argues, "a property of an object is essential if it must have the property to be what it is" (Fine 1995, 53). His basic idea is that an essential property of an object should be something to do with *the thing's nature* or *what it really is*. Fine argues that the modal conception of essence is too wide to capture what things really are. Fine's famous example is as follows: In every possible world where Socrates exists, so does {Socrates}. If an essential property is nothing but a necessary property, therefore, <belonging to {Socrates}> is one of the essential properties of Socrates. But we intuitively think that this is not so. We believe that an essential property of *x* should be something that tells us what *x* really is. But <belonging to {Socrates}> is quite irrelevant to *what Socrates really is*.

As Fine points out, it is reasonable to believe that the modal conception of essence had not been a standard view of essence before the contemporary analytic period.[18] Recently, Anat Schechtman also points out that the modal approach can be disturbing when we interpret so-called "rationalists" such as Descartes, Spinoza, and Leibniz.[19] Considering this, it seems reasonable to expect that Leibniz does not accept the modal conception of essence. The following passage seems to support this:

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[18] Fine (1994, 2).

[19] Schechtman (2016, 183). She also points out that early modern philosophers generally do not accept the modal conception of essence in her recent paper (Schechtman, *forthcoming*).

> Yes, I agree that, in the present state, the external senses are necessary for our thinking, and that if we did not have any, we would not think. *But that which is necessary for something does not, for all that, constitute its essence*. Air is necessary for our life, but our life is something other than air (G VI. 506/AG 191; my emphasis).

In this *letter to Queen Sophie Charlotte* (1702), Leibniz criticizes John Toland (1670-1722)'s empiricist view. As an empiricist, Toland believes that we would not think if we did not have any external senses; thus, having external senses is necessary for thinking. Leibniz in fact agrees with him. However, he immediately points out that this does not mean that having external senses are essential to our thinking. He gives a general claim: "that which is necessary for something does not, for all that, constitute its essence" (G VI. 506/AG 191). In any possible world where {Socrates} does not exist, Socrates also does not exist. Likewise, in any possible world where there are no external senses, there are no thoughts at all. Air is a necessary condition for our life, but this does not mean that air is an essential part of our life. Given that, it seems reasonable to believe that necessary and essential properties are not co-extensive for Leibniz. I will show additional evidence for it in the next section.

For the above reason, it is misleading to say that Leibniz is a superessentialist; all the properties might be necessary but not essential. But this is not a real triumph. The view that every property of a possible substance is, at least, necessary for it is still extremely radical since this means that there are no accidental properties at all. But this is not Leibniz's view. In Chapter I, I have already argued that (CNI) does not imply that every property of a substance is necessary for it. The relevant question is which modality is used in (CNI); absolute or hypothetical. If it were absolute, then Leibniz would truly believe that there is no contingent property at all. But the following passage shows that it is merely hypothetical:

> So all human events could not fail to happen as they have in fact happened, supposing the choice of Adam to have been made, but not so much because of the individual concept of Adam, although this concept contains them, *as because of the plans of God* which also enter into this individual concept of Adam, and determine that of this entire universe, and thereupon both that of Adam and that of all other individual substances in this universe—each individual substance expressing the whole universe of which it is a part, according to a certain relation, by the connection that holds among all things, because of the linkages among God's resolutions or plans (A II.ii. 73-4/LA 101-3; emphasis added).

As Thomas Feeney (2016, 165) argues, this shows that a substance could not have been otherwise not just because of its essence but because of God's wise and good choices.

Therefore, I believe what (CNI) really shows is just that every property of a substance is *hypothetically* necessary for it. Whenever other people criticize his view as a superessentialism, Leibniz argues that they fail to distinguish between absolute and hypothetical necessity and that hypothetical necessity "does not destroy the contingency of things and does not produce the absolute necessity that contingency cannot allow" (G III. 400/AG 193).

Admittedly, advocates of the superessentialist reading could argue that Leibniz's emphasis on hypothetical necessity is fully compatible with their reading. They could argue that even if superessentialism is true, it is in some sense always hypothetically necessary that a created substance has a certain property. For example, even if I am a human in every possible world where *I exist,* God could create a possible world where I do not exist; in this sense, my being human is hypothetically necessary. This is true no matter whether I am essentially human or not.

Although I admit that this is a reasonable answer, I want to point out two issues about it. First, and most importantly, the superessentialist reading is in fact incompatible with the *de re* reading of hypothetical necessity:

(De Dicto) It is (merely) hypothetically necessary that Leibniz is a philosopher.

(De Re) Leibniz is, (merely) hypothetically necessarily, a philosopher.

Although the superessential reading is compatible with (De Dicto) for the reason I explained above, it is incompatible with (De Re). Now the burden for the superessentialist reading is to show that Leibniz always intends to mean (De Dicto) *exclusively* whenever he emphasizes the distinction between hypothetical and absolute necessity. Leibniz indeed emphasizes *de dicto* hypothetical necessity in many places. As we can see in the above passage, however, it is hard to deny that the *de re* reading is sometimes more natural than the *de dicto* one. For instance, Leibniz says, "on the hypothesis of the divine will choosing the best, or operating most perfectly, certainly nothing but these things could have been produced; but according to the very nature of things considered in itself [*per se*], things could have been produced otherwise" (A VI.iv. 1776/G I. 149/L 204); clearly, it seems more natural to understand Leibniz's notion of "possible in their own nature" as *de re* not as *de dicto* possibility.[20] Second, my purpose in this section is to show

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[20] In fact, Alan Nelson (2005) suggests that Leibniz's notion of hypothetical modality should be understood as a De Dicto one only. And he correctly claims that if his suggestion is correct, then "nothing concerning (created) substances is absolutely necessary" (Nelson 2005, 297). Any true proposition of the from "X is P," where X is a created substance, cannot be (de dicto) absolutely necessary. But as I mentioned above, I think that there is no convincing reason to believe that Leibniz's notion of hypothetical modality should be understood as a de dicto one only. Nelson also suggests that Leibniz's notion of "possible in their own nature" can be understood as follows:

> Caesar's crossing the Rubicon is merely hypothetically necessary, Caesar's not crossing the Rubicon is thus possible in itself. Again, this does not mean that God understands a world in which *Caesar* does not cross the Rubicon. Nor does it mean that God must understand worlds

that (CNI) is insufficient to support the superessentialist reading. For this, it is good enough for me to argue that (CNI) does not automatically imply superessentialism; mere compatibility cannot count as evidence for the superessentialist reading. Considering these two, the burden of proof seems to be on the advocates of the superessentialist reading.

6. The Tripartite Distinction of Properties

For the reasons I argued in the previous section, I believe the superessentialist reading is suspicious. In fact, I am not the only one who supports the anti-superessentialist reading of Leibniz. Sleigh (1990) and Cover and Hawthorne (1999) have already argued it before; they argue that for Leibniz, not all but only intrinsic monadic properties of a possible substance are essential to it. Sleigh says that Leibniz draws "a traditional distinction between the essential (necessary) properties of an individual substance and its contingent (broadly construed, accidental) properties" (Sleigh 1990, 79). I agree that Leibniz makes a distinction between necessary and accidental properties. But I also pointed out that Leibniz makes a distinction

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> in which individuals very similar to Caesar cross things very similar to the actual Rubicon. It means only that God understands worlds without Caesar and those definitely do not include Caesar's crossing the Rubicon. *This might also be expressed (with some obscurity, it must be admitted) by saying that it is in the nature of our Caesar that he possibly not cross the Rubicon* (Nelson 2005, 297; emphasis added).

This shows well that Nelson tries to understand Leibniz's notion of "possible in their own nature" as a de dicto possibility. But as Nelson admits, this is not a natural way of understanding "possible in their own nature"; the term itself, "possible in their own nature," indicates that this should be understood as a de re possibility. More seriously, Nelson's suggestion cannot understand "necessary in their own nature" correctly. If I am essentially a human, then it is natural to say that being human is necessary in my own nature. But according to Nelson's suggestion, my being human cannot be necessary in my own nature. For, as Nelson said above, any true proposition about created substances cannot be (de dicto) absolute necessary. This understanding of "possible in their own nature," in conjunction with the superessentialist reading, makes Leibniz's philosophy much more radical; now Nelson's Leibniz should say that: *for any created substance, every property of it is essential to it, but no property of it is necessary in its own nature*. I believe that this is not a correct understanding of Leibniz's philosophy. In Chapter V, I will suggest my own understanding of Leibniz's notion of "modality in their own nature."

between essential and necessary properties, too. Given that, it is natural to expect that Leibniz has three different types of properties. I argue that he draws a sharp distinction between essential, merely necessary (*i.e.*, necessary but not essential), and accidental properties.

In the *Conversation of Philarète and Ariste* (1712 or 1715), Ariste suggests that the notion of substance can be defined as follows: "substance is a concrete being which is *naturally* independent of every other created concrete being" (G IV. 583/L 621). About this suggestion, Leibniz's spokesman, Philarète, points out two things. First, Ariste "must explain the concept of concrete and abstract more distinctly" (G IV. 583/L 621). Second, defining something by what occurs *naturally* to it is not a good way in the strictest sense. He says,

> But we require that definitions may also be useful which are drawn from that which occurs naturally, and that one can distinguish three levels of predicates: the *essential*, the *natural*, and what is simply *accidental*. In metaphysics, however, one seeks essential attributes or those drawn from what we call a formal reason (G IV. 583-4/L 621).

Leibniz's point is that things should be defined by their essential properties (i.e., attributes), not by natural properties. He also points out that we can distinguish the essential, the natural, and the accidental properties. But what is "the natural"? Clearly, it is something in between the essential and the accidental, but Leibniz does not give a detailed explanation. My suggestion is to read it as a "merely necessary" property. This fits nicely with the context. For instance, it seems wrong to define Socrates in terms of his merely necessary properties, such as <being a member of {Socrates}.[21]

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[21] Another suggestion is to read it as Aristotle's concept of "what happens for the most part (*hos epi to polu*)." Although this suggestion is appealing, there is one problem. As Dorothea Frede points out, "in principle it belongs to the *contingent*" Frede (1992, 207), and this would make Leibniz's three levels of predicates vague. Considering this, it seems more coherent to read it as Aristotle's *propria* rather than *hos epi to polu.* For Aristotle's *propria*, see footnote 36 of this chapter.

Leibniz's earlier text can support this suggestion. In 1676, he wrote:

> An "attribute" is a necessary predicate which is conceived through itself, or, which cannot be analyzed into several others.
> An "affection" is a necessary predicate which can be analyzed into attributes, or, an affection is a predicate which can be demonstrated of a subject.
> […]
> An "essence" is everything which is conceived in a thing through itself, that is, the aggregate of all attributes.
> An "accident of a thing" is a contingent predicate (A Vi.iii. 574/DSR 95).

The primary purpose of this text is to prove that the idea of God, the most perfect being, is *possible*. Leibniz famously argues that Anselm's or Descartes' ontological argument should be supplemented by such a proof. In doing so, he provides his definitions of important metaphysical concepts first as above.[22]

In this passage, note that Leibniz distinguishes three different types of properties: attributes, affections, and accidents. And it seems natural to expect that this corresponds to the tripartite distinction in the *Conversation of Philarète and Ariste.* I suggest that these three correspond with essential, natural, and accidental properties.

But what are these attributes, affections, and accidents for Leibniz?[23] First, Leibniz claims that attributes are necessary predicates (properties) which cannot be analyzed into others;

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[22] Leibniz has maintained the conclusion of the proof of the possibility of the *Ens Perfectissimum* throughout his career. But Lærke (2008) points out that after 1677, Leibniz only mentions his proof but never repeats it. In so saying, Lærke seems to hold that Leibniz might abandon the proof at some point; he might come up with another proof of it. Does this cause a problem? First, as Nachtomy points out, "[f]rom the fact that he does not repeat the argument it cannot be concluded that he abandoned it" (Nachtomy 2011, 947 n.25). Leibniz might just not feel the necessity of repeating it. Second, even if he abandons the argument, this does not mean that he also abandons his definitions of the concepts. Leibniz keeps using such concepts, and there is no sufficient reason to believe that his definitions of them have changed in his mature period.

[23] My explanation is indebted to Nachtomy (2007, 22-4).

in other words, they are simple and fundamental properties. Most importantly, attributes are not just necessary but essential. Leibniz says that an essence is "the aggregate of all attributes" (A Vi.iii. 574/DSR 95). Thus, each attribute of a possible substance is a part of its essence. Put differently, an attribute of a possible substance is essential to it. But what is an attribute in Leibniz's metaphysics? Ohad Nachtomy (2007, 22-3) convincingly points out that Leibniz identifies an attribute with a perfection or a simple form. Leibniz writes that "God is the subject of all absolute simple forms" (A VI.iii. 519/DSR 79) and adds that "[a]n attribute of God is any simple form (A VI.iii. 514/DSR 69). And in proving the existence of the most perfect being, he argues that the most perfect being is the subject of all perfections (A VI.iii. 578-80/DSR 101-3). Given that, it is natural to say that an attribute is identical with a perfection (and a simple form).

And Leibniz tries to define a "perfection" as follows: "I term a "perfection" every simple quality which is positive and absolute or, which expresses without any limits whatever it does express" (A VI.iii. 578/DSR 101). And since a perfection is simple, "it is unanalyzable or indefinable, for otherwise it will either not be one simple quality but an aggregate of several" (A VI.iii. 578/DSR 101). Thus, a perfection, which is an attribute, is a simple, absolute, and purely positive property. And since they are purely positive and simple, "all *perfections are compatible with each other,* or, that they can be in the same subject" (A VI.iii. 578/DSR 101). And by definition, God is the subject of all attributes.

As you can see, attributes are fundamental building blocks in Leibniz's metaphysics. Most interestingly, Leibniz seems to define individual substances as diverse combinations of attributes.[24] In a paper entitled *Definitionen* (1679?), he writes:

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[24] Strictly speaking, he does not "define" a possible substance as a combination of attributes. He simply says that there is one-to-one correspondence between the set of individual substances and combinations of all attributes.

> There can be as many individual substances as there are diverse combinations of all compatible attributes. And from this the principle of individuation, about which so many disputes took places among the Scholastics, is evident (A VI.iv. 306).

This passage is interesting in many ways. First, Leibniz says that "there can be as many individual substances as there are combinations of all compatible attributes." Since all attributes are compatible with each other, we can simply erase "compatible" in this sentence. And Leibniz says that "there can be." I interpret this modal sentence as follows: "there are as many individual possible substances as there are combinations of all attributes."[25][26]

Let us elaborate on it further. For the sake of argument, suppose that there are only three different attributes: *p, q,* and *r*. Then there are seven different combinations of them;[27][28] hence, there are seven different possible substances. Let us name them as follows:

TABLE II

AN EXAMPLE OF POSSIBLE SUBSTANCES AND ATTRIBUTES

Possible Substance	Attributes	Possible Substance	Attributes
A	*p*	*E*	*p,r*
B	*q*	*F*	*q,r*
C	*r*	God	*p,q,r*
D	*p,q*		

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[25] Sleigh (1990, 74) and Nachtomy (2007, 53) suggest the same interpretation.

[26] But see section 4 of Chapter V. Maybe Leibniz, in his mature period, should say that there are more individual substances than combinations of all attributes. As I will show, my overall interpretation can be neutral with respect to this issue. For simplicity's sake, therefore, I will bracket this issue here.

[27] I assume that a possible substance has at least one attribute.

[28] Strictly speaking, there are in fact infinitely many combinations since an attribute is a maximizable quality. Thus, a possible substance is not just having or not having an attribute; it is a matter of degree. And Leibniz believes that for any attribute *x*, only God can have a maximized degree of *x*. For simplicity's sake, however, I will assume that an attribute is not a maximizable property; a (created) possible substance is simply having or not having it.

By definition, a possible substance that has all the attributes (*p, q, r*) is the most perfect being, i.e., God. Except for God, therefore, we can know that there are six different finite possible substances, and each combination of attributes represents an essence of each possible substance. As Leibniz points out, each essence is the source of the principle of individuation. For instance, the essence of *D* is the aggregate of *p* and *q*; in other words, *p* is essential to *D*, and so as *q*.[29]

Then, what are affections? Leibniz writes that an affection is a necessary property which can be analyzed into attributes. I suggest that an affection of a possible substance is a property that necessarily follows from its essence. In this sense, affections are merely necessary properties; they are necessary but not a part of essence in the strictest sense. For instance, *D* will have the following affections: <*p* and *q*>, <*p* or *r*>, <(*p* and *q*) or *r*>, and etc. Simply put, any property of a possible substance that necessarily follows from its attributes is its affection.

Interestingly, some negative properties (e.g., imperfections) are also affections.[30] Thus, some negative properties necessarily follow from its essence. For instance, <Not-*q*> and <Not-*r*> are affections of *A* since *p* is the only attribute of it. Although they do not constitute its essence, they are still necessary qualities of *A*. The necessity of them can be proved as follows. Suppose, for reductio, that *A* happens to have *q*. Then *A* will be intrinsically indistinguishable from *D* since they will have the same attributes, *p,* and *q*. But this violates Leibniz's famous *principle of identity of indiscernibles* (or, *No Purely Extrinsic Denominations*).[31] As Leibniz writes, "no two essences are equally perfect" (BH 74). Therefore, *A* cannot have *q*. Likewise, *A* cannot have *r*. Therefore, A is necessarily not-*q* and necessarily not-*r*. And anything supervenes on any combination of attributes and affections (including negative ones) of a possible substance will also be an affection of it.[32] It seems worth mentioning that this view implies that by definition, all possible creatures have at least one negative affection while the Creator does not have any.

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[29] Nachtomy (2007) provides a detailed explanation of this "combinatorial" view of possible individuals.

[30] I am not saying that all negative properties are necessary for Leibniz; there are certainly also contingent negative properties.

[31] In fact, the inference here does not need to rely on such strong principles. Note that before creation, a possible substance is nothing but a Divine idea in God's understanding. Almost everyone, including Kant, would agree that no two ideas or concepts share the exact same things.

Lastly, an accident of a possible substance is a contingent property of it; an accident is truly contingent since it does not necessarily follow from its essence alone. The most notable examples are relations. For Leibniz, relations do not follow from a single essence. But in some sense, we (at least, God) can figure out what accidents a possible substance will have if we have the perfect information about all the possible substances. Existence is also an accidental property. Unlike the infinite being, the property of existence does not follow from a finite substance's essence. In the next two chapters, I will deal with this issue.

So far as I know, this tripartite interpretation of Leibniz has not been suggested in the literature. In fact, however, that Leibniz distinguishes three different types of properties is natural historically and philosophically. Historically, it is common for the scholastic philosophers to distinguish three types of properties: *essentials, necessary accidents*, and *accidents*.[33][34] And I believe this distinction corresponds very well to Leibniz's. Just like Leibniz's view, necessary accidents are properties that necessarily "flow" from essentials.

Michael Gorman convincingly shows that Aquinas has such a view; he says, "Where the modal view [the modal account of essence] sees one distinction, then, Aquinas sees two: a distinction between essential features and accidental features, and a distinction between necessary and non-necessary accidents" (Gorman 2017, 22). For instance, Aquinas says,

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[32] Michel Finchant (1971) and Nachtomy (2016) point out that for early Leibniz, these negative affections are the ultimate source of incompossibility between possible substances.

[33] I especially want to thank Jeffrey McDonough for pointing it out.

[34] Schechtman (*forthcoming*) claims that early modern philosophers in general have such a tripartite distinction, too.

> Now there are two kinds of accident: namely, the necessary, which is not separated from a thing (as being capable of laughter is not separated from a human being), and the non-necessary, which is separated (as whiteness is separated from a human being) (*De. Prin. Nat*., c.2 / Aquinas 2014, 4).[35]

> It should also be noted that some accidents are caused by the essential principles according to perfect act, e.g., the heat in fire, which is always hot; other accidents are the result of an aptitude only, but in this latter case there occurs a complement from an external agent, e.g., transparency in the air, which is completed by a bright external body. In such cases, the aptitude is an inseparable accident, but the complement that advenes from some principle that is outside the essence of the thing or does not enter into the constitution of the things, is separable, e.g., the ability to be moved, and so on (*De. Ente.,* c.6/ Aquinas 2014, 32).[36]

In these passages, Aquinas claims that there are two distinct kinds of accidents (necessary- and non-necessary), and that necessary accidents are non-essential but necessary features of a thing. Since they are features that necessarily directly "flow" from essential features, things *must* have necessary accidents even though they are not essential in the strict sense. This corresponds very well to Leibniz's view of mere necessaries (*i.e.,* affections or naturals).

It is historically natural to think that Leibniz might accept this scholastic distinction; throughout the dissertation, I emphasize that Leibniz shares some (in fact, many) core metaphysical concepts with the scholastic philosophers. But there is also a philosophical reason. To see it clearly, it is worth mentioning that Kit Fine also has a similar tripartite distinction: *constitutive essentials*, *consequential essentials*, and *accidents* (Fine 1995b, 56-7).[37][38] The fact that they all share the basically same tripartite distinction is not just a historically interesting episode. The reason why they *do* (and *can*) accept this distinction is that they all deny the modal account of essence.[39] Note that the advocates of the modal account cannot easily distinguish essentials from mere necessaries. Both essentials and mere necessaries are features without which a thing cannot exist; if one accepts the modal account, they both should be counted as "essential" properties. Only when we deny the modal account, we can have a logical space for mere necessaries (or necessary accidents).

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[35] Interestingly, Aquinas believes that the ability to laugh is a necessary (but inessential) feature of a human. He claims, "the ability to laugh follows upon the form in the case of human being, since laughter takes place due to some cognitive apprehension belonging to the soul of human being" (*De. Ente.,* c.6/ Aquinas 2014, 32).

[36] I slightly revised Peter King's translation. The original text is as follows: "Sciendum etiam est quod accidentia aliquando ex principiis essentialibus causantur secundum actum perfectum, sicut calor in igne, qui semper est actu calidus; aliquando vero secundum aptitudinem tantum, sed complementum accidit ex agente exteriori, sicut diaphaneitas in aere, quae completur per corpus lucidum exterius. Et in talibus aptitudo est accidens inseparabile, sed complementum, quod advenit ex aliquo principio, quod est extra essentiam rei vel quod non intrat constitutionem rei, est separabile, sicut moveri et huiusmodi." You can also find Robert T. Miller's translation at [https://sourcebooks.fordham.edu/basis/aquinas-esse.asp#f2].

Thus, it is philosophically reasonable to expect that Leibniz has the tripartite distinction, given that he denies the modal account of essence as I argued in the previous section. Conversely, the fact that he has the tripartite distinction is philosophical evidence that he does not accept the modal account of essence. Therefore, I believe that my two claims – that Leibniz does not accept the modal account of essence and that he has the tripartite distinction of properties – give a coherent picture of Leibniz's metaphysics.

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[37] As Fine (1995b, 57) himself points out, this distinction in fact goes back to Aristotle. He says that his distinction between constitutive and consequential essence roughly corresponds to Aristotle's distinction between essence and propria. For Aristotle's distinction, see Kung (1977).

[38] Two caveats: First, Fine's consequential *essentials* roughly correspond to Aquinas' necessary *accidents*. Thus, one calls them "essentials" while another calls the same things "accidents." I do not believe that this is a significant difference between them; this seems just to be a verbal issue. Second, there is in fact one significant difference between Fine's consequential essentials and Aquinas' necessary accidents. While Fine's consequential essentials are features that *logically* follow from constitutive essentials, Aquinas' necessary accidents *necessarily* follow from essentials. How about Leibniz's merely necessaries? This difference might not be important for Leibniz, since I believe that Leibniz's (absolute) modal notions depend on logical modality. But I do not need to take a risk here. So I will safely assume that merely necessaries are features that *necessarily* follow from essentials.

[39] Gorman (2005, 2017) convincingly argues that Aquinas does not accept the modal account of essence. Also see John F. Wippel (2000, 266-275). In contrast, Anthony Kenny (1980) seems to think that Aquinas accepts the modal account of essence. But I am quite convinced by Gorman's interpretation.

Thus far, I have argued that Leibniz is not a superessentialist; rather, he accepts an Aristotelian/scholastic tripartite distinction of properties. And, in my opinion, this reading is textually well-supported. But considering that the superessentialist reading of Leibniz has long been a dominant view, I expect that people might have some residual worries about my interpretation. So before going further, I will discuss them briefly.

One way to retain the superessentialist reading is to say that Leibniz really accepts superessentialism but conceals it because it is too radical. John Whipple argues that Leibniz sometimes conceals his real metaphysical views since he "took his metaphysics to be esoteric in the sense that it involved a range of purely intelligible concepts and principles, many of which were far removed from received opinions or "common sense"" (Whipple 2015, 3). If so, we should not expect to easily find the texts where Leibniz explicitly says that he endorses superessentialism, even if he really did. Needless to say, superessentialism is very far from received opinions and common sense.

Although I believe this is a possibility we should consider carefully, this suggestion has one problem. Even if it is the case that Leibniz conceals his superessentialism in most of his "exoteric" writings, it is reasonable to expect that he reveals his real view in some "esoteric" writings.[40] However, it is very hard to find a place where he reveals his endorsement of superessentialism in any type of writing, such as published articles, books, and correspondence with others. Admittedly, we can find (CNI) consistently in his various writings. But I have already argued that there are gaps between (CNI) and superessentialism. Given that, more concrete evidence is needed to support the superessentialist reading. Without it, it seems more reasonable to believe that Leibniz is not a superessentialist.

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[40] For the distinction between the exoteric and esoteric writings of Leibniz, see Whipple (2015).

Lastly, advocates of the superessentialist reading might argue that superessentialism is demanded or inferred if we consider Leibniz's metaphysics as a coherent and systematic whole. In other words, they could argue that there is a systematic reason to believe that he accepts superessentialism, even if he does not explicitly say so.[41] For instance, Mates could argue that the superessentialist reading is needed for his understanding of compossibility. Regarding this, Whipple could also argue that Leibniz sometimes conceals his real view for pedagogical reasons; he conceals it but gives some important hints so readers could infer what his real view is.[42] It might be that Leibniz asks us to find superessentialism from his metaphysics as a whole.

I agree with the spirit of this response completely. Of course, the issue of essentialism is closely connected with other unsettled issues of Leibniz's philosophy, and disagreement in one area could lead to disagreement in others. But throughout the dissertation (especially in this chapter), I emphasize that anti-superessentialism is *required* to have a coherent understanding of compossibility. In the previous sections, I have shown that the Wilson-Sleigh interpretation can satisfy all the requirements, but *only* on the assumption that Leibniz is not a superessentialist. For me, this "systematic" concern is one of the biggest reasons to believe that Leibniz is not a superessentialist.

7. **The Tripartite Structure of Individual Concepts**

Before concluding this chapter, I should answer the following two important questions. First, how can this distinction among properties be compatible with Leibniz's famous theory of complete individual concepts? Second, where is the place for the individual laws in this framework? Let us start with the first one. Leibniz famously argues that each substance has a corresponding complete individual concept, and it contains all and only true predications of the substance. So some might think that the theory of complete individual concepts directly entails superessentialism. But many commentators have already pointed out that it is not; the world-index strategy is one of the clearest counterexamples to it.[43] Thus, there is nothing wrong to say that a complete individual concept contains not only essential and necessary properties but also contingent ones.

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[41] This assumes that Leibniz has a coherent philosophical system. Many commentators believe he does, but not unanimously. For the non-systematic understanding of Leibniz, see Daniel Garber (2009, 78) and Catherine Wilson (1999, 373).

[42] For Leibniz's "pedagogical exoteric" writing, see Whipple (2017, 324-28).

In fact, many scholars have realized that an individual concept has at least two distinctive layers: "thin-thick" or "incomplete-complete" layers.[44] And they, more or less, agree that thin or incomplete individual concepts contain only monadic and intrinsic predications while thick or complete ones contain all the true predications including relational ones. This claim is not without textual evidence. Leibniz says,

> In this complete concept of possible Peter that appears to God, there are contained – I admit – not only essential or necessary items (which of course flow from incomplete or species concepts, and as such are demonstrated from terms, in such a way that the contrary implies a contradiction), but also so to speak existential or contingent truths. This is because it is of the nature of an individual substance that its concept is perfect and complete (A VI.iv. 1600/LS 258).

In this passage, Leibniz argues that the complete individual concept of possible Peter contains essential or necessary items, which can be logically demonstrated from its essence and the principle of non-contradiction, *and* existential or contingent things. Thus, Leibniz clearly shows that the mere fact that a predication *F* is contained in the complete individual concept of *x* does not mean that *x* is necessarily *F*.

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[43] For this, see footnote 6 of Chapter I.

[44] Most notably, Brown (1987), Cover and Hawthorne (1999), Messina and Rutherford (2009), and Nachtomy (2007) have emphasized this distinction.

In DM§13, Leibniz explains this more explicitly. He says,

> The notion of an individual substance includes once and for all everything that can ever happen to it and that, by considering this notion, one can see there everything that can truly be said of it, just as we can see in the nature of a circle all properties that can be deduced from it. But it seems that this would eliminate the difference between contingent and necessary truth […] To this I reply that we must distinguish between what is certain and what is necessary. Everyone grants that future contingents are certain, since God foresees them, but we do not concede that they are necessary on that account. But (someone will say) if a conclusion can be deduced infallibly from a definition or notion, it is necessary (A VI.iv. 1546/AG 44-5).

As you can see, Leibniz firmly believes that his theory of complete individual concepts is compatible with the distinction between contingent and necessary truths. Necessary truths of *x* can be directly deduced from *x*'s essence, while contingent truths are not necessary but merely certain since God foresees him. Thus, contingent ones are contained in the individual concepts only indirectly; their containment in an individual concept of *x* is based not just on x's essence but also on God's choices and its connection with other possible substances. In the following chapters, I will elaborate on it in detail. For now, the important thing to notice is that the distinction between the thin and the thick individual concept is textually well warranted.

Strictly speaking, however, I suggest that a complete individual concept should have three distinctive layers corresponding to the distinction among essential, merely necessary, and contingent properties. The innermost layer (hereafter, "the inner core") contains only essential predications while the second layer (hereafter, "the outer core") contains all the necessary predications which necessarily follow from essential predications. Simply put, the inner core contains attributes while the outer one contains affections. And for this reason, the outer core is inseparable from the inner core. I believe that the inner and outer cores together are the true basis for incompossibility; they are the true *relata* of the relation of incompossibility.[45]

Lastly, the third layer (hereafter, "the crust") contains all the true contingent predications, including relational ones. Importantly, the crust does not necessarily follow from the inner or outer cores; predications in the crust are contained in the individual concepts *only when we consider God's choices*. Leibniz writes,

> [I]n eternal truths the connection of subject and predicate is necessary, and depends on the possibility or impossibility of essences or on the understanding of God, and in truths of fact or existence this connection is contingent and in part depends instead on the will of God" (A II. ii. 56/LA 81-3).

He also says, "all human events could not fail to occur as in fact they did occur, once the choice of Adam is assumed; but not so much because of the individual concept of Adam, although this concept contains them, but because of God's plans" (A II.ii. 73-4/LA 57). In this sense, these predications are truly contingent.[46]

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[45] In this sense, we should say that even the "thin" or "incomplete" individual concepts contain not only intrinsic positive properties but also other necessary but derivative properties (including necessary negative ones). Most commentators have failed to notice it since they did not sharply distinguish between the inner and outer cores; Nachtomy (2007) is one of few exceptions. In fact, therefore, there is no such puzzle in Leibniz's metaphysics as follows: "how can there be any incompossibilities among thin individual concepts if thin individual concepts contain only intrinsic positive properties?" In my view, Leibniz does not need to answer this question since he in fact does not think in this way at all. Although the inner core contains only attributes, the outer core contains many other properties, including negative ones, and it is inseparable from the inner one.

[46] Again, this does not imply that they are not hypothetically necessary.

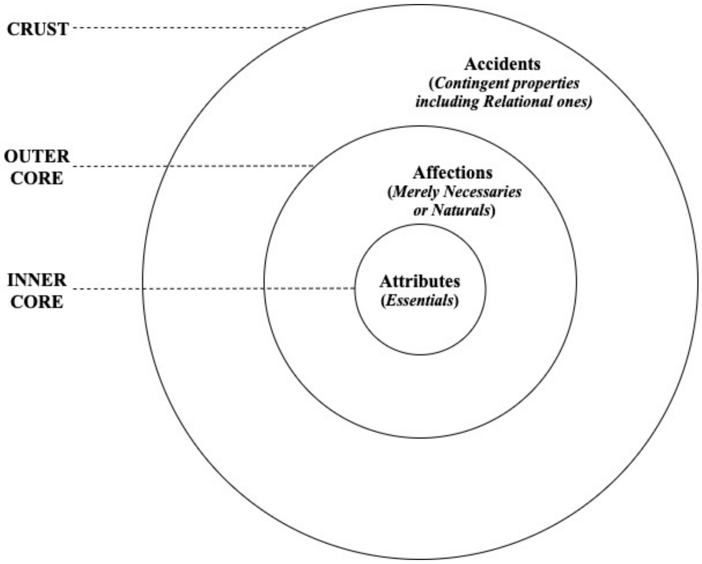
CRUST
OUTER CORE
INNER CORE
Accidents
(Contingent properties including Relational ones)
Affections
(Merely Necessaries or Naturals)
Attributes
(Essentials)

Figure 7. The tripartite structure of individual concepts

And I argue that the crusts are not the basis for incompossibility among possible substances. The incompossibility among possible substances is the basis for the contingent properties in the crusts of individual concepts, not *vice versa*. I shall return to this point in the next two chapters.

Now let us move on to the second question. In proposing the Wilson-Sleigh interpretation, I tentatively suggested that only monadic and intrinsic properties and individual laws are contained in the individual concepts. We can do better now. We know that attributes, which are monadic and intrinsic, are contained in the inner core while affections are contained in the outer core. In order for the Wilson-Sleigh view to work, the individual laws should be contained in either the inner or the outer core. Thus, an individual law of a possible substance should be at least necessary for it. To say that an individual law is contained in the outer core means that it necessarily follows from some combination of attributes and affections (including negative ones). On the other hand, individual laws will be contained in the inner core if laws are irreducible to attributes and affections.

Clearly, each direction has its advantages and drawbacks. The first option – the individual law of a possible substance is contained in its outer core – is philosophically parsimonious in the sense that I do not need to posit an additional thing in my picture. The individual laws simply supervene on some combinations of attributes and affections. But the obvious problem is that we do not know exactly how individual laws necessarily follow from attributes of individuals. We might already have the required resources to cook them up. In the last two sections, I have emphasized that the inner core of a possible substance is inseparable from its outer core and that every possible substance (except God) has at least one negative affection in its outer core. Thus, we in fact have good resources; we do have not only a few (fundamental) attributes but also many derivative affections including negative ones. Given that, it seems not impossible to derive the required individual laws from them. But I need to admit that it is still not quite clear exactly how we can do that.

The second option – the individual law of a possible substance is contained in its inner core – seems less preferable in the sense that we need to posit more *primitive* things additionally into the whole picture. But this is not a serious drawback; I have no reason to believe that these additional things engender serious problems in Leibniz's metaphysics. If it is uncertain whether the individual laws necessarily follow from attributes and affections, it seems safer to choose the second one. Moreover, this option is not without textual support. In many places, Leibniz seems to write that the individual concepts contain "the *primitive* Laws" (A II.ii. 47/LA 65; my emphasis) or "*primitive* free decrees, which may be called laws of the universe" (A II.ii. 46/LA63; my emphasis).

The difference between these two options is analogous to that between Mates' and Rescher's position on the reducibility of relations. Rescher argues that relational predications are irreducibly contained in the individual concepts, while Mates claims that they are reducible to monadic predications. As Chiek (2016, 97-100) points out, however, the difference between them is not huge because they both agree that all relational predications are, reducibly or irreducibly, “contained” in the individual concepts; either one is good enough for the basis of the logical interpretation. Likewise, the Wilson-Sleigh interpretation can go either direction.

The exact ontological status of individual laws is an interesting issue, but the important thing for me now is that either option is sufficient for making the Wilson-Sleigh interpretation work. For now, therefore, I will leave it as an open question.

8. Conclusion

In this chapter, I (re)discover and develop what I call the “Wilson-Sleigh interpretation of compossibility.” And I show that, unlike other existing readings, this view can satisfy all the important requirements: *Anti-Spinozism*, *Idealism*, *World-Apart*, *Ontological Independence*, and *Intransitivity*. Someone might criticize it because it is at odds with the superessentialist reading of Leibniz. However, I argue that the superessentialist reading is misleading. Leibniz truly believes that everything that will happen certainly happens. But this means that everything is hypothetically necessary; absolutely speaking, there are true contingent truths in the universe. Still, however, Leibniz writes that in some sense, even contingent truths are contained in the individual concepts since God can certainly foresee them. What exactly does this mean, and how exactly does this happen? In the remaining chapters, I will develop a combinatorial theory of compossibility and answer these questions via this theory.

IV. A COMBINATORIAL THEORY OF COMPOSSIBILITY

1. Introduction

Thus far, I showed that various texts suggest that the compossibility relation is intransitive for Leibniz. But the intransitivity is not the only lesson we can learn from that passage. As I argued, it also shows that for Leibniz, the compossibility problem is a kind of *one-player combinatorial game*; the goal of God is to find out the perfect one among a number of different combinations. The purpose of this chapter is to develop a formal theory of it. My theory has the following features: (1) It uses combinatorial principles to solve the problem of compossibility; God calculates all the possible combinations and the sum of the perfection of each combination by simple mathematical principles. But (2) the combinatorial principles I am relying on are non-Humean. In Chapter II, I denied that everything can be combined with everything else; world-apart passages do not imply *Humean Combinatorialism*. Moreover, (3) my theory can provide solutions to the important puzzles of compossibility. More specifically, I show that both *Anti-Spinozism* and *World-Apart* are deduced from the principles of my theory. My ambitious goal in this chapter is to realize Leibniz's dream "to do in philosophy what Descartes and others have done in arithmetic and geometry by means of algebra and analysis" (A II.i. 160).

2. Combinatorics and Compossibility

It is hard to doubt that combinatorics had been one of the main methodological tools for Leibniz to solve problems in many different areas, such as philosophy, mathematics, and theology. But researchers have largely neglected the importance of combinatorics in Leibniz's metaphysics.[1]

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[1] There are some exceptions. For instance, Burkhardt and Wolfgang Degen (1990), Cook (2000), Hartz

This negligence is unfortunate, for, as Massimo Mugnai argues, combinatorics (or, combinatorial mereology) “becomes in Leibniz’s hand a kind of all-purpose tool capable of introducing us to the intimate secrets of nature” (Mugnai 2017, 176).[2]

You can find the same negligence in the literature on compossibility. Although compossibility seems to be related to combinatorics, commentators generally do not pay due attention to their relation. As Ohad Nachtomy (2007, 69-73) argues, however, Leibniz applies “God’s combinatorial activity” in almost every level of his metaphysics. Of course, some existing readings (notably, the lawful and packing) can be seen as using combinatorial ideas in interpreting compossibility. But their (Humean) combinatorial ideas are not adequately based on Leibniz’s own texts. As I argue throughout the dissertation, a careful reading of them reveals that Leibniz’s view on compossibility is not Humean at all.

Now let us consider Leibniz’s texts. Leibniz explicitly applies combinatorial ideas to explain Divine creation or compossibility at least three different times:

> [1] *Dialogue between Theophile and Polidore* (1679?)
> Let us suppose that there are possible beings A B C D E F G, all equally perfect and with equal claims to existence, of which there are following incompatibilities: A with B, B with D, D with G, G with C, C with F, F with E. Now we can make two of them exist together in fifteen ways: AC, AD, AE, AF, AG, BC, BE, BF, BG, CD, CE, DE, DF, EG, FG. Again, three of them could be made to exist together as follows: ACD, ACE, ADE, ADF, AEG, AFG, BCE, BEG, BFG. But four could be made to exist in only one way ACDE, which will be chosen among all the others because we can obtain the most in that way. In consequence, this quartet ACDE would exist in preference to the rest B F G, which would be excluded, because we could not obtain a quartet if we took any one of them (A VI.iv. 2231-2/Grua 285-6).

(2006), Nachtomy (2007), and Mugnai (2017).

[2] In the *De Arte Combinatoria*, Leibniz tries to solve not only logical but also metaphysical, physical, and practical problems by using his art of combination.

> [2] *De Veritatibus Primis* (1680?)
> For example, let A, B, C, D be four equally perfect (therefore equally possible) possibles; and let us suppose that D is incompatible with A and with B, and A is compatible with others (i.e., B and C) but not with D. Then the combination that will be realized is assuredly ABC. For, if D existed, there could exist only the combination CD, which is less perfect than the combination ABC, being fewer in number (A IV.iv. 1442-3/G VII. 194).
>
> [3] *General Inquiries about the Analysis of Concepts and of Truths* (1686)
> So if there are several things A, B, C, and D, and one of these is to be chosen, and if B, C, and D are alike in all respects, A alone being distinguished from the rest in some way, then A will please any mind which understands this. It is the same if a distinction does not at any rate *appear* between B, C, and D, but does appear between them and A, and the mind decides to choose; it will choose A. But it chooses freely, for it can still ask whether there is not a distinction between B, C, and D (A VI.iv. 763/C 376/P 66).

In these three passages, Leibniz uses the same combinatorial schema to explain why God creates a specific collection of possible substances rather than others. Given these passages, I believe that Leibniz established his combinatorial idea of compossibility around 1679-80. And passage [3] shows, or I shall argue, that Leibniz retains the same idea in so-called his "mature period." We can also find the same combinatorial idea in many passages from the *Theodicy.*[3]

In fact, I am not the only one who thinks that these passages might be relevant to the debate on compossibility; Couturat (1901, 225), Fichant (1971, 31-4), Abraham (1972, 8-9), Burkhardt and Degen (1990, 6), and Rescher (2007, 50-1) mentioned at least one of these three passages in their discussions. Unfortunately, however, they seem to fail to capture the real importance of these passages; they did not analyze them carefully. I suspect that this is because these passages seem to be at odds with the standard understanding of Leibniz's metaphysics; for instance, [1] and [2] appear to be incoherent with *World-Bound Individuals* (WBI). Hence, commentators who accept these doctrines cannot place a good deal of weight on the above passages. Michel Fichant points it out explicitly. In quoting passage [1], he says:

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[3] For instance, "The wisdom of God, not content with embracing all the possible, penetrates them, compares them, weighs them one against the other, to estimate their degrees of perfection or imperfection, the strong and the weak, the good and the evil. It goes even beyond the finite combinations, it makes of them an infinity of infinites, that is to say, an infinity of possible sequences of the universe, each of which contains an infinity of creatures" (G VI. 252/H 267).

> The same, i.e., numerically identical, term is found in different combinations: thus, A in ACD, ACE, and ADF. But […] one can never find two identical *real beings* (i.e., individual substances) in two different worlds (Fichant 1971, 33).

In this passage, Fichant argues that [1] cannot be Leibniz's real metaphysical view since it conflicts with WBI. As I have discussed throughout the dissertation, however, WBI is not a necessary part of my interpretation of Leibniz. Therefore, the mere incoherence with it does not prevent me from using these passages.[4]

But Fichant gives two more reasons why we should not place too much weight on these passages. Now let us consider whether his reasons are valid or not. First, he argues that the combinatorial schema in these passages is too "abstract and incomplete" (Fichant 1971, 32) to be relevant to Leibniz's real metaphysical view. His main worry is about infinity; he says,

> The alphabet (in [1]) is finite, and the number of possible combinations is also finite: such is the law that governs the horizon of the human doctrine. On the contrary, the possible beings in God('s understanding) are infinite, and there is an infinity of possible worlds among which he chooses (Fichant 1971, 32-3).

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[4] Moreover, it is not clear that these combinatorial passages are really incompatible with WBI; it depends on how Leibniz individuates individuals. For instance, Leibniz might be able to say that strictly speaking, A in the ACD-world is distinct from A in the ADF-world even though they share the same essence. I will elaborate on this point more in section 4 of Chapter V. In this chapter, just for simplicity's sake, I will assume that As in different possible worlds are transworld-identical.

In some sense, Fichant makes a valid point; Leibniz himself cares much about the infinity of possible substances and our inscrutability of them. In the *Theodicy*, he says:

> It exceeds them intensively, by reason of the infinitely infinite combinations it makes thereof, and its many deliberations concerning them. The wisdom of God, not content with embracing all the possibles, penetrates them, compares them, weighs them one against the other, to estimate their degrees of perfection or imperfection, the strong and the weak, the good and the evil. It goes even beyond the finite combination, it makes of them an infinity of infinites, that is to say, an infinity of possible sequences of the universe, each of which contains an infinity of creatures (G VI. 252/H 267).

For this reason, he claims that reasons for God's choice "are too diverse to become known to us" (G VI. 160/H 180).

But this is not a severe problem. Humans have always developed simple (and finite) theories or models to understand (infinitely) complex phenomena. And the actual history of science proves that this process can give us valuable insights into the hidden nature of reality, even granting the limitation of human understanding. Recently, some philosophers rightly argue that model-building can be fruitful even in philosophy.[5] I argue that the history of philosophy is not an exception; we might be able to figure out the underlying mechanism of God's choice by developing good models even though it is impossible for us to know the *actual* process of God's choice. And this attitude accords well with Leibniz's own view:

> We should lay aside the false hope of forming a conception of a universal System of the World, and of extending our analysis down to the first rudiments, as it were, and elements of bodies, i.e., to principles that do not exist. But *just as a teacher of the science of fortification*, when he lectures about earths, has plenty to say about sands, pebbles, limestone, and clay, but does not trouble with the smaller bodies hidden in the earth,

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[5] For instance, L.A. Paul (2012), Williamson (2017), and Button and Walsh (2018).

> regarding them as irrelevant to his purpose, *so we shall be happy enough if we can explain those insensible bodies whose effect observably reaches us, since it is neither useful nor possible for us mortals to proceed any further* (A VI.iv. 1512/LC 295; my emphasis).

As Leibniz points out in this passage, being abstract and incomplete is not a problem at all. It is, in fact, a necessary condition for gaining any knowledge of reality given the limitation of human beings.

Even Fichant agrees that this is not the "principal difficulty" (Fichant 1971, 33) of the combinatorial schema in these passages. His more fundamental worry is that from these passages, Leibniz does not explain why some possible beings are incompossible with some other possible beings (Fichant 1971, 33). As you can see in [1] and [2], Leibniz simply assumes that there are certain incompossibilities such as "A with B, B with D, D with G, G with C, C with F, F with E" (A VI.iv. 2231/Grua 285). Thus, those passages do not give any explanation of what the basis of the incompossibility is. Given this, Fichant argues, the combinatorial schema in those passages could not solve the puzzle of compossibility.

Fichant is certainly right in the sense that the combinatorial schema by itself cannot ground the metaphysical basis of the incompossibilities among possible substances; in these passages, Leibniz simply assumes that there are such things. However, this "incompleteness" of the combinatorial schema does not seem to be a serious difficulty for me. As we shall see, we can get interesting and valuable insights from this "incomplete" schema. More importantly, I believe I have already had a good metaphysical foundation of the incompossibility among possible substances. In the previous chapter, I argued that the Wilson-Sleigh interpretation can explain why and how some possible substances are (in)compossible with some other possible substances: two or more possible substances are compossible if and only if their *core* individual concepts are logically compatible with each other. If I am right, therefore, I have already answered the foundational question of compossibility.[6] So I start developing this combinatorial schema more rigorously without worrying too much about Fichant's concerns.

3. The Logical Principles of Compossibility

Before going further, a more careful analysis of these passages seems to be in order. The first thing we can notice is that in [1] and [2], Leibniz uses the notion of compatibility to explain compossibilities between entities. This is not surprising; as we saw in Chapter I, Leibniz defines compossibility in terms of logical compatibility in many different places (e.g., A VI.ii. 498 and A VI.iv. 867). Thus, he simply uses his "logical" definition of compossibility in these passages. This logical definition is one of the core parts of the (standard) logical interpretation. But the Wilson-Sleigh interpretation I defend also endorses the logical definition of compossibility. Thus, Leibniz's using the notion of compatibility accords well with my view.

Second, as Fichant points out, Leibniz "does not consider the *order* of terms" (Fichant 1971, 32) in these passages. For instance, in passage [1], ACD is equivalent to DCA; Leibniz does not treat them as two different combinations. Also, he implicitly uses the following rule in this combinatorial schema: *the same entity cannot be added more than once*. Without this rule, we can generate denumerably many combinations just from one entity: for instance, A, AA, AAA, and so on. Thus, Leibniz's combinatorial rule is both *idempotent* and *commutative*:

(Idempotence) For any X, XX = X

(Commutativity) For any X and Y, XY = YX

---

[6] I will show that the Wilson-Sleigh interpretation is quite coherent with the combinatorial schema in the next chapter.

These two characteristics of the combinatorial schema are also not surprising at all. Ever since his early career, Leibniz has noticed that there are two different kinds of *addition*. Whereas we have X + X = 2X in the case of arithmetical addition, the *real* addition is idempotent, i.e., X ⊕ X = X.[7] He points it out most clearly in his essay *A Study in the Calculus of Real Addition* (after 1690). In this essay, Leibniz employs the symbol "⊕" to designate real addition, and provides the following axioms:

> *Axiom 1.* B ⊕ N = N ⊕ B, or, transposition makes no difference here.
>
> …
>
> *Axiom 2.* A ⊕ A = A. If nothing new is added, nothing new is made; i.e. repetition changes nothing here (A VI.iv. 833-4/G VII. 237/P 132).

In the same essay, he provides some explanations for these two axioms:

> *Note to axioms 1 and 2.* As general algebra [*speciose generalis*] is merely the representation and treatment of combinations by signs, and as various laws of combination can be discovered, the result of this is that various methods of computation arise. Here, however, no account is taken of the variation which consists in a change of order alone, and AB is the same for us as BA. Next, no account is taken here of repetition; i.e. AA is the same for us as A. Consequently, whenever these laws are observed, the present calculus can be applied (A VI.iv. 834/G VII. 245/P 142).

Thus, both idempotence and commutativity are general features of Leibniz's "general algebra" or "art of combination"; in the combinatorial schema in [1] and [2], he simply employs his general calculus.

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[7] On Leibniz's distinction between real and arithmetical addition, you can see Lenzen (1989) and Swoyer (1994).

Strictly speaking, it needs to be pointed out that Leibniz's combinatorial rule is also *associative*:

(Associativity) For any X, Y, and Z, (XY)Z = X(YZ)

Unlike Idempotence and Commutativity, Leibniz does not specify Associativity as an "axiom" of his art of combination. But it is well known that Associativity is implicitly taken for granted in many of Leibniz's technical works; most likely, Leibniz mistakenly believes that Associativity is not a separate property from Commutativity. But it needs to be pointed out explicitly now.

Now let us focus more on the compossibility relation itself. In [1] and [2], Leibniz treats compossibility basically as a binary relation, so I will follow him. For simplicity's sake, let us use the following notations:

xCy : x is compossible with y
xC̶y : x is incompossible with y

where lowercase letters designate possible substances. Unfortunately, Leibniz uses uppercase letters to designate possible substances. So, sometimes, I will also use uppercase letters in this chapter. But the context will be clear enough to see what designates what.

We now should ask what kind of binary relation it is. Even though Leibniz was not explicit, it is not difficult to figure out that compossibility is *reflexive, symmetric*, and *exhaustive*:

(Reflexivity) xCx
(Symmetry) xCy ↔ yCx
(Exhaustiveness) xCy ∨ xC̶y

We can find them in the passages; in addition, it is worthwhile to mention that almost every commentator agrees that compossibility has the above properties.[8] As I said in Chapter I, all the influential interpretations agree that compossibility is reflexive and symmetric; also, they all accept that for any two possible substances, they are either compossible or incompossible. This is mainly because, I believe, they seem evidently true. Intuitively, it is hard to deny that anything is compossible with itself and that if x is compossible with y, then y is also compossible with x. Moreover, these three properties follow from the logical definition of compossibility along with the *principle of non-contradiction* and the *principle of excluded middle*. And Leibniz evidently accepts these two fundamental principles: for instance, he says, "nothing is and is not at the same time, or anything either is or is not" (A VI.iii. 584/DSR 107). Given that, we can accept Reflexivity, Symmetry, and Exhaustiveness as basic principles of our combinatorial theory.[9]

Thus far, we have discovered the positive properties of Leibniz's combinatorial schema and compossibility. Sometimes, however, what it is *not* —rather than what it *is* —reveals its nature more clearly. As I argue repeatedly, passage [1] shows that the compossibility relation is not transitive for Leibniz. In fact, Fichant has already pointed it out. In analyzing passage [1], he says:

> In other words, *compatibility is not an equivalence relation*. So, it is reflexive (A is compatible with A), symmetric (if A is compatible with B, then B is compatible with A), *but it is not transitive*. In the schema presented in the text, A is compatible with C, C is compatible with B, but A is incompatible with B (Fichant 1971, 45).

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[8] As far as I know, no one denies it.

[9] You can think of them as axioms. But I purposely refrain from using the term since, strictly speaking, only identical statements can be seen as axioms for Leibniz.

Passage [2] also shows that compossibility is intransitive: in [2], B is compossible with C, C is compossible with D, but B is incompossible with D.

Not only transitivity, [1] and [2] also reveal that Leibniz ***does not*** accept the followings:

(Transitivity) xCy & yCz → xCz
(Anti-transitivity) xCy & yCz → xꞒz
(Negative Transitivity) xꞒy & yꞒz → xꞒz

In [1], A is compossible with C, C is compossible with D, and A is compossible with D; also in [2], A is compossible with B, B is compossible with C, and A is compossible with C. Thus, compossibility is *not anti-transitive*. Since the compossibility relation is neither transitive nor anti-transitive, we can call it *merely intransitive*. Moreover, it is not negatively transitive; in other words, *in*compossibility is also not transitive. In [1], for instance, A is incompossible with B, B is incompossible with D, but A is compossible with D; also in [2], A is incompossible with D, D is incompossible with B, but A is compossible with B. Thus, *in*compossibility *is also not transitive.*[10] And this intransitivity of *in*compossibility is an additional problem for the existing interpretations since these views imply that incompossibility is transitive.[11] All these formal problems indicate that existing interpretations have been working on the wrong puzzle.

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[10] We can also ask whether compossibility is negatively anti-transitive or not:

(Negative Anti-transitivity) xꞒy & yꞒz → xCz

Thus, we need to know whether incompossibility is anti-transitive. Unfortunately, we cannot find a counterexample for it in the passages. But given the logical definition of compossibility and the Wilson-Sleigh framework, we can see that incompossibility is not anti-transitive. Let "CIC(*X*)" stand for the core individual concept of *x*. And suppose the following individual concepts of *ABC:*

CIC(*A*) = {*p, q*, and law: "if anything is p, then nothing is r"}
CIC(*B*) = {*q, r*, and law: "if anything is q, then nothing is t"}
CIC(*C*) = {*r; t*, and law: "if anything is t, then nothing is u"}

In this example, A is incompossible with B, B is incompossible with C, also A is incompossible with C. Thus, compossibility is *not negatively anti-transitive*.

4. The Combinatorial Construction of Possible Worlds

Now I start developing my combinatorial theory of compossibility. This theory has two parts: *construction* and *evaluation* of possible worlds. I develop the construction part in this section and the evaluation one in the next two. Basically, what I am going to do is to translate Leibniz's theory of compossibility into contemporary mathematical language. Admittedly, formalization itself cannot solve all the relevant problems; I am not trying to do this impossible thing. However, I believe that this project can help us attain a clearer understanding of the logical structure of Leibniz's metaphysical system. More importantly, this project fits very well with what he says below:

> I saw how the most distinguished men, Saint Thomas and Saint Bonaventura and William Durand and Gregory of Rimini and many other authors of former times, have offered not a few theorems of marvelous subtlety to first philosophy which might have been demonstrated with the utmost rigor. I recognized how Natural Theology, which had been most gloriously created by these men, had been submerged in a barbaric darkness, and through a confused use of words floundered between doubtful distinctions, and so *I often played the mathematician in theology…; I set up definitions and tried to deduce from them certain Elements which were not inferior to those of Euclid in clarity but far exceeded them in the magnitude of their consequences* (A VI.iii. 155/W 59; my emphasis).

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[11] See footnote 14 in Chapter III. In this footnote, I showed that McDonough (2010, 158-9)'s approach implies that incompossibility is transitive even though it does not imply that compossibility is transitive. In this sense, this approach is also not free from the problem of intransitivity (of incompossibility).

The above passage shows what he tries to do in theology; he sets up basic definitions and axioms and deduces theological theorems from them. This is exactly what I try to show in this chapter. And this can show clearly how and why Leibniz believes that "a certain Divine Mathematics or Metaphysical Mechanism is used in the very origination of things" (G VII. 304/AG 151).

In so doing, I will use set-theoretical concepts. Some might have a methodological worry about this. Of course, Leibniz did not know about set-theoretical concepts. However, as we can see from the *De Arte Combinatoria* (1666), *General Inquiries* (1686), and *A Study in the Calculus of Real Addition* (after 1690), Leibniz has a quite strong formal tool for mereological calculus. For this reason, Mugnai (2017) convincingly argues that Leibniz possesses all the fundamental ingredients of the *core mereology* in the contemporary sense.[12] If we set aside ontological issues, it is hard to deny that (formal) mereology and set theory share a very similar formal structure. So I am relatively sure that Leibniz already has a formal tool, which is strong enough for what I am going to do. The reason why I use set-theoretical concepts is just a pragmatic one: it makes things simpler and more appealing to contemporary readers.

Let us develop the construction part of the theory. From the combinatorial passages, we can see that Leibniz gives a model (of possible worlds construction). Informally, a model consists of a bunch of possible substances and incompossibilities among them. We can define it mathematically as follows:

Definition of construction-model: A construction-model M is an ordered pair $<\mathfrak{D}, \mathfrak{I}>$ where:

- $\mathfrak{D}$ is a nonempty set ("possible substances")
- $\mathfrak{I}$ is a subset of $\mathfrak{D} \times \mathfrak{D}$ (" pairs of *incompossible* substances")

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[12] Regarding the core mereology, see Varzi (2016).

In [2], for instance, Leibniz says: “let A, B, C, D be four equally perfect (therefore equally possible) possibles; and let us suppose that D is incompatible with A and with B, but A is compatible with others (i.e., B and C) but not with D” (A VI.iv. 1443/G VII. 194). It can be expressed mathematically as $M_1 = <\mathscr{D}_1, \mathscr{I}_1>$, where:

$\mathscr{D}_1 = \{A, B, C, D\}$

$\mathscr{I}_1 = \{<A, D>, <B, D>, <D,A>, <D,B>\}$.[13]

Likewise, the model in [1] can be expressed as $M_2 = <\mathscr{D}_2, \mathscr{I}_2>$, where:

$\mathscr{D}_2 = \{A, B, C, D, E, F, G\}$

$\mathscr{I}_2 = \{<A, B>, <B, D>, <D, G>, <G, C>, <C, F>, <F, E>\}$.

On the other hand, the model in [3] needs more careful attention since it looks somewhat peculiar. Let us see it once more:

> [3] *General Inquiries about the Analysis of Concepts and of Truths* (1686)
> So if there are several things A, B, C, and D, and one of these is to be chosen, and if B, C, and D are alike in all respects, A alone being distinguished from the rest in some way, then A will please any mind which understands this. It is the same if a distinction does not at any rate *appear* between B, C, and D, but does appear between them and A, and the mind decides to choose; it will choose A. But it chooses freely, for it can still ask whether there is not a distinction between B, C, and D (A VI.iv. 763/C 376/P 66).

The model in [3] is different from that of [1] and [2] in the following aspects. First, it seems that Leibniz does not give any incompossibilities between substances. Second, he assumes that one particular individual (i.e., A) is better than others. Since we shall delve into the second point in the next section, I focus only on the first here.

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[13] Note that by Symmetry, we can easily know that if <A,D> is in $\mathscr{I}$, then <D,A> should be there, too. So for notational simplicity, I will only write one of two hereafter; for instance, {<A,B>} instead of {<A,B>, <B,A>}.

Regarding this, I argue that Leibniz in fact gives a number of incompossibilities also in [3]. Here he says, "if there are several things A, B, C and D, and one of these is to be chosen" (A VI.iv. 763/C 376/P 66). But his second assumption looks weird since Leibniz firmly believes that God strives to create the greatest number of possible substances; if so, why did God try to create only one of them? But there is nothing weird here since Leibniz simply gives a model according to which God cannot create more than one possible substance. Thus, I believe that the following is Leibniz's actual model in passage [3]:

$\mathscr{D}_3 = \{A, B, C, D\}$

$\mathscr{I}_3 = \{\langle A, B\rangle, \langle A, C\rangle, \langle A, D\rangle, \langle B, C\rangle, \langle B, D\rangle, \langle C, D\rangle\}$.

Informally speaking, this is a model where everyone is incompossible with every other. If so, God cannot but creating only one (thus, the best) possible substance among them. Given this, it becomes clearer that Leibniz uses the same combinatorial schema in all three passages.

A construction-model *M* consists of the domain and the incompossibility base. And as I said in the previous section, I accept Reflexivity, Symmetry, and Exhaustiveness as basic principles of our combinatorial schema:

(Reflexivity)	xCx
(Symmetry)	$xCy \leftrightarrow yCx$
(Exhaustiveness)	$xCy \vee x\not{C}y$

My theory needs just one more principle:

(Non-Emptiness) $\mathscr{I}$ is a nonempty set

Intuitively, this means that there is at least one pair of incompossible substances. As we have seen, Leibniz believes that there are (infinitely) many pairs of incompossible substances. Given this, Non-Emptiness is not a strong principle. Thus, the construction part of my theory needs only four weak principles: Reflexivity, Symmetry, Exhaustiveness, and Non-Emptiness. From these, however, we can deduce some interesting results. One thing we can easily get is the following:

Proposition (Plurality): There are at least two possible substances *in* $\mathfrak{D}$.

Proof. Suppose there is only one possible substance *x* in $\mathfrak{D}$. By reflexivity, *x* is compossible with itself. Hence, there is no pair of incompossible substances. This contradicts Non-emptiness. Therefore, there are at least two possible substances in any domain. □

Thus, my theory entails that there are multiple possible substances.[14]

Now I will construct possible worlds from possible substances and their (in)compossibilities. In order to this, we need some definitions:

Def. (Compossible Set)	w is a compossible set	iff	∀x,y ∈ w s.t. x and y are compossible.
Def. (Possible World)	w is a possible world	iff	w is a non-empty compossible set.
Def. (Singleton World)	w is a singleton world	iff	w contains only one possible substance.
Def. (Spinozistic World)	w is a Spinozistic world	iff	w contains every possible substance in $\mathfrak{D}$.

Thus far, I have treated compossibility as a binary relation. From this, I define a compossible set as a set such that any two members of it are compossible with each other. And from this definition of compossible set, I define a possible world as a non-empty compossible set. Not every collection of possible substances constitutes a possible world; a collection of possible substances constitutes a possible world only when every member of that collection is compossible with every other. Also, note that the empty set is, by definition, a compossible set. However, as Leibniz might agree, I do not want to treat the empty set as a possible world. Hence, I define a possible world as a *non-empty* compossible set. And this set-theoretical definition of possible world evidently satisfies Idempotence, Commutativity, and Associativity of the combinatorial schema:

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[14] Burkhardt and Degen (1990, 9) proved the same thing from different axioms.

(Idempotence) For any possible world w, $w \cup w = w$.
(Commutativity) For any two possible worlds w and v, $w \cup v = v \cup w$.[15]
(Associativity) For any possible worlds w, v, and u, $(w \cup v) \cup u = w \cup (v \cup u)$.[16]

I also gave definitions of Spinozistic and singleton worlds; a world is a singleton world if it is a singleton set, and a world is a Spinozistic world if it is equal to the domain. From these definitions, we know that the following should be the case:

Proposition (World Apart): For any x in $\mathfrak{D}$, there is a singleton world of x.

Proof. Suppose there is a possible substance *a* in $\mathfrak{D}$. By Reflexivity, *a* is compossible with itself. Hence, $\{a\}$ is a non-empty compossible set. By definition, therefore, $\{a\}$ is a possible world. Without loss of generality, for any x in $\mathfrak{D}$, there is a singleton world of x. □

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[15] This does not mean that $w \cup v$ is a possible world; it is a possible world only when it is a compossible set. There is no guarantee that $w \cup v$ is a compossible set even if both w and v are compossible sets singly.

[16] Again, there is no guarantee that $(w \cup v) \cup u$ is a compossible set.

Proposition (No Spinozistic World): There is no Spinozistic world.
Proof. For reductio, suppose there is Spinozistic world, *s*. If so, *s* is a compossible set, which contains every possible substance in the domain. This means that every possible substance is compossible with every other. But this contradicts Non-Emptiness. Therefore, there is no Spinozistic world. □

These two proofs show that my theory satisfies both *World-Apart* and *Anti-Spinozism*. It not only simply satisfies them, but it also explains clearly why and how Leibniz firmly believes them. As we can see in the *Des Bosses correspondence*, Leibniz seems to think that both *World-Apart* and *Anti-Spinozism* are obviously true (at least) for him, even though his correspondents such as Des Bosses cannot capture this obviousness at all. This is because, if I am right, both *World-Apart* and *Anti-Spinozism* are simple theorems or corollaries of his "*Divine Mathematics*" (G VII. 304/AG 151).

Thus far, I have shown that my theory satisfies two crucial requirements I identified in Chapter I. But this is not the end of the story; there are a few more interesting results in the construction part of my theory. First, we can exactly calculate how many possible worlds there are if we know the domain and the incompossibility base. In general, the following is the case:

Proposition (#Possible Worlds)
: $n \leq \#\text{ possible worlds} \leq 3 \cdot 2^{n-2} - 1$, *where* $n = \#$ *possible substances in* $\mathfrak{D}$
Proof. First, the lower bound case is where every possible substance is incompossible with every other possible substance in $\mathfrak{D}$. If this is the case, there will be only *n* many singleton worlds, and these are all and only possible worlds. Thus, there will be only *n* many possible worlds. Second, the upper bound case is where there is only one pair of incompossible substances in $\mathfrak{D}$. In this case, we can calculate the total number as follows: $2^n - 1$ (the number of combinations when

there is no pair of incompossible substances) subtract 2^{n-2} (the number of combinations containing a pair of incompossible substances). And $(2^n - 1) - 2^{n-2}$ is equal to $3 \cdot 2^{n-2} - 1$.[17] □

More importantly, my theory can shed fresh light on the controversy over the maximality condition. As I mentioned briefly in Chapter I, one of the issues among commentators is whether any possible world should be a *maximal* compossible collection of possible substances. First, consider the following passages from his letter to Bourguet:

> When you say that "one world that is infinite (in every respect) must in a sense include all possible [substances][18]," I agree—in the sense which I have given, taking possibles to be compossibles (G III. 573/L 661).
>
> Thus the universe is a collection of a certain order of compossibles only and the actual universe is a collection of all the possibles which exist, that is to say, those which form the richest composite (G III. 573/L 662).

Based on these passages, Benson Mates argues that maximality is a constitutive condition of being possible world. He says that "Leibniz does not consider that every collection of complete individual concepts constitutes a possible world; the concepts in question must be compossible and *the collection must be maximal*" (Mates 1986, 75; emphasis added).

As Cover and Hawthorne points out, however, even Mates acknowledges that Leibniz explicitly contradicts maximality in the very same letter to Bourguet:

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[17] Admittedly, the lawful interpretation is also able to calculate the number of possible worlds from the number of possible substances. Given that it accepts *Humean Combinatorialism*, the number of possible worlds is equal to $2^n - 1$ for them, where n is the number of possible substances. As I argued in Chapter II, however, *Humean Combinatorialism* is not on the right track.

[18] Loemker translated it into "all possible worlds"; but this translation is obviously incorrect. Given the context, we should translate it into "all possible substances."

> And since there are different combinations of possibilities, some of them better than others, there are many possible universes, *each collection of compossibles making up one of them* (G III. 573/L 662; emphasis added).

Cover and Hawthorne's solution to this seeming contradiction is to appeal the distinction between absolute and hypothetical necessity. It is hard to deny that Leibniz believes that the actual world is maximal. But this is just because of God's plans. According to them, the "maximality is at best morally necessary rather than a feature of every possible world" (Cover and Hawthorne 1999, 136). According to them, therefore, maximality is not a necessary condition for being a possible world.

I believe that neither side has conclusive evidence on this issue. So I do not dare to solve this question here. In this section, I have simply assumed that maximality is not necessary for being a possible world. But this does not mean that I have a strong opinion about it; in fact, my theory can be completely neutral with regard to this issue. In other words, my theory is also compatible with the maximality condition. In the remainder of this section, I will show it.

First, we need to clarify what "maximality" means. As far as I know, Robert Sleigh is the only one who has tried to define it clearly. He suggests, "A collection of complete individual concepts X is maximal just in case, for any complete individual concept C not in X, $X\cup\{C\}$ is not compossible" (Sleigh 1990, 50). Basically, his suggestion is that a collection is maximal just in case it is impossible to contain more. I believe this definition of maximality is fundamentally correct; I will bring his insight into my theory.

In order to do that, I need more definitions:

Def. (Proper Subworld) w is a proper subworld of u iff w and u are possible worlds & $w\subset u$
Def. (Proper Superworld) w is a proper superworld of u iff w and u are possible worlds & $w\supset u$

In other words, w is a proper subworld (or, proper superworld) of u just in case they are both possible worlds and w is a proper subset (or, proper superset) of u. From these definitions, we know that the following should be the case:

Proposition (Proper Subworld Transitivity)
: If w is a proper subworld of u & u is a proper subworld of v, then w is a proper subworld of v.
Proof. By definition, w is a proper subset of u, and u is a proper subset of v. By the transitivity of proper subsethood, therefore, w is a proper subset of v. And by assumption, we already know that w and v are both possible worlds. Therefore, w is a proper subworld of v. □

Although this proposition looks self-evident, it is worth mentioning since it is important to the following discussions.

For now, the more important thing is that we can define the concepts of maximal and minimal world by using them:

Def. (Maximal World) w is a maximal world iff there is no proper superworld of w
Def. (Minimal World) w is a minimal world iff there is no proper subworld of w

In the secondary literature, commentators have focused only on the concept of maximal world. However, it is straightforward that we can have the counter-concept of it: that of minimal world. Remember that in the standard logical interpretation, compossibility is an equivalence relation. Given that, every possible world is both maximal and minimal for the advocates of the standard logical view; in other words, the concepts of possible, maximal, and minimal world are all extensionally equivalent to each other. This is not the case in my theory; they are not extensionally equivalent to each other. Instead, the following is the case:

Proposition (Minimal-Singleton): w is a singleton world iff w is a minimal world.

Proof. (1) For reductio, suppose that w is a singleton but not minimal world. Then, there must be a proper subworld of w. But the only proper subset of w is the empty set. By definition, however, the empty set is not a possible world. Contradiction. Therefore, if w is a singleton world, then it is also minimal.

(2) For reductio, suppose that w is minimal but not a singleton world. Then w contains more than one possible substance, x_1, x_2, …, and x_n, where $n \geq 2$. But, since $w = \{x_1, x_2, \dots x_n\}$ is a compossible set, $w\backslash\{x_i\}$ is also a compossible set for any x_i. Thus, given that w is a possible world, $w\backslash\{x_i\}$ is also a possible world for any x_i. Since $w\backslash\{x_i\}$ is a proper subworld of w, w is not minimal. Contradiction. And this is always the case unless w is a singleton world. Therefore, if w is a minimal world, then it is also a singleton world. □

In other words, the concepts of singleton and minimal world are extensionally equivalent to each other in my theory. And this proposition shows more clearly why and how my theory satisfies *World-Apart*.

Furthermore, we can get the following results:

Proposition (Unrestricted Detachment)

: For any possible substance x and possible world w, if $x \in w$ and w is not a singleton world, then $w\backslash\{x\}$ is also a possible world.

Proof. Since $w = \{y_1, y_2, \dots y_n, x\}$ is a non-singleton compossible set, $w\backslash\{x\}$ is also a compossible set. Thus, given that w is a non-singleton possible world, $w\backslash\{x\}$ is also a possible world. □

Proposition (Restricted Attachment)

: For any possible substance x and possible world w, $\{x\} \cup w$ is a possible world only if x is compossible with every member of w.

Proof. By definition, $\{x\} \cup w$ can be a possible world only if $\{x\} \cup w$ is a compossible set. And $\{x\} \cup w$ can be a compossible set only if any two members of $\{x\} \cup w$ are compossible with each other. By assumption, we already know that all the members of w are compossible with each other. Therefore, {x}∪ w is a possible world only if x is compossible with every member of w.□

This discrepancy between detachment and attachment shows clearly why *Humean Combinatorialism* provides the wrong picture of Leibniz's philosophy. In Chapter II, I argued that the world-apart passages do entail that it is always possible for God to detach a possible substance (or substances) from a possible world that has already been made. However, they do not entail that it is always possible to attach a possible substance *y* to a possible world that has already been made since we do not know whether *y* is compossible with possible substances in the world. The above two propositions are proofs of it.

We have seen the gist of the construction part of my theory. Now we can represent it graphically. For example, passage [1] can be represented as follows:

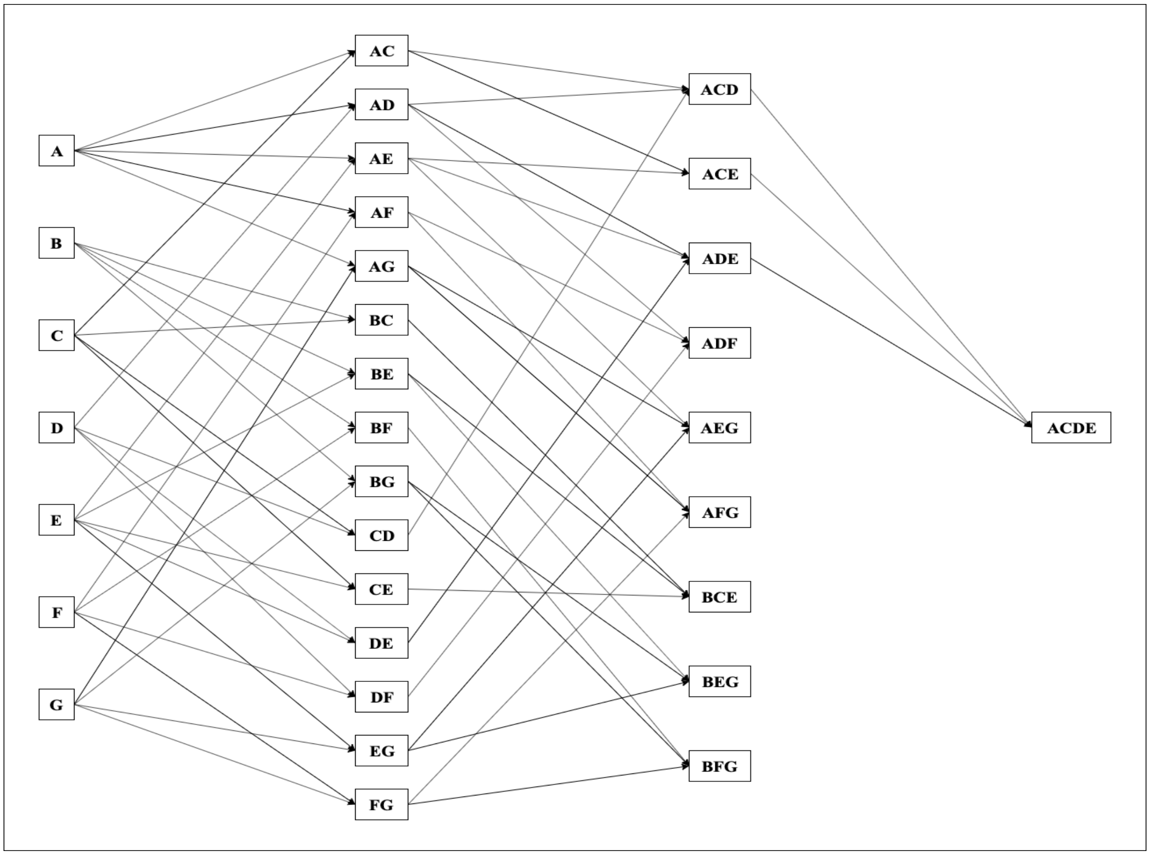

Figure 8. A graph representation of passage [1]

In this (directed) graph, the arrows represent the proper subworld relations between possible worlds. For instance, "$\varphi \rightarrow \psi$" means that φ is a proper subworld of ψ; equivalently, this also means that ψ is a proper superworld of φ. And by Proper Subworld Transitivity, we know that ω is a proper subworld of ψ if "$\omega \rightarrow \ldots \rightarrow \psi$" is the case. Given that, the concepts of minimal and maximal worlds can be described graph-theoretically as follows:

(Minimal World) w is a minimal world iff $\deg^{-}(w) = 0$
(Maximal World) w is a maximal world iff $\deg^{+}(w) = 0$

Thus, w is a minimal (or, maximal) world if and only if in the graph, its in-degree (or, out-degree) is equal to 0.

This graph contains all the relevant information. First, this shows that there are 32 many possible worlds. Among them, there are seven minimal worlds: A, B, C, D, E, F, and G. As Minimal-Singleton shows, all and only minimal worlds are singleton worlds. As World Apart argues, moreover, this graph shows that there are corresponding singleton worlds for all the possible substances in the domain. On the other hand, this graph shows that there are seven maximal worlds: ADF, AEG, AFG, BCE, BEG, BFG, and ACDE. So if we accept the maximality condition, we would have only seven many possible worlds in this model.[19] This shows that there is no problem for me to accept the maximality condition. Thus, my theory can be neutral with the maximality condition.

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[19] Note that even if maximality is a constitutive condition of being a possible world, this does not entail that possible substances are world-bound. For instance, A is contained in 4 different maximal worlds in this model. Many commentators have mistakenly assumed that the maximality condition entails *World Bound Individuals* (WBI). But that is incorrect; it is true that WBI entails maximality, but not *vice versa*.

But I will keep assuming that maximality is not a constitutive condition for being a possible world. Even though there is no conclusive evidence, I believe that there are overriding reasons for thinking that "there are as many possible worlds as there are series of things that can be posited without implying a contradiction" (A II.iii. 680/Grua 390) for Leibniz. Still, however, it is hard to deny that maximal worlds have something special. In many passages, Leibniz seems to claim that maximal worlds are *better* than non-maximal ones, or that the best world *is* maximal. In the next section, we will try to address this issue.

5. **The Evaluation of Possible Worlds: Part I**

In my view, God evaluates the values of possible worlds *after* constructing them.[20] Some commentators might be uncomfortable with this sharp distinction between construction and evaluation. For instance, advocates of the lawful and cosmological interpretation argue that a collection of possible substances can constitute a possible world *because* possible substances in that collection are harmonious with each other. In their view, therefore, evaluation and construction cannot be separated. Throughout the dissertation, however, I have argued that this conception of compossibility cannot satisfy *Anti-Spinozism*. Without distinguishing between construction and evaluation sharply, we cannot show that it is *absolutely* impossible for God to create all the possible substances.[21]

Now I will develop the evaluation part of my theory. This part starts with the following two fundamental principles:

(The Best Possible World) God creates *the* best of all possible worlds.

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[20] Of course, this indicates the logical priority rather than the temporal one.

[21] Lærke (2016) argues the same point very nicely.

(Goodness of Existence) For any possible substance x, x has "more reason for existing than for not existing" (A VI.iii. 472/DSR 21).

The first claims that only inhabitants in the actual world are actualized (equivalently, exist), while the second shows that for any possible substance x, the existence of x is better than its non-existence.[22] These two principles are nothing new at all; in fact, they are the starting point of the whole discussion. As I argued in Chapter I, the initial question of the whole issue was why God did not create all the possible substances if existence is always better than non-existence. Thus, these two principles are the very sources of this initial question. Given that, I can safely have them as principles of my theory.

Then how to calculate the values of possible worlds? In [1] and [2], Leibniz seems to calculate the value of a possible world as the sum of the values of its inhabitants. Let us follow this schema.[23][24] In [1] and [2], moreover, Leibniz assumes that all possible substances in the domain are equally perfect. He says that they are "all equally perfect and with equal claims to existence" (A VI.iv. 2231/Grua 285) in [1] and "equally perfect (therefore equally possible) possibles" (A VI.iv 1442/G VII. 194) in [2]. Thus, he is assuming the following:

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[22] Note that this does not entail that for *any* x, existence of x is better than its non-existence; this is the case only for possible *substances*. Thus, Leibniz can still say that some (non-substance) entities have purely negative values even if he endorses the Goodness of Existence.

[23] This does not mean that we should calculate the value of a possible world as the sum of values of its habitants. I am quite neutral about it. However, I will keep using the summation rule because it is the simplest. But I am quite open to other alternatives, too. For instance, we can have one interesting result by using multiplication instead of summation. Suppose that we assign a unique prime number to each possible substance and that the value of a possible world is determined by multiplying all the values of its inhabitants. By doing so, each possible world will have a unique value. And this answers why there is only one best possible world. This is simply because every possible world has a unique value. Leibniz must be familiar with this method; for instance, he says, "if it is hard to decide which constituents belong to which, we can assign them some prime number temporarily and use it to designate other things by means of them" (A VI.iv. 196/C 50/L 236). For more, see his *Elements of a Calculus* (1679) (A VI.iv. 195-205/C 49-57/P 17-24). For general objections to the additivity of perfections, see Feeney (2016).

[24] The results in the following sections rely on this rule of additivity. But presumably, most of the results are stable under the revisions of the rule.

(Equality) All possible substances are equally perfect and with equal claims to existence.

And it is not hard to figure out that the largest world should be the best world if one accepts Equality. Not surprisingly, Leibniz argues that in both [1] and [2], God will choose the largest world among them[25]: ACDE in [1] and ABC in [2]. Also, we can know that the largest world should be maximal:

Proposition (Maximality of the Largest): The largest world is maximal.
Proof. For reductio, suppose that there is the largest world w, which is not maximal. Then there is some w', which is a proper superworld of w. But then w' is larger than w. Contradiction. □

Therefore, the best world should be a maximal world if we accept Equality. In other words, a possible world cannot be the best without being maximal.

However, Equality does not reflect Leibniz's real view correctly. In fact, Leibniz believes that different possible substances have different degrees of perfection. Thus, Leibniz actually accepts the following:

(Proportionality) Each possible substance has its own degree of claim to existence in proportion to its degree of perfection.

It is not hard to find evidence of Leibniz's endorsement of it. In *On the Ultimate Origination of Things* (1697), for instance, he says, "all possibles, that is, everything that expresses essence or possible reality, strive with equal right for existence in proportion to the amount of essence or reality or the degree of perfection they contain" (G VII. 303/AG 150).

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[25] By "the largest world," I mean the possible world with the biggest cardinal number. Again, this can be tricky when we compare the sizes of infinite possible worlds. As I mentioned briefly in Chapter I, there is no clear evidence that Leibniz has a rigorous way to make a comparison among infinities. This is not a big problem for now since we are dealing only with finite models. For simplicity's sake, therefore, I will bracket this issue.

I want to bring this view into my theory. To do this, I define what I call "Individual Perfection Function":

(*Individual Perfection Function*) $f : \mathfrak{D} \rightarrow \mathbb{R}^+$

This is a function from the domain to the set of positive real numbers; this function assigns a positive real number to each possible substance. The basic idea is quite similar to the utility function we commonly use. And I keep calculating the value of a possible world as the sum of the individual perfections of its inhabitants:

(*World Perfection Function V.1*) $s(\mathrm{w}) = \sum_{i \in \mathrm{w}} f(i)$

Also, for simplicity's sake, I will use the following notation:

x>y: x is (strictly) better than y.

And this is defined as:

Def. (Better-than Relation) x>y iff $f(\mathrm{x}) > f(\mathrm{y})$ or $s(\mathrm{x}) > s(\mathrm{y})$.[26]

Thus, x is (strictly) better than y if and only if the perfection of x is (strictly) bigger than that of y.[27]

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[26] Thus, I am comparing an individual only with other individuals and a possible world only with other possible worlds.

[27] Two things are worth mentioning at this point. First, note that the codomain of the World Perfection

Note that if we accept Proportionality instead of Equality, then the best world might not be the largest world. For instance, let us suppose that in the model of passage [1], each possible substance has the following degree of perfection:

TABLE III

POSSIBLE SUBSTANCES AND THEIR DEGREES OF PERFECTION 1

Possible Substance	Degree of Perfection	Possible Substance	Degree of Perfection
A	1	E	1
B	2	F	2
C	1	G	2
D	1		

Given this, the value of the BFG-world is 6, while that of the ACDE-world is just 4. If so, God will choose BFG instead of ACDE since the BFG-world is better than the ACDE-world. But note that the BFG-world is not the largest. Thus, the best world may not be the largest world.

However, the best world still should be a maximal world, even if we accept Proportionality. For instance, note that the BFG-world is one of the maximal worlds in the above example. We can prove it as follows:

Proposition (Best-Maximal): The best world is a maximal world.

Proof. For reductio, suppose that the best world, w, is not maximal. Then there is some w’, which is a proper superworld of w. By definition, w’ contains all the possible substances of w and at least one more possible substance, say, x. Hence, $s(w') = s(w) + f(x)$. But by Goodness of Existence, $f(x) > 0$. Therefore, $s(w') > s(w)$; subsequently, w’ > w. Contradiction. □

Function is the set of *positive* real numbers. This is the case because of Goodness of Existence; given this principle, a possible substance should have a positive degree of perfection. Second, Equality and Proportionality are not mutually exclusive. In fact, Equality is just a special case of Proportionality; In the Equality case, we just use a *constant* individual perfection function.

Thus, a possible world still cannot be the best without being maximal even if we accept Proportionality instead of Equality. This shows why Leibniz claims that maximal worlds are *better* than non-maximal ones.

Moreover, my theory now can have an important implication in Leibniz's Theodicy. Consider the following model:

$\mathfrak{D}$ = {Holmes, Marcus, Cartwright, Rand, Hitler}

$\mathfrak{I}$ = {<Holmes, Hitler>, <Holmes, Rand>, <Holmes, Cartwright>}.

In this model, there are five possible substances: Holmes, Marcus, Cartwright, Rand, and Hitler. For simplicity's sake, I will use the capital letters to refer to them; "H" to Holmes, "M" to Marcus, …, and "H_2" to Hitler. And we assume that H is incompossible with H_2, R, and C; by Symmetry, H_2, R, and C are also incompossible with H. And each possible substance has the following degree of perfection:

TABLE IV

POSSIBLE SUBSTANCES AND THEIR DEGREES OF PERFECTION 2

Possible Substance	Degree of Perfection	Possible Substance	Degree of Perfection
Holmes (H)	5	Rand (R)	2
Marcus (M)	4	Hitler (H_2)	0.1
Cartwright (C)	3		

As you can see, Holmes is the best possible substance in the domain, while Hitler is way worse than others. So it is most likely for God to choose Holmes rather than Hitler. Let us see whether this is the case.

First, this model can be represented graphically as follows:

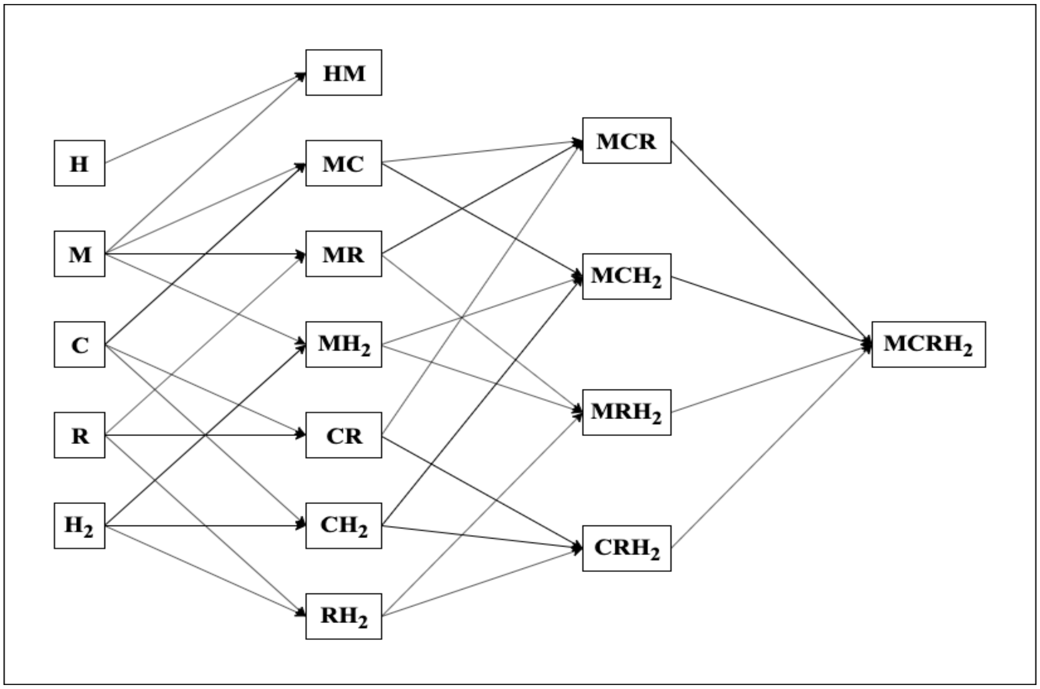

Figure 9. A graph representation of the Holmes – Hitler Model

This graph shows that there are 17 many possible worlds. Among them, there are five minimal worlds: H, M, C, R, and H_2. The more important thing is to find maximal worlds. A world is maximal if and only if its outdegree is equal to 0. In this graph, there are 2 such possible worlds: HM and $MCRH_2$. And by Best-Maximal, we know that the best world should be maximal. Therefore, we only need to calculate the values of HM and of $MCRH_2$ to figure out which one is the best. And $s(HM) = f(H) + f(M) = 5 + 4 = 9$ while $s(MCRH_2) = f(M) + f(C) + f(R) + f(H_2) = 4 + 3 + 2 + 0.1 = 9.1$; thus, $s(MCRH_2) > s(HM)$. Consequently, $MCRH_2 > HM$. Therefore, $MCRH_2$-world is the best in this model; God will choose $MCRH_2$ instead of HM.

Individually, $H > M > C > R > H > \ldots > H_2$. But note that the best possible substance is not contained while the worst possible one is contained in the best possible world; Hitler exists, but Holmes does not. This kind of situation fits very well with what Leibniz says in the *Theodicy*:

> One may say that men are chosen and ranged *not so much according to their excellence as according to their conformity with God's plan*. Even so it may occur that a stone of lesser quality is made use of in a building or in a group because it proves to be the particular one for filling a certain gap (G VI. 161/H 181; my emphasis).

Excellent possible substances are indeed more likely to be chosen by God since they will please God's mind. However, they are still not guaranteed to be chosen; as Leibniz says here, the more important thing is to be conformed with God's (bigger) plan. Holmes could not, while Hitler was able to do that by "filling a certain gap" (G VI. 161/H 181). This is the reason why Hitler was chosen instead of Holmes, even though Holmes is 50 times better than Hitler. And I believe that this is the solution of Leibniz for one of the problems of evil. Why did God create Hitler rather than Holmes? The above is the answer. My theory gives a mathematical solution to this theological question.[28]

6. The Evaluation of Possible Worlds: Part II

In the previous section, I developed an evaluation theory of possible worlds: according to this theory, the value of a possible world is determined by the sum of degrees of perfection of its inhabitants. As I briefly mentioned in Chapter I, however, Leibniz seems to believe that two different criteria are employed in God's choice: variety and simplicity (or harmony among substances). He says:

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[28] I am not saying that this is the only solution for all the problems of *Theodicy*; Leibniz suggests different solutions for different problems. But it seems clear that this (mathematical) solution provides a good answer for many questions of his *Theodicy*.

> This is the way of obtaining as much variety as possible, but with the greatest order possible, that is, it is the way of obtaining as much perfection as possible (Mon §58; G VI. 616/AG 220).

> God makes the maximum of things he can, and what obliges him to seek simple laws is precisely the necessity to find place for as many things as can be put together; if he made use of other laws, it would be like trying to make a building with round stones, which make us lose more space than they occupy (A letter to Malebranche (1679); A II.i. 725/L 211).

> It follows from the supreme perfection of God that he chose the best possible plan in producing the universe, a plan in which there is the greatest variety together with the greatest order. The most carefully used plot of ground, place, and time; the greatest effect produced by the simplest means; the most power, knowledge, happiness, and goodness in created things that the universe could allow (PNG §10; G VI. 603/AG 210).

In these passages and many others, Leibniz seems to argue that God tries to find an order in which there is (i) the greatest variety with (ii) the greatest order (i.e., the most harmonious order). If so, I might need to bring the harmony criterion into my theory.

In fact, however, it is controversial whether there really are two irreducible criteria for Leibniz. One can argue that these criteria are reducible to one another or some other thing. This reading can be supported by the following passage from the *Theodicy* §208:

> The ways of God are those most simple and uniform: for he chooses rules that least restrict one another. They are also the most *productive* in proportion to the *simplicity of ways and means*. It is as if one said that a certain house was the best that could have been constructed at a certain cost. *One may, indeed, reduce these two conditions, simplicity and productivity, to a single advantage, which is to produce as much perfection as is possible*: thus, Father Malebranche's system in this point amounts to the same as mine (G VI. 241/H 257; emphasis added).

In this passage, Leibniz seems to argue that there is only one condition: *to create as much perfection as possible*. Similarly, he seems to argue that the two conditions are in fact the same thing as this condition in his letter to Christian Wolff of 18 May 1715:

> The more there is worthy of observation in a thing, the more general properties, the more harmony it contains; *therefore, it is the same to look for perfection in an essence and in the properties that flow [fluunt] from the essence* … Order, regularity, and harmony come to the same thing. *You can even say that it is the degree of essence*, if essence is calculated from harmonizing properties, which give essence weight and momentum, so to speak (GLW 172/AG 233-4; emphasis added).

For this reason, Gregory Brown argues that two seemingly different criteria are indeed the same thing as each other. He says, "the two notions of perfection, viz., simplicity of laws in conjunction with richness of phenomena, on the one hand, and quantity or degree of essence, on the other, are not in conflict, but come indeed to the same thing" (Brown 1987, 200-1). Therefore, the evaluation theory I developed in the previous section might be good enough for Brown and other advocates of the reducibility reading. It provides a good model for them since, according to it, God's sole criterion is to create the highest degree of perfection as possible. This fits very well with the reducibility reading.

Although the reducibility reading seems quite plausible, many other commentators endorse the irreducibility reading. They believe that variety and harmony are two distinct criteria. Arguing for or against it is not my purpose here; I admit there is no conclusive evidence for either reading. Rather, my goal is to provide a good (formal) model for each camp in this controversy. Since I have already provided a good model for the reducibility reading, now I start developing a model for the irreducibility one. To distinguish these two models sharply, let us call the previous one "ET1."

Let us now develop ET2. In fact, this can be easily done since ET2 is, more or less, an expansion of ET1. The crucial thing is just to add one more function into my theory:

(Harmony Function) $h : J \rightarrow \mathbb{R}, \quad \text{where } J \subseteq P(\mathfrak{D})$

This is a function from a subset of the power set of the domain to the set of positive real numbers. Intuitively, this function assigns a positive real number to each set of compossible substances; this indicates the harmony of a possible world. And now I calculate the value of a possible world as the sum of the individual perfections of its inhabitants *and* the harmony among them[29]:

(*World Perfection Function V.2*) $s(\mathrm{w}) = \sum_{i \in \mathrm{w}} f(i) + h(\mathrm{w})$

Although all the advocates of the irreducibility reading agree that there are two really distinct criteria, the relation between these two remains controversial. Rescher believes that these two criteria are in a state of mutual tension. He argues that the less variety a world contains, the more harmonious it will be, and *vice versa*.[30] Thus, he believes that there is a trade-off between harmony and variety. However, David Blumenfeld and some others convincingly argue that the trade-off thesis is wrong given that Leibniz repeatedly claims that the actual world has the greatest variety together with the greatest order.[31] If there really is a trade-off between them, how can there be a world which has the greatest variety and the greatest order? For this reason, most commentators do not accept the trade-off thesis.[32]

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[29] Once more, I am using the summation because it is the simplest. I am quite open to other alternatives, too. In this case, particularly, using the multiplication between the harmony and the sum of degrees of perfection seems quite natural; for instance, Rescher (2007) uses it.

[30] See Rescher (2007, 60-63).

[31] See Blumenfeld (1995); also, Messina and Rutherford (2009, 967) and McDonough (2010, 141-3).

In contrast, Blumenfeld suggests the opposite idea. He agrees with Rescher in that variety and harmony are not completely independent of each other. Unlike Rescher, however, Blumenfeld argues that harmony is the means to achieve variety. For this reason, he argues, "the best possible world = the most harmonious one = the one that has the maximum of variety and the maximally simple laws = the one with the most phenomenal individuals and the most monads = the one with the most reality or essence" (Blumenfeld 1995, 394). This idea can be formalized as follows:

(B-Principle) For any two possible words w and v, $|w| > |v|$ if and only if $h(w) > h(v)$.

Thus, the larger, the more harmonious and *vice versa*. By adding this principle, I can formalize Blumenfeld's view. However, not many commentators agree with Blumenfeld's positive suggestion, although his criticism against the trade-off thesis quite convinces them.[33] The mere fact that there is no trade-off does not entail that harmony is the means to achieve variety. And Blumenfeld fails to give convincing evidence for his positive idea. Therefore, I will develop ET2 without B-Principle.[34]

Now let us see some implications of this theory. First, let us consider the following example:

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[32] I also believe that the trade-off thesis is wrong. Again, however, my goal is to provide a good model for each camp. And I can give a good model for the trade-off view by adding the following principle into ET2:

(R-Principle) For any two possible worlds w and v, $|w| > |v|$ if and only if $h(w) < h(v)$.

Thus, the larger, the less harmonious, and *vice versa*.

[33] For instance, Rutherford (1995, 28).

[34] As you shall see, however, I will introduce a similar but much weaker principle into my theory.

$\mathcal{D}$ = {Peach, Bowser, Mario}

$\mathcal{I}$ = {<Bowser, Mario>}.

In this example, there are 3 possible substances: Peach, Bowser, and Mario. And they have the following individual degrees of perfection and harmony between them:

TABLE V
POSSIBLE SUBSTANCES, DEGREES OF PERFECTIONS, AND HARMONIES

Possible Substance	Degree of Perfection	Set of Substances	Harmony
Bowser (B)	5	Bowser, Peach	0.01
Peach (P)	4.9	Peach, Mario	1.1
Mario (M)	4		

Given that, we know that there are 5 possible worlds: B, P, M, BP, and PM. Since it is evident that singleton worlds cannot be the best in this example, we can compare only BP and PM. So $s(\mathrm{BP}) = f(\mathrm{B}) + f(\mathrm{P}) + h(\mathrm{BP}) = 5 + 4.9 + 0.01 = 9.91$ while $s(\mathrm{PM}) = f(\mathrm{P}) + f(\mathrm{M}) + h(\mathrm{PM}) = 4.9 + 4 + 1.1 = 10$. Hence, PM-world is better than BP-world. Therefore, God will create Peach and Mario.

One thing we can notice in this simple example is that: even though the best possible substance (i.e., Bowser) and the second-best one (i.e., Peach) are compossible with each other, God will not create the best one. This kind of situation can never happen in ET1; in ET1, if there are only three possible substances in a domain and if the best and the second-best are compossible with each other, then the best one (also the second-best one) is guaranteed to be actualized by God. But the consideration of harmony makes some difference. In the above example, Bowser fails to be actualized since he and Peach are not as harmonious as Peach with Mario. In contrast, Mario could be actualized since he made a good couple with Peach even though he was the worst possible substance in the domain.

I believe that the above example shows that ET2 can be meaningfully differentiated from ET1. Moreover, we can meaningfully distinguish Optimality from Maximality. For this, I introduce the following concept:

Def.(Leibniz-Optimality) w is a Leibniz-optimal world iff
$\forall v$ (v is a proper superworld of w $\rightarrow \sim (v \succ w)$)

Thus, a possible world is Leibniz-optimal if and only if no proper superworld of it is better than that world. In other words, w is Leibniz-optimal just in case there is no way to make w better without detaching at least one inhabitant in w. Needless to say, this conception is heavily influenced by the concept of Pareto-Optimality, a concept of efficiency used in the social sciences, such as economics and political science.[35] And we can easily prove that a maximal world should be Leibniz-optimal:

Proposition (Maximal-Optimal): A maximal world is Leibniz-optimal.
Proof. This proposition is vacuously true since, by definition, a maximal world has no proper superworld of it. □

Also, it is not difficult to prove that the best world should be Leibniz-optimal:

Proposition (Best-Optimal): The best world is Leibniz-optimal.
Proof. The best world is, by definition, better than any other possible world. Hence, it trivially follows that there is absolutely no way to make the best world better. Therefore, the best world is Leibniz-optimal. □

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[35] A state of affairs is Pareto-optimal if and only if there is no alternative state that would make some people better off without making anyone worse off. This concept is named after the Italian sociologist Vilfredo Pareto (1848 – 1923).

Interestingly, however, a Leibniz-optimal world may not be maximal. I show this by example. Let us use our Holmes-Hitler example once more:

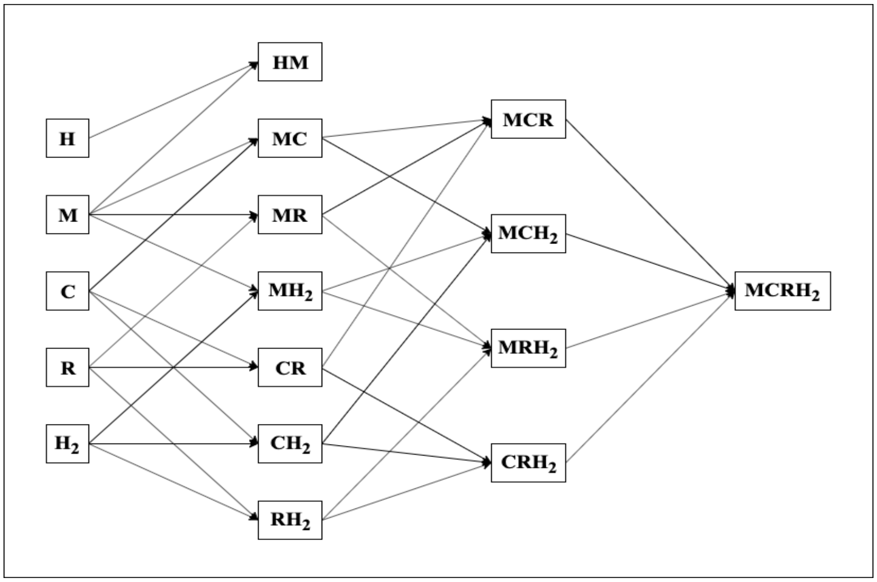

Figure 10. A graph representation of the Holmes – Hitler Model (again)

Again, they have the following degrees of perfection:

TABLE VI

POSSIBLE SUBSTANCES AND THEIR DEGREES OF PERFECTIONS 2 (AGAIN)

Possible Substance	Degree of Perfection	Possible Substance	Degree of Perfection
Holmes (H)	5	Rand (R)	2
Marcus (M)	4	Hitler (H_2)	0.1
Cartwright (C)	3		

We have already seen, according to ET1, the $MCRH_2$-world is the best among them. In ET2, however, we also need to consider how harmonious possible substances are. For the simplicity's sake, let us focus only on MCR and $MCRH_2$. Let us assume that $h(MCR) = 1$ while $h(MCRH_2) = 0.1$. If so, $s(MCR) = f(M) + f(C) + f(R) + h(MCR) = 4 + 3 + 2 + 1 = 10$ while $s(MCRH_2) = f(M) + f(C) + f(R) + f(H_2) + h(MCRH_2) = 4 + 3 + 2 + 0.1 + 0.1 = 9.2$. Therefore, $MCR \succ MCRH_2$.

Since $MCRH_2$ is the only proper superworld of MCR, MCR is Leibniz-optimal.[36] But this world is not maximal. Therefore, a Leibniz-optimal world may not be maximal.

This result also shows that the best world may not be maximal. In the above example, let us assume that all the possible worlds except for MCR have 0.1 as its harmony value: thus, $h(MCRH_2) = h(MCH_2) = h(MRH_2) = h(CRH_2) = \ldots = 0.1$ while $h(MCR) = 1$. If so, we can easily figure out that MCR is the best world among them. Again, however, MCR is not a maximal world. Some commentators might feel uncomfortable with this result since Leibniz repeatedly claims that the actual world, which is the best, has "the greatest variety together with the greatest order" (G VI. 603/AG 210) as much as it can have. If the best world is not maximal, however, that world does not have the greatest variety it could have. Therefore, someone might argue that ET2 contradicts with what Leibniz says.

Strictly speaking, however, there is no contradiction. Leibniz simply says that the actual world *is* maximal; as far as I know, he never says that it *must* be maximal. It is true that ET2 does not entail that the best world is maximal. But it is also true that ET2 does not entail the negation of this proposition. In other words, ET2 is independent of the actual world's being maximal; ET2 is completely compatible with the maximality of the actual world. It simply does not follow from ET2 as a theorem. Thus, the actual world's being maximal is a contingent fact. This fits reasonably well with textual evidence.

I believe that the above answer is plausible, and we need to consider it more seriously. However, I expect that many commentators still feel uncomfortable with it. I am also not completely comfortable with the possibility of the best world's being non-maximal; it seems that there is something special in maximality. Among others, Donald Rutherford is one who emphasizes the importance of maximality. According to him, maximality is the primary criterion of God in choosing the best possible world; for, only by doing so, we can be sure that the best world is governed by "the principle of general order" (G III. 51), which is, according to Rutherford, nothing but the principle of continuity.[37] Rutherford argues that the principle of continuity is important for Leibniz since it guarantees that no "gaps" are allowed between the states of substances. He says, "[b]y observing the principle of continuity in his creation of the world, God is able to realize the most complete series of beings possible: one in which there are no gaps between successive degrees of perfection" (Rutherford 1995, 30). This continuity between substances captures the universal connectedness of created substances, and in turn, this guarantees that there are no "voids" in the physical realm.[38]

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[36] By Maximal-Optimal, $MCRH_2$ is Leibniz-optimal, too.

For Leibniz, as Rutherford shows, "fullness" or "completeness" seems to be one of the primary indexes of a possible world's being harmonious. For this reason, I believe that Rutherford's so-called "Maximum" view is quite plausible. Again, however, my primary purpose here is to provide a good model for each camp rather than to take someone's side. So I will simply provide a model for Rutherford's view. I can do this by adding the following principle into ET2:

(No-Trickster) For any two possible worlds w and v, if $w \subset v$, then $h(w) \leq h(v)$.

Note that ET2 with this principle entails that for any possible world w, w is better than any proper subworlds of w. Therefore, a Leibniz-optimal world must be maximal; subsequently, it entails that the best world is maximal. Also, note that this principle is weaker than Blumenfeld's B-Principle; B-Principle entails No-Trickster but not *vice versa*.

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[37] Rutherford (1995, 29-30).

[38] Rutherford (1995, 29-31) gives a more detailed picture of his view.

In fact, however, No-Trickster does not capture Rutherford's view correctly. No-Trickster shows that for any possible world w, w is at least as harmonious as its proper subworlds regardless of whether w is maximal or not. But Rutherford's idea is, rather, that maximal worlds are more harmonious than non-maximal worlds. This can be better captured by the following:

(RM-Principle) For any two possible worlds w and v, if v is a maximal world and w is not, then $h(\mathrm{w}) \leq h(\mathrm{v})$.

Note that RM-Principle neither entails nor is entailed by No-Trickster; not only that, RM-Principle is also independent of B-Principle. This shows that RM-Principle is independent of them even though they all look quite similar to each other.[39] But RM-Principle still can make the best world maximal:

Proposition: ET2 + RM-Principle $\vDash$ The best world is maximal.

Proof. For reductio, suppose that the best world w is not maximal. Then there is a maximal world v such that $\mathrm{w} \subset \mathrm{v}$ and $\mathrm{w} \succ \mathrm{v}$. Hence, $s(\mathrm{w}) > s(\mathrm{v})$. Thus, $\sum_{i \in \mathrm{w}} f(i) + h(\mathrm{w}) > \sum_{i \in \mathrm{v}} f(i) + h(\mathrm{v})$. But since $\mathrm{w} \subset \mathrm{v}$, $\sum_{i \in \mathrm{w}} f(i) < \sum_{i \in \mathrm{v}} f(i)$. Therefore, $h(\mathrm{w})$ must be strictly bigger than $h(\mathrm{v})$. By RM-Principle, however, $\mathrm{h(w)} \leq \mathrm{h(v)}$ since v is a maximal world. Consequently, $\mathrm{v} \succ \mathrm{w}$. Contradiction. □

I believe that RM-Principle successfully captures Rutherford's core idea. Thus, ET2, in conjunction with RM-Principle, provides a good formal model for Rutherford's view. In fact, however, we can do better; we can still achieve the desired goal with the following principle, which is weaker than RM-Principle:

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[39] And this helps us distinguish Blumenfeld's and Rutherford's views more clearly.

(Completeness) For any two possible worlds w and v, if w⊂v and v is maximal, then h(w) ≤ h(v).

It is not difficult to see that this principle is weaker than RM-Principle. RM-Principle entails Completeness but not *vice versa*; unlike RM-Principle, Completeness permits a situation in which some non-maximal worlds can be better than some other maximal worlds.[40] Furthermore, it is also weaker than No-Trickster; Completeness is entailed by but does not entail No-Trickster. In turn, this implies that Completeness is also weaker than B-Principle. Thus, Completeness is the weakest one among similar principles.

Still, we can get by with this weakest one:

Proposition: ET2 + Completeness ⊨ w is maximal iff w is Leibniz-optimal.

Proof. (1) If w is maximal, then it is Leibniz-optimal: in Maximal-Optimal, I have already shown that ET2 entails it. Therefore, ET2 + Completeness also entails it.

(2) If w is Leibniz-optimal, then it is maximal: For reductio, suppose that w is Leibniz-optimal but not maximal. Then there is a maximal world v, s.t. w⊂v. Since w is Leibniz-optimal, it is not the case that v is better than w, *i.e.*, ~(v ≻ w). Thus, $\sum_{i\in w} f(i) + h(w) \geq \sum_{i\in v} f(i) + h(v)$. But since w⊂v, $\sum_{i\in w} f(i) < \sum_{i\in v} f(i)$. Therefore, h(w) must be strictly bigger than h(v). By Completeness, however, h(w) ≤ h(v) since w⊂v and v is maximal. Consequently, v ≻ w. Contradiction. □

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[40] Thus, Completeness implies that some incomplete worlds can be better than some other complete worlds. Intuitively, a famous artist's incomplete piece could be better than a complete one by a novice. Note that RM-principle cannot permit this possibility.

And this shows that the best world must be maximal in ET2 + Completeness. Thus, we can achieve our goal by adding Completeness, which is weaker than No-Trickster or RM-Principle.

I believe that ET2 + Completeness can capture Leibniz's real view without assuming any heavy principles. So I am more than happy to accept it as my view on this issue. But again, my primary goal is rather to provide a good formal model for each possible view. In this and the previous sections, I believe I have done this:

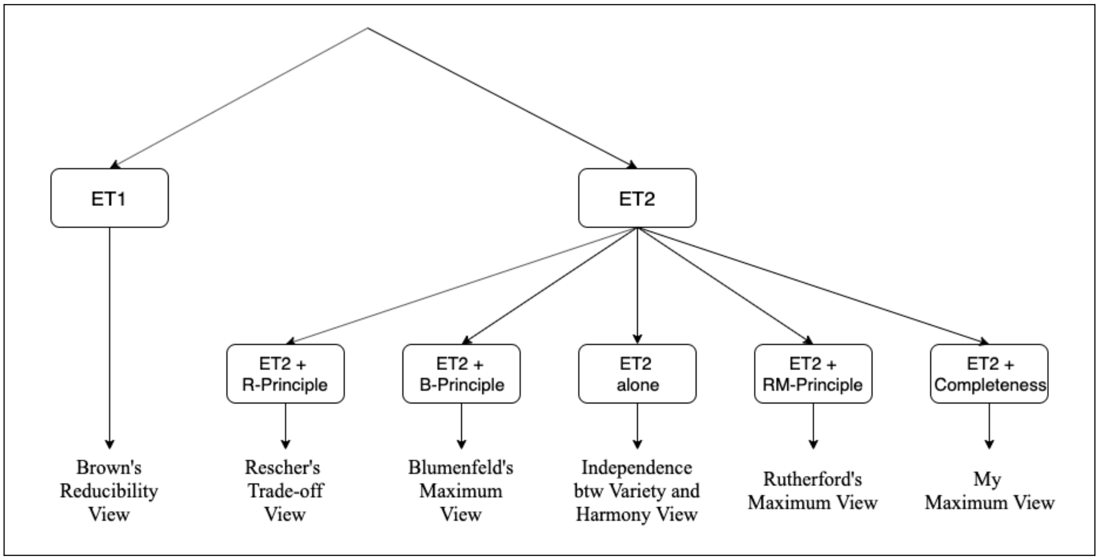
ET1
ET2
ET2 + R-Principle
ET2 + B-Principle
ET2 alone
ET2 + RM-Principle
ET2 + Completeness
Brown's Reducibility View
Rescher's Trade-off View
Blumenfeld's Maximum View
Independence btw Variety and Harmony View
Rutherford's Maximum View
My Maximum View

Figure 11. Summary of various evaluation theories

As you can see, my theory of evaluation can provide a good formal model for almost all the existing readings and more. I am not completely sure which one is the correct view of Leibniz, but it seems likely that one of them is.

7. Conclusion: Leibnizian Humility

In this chapter, I developed a combinatorial theory of compossibility based on Leibniz's passages. This theory consists of two parts: Construction and Evaluation of possible worlds. In the construction part, I formally proved why it is *absolutely* impossible even for God to create the Spinozistic world while the world-apart scenario is *absolutely* possible. This fits very well with what I have argued in the previous chapters. Moreover, I developed the evaluation part of my combinatorial theory and showed that this formal model could solve some problems of Theodicy in a rigorous manner. Of course, formalization alone cannot solve all the problems, but it helps us see problems clearly and solve some of them eventually.

So I believe that my theory reveals what Leibniz has in mind when he says: “From this we can already understand in a wondrous way how a certain Divine Mathematics or Metaphysical Mechanism is used in the very origination of things, and how the determination of a maximum finds a place” (G VII. 304/AG 151). Robert Adams once claimed, “Leibniz gives us no idea how one would even begin an analysis, finite or infinite, to determine which world is the best possible” (Adams 1994, 27). But if I am right, Leibniz *does* give us a good idea of how to determine which world is the best possible. The purpose of this whole chapter was to show this rigorously.

Strictly speaking, “Divine Mathematics” is not substantially different from Human mathematics, so even humans can figure out some core ideas of Divine mathematics. But does this mean that humans can calculate which one is the best world among others? My theory shows that theoretically, even humans can do this if there are only finitely many possible substances and we have all the relevant information. However, Leibniz believes that there is an infinite number of possible substances, and we simply cannot have perfect information about infinitely many things. In the *Theodicy*, Leibniz says:

> The wisdom of God, not content with embracing all the possibles, penetrates them, compares them, weighs them one against the other, to estimate their degrees of perfection or imperfection, the strong and the weak, the good and the evil. It goes even beyond the finite combination, it makes of them an infinity of infinites, that is to say, an infinity of

> possible sequences of the universe, each of which contains an infinity of creatures (G VI. 252/H 267).

For this reason, he also says: “it is necessary that we may be ignorant of the reasons for God’s choice. Those reasons are too diverse to become known to us” (G VI. 160/H 180). I believe this “Leibnizian Humility” has some further implications for his whole philosophy. In the last chapter of the dissertation, I will investigate them.

V. INDEPENDENCE AND INTERCONNECTEDNESS

1. Introduction

In this dissertation, I have argued two central positions: the Wilson-Sleigh interpretation and a combinatorial theory of compossibility. In the previous chapter, I suggested that the Wilson-Sleigh interpretation could provide the metaphysical foundation of compossibility for my combinatorial theory. Strictly speaking, however, they are independent of each other; someone can accept one without endorsing the other. For instance, some might think that the Wilson-Sleigh interpretation is convincing, but my combinatorial theory of compossibility is misguided. Or, others might think that my combinatorial theory is useful, but the Wilson-Sleigh interpretation is not a good foundation of compossibility.

However, I believe that these two theses of mine provide a coherent picture of Leibniz's whole philosophy. Not only can they solve the problems of compossibility, but also they can help us attain a better understanding of other central features of Leibniz's philosophy, such as his views on the conceptual containment theory of truth, the theory of contingency, and the problem of transworld identity. In this concluding chapter, I will briefly investigate these implications of my view.[1] The fact that my views can provide a good picture of Leibniz's philosophy can give us an additional reason to accept them both. I will show that they can help us understand how Leibniz can consistently argue that individual substances are *metaphysically* independent but *morally* interconnected with each other.

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[1] Of course, I will not be able to address them fully in this chapter; each deserves a separate paper.

2. The Wilson-Sleigh Theory and Complete Individual Concepts

First, let us see how to combine my combinatorial theory with the Wilson-Sleigh interpretation. A construction model of my theory consists of a domain $\mathscr{D}$ and an incompossibility base $\mathscr{I}$. As Fichant (1971, 33) argues, the philosophical problem of it is that it simply assumes incompossibilities between entities without explaining why there are such incompossibilities between them. Thus, the combinatorial theory by itself cannot provide the complete picture of Leibniz. however, I believe the Wilson-Sleigh interpretation can complete it by filling this explanatory gap.

In order to see this, let us consider the example I used in Chapter III again. Suppose that there are four possible substances *ABCD*, and each has its own *core* individual concept. In Chapter III, I distinguished three different layers of individual concepts (Inner core, Outer core, and Crust) and argued that the true source of (in)compossibility is the inner core of individual concepts. In this context, however, the subtle distinction between inner and outer core is irrelevant. Therefore, I will simply treat them together as "core" individual concepts for simplicity's sake. Again, let "CIC(*x*)" stand for the core individual concept of *x*. The core individual concepts of *ABCD* are as follows:

CIC(*A*) = {*p, q*, and law: "if anything is p, then nothing is r"}
CIC(*B*) = {*q, r*, and law: "if anything is q, then nothing is s"}
CIC(*C*) = {*q, t*, and law: "if anything is t, then nothing is u"}
CIC(*D*) = {*s, t*, and law: "if anything is t, then nothing is v"}

As I argued, the core individual concept of x contains attributes, affections, and individual law of x. For simplicity's sake, once again, I will assume that the core individual concept of x contains only its attributes and individual law as above.

Since I already showed that the Wilson-Sleigh interpretation could satisfy all the requirements I identified, I will not repeat it here.[2] What I try to show here is that we can easily figure out what the incompossibility base must be in this example. Given the core individual concepts of them, we know that A cannot be in the same possible world with B, and B cannot be in the same possible world D. Thus, A is incompossible with B and B is incompossible with D. If so, we can formulate this example as a model of my combinatorial theory:

$\mathcal{D} = \{A, B, C, D\}$

$\mathcal{I} = \{\langle A, B\rangle, \langle B, D\rangle\}$.[3]

Thus, the incompossibility base of a model is explained by the core individual concepts of possible substances in the domain. And it is a short step from here to the construction of possible worlds. In this model, there are 9 possible worlds: A, B, C, D, AC, AD, BC, CD, and ACD. And among them, there are two maximal worlds: BC and ACD.

From the above example, it seems clear that the Wilson-Sleigh interpretation coheres with my combinatorial theory of compossibility. But this is not the end of the story; I believe that we can go further from here. Most importantly, they can explain why and how an entity's true predications are "contained" in its *complete* individual concept. As I argued in Chapter III, Leibniz believes that complete individual concepts contains not only essential or necessary items but also contingent ones:

> In this complete concept of possible Peter, which I concede is observed by God, are contained not only essential or necessary items, namely, those that flow from an incomplete or species concept, and are demonstrated from terms so that the contrary

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[2] For this, see section 4 of Chapter III.

[3] For notational simplicity, again, I will write $\{\langle A, B\rangle, \langle B, D\rangle\}$ instead of $\{\langle A, B\rangle, \langle B, D\rangle, \langle B, A\rangle, \langle D, B\rangle\}$.

> implies a contradiction, but also existential things, so to speak, or contingent items are included there, because it is of the nature of an individual substance that its concept is perfect or complete (A VI.iv. 1600/Grua 311).

> The notion of an individual substance includes once and for all everything that can ever happen to it and that, by considering this notion, one can see there everything that can truly be said of it, just as we can see in the nature of a circle all properties that can be deduced from it. But it seems that this would eliminate the difference between contingent and necessary truth […] To this I reply that we must distinguish between what is certain and what is necessary. Everyone grants that future contingents are certain, since God foresees them, but we do not concede that they are necessary on that account. But (someone will say) if a conclusion can be deduced infallibly from a definition or notion, it is necessary (A VI.iv. 1546-7/AG 44-5).

For this reason, I suggested that a complete individual concept should have three distinctive layers, and the outermost layer ("the crust") contains all the contingent predications.

But how can contingent predications be contained in individual concepts? Since attributes are essential properties, it is natural to say that the individual concept of an entity contains them. And given that affections necessarily follow from attributes, it is also natural to say that they are, in some sense, contained in the individual concept. But contingent properties do not necessarily follow from attributes. If so, in what sense are they contained in an individual concept? As I showed in Chapter III, Leibniz's official answer is that: they are contained in the individual concepts *only when we consider "the sequence of things which God has freely chosen, a sequence based on God's first free decree always to do what is most perfect"* (A VI.iv. 1548/AG 46; my emphasis). Leibniz writes, "in truths of fact or existence this connection [of subject and predicate] is contingent and in part depends instead on the will of God" (A II.ii. 56/LA 81-3). He also says, "all human events could not fail to occur as in fact they did occur, once the choice of

Adam is assumed; but not so much because of the individual concept of Adam, although this concept contains them, but because of God's plans" (A II.ii. 73-4/LA 57).

According to Leibniz, the containment of contingent predications depends not only on the (core) individual concept but also on God's plans. But what does this exactly mean? Leibniz's answer by itself cannot solve the mystery. As John Carriero (1993, 7) asks, exactly how "the sequence of things which God has freely chosen" is related to contingent truths? No one gave a plausible answer for this. Fortunately, we now have a good mathematical theory of God's creation. To see this, let us consider the above example once more. The above example of the *Wilson-Sleigh theory* can be represented as follows:

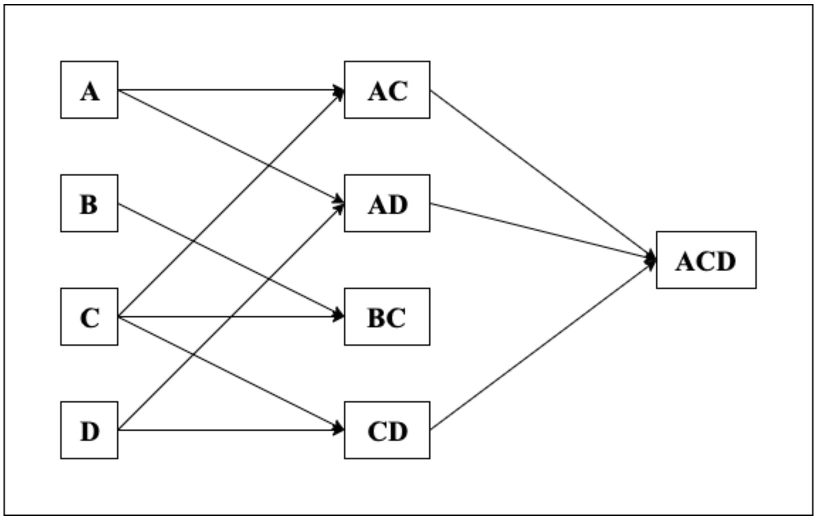

Figure 12. A graph representation of the ABCD model

To see God's plan more clearly, we also need to consider the evaluation part of my theory. In the previous chapter, I developed various versions of the evaluation theory. For simplicity's sake, let us use the simplest one; thus, let us assume that all possible substances are equally perfect and with equal claims to existence. According to this assumption, God will choose the largest world; in this example, God will choose the ACD-world.

What does this creation story show? We have already seen many results of this mathematical theory of the Divine creation. Along with the Wilson-Sleigh interpretation, it tells us more; it tells us the mechanism of Leibniz's conceptual containment theory of truth. At first, we start only with the core individual concepts of possible substances. Since core individual concepts contain only essential or necessary predications and individual laws, we did not have any information about contingent predications at this point. For instance, the only thing we can know about C is its core individual concept:

CIC(*C*) = {*q, t*, and law: "if anything is t, then nothing is u"}.

Thus, we do not know anything about C's contingent properties at this point.

Through the combinatorial theory, however, we are able to squeeze more information about C. For instance, we know that C has some relations with A in the AC-world, with B in the BC-world, and with D in the CD-world, and so on. At this point, we have all the possible predications of C. Thus, we have the "slightly incomplete" individual concept of C:

The *Slightly Incomplete* Individual Concept of C = {*q, t*, and law: "if anything is t, then nothing is u", …, having some relations with A in the AC-world, with B in the BC-world, with D in the CD-world, …}

This individual concept of C is *slightly incomplete* since it does contain *actual* predications of C. But note that we can have the slightly incomplete individual concept of C only through the construction part of the combinatorial theory. Now by using the evaluation part, we can know that C will be actualized by God since it is in the best possible world. Thus, we know it *exists* as an inhabitant of the ACD-world. I suggest that all the true contingent predications—including relational, merely possible, and existential ones—are obtained in this way. If so, we can now have the "complete" individual concept of C through the combinatorial theory of compossibility:

The *Complete* Individual Concept of C in the ACD-world = {*q, t*, and law: "if anything is t, then nothing is u", …, having some relations with A in the AC-world, with B in the BC-world, with D in the CD-world, …, existing in the ACD-world, …}

Thus, the complete individual concept "results" or "arises" from the core individual concept. In the same way, we can figure out the complete individual concepts of other possible substances, too. As you can see, the contingent predications of an entity do not follow from its core individual concept alone; they can be predicated if we consider the core individual concepts of all the possible substances in the domain and God's (omnibenevolent) will.[4]

The thesis that contingent predicates are not literally contained in an individual concept is not something new especially among the "non-logical" commentators. For instance, Cover and Hawthorne argue that contingent truths "about the world supervene on the global monadic facts" (Cover and Hawthorne 1999, 85). If we set aside some subtle issues, I basically agree with them; contingent truths supervene on or necessarily follow from the essential features of all the possible substances and God's plan. My combinatorial theory shows the underlying mechanism of this supervenience more clearly.[5]

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[4] Note that if God created the BC-world instead of the ACD-world, C (in the BC-world) would have a different complete individual concept from C (in the ACD-world) even though both Cs share the exact same "slightly incomplete" individual concept. Thus, their complete individual concepts would be differentiated (only) by which possible predications would become *actual*; for instance, C in the BC-world would have *existence-in-the-BC-world*, while C in the ACD-world would have *existence-in-the-ACD-world*. This raises an interesting philosophical question: for Leibniz, is C in the ACD-world identical to C in the BC-world? I will investigate it in section 4 of this chapter.

[5] The exact relationship between relational and monadic facts is a controversial issue; is it entailment, reduction, grounding, or supervenience? Although this issue deserves due attention, I will bracket it here. For my purpose here, the important thing is that contingent facts (including relations) do necessarily

There are two more things worth mentioning at this point. First, we have already discussed that Mates (1972, 109) and Adams (1994, 72-4) consider the world-index strategy. Adams says, "the individual concept of an individual that exists in more than one possible world could be complete‒complete with respect to *world-indexed* predications" (Adams 1994, 73). Given that a complete individual concept is *complete*, it is in fact natural to expect that an individual concept includes the world-indexed predications. Nevertheless, no one seriously considers it Leibniz's actual view; thus far, I also have not considered it seriously in this dissertation. As you can see, however, the complete individual concept of C contains world-indexed predications, such as having some relations with A *in the AC-world*, and with B *in the BC-world*. Thus, I in fact believe that the individual concept of an entity is *complete with respect to world-indexed predications*.

Regarding world-indexicality, there are two more things to note. First, not all the predications are world-indexed. The predications which were already contained in the core individual concepts are not world-indexed. This is quite natural; as I argued in Chapter III, the core individual concept of an entity contains only attributes and affections (except for the individual law). Given that they are essential or necessary, there is no reason for them to be world-indexed. Second, although I accept the world-indexicality of complete individual concepts, I still do not endorse the world-index *strategy*. According to my picture, the world-indexicality is not a strategy but a result of my combinatorial theory. In this sense, I still think that the world-index strategy is misguided; the world-indexicality should not be the starting point of Leibniz's metaphysics.

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follow from the core individual concepts of all the possible substances and the Divine will. So I use the concept of supervenience simply because it is the weakest one that can capture this necessary covariation.

Second, note that existence is contained in the complete individual concept of C while it is not in its core individual concept. In the literature, existence has been one of the controversial issues. In his *Critical Exposition of the Philosophy of Leibniz*, Bertrand Russell (1937, 27) famously argues that existence is not contained in the concept of a subject that has it, except in the case of God. In some sense, this famous exception he makes is understandable. If existence is contained in the concepts of a subject that has it, then it is impossible even for God not to create it.[6] If so, creation cannot be a voluntary action of God; we have seen enough that Leibniz cannot stand this implication.

However, Adams (1994, 42-44) convincingly argues that Russell's view is problematic. First, given that other contingent predications (e.g., relational ones) are contained in the concepts, it is arbitrary to say that only existence is an exception. This is problematic, especially because Leibniz says that existence is a real contingent predicate. For instance:

> But when one says that a thing exists, or that it has real existence, this existence itself is the predicate—that is to say, it has a concept linked with the idea that is in question, and there is a connection between these two concepts (NE 358).

Given this, Russell's view seems *ad hoc*. Second, Leibniz tries to explain how existence is contained in the concepts of individuals that exist. Adams says, "existence is contained in the concepts of existing things, not directly, but by virtue of the factors that determine God to create those things" (Adams 1994, 43).

Admittedly, E. M. Curley (1972, 83ff) argues that there are some texts where Leibniz says that existence is not contained in an entity's concept. In a paper known as *Necessary and*

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[6] In my view, of course, this is wrong; existence in contained only in the "complete" individual concepts. But the true entities God considered at the moment of creation are the "core" individual concepts not "complete" ones.

Contingent Truth, Leibniz says that "the possibility or notion of a created mind does not involve existence" (A VI.iv. 1522/C 23/MP 104). But Adams rightly points out that this flatly contradicts what Leibniz says in the same paper: "all the knowledge of propositions which is in God, whether this is of the simple intelligence, concerning the essences of things, or of vision, concerning the existences of things, or middle knowledge concerning conditioned existences, results immediately from the perfect understanding of each term which can be the subject or predicate of any proposition" (A VI.iv. 1515/C 17/MP 96). In the same paper, Leibniz claims that existence is both included and excluded in a thing's concept.

Adams' solution for this seeming contradiction is simple but insightful. He says, "the best consistent reading of the paper, I think, is one on which the *complete* concept of any existent thing does involve its existence, and "the possibility or Concept of a created mind" that "does not involve existence" is understood in a narrow sense" (Adams 1994, 44). Regarding this, I completely agree with him. In my view, existence is contained in the "complete" individual concept of an existent thing. But this does not mean that it is also contained in the "core" concept of it. Rather, according to my combinatorial theory, it is really important to realize that before creation, existence —along with all the other contingent predicates—is never contained in the core concepts.

In my view, therefore, it is natural for Leibniz to say that existence is included (in the complete concepts) *and* excluded (in the core concepts) even in the same paper; there is no real inconsistency here. Although Adams has already figured it out, he could not persuade other commentators. This is because he hastily believes that "Leibniz gives us no idea how one would even begin an analysis, finite or infinite, to determine which world is the best possible" (Adams 1994, 27). As Adams rightly points out, Leibniz claims that existence is included in the (complete) concepts of existing things in virtue of the factors concerning God's creation. Therefore, the issues on existence cannot be fully resolved without a good theory of the Divine creation. So I believe that we are in a better position now. With the help of my combinatorial theory, we can better understand Leibniz's attempts to explain how existence is contained in *complete* individual concepts.

3. Leibnizian Humility and the Theory of Contingency

In the previous section, I explained how the complete individual concepts emerge from the core individual concepts. In my view, Leibniz does not try to solve the problem of compossibility by using his conceptual containment theory of truth; in contrast, the conceptual containment of truth is a consequence of his theory of compossibility. This is the very place where my view and the standard logical one diverge. In my opinion, advocates of the standard logical interpretation have confused the explanatory order between them.

In conjunction with the Wilson-Sleigh interpretation, I believe my combinatorial theory explains clearly how the complete individual concept of a thing contains not only essential or necessary but also contingent truths. In my view, contingent truths are contained in complete concepts through God's combinatorial activity of creation. At this point, however, someone might ask the following questions: Are these contingent truths really *contingent*? If so, in what sense are they contingent? In order to answer these questions, we need to consider Leibniz's theory of contingency.

Leibniz's view on contingency has been one of the most hotly contested issues among commentators. It is generally agreed that Leibniz has at least two different accounts of contingency: (1) the *per-se*-possible (or possible-in-its-own-nature) account and (2) the infinite analysis account. Unfortunately for Leibniz, it is also widely agreed that they are both problematic. However, I refuse to accept these two general agreements. Instead, I argue that these two seemingly different accounts are in fact the same thing and that it is not a particularly problematic theory of contingency.

In *Leibniz: Determinist, Theist, Idealist* (1994), Adams provides, in my opinion, the most systematic and influential account on this issue, so I will basically follow his explanation. Let us start by looking at the *per-se*-possible account. According to Adams and other commentators, Leibniz comes up with this account around 1670s. In a comment on Spinoza from about 1678, Leibniz says, "on the hypothesis of the divine will choosing the best, or operating most perfectly, certainly nothing but these things could have been produced; but according to the very nature of things considered in itself [*per se*], things could have been produced otherwise" (A VI.iv. 1776/G I. 149/L 204). We can find it more fully in the following passage:

> Rather, we must say that God wills the best by his own nature. "Therefore," you will say, "he wills by necessity." I will say, with St. Augustine, that that such necessity is blessed. "But surely it follows from this that things exist by necessity." How so? Since the nonexistence of what God wills to exist implies a contradiction? I deny that this proposition is absolutely true, for otherwise that which God does not will would not be possible. For things remain possible, even if God does not choose them. Indeed, even if God does not will something to exist, it is possible for it to exist, since, by its nature, it could exist if God were to will it to exist. "But God cannot will it to exist." I concede this, yet, such a thing remains possible in its nature, even if it is not possible with respect to the divine will, since we have defined as in its nature possible anything that, in itself, implies no contradiction, even though its coexistence with God can in some way be said to imply a contradiction. But it will be necessary to use unequivocal meanings for words in order to avoid every kind of absurd locution (A VI.iv. 1447/Grua 289/AG 20-1).

Adams points out that Leibniz still takes this position in the *Theodicy*. For instance, Leibniz says, “it may indeed be said that that this man [who in fact will be damned] can be saved in respect of *the possibility of human nature*, which is capable of salvation; but that it may not be said that God can save him in respect of God himself, because it is impossible that God should do that which he must not do” (G VI. 216/H 233-4; my emphasis). There are in fact many more passages in which Leibniz explicitly relies on the *per-se*-possible account in the *Theodicy*. For this reason, Adams (rightly) argues that this account is Leibniz’s “principal (and most confident) solution to the problem of contingency” (Adams 1994, 12).

Although it seems clear that Leibniz has taken this position throughout his career, many commentators have found it problematic or, at best, unsatisfactory. Adams (1994, 13) points out that the first problem about it is to understand what is meant by “possible in its own nature.” If the complete concept of x contains P, then is not-P possible in x’s own nature or not? The second problem about this account is closely related to the first one. If an individual has a complete concept containing all of its true predicates, then how can there be a *true contingent* predicate in its own nature?[7] Thus, the conceptual containment theory of truth appears to preclude contingency (understood in the *per-se*-possible account of contingency).

Many commentators seem to find these two problems insurmountable.[8] Unlike Adams, they believe that Leibniz abandons this account at some point before his mature period. Regarding this, I agree with Adams; I believe that Leibniz maintains this account throughout his career. So I need to answer the above two problems. In my view, there is no difficulty in answering them. First, what does it mean to say that something is possible in its own nature?

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[7] Cf. Nelson (2005). In footnote 20 of Chapter III, I examined Nelson (2005)’s understanding of this concept.

[8] For instance, Curley (1972) and Carriero (1993).

Answer: P is possible in x's own nature just in case the *core* individual concept of x and P together does not imply a contradiction. Given that, the answer for the second problem naturally follows: there can be true (contingent) predicates in complete individual concepts since some predicates are contained only in complete individual concepts but not in *core* individual concepts.

Needless to say, the above explanation fits very well with the tripartite structure view I defended in Chapter III:

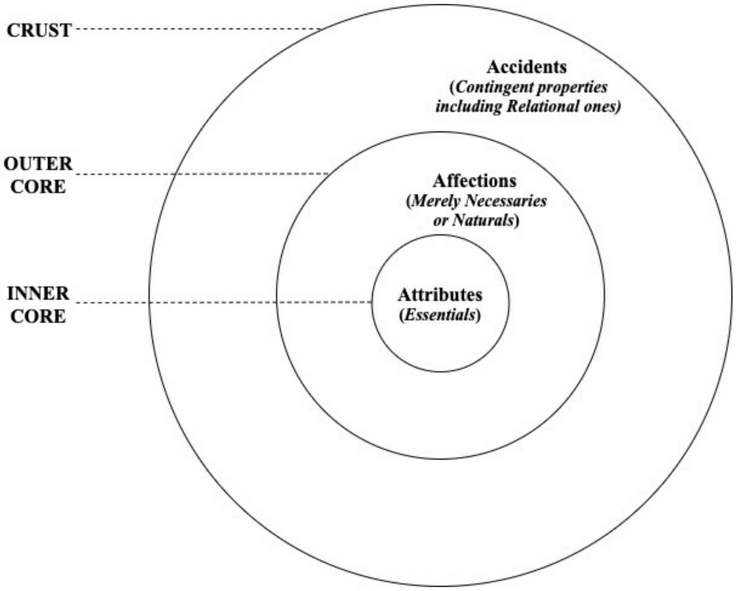
CRUST
OUTER CORE
INNER CORE
Accidents
(Contingent properties including Relational ones)
Affections
(Merely Necessaries or Naturals)
Attributes
(Essentials)

Figure 13. The tripartite structure of individual concepts (again)

According to this view, we can further formulate the related concepts as follows:

P is essential in x's own nature iff P is contained in the inner core concept of x.
P is necessary in x's own nature iff P is contained in either the outer core or the inner core concept of x.
P is possible in x's own nature iff the core (inner+outer) concept of x and P together does not imply a contradiction.

Thus, my view can provide a good explanation of what is meant by “possible in its own nature” and how to distinguish necessary and contingent truths within individual concepts. In my view, therefore, the two problems raised against the *per-se*-possible account are not insurmountable. Rather, they are in fact misguided; they raised wrong questions to which Leibniz does not need an answer.

A few clarifications seem to be in order. On the one hand, I define contingency negatively: P is contingent to x just in case the core concept of x does not contain P but it is not contradictory with P. As the above picture shows, on the other hand, I also define contingency positively: P is contingent to x just in case the crust concept of x contains P but the core concept of x does not. But are these two definitions coextensive? My answer to this question is Yes; I believe that they are coextensive. Thus, I accept the following:

(Coextensiveness) the core (inner+outer) concept of x does not contain P but it is not contradictory with P iff the crust concept of x contains P but the core concept of x does not.

This thesis can be justified by my combinatorial theory in conjunction with some principles of Leibniz. The left arrow of this biconditional seems relatively straightforward. Given that the crust concept of x supervenes on the core concept of all the possible substances and the divine will,[9] it is not demanding to say that P should be at least consistent with the core concept of x if the crust of x contains P.

In contrast, the right arrow of it is not clear. The mere fact that the core concept of x is consistent with P does not seem to guarantee that the crust of x contains P. For instance, let us reconsider the previous example. We supposed that there are four possible substances and that they have the following core individual concepts:

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[9] Of course, the core individual concepts themselves are intrinsically consistent.

CIC(*A*) = {*p, q*, and law: “if anything is p, then nothing is r”}
CIC(*B*) = {*q, r*, and law: “if anything is q, then nothing is s”}
CIC(*C*) = {*q, t*, and law: “if anything is t, then nothing is u”}
CIC(*D*) = {*s, t*, and law: “if anything is t, then nothing is v”}

And through my combinatorial theory, we figured out that C would have the following core individual concept:

The *Complete* Individual Concept of C in the ACD-world= {*q, t*, and law: “if anything is t, then nothing is u”, …, having some relations with A in the AC-world, with B in the BC-world, with D in the CD-world, …, existing in the ACD-world, …}

Now consider the following predication: <having some relation with E (at some world)>. This predication seems consistent with the core concept of C.[10] However, the above complete (core+crust) concept of C does not contain <having some relation with E (at some world)>. If so, Coextensiveness seems false.

As the above example shows, the coextensiveness thesis is doubtful *if we consider a finite model*. But remember that the *actual* or *real* model is not finite at all. As seen in Chapter III, there are “as many individual substances as there are diverse combinations of all compatible attributes” (A VI.vi. 306) in the divine understanding. And as I showed in the previous chapter, God considers all the possible combinations among these possible substances. Given that all the logically possible contingent truths supervene on all the possible combinations among all the possible substances, the crust concept of something should contain all the logically possible contingent truths. Thus, the crust concept of an entity must contain all the logically possible contingent truths, given that God considers all the possible substances and combinations among them. Therefore, Coextensitveness should be the case in God's actual model.

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[10] Of course, it depends on the core concept or nature of E. For the sake of argument, however, let us suppose that they are consistent.

Now I believe we have a good account for Leibniz's theory of contingency. P is contingent for x just in case P is contained not in the core but in the crust of x. Thus, my combinatorial view defends the *per-se*-possible account of contingency by clarifying what is meant by "possible in it own nature." I firmly believe that this is *the* theory of contingency for Leibniz throughout his career. Then how about so-called the "infinite analysis" account of contingency? Adams argues that the infinite analysis constitutes "the outer walls" of Leibniz's castle of contingency while the per-ser possible account is "the innermost and surest bastion" of it (Adams 1994, 22-23). Thus, Adams seems to think that there really are two different theories of contingency for Leibniz although he believes that the *per-se*-possible account is the principal one. In the remainder of this section, I will argue against it; Leibniz never suggests it as an independent theory of contingency.

Let us consider the following passage:

> And with this secret the distinction between necessary and contingent truths is revealed, something not easily understood unless one has some acquaintance with mathematics. For in necessary propositions, when the analysis is continued indefinitely, it arrives at an equation that is an identity; this is what it is to demonstrate a truth with geometrical rigor. But in contingent propositions one continues the analysis to infinity through reasons for reasons, so that one never has a complete demonstration, though there is always, underneath, a reason for the truth, but the reason is understood completely only by God,

> who alone traverses the infinite series in one stroke of mind (A VI.iv. 1650/Grua 303/AG 28).

Inspired by this passage, some commentators suggest that for Leibniz, a predicate is contingent just in case it is contained in the concept of a subject without this containment being provable or demonstratable by analysis in a finite number of steps; in contrast, a predicate is necessary just in case the containment of it can be provable by analysis in a finite number of steps.[11] Thus, they argue that Leibniz tries to define necessity and contingency in terms of finite demonstrability.

The infinite analysis account tries to demarcate contingent truths from necessary ones without making a distinction between the core and complete individual concepts. It argues that all the truths are flatly contained in the individual concepts, but some truths are provable in a finite number of steps while others are not. In my view, however, this attempt is misguided in the first place; as I argue in Chapter III and here, it is important to realize that Leibniz makes a distinction between the core and complete individual concept. Once again, the complete individual concepts are not the starting point but a consequence of God's combinatorial activity. We should not start from the complete individual concepts.

In my opinion, two well-known problems of the infinite analysis account stem from this confusion. The first one is the so-called *lucky proof problem*. Adams presents this problem as follows:

> Even if infinitely many properties and events are contained in the complete concept of Peter, at least one of them will be proved in the first step of any analysis. Why couldn't it be Peter's denial? Why couldn't we begin to analyze Peter's concept by saying, 'Peter is a denier of Christ and …"? Presumably such a Lucky Proof must be ruled out by some

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[11] For instance, Curley (1972). More recently, McDonough and Soysal (2018) suggest a more sophisticated version of the infinite analysis account.

> sort of restriction on what counts as a step in an analysis of an individual concept, but so far as I know, Leibniz does not explain how this is to be done (Adams 1994, 34).

The problem is that: even if the concept of Peter is infinitely complex, we might luckily discover that it contains the concept <denier of Christ> in a finite number of steps. In fact, it is possible to prove it even at the beginning of the analysis. If so, the infinite analysis account is problematic.

The second problem reflects a greater difficulty with this account. Suppose that we can solve the lucky proof problem by coming up with a worked-out version of the infinite analysis account. Even if this is the case, why should we believe that an infinite analysis provides a satisfactory foundation for contingency? Carriero rightly asks: "Even if a worked-out theory were forthcoming that made evident how, in the case of a contingent truth, notional containment is secured by an infinite analysis and not a finite demonstration, would we be left with a satisfactory foundation for contingency?" (Carriero 1993, 15). Contingency is one thing, demonstrability is another; we have no reason to believe that necessity and contingency are somehow defined by (in)finite demonstrability. If Leibniz really endorses the infinite analysis account, it is mysterious that he does not even try to justify his novel definition of contingency.

These two have been regarded as serious and substantive problems about the infinite analysis account of contingency. For this reason, Adams says, "the demonstrability conception of necessity is fundamentally misguided" (Adams 1994, 29). Carriero also claims, "thinking along "proof theoretic" lines has not proved particularly helpful" (Carriero 1993, 16). In general, I agree with them. It is fundamentally misguided to think that Leibniz has the demonstrability conception of contingency, independently of his *per-se*-possible conception of it. Once again, I argue that the *per-se*-possible conception is *the* conception of contingency for Leibniz. But this does not mean that the infinite analysis is completely irrelevant to the concepts of necessity and contingency. Rather, the infinite analysis account should be explained by Leibniz's more fundamental account of contingency, the *per-se*-possible account.

According to (my combinatorial version) of the *per-se*-possible account, we start from the *core* individual concepts not from the *complete* individual concepts. And the core individual concept of an individual contains only its attributes and affections (also its individual law). As I argued in Chapter III, attributes are constitutive parts of the core individual concepts, while affections necessarily follow from the attributes. Theoretically, therefore, it is literally possible to prove any attribute or affection of an individual from its core individual concept in a finite number of steps. Remember that attributes and affections are necessary properties. Given that, Leibniz has every right to say that a predicate is necessary if it is provable in a finite number of steps. And as Carriero argues, "Leibniz's contention that necessary truths are demonstrable is traditional" (Carriero 1993, 13). He argues that many scholastic philosophers, such as Aquinas, have such view of necessity.[12]

Given that the necessity part is in fact natural and traditional, what is peculiar about the infinite analysis account is the contingency part; according to it, contingent truths are *contained in* the individual concept but not provable in a finite number of steps. But I argue that Leibniz never has such a theory of contingency. According to my (combinatorial) view, necessary truths are provable in a finite number of steps *because* they are, more or less, contained in the core individual concept. In contrast, contingent truths are not provable in a finite number of steps *because* they are not contained in the core individual concept. Leibniz never tries to define necessity and contingency in terms of demonstrability; rather, it is just a derivative and "secret" (A VI.iv. 1650/Grua 303/AG 28) the distinction between necessary and contingent truths has.

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[12] For instance, *Summa Theologica* I, 25, 3.

Given that, we can explain away two well-known problems about the infinite analysis account. First, Leibniz does not need to worry whether an infinite analysis provides a satisfactory foundation for contingency. This is simply because he never tries to provide an infinite analysis as a foundation for contingency. Rather, an infinite resolution is a result of contingency. Second, the lucky proof problem is a pseudo-problem simply because contingent truths are *not* contained in the core individual concept. Leibniz does not need to explain how to prevent the lucky proof cases since there can never be such cases. The core individual concept of an entity does not contain sufficient information for any contingent truths of it. Even God cannot prove any contingent truth of me if God focuses only on my core individual concept.

Hence, I believe that the infinite analysis account is misguided, and the fundamental problem of it is not to distinguish between core and complete individual concepts. Not only is it philosophically problematic, but also Leibniz never accepts it as his definition of contingency. But textual evidence shows that infinite resolution is in some way connected with contingency. As Carriero claims, therefore, we need to look for "a model of infinite resolution that will make perspicuous that every contingent truth has an infinite resolution and that only contingent truths have infinite resolutions" (Carriero 1993, 16).[13]

Fortunately, my combinatorial view provides such a model. In the previous chapter and here, I explain how to deduce all the possible predicates of a subject from the information of all the possible substances of the domain. Theoretically, even human beings can deduce all the possible predicates of the subject *if there are only a finite number of possible substances and we have perfect information about them*. But this does not mean that we are actually able to do that because there is an infinitely infinite number of possible substances in the *actual* domain, and humans can *never* have perfect information.

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[13] Carriero himself gives his "series of infinitely complex physical arguments" (Carriero 1995, 1) as such a model. For this, see Carriero (1993 and 1995). Although I disagree with him with respect to the "physical" part, I share the same idea that for Leibniz, contingent truths are related to infinite complexity.

As a matter of fact, even God cannot deduce contingent truths of an individual just from its core individual concept alone. But since God knows about all the possible substances and combinations among them, God can (and *does*) have *a priori* understanding of the contingent truths of any given subject. Leibniz says:

> Existential or contingent propositions differ entirely from these [necessary truths]. Their truth is understood a priori by the infinite mind alone, and cannot be demonstrated by any resolution (A VI.iv. 1517/C 18/MP 98).

Thus, God can do this because only God can have perfect information about all the possible substances. Leibniz says, "this [a reason for a contingent truth] cannot be given in full except as a result of a perfect knowledge of all the parts of the universe—a task which surpasses all created powers" (A VI.iv. 1517/C 18/MP 98).

Moreover, my combinatorial theory shows that we need to know the perfect information about all the possible substances in the domain to calculate all the possible combinations among them; a small bit of information changes all the combinatorial calculations. Thus, even if someone happens to have perfect information about all the possible substances in the actual world (which is impossible!), then she still cannot deduce contingent truths correctly. In order to do this, she needs to know all the merely possible substances, too. This is why Leibniz says, "even if someone could know the whole series of the universe, even then he could not give a reason for it [a contingent truth], unless he compared it with all other possibles" (A VI.iv. 1518/C 19/MP 99).

Thus, the reason why all and only contingent truths have infinite resolutions is that (1) contingent truths depends on all the other possible substances in the whole domain but that (2) there is an infinitely infinite number of possible substances in the divine understanding, which is the actual domain of all the possible substances. In this sense, it is true that infinite resolution is one of the crucial characteristics of contingency for Leibniz. Thus, the infinite analysis account is not entirely incorrect; being indemonstrable in a finite number of steps is one secure indicator of contingency. But this is just an indicator or criterion, not a definition. My combinatorial theory shows why and how infinite resolution can be a secure indicator for contingent truths within Leibniz's principal account of contingency, the *per-se*-possible account.

4. Individuation and Transworld Identity

In the second section of this chapter, I explained how complete individual concepts result from core individual concepts. In my view, core individual concepts are more fundamental than complete individual concepts. And I showed that strictly speaking, distinct complete individual concepts result from the same core individual concept. I will elaborate on this issue in this section.

Let us reconsider the example I keep using in this chapter. First, we know that C has the following core individual concept:

CIC(*C*) = {*q, t*, and law: "if anything is t, then nothing is u"}.

But through (the construction part of) the combinatorial theory, we can know all the possible predications of C. Thus, we have the "slightly incomplete" individual concept of C:

The *Slightly Incomplete* Individual Concept of C = {*q, t*, and law: “if anything is t, then nothing is u”, …, having some relations with A in the AC-world, with B in the BC-world, with D in the CD-world, …}

And we know that all the Cs–C in the C-world, C in the AC-world, C in the BC-world, C in the CD-world, and C in the ACD-world–share the core and the “slightly incomplete” individual concept. Thus, they share not only the *essence* and but also all the *possible* predications.

However, they do not share the exact same “complete” individual concept. Suppose that the slightly incomplete individual concept of C contains <C is married in the ACD-world> and <C is unmarried in the BC-world>. Given that, we can know that both <C is possibly married> and <C is possibly unmarried> are true. But is <C is *actually* married> true? We cannot know this at this point since the slightly individual concept of C does not contain the relevant information. In order to know this, we should know which possible world God actualizes. If God created the ACD-world, then <C is actually married> would be contained in the complete concept of C (in the ACD-world); thus, it would be true. In contrast, if God created the BC-world, then <C is actually married> would not be contained in the complete concept of C (in the BC-world); thus, it would be false.

In our example, I said that God created the ACD-world since it is the best possible world in the domain. Thus, the complete individual concept of C (in the ACD-world) contains <C is actually married>. But it is not absolutely necessary for God to create the ACD-world; God could have created the BC-world instead of the ACD-world. But if so, then C (in the BC-world) would have a different complete individual concept; most notably, the complete individual concept of C (in the BC-world) does not contain <C is actually married>. Thus, strictly speaking, C in the ACD-world and C in the BC-world have different complete individual concepts. But this raises a following question: Does Leibniz believe that C in the ACD-world is identical to C in the BC-world? In other words, are possible substances individuated by *core* individual concepts or *complete* individual concepts?

Before answering this question, I want to emphasize that my interpretation in this dissertation can be neutral with respect to this issue; no matter how Leibniz individuates possible substances, it does not pose a serious problem for my view. Rather, my view can fit reasonably well with both positions. Now let us delve into both positions in turn.

(i) *Each possible substance has a unique core individual concept*: In this position, C in the ACD-world is (transworld-)identical to C in the BC-world (also, to all the Cs in other possible worlds). Note that the inner core of *x*'s individual concept contains *x*'s all the essential properties. Thus, the inner core of *x* corresponds to *x*'s essence. And in my view, if x and y share the same inner core, then they also share the same outer core and the same slightly incomplete individual concept. Thus, C in the ACD-world and C in the BC-world share all the same essential, merely necessary, and possible properties; the only difference is which possible properties are *actualized*. Given that, there seems no good reason to deny that C in the ACD-world is identical to all the other Cs in other possible worlds. And in this position, X is possibly P if and only if there is a possible world where X is P. For instance, <C is possibly unmarried> is true if and only if there is a possible world where C is *literally* unmarried in that world.

(ii) *Each possible substance has a unique complete individual concept*: On the other hand, C in the ACD-world is not (transworld-)identical to C in the BC-world since they do not share the same complete individual concept. In general, no two possible substances in different possible worlds are identical; thus, every possible substance is *world-bound*. Thus, this position implies *World-Bound Individuals* (WBI). Note that the previous position – possible substances are individuated by core concepts – is incompatible with WBI.

Now the question is what Leibniz's real position is: (i) or (ii)? Although I believe (i) is philosophically simpler and more natural than (ii), But if (i) is philosophically simpler and more natural than (ii), (ii) has better textual evidence.[14] For instance, he says:

> In this complete concept of possible Peter that appears to God, there are contained – I admit – not only essential or necessary items (which of course flow from incomplete or species concepts, and as such are demonstrated from terms, in such a way that the contrary implies a contradiction), but also so to speak existential or contingent truths. This is because it is of the nature of an individual substance that its concept is perfect and complete, and contains all the individual and contingent circumstances down to the most trifling. Otherwise, it would not be complete, nor would it be distinguished from any other; for *those things differing even in the smallest detail would be distinct individuals, and a concept that is still indeterminate in the smallest details will not be complete, but could be common to two different individuals*. (A VI.iv. 1600/LS 258; my emphasis).

As seen before, this passage shows that an individual concept has different layers. But then Leibniz says that an incomplete concept could be common to different individuals. In so saying, he seems to argue that possible substances can be individuated only by *complete* individual concepts.[15] In our example, all the Cs in different possible worlds share the same slightly incomplete individual concept. Even though it contains all the essential, necessary, and possible predications, it does not contain *actual* predications. In this sense, this concept is "still indeterminate in the smallest details" (A VI.iv. 1600/LS 258), so it is common to many different individuals, *i.e.*, all the Cs in different possible worlds.

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[14] I do not need to deny that my overall interpretation in this dissertation fits better with (i) than (ii). But this does not mean that my interpretation is incompatible with (ii); I believe my view fits reasonably well also with (ii), (maybe) with some minor revisions.

[15] I want to thank John Whipple for pointing it out to me.

In general, Leibniz seems to believe that possible-X is not identical to actual-X. In his letter to Arnauld (1686), He says:

> It, therefore, also follows that he would not have been our Adam, but another Adam, had other events happened to him, for nothing prevents us from saying that he would be another. Therefore, he is another. (G II. 42/AG 73).

In this passage, Leibniz even gives an argument for the doctrine of transworld non-identity. According to him, there is no reason to prevent us from saying that actual-Adam is distinct from possible-Adam(s). Therefore, by *the principle of sufficient reason* (PSR), actual-Adam is distinct from possible-Adam(s). I am not sure how convincing this argument is, and whether Leibniz has other arguments for the doctrine of transworld non-identity.[16] For the present purpose, it is good enough to see that Leibniz seems to believe it. Given that, (ii) seems to be better supported by Leibniz's texts than (i).

Note that WBI does not imply superessentialism. Throughout the dissertation, I emphasize that it is important for my view to deny the superessentialist reading of Leibniz. But this does not mean that my view cannot accept WBI. Notably, existing interpretations either accept both WBI and superessentialism (e.g., the standard logical view) or reject them both (e.g., the lawful view). But we can in fact accept WBI without superessentialism.

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[16] For instance, it seems that we can make a good counterargument against it. There is no reason to prevent us from saying that actual-Adam is identical to possible-Adam(s). Therefore, by PSR, actual-Adam is identical to possible-Adam(s). This is an interesting topic, but I will bracket this issue here for the present purpose.

This fact is not surprising because modern readers are familiar with such a view: David Lewis' counterpart theory.[17] According to it, every individual is world-bound; but this does not imply superessentialism since modal properties are defined by the counterpart relation.[18] In this sense, position (ii) makes Leibniz's philosophy look similar to Lewis' counterpart theory. As a matter of fact, some Leibniz scholars attribute a counterpart theory to Leibniz.[19] It seems to me that it is not entirely incorrect to attribute a counterpart theory to Leibniz, but only with some important caveats. Before concluding this chapter, I will briefly investigate them.

First and most importantly, Leibniz does not provide a counterpart theory as his primary theory of contingency. As I argued in the previous section, the *per-se*-possible account is *the* principal account for him. Just like the infinite analysis account, his counterpart theory is, at best, a derivative account of contingency.[20] Unlike Lewis, Leibniz never tries to define modal notions by the counterpart relation. For instance, while Lewis would say that C could exist alone (except God) *because* C has a counterpart who exists alone, Leibniz would say that C has a counterpart who exists alone *because* C could exist alone (except God). In turn, for Leibniz, C could exist alone (except God) *because* existing alone is possible in C's own nature.

Second, Leibniz's notion of counterpart can be importantly distinguished from Lewis' notion of it. Let us see Lewis' notion first. According to Lewis, *x is a counterpart of y if and only if x resembles y more closely than do the other things in x's world*.[21] Thus, for Lewis, the counterpart relation is a relation of similarity. According to Leibniz, in contrast, *x is a counterpart of y if and only if x and y share the same core individual concept*. To distinguish them clearly, let us use the term "Lewis-counterpart" for Lewis's notion of counterpart and "Leibniz-counterpart" for Leibniz's notion.

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[17] Lewis (1968, 1986).

[18] And again, essential properties are defined by modal properties. Ultimately, therefore, essential properties are defined by the counterpart relation.

[19] For instance, Mates (1972), Mondadori (1973), and Griffin (1999). Margaret Wilson (1979) argues that Leibniz could not accept a counterpart theory since this would lead to the conclusion that there are multiple possible gods. But as Griffin (1999, 321) argues, this problem can be fixed by restricting the counterpart-theoretic analysis to *created* individuals.

[20] This applies equally to position (i). Thus, Leibniz's possible world account is, no matter whether it is a counterpart theory or the standard possible world semantics, a derivative account of modality.

[21] Lewis (1968, 114).

Now let us consider these two different counterpart relations.[22] Suppose that *x* is a Leibniz-counterpart of *y*. Does this imply that *x* is a Lewis-counterpart of *y*, too? Arguably, it seems to be the case. If *x* is a Leibniz-counterpart of *y*, then *x* and *y* share the same core individual concept. According to my interpretation, this means that *x* and *y* also share the same slightly incomplete individual concept. Thus, they share all the same essential, necessary, and possible properties. If so, it seems to be the case that *x* resembles *y* more closely than do the other things in *x*'s world. If this is really so, *x* is a Lewis-counterpart of *y*, too.

In contrast, the converse should not be the case. Suppose that *x* is a Lewis-counterpart of *y*. This means that *x* resembles *y* more closely than do the other things in *x*'s world. But suppose that no one in x's world shares the same core individual concept with y. If so, *x* could not be a Leibniz-counterpart of *y*.

There are also many important differences between the Lewis-counterpart relation and the Leibniz-counterpart relation. Remember that the Lewis-counterpart relation is a relation of similarity, while the Leibniz-counterpart relation is a relation of having-the-same-core-individual-concept-as. Given that, the Lewis-counterpart relation is asymmetrical and intransitive, while the Leibniz-counterpart relation is both symmetrical and transitive. And an individual in any world can have two Lewis-counterparts in any other world, while an individual in any world can have at most one Leibniz-counterpart in any other world. Also, two individuals in any world can have a common Lewis-counterpart in any other world, while no two individuals in any world can have a common Leibniz-counterpart in any other world.[23] Given that, we should consider their important differences very carefully when we attribute a counterpart theory to Leibniz.

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[22] I will investigate them within (my interpretation of) Leibniz's philosophy.

Lastly, I will end this chapter by answering one possible worry about this position. In this dissertation, I argue that the standard logical view and Messina and Rutherford's cosmological view cannot satisfy *Intransitivity* since they accept WBI. Someone could argue that by the same logic, this position cannot satisfy *Intransitivity* since it implies WBI. I argue that this possible objection does not pose a problem for my view. Remember that I did not argue that Messina and Rutherford's view cannot satisfy *Intransitivity* simply because they accept WBI. My argument was two-fold: (1) their notion of *per se* compossibility, based on (their understanding of) incomplete concepts, cannot satisfy *Intransitivity* since everything is *per se* compossible with every other for them. (2) their restricted notion of compossibility, based on complete concepts, cannot satisfy *Intransitivity* since they accept WBI. In any case, therefore, their view cannot satisfy *Intransitivity*. In my view, in contrast, the compossibility relation between core individual concepts is still intransitive even though the compossibility relation between *complete* individual concepts is transitive. And as I argued in Chapter III, core individual concepts are the true *relata* of the relation of compossibility; this doctrine –the true relata of compossibility are core individual concepts – is independent of the doctrine that possible substances are individuated by complete individual concepts. Therefore, even if I accept position (ii), my view can still satisfy *Intransitivity*.

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[23] For these features of the Lewis-counterpart relation, see Lewis (1968, 115-6). Since these features are well-known, I will not repeat them here. On the other hand, I believe the features of the Leibniz-counterpart relation are straightforward.

5. Conclusion

In this concluding chapter, I have shown that two main theses of mine, the Wilson-Sleigh interpretation and a combinatorial theory provides a new (and hopefully better) understanding of three other aspects of Leibniz's philosophy: the conceptual containment theory of truth, the theory of contingency., and his view on transworld identity. If I am correct, these three aspects of Leibniz's philosophy could be understood correctly only through a correct understanding of Leibniz's theory of compossibility. In this chapter, I have tried to show that these aspects of Leibniz's philosophy can be better understood through my interpretation of compossibility. Conversely, I have tried to defend my interpretation of compossibility by showing that it can help us better understand Leibniz's other doctrines. I believe that other aspects, such as antecedent and consequent will, and freedom, could also be better understood through my view of compossibility. In doing so, I hope that my new interpretation can lead us to a new (and hopefully better) understanding of Leibniz's whole philosophy. I will leave these as my future projects.

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Education

Ph.D.	Philosophy	**University of Illinois at Chicago,** USA	2021
	Visiting Fellow	**Harvard University**, USA Host: Jeffrey McDonough	2020 - 2021
M.A.	Philosophy	**University of Illinois at Chicago,** USA	2018
M.A.	Philosophy	**Seoul National University**, South Korea	2015
B.A.	Religious Studies	**Seoul National University**, South Korea	2013
B.A.	Philosophy	**Seoul National University**, South Korea	2013

Areas of Specialization

Early Modern Philosophy (especially Leibniz), Metaphysics

Areas of Competence

History and Philosophy of Logic, Kant's Theoretical Philosophy, Buddhist Philosophy

Selected Presentations

"Ontological Independence, World-Apart, and Humean Combinatorialism"

- *Chicago Modern Philosophy Roundtable* (online) October 2021

"Ontology Meets Logic: A Defense of Ontological Pluralism"

- *14th Annual Cambridge Graduate Conference on the Philosophy of Mathematics and Logic* (online) January 2021
- *American Philosophical Association (*APA*) Eastern Division* (online) January 2021

"A Combinatorial Theory of Compossibility in Leibniz's Metaphysics"

- *The Fourteenth Annual Conference of the Leibniz Society of North America* (online) December 2020
- *The Australasian Seminar in Early Modern Philosophy (ASEMP) 2019*
  The University of Queensland, Australia November 2019
- *St. Andrews Kant Colloquium 2019: Kant and Leibniz on the Ontological Argument*
  University of St Andrews, Scotland July 2019

- *Work in Progress Series*, University of Illinois at Chicago, USA March 2019

"Kant's Distinction of Necessity and Strict Universality, and the Threat of Spinoza"

- *International Conference on Kantian Study*, Wuhan University, China June 2019

"The Dynamics of Appetites: an Alternative Reading of Leibnizian Appetites"

- *The 10th BESETO Conference of Philosophy*
  Seoul National University, South Korea March 2016

"A Critique of Lee's New Reading of Leibnizian Appetites"

- *The 9th BESETO Conference of Philosophy*
  University of Tokyo, Japan September 2014

Publications in Korean Journals

- 2021, "On the Individuation of Pictorial Systems in Neo-Naturalism," *Korean Journal of Philosophy* 148: 139-158
- 2013, "Counterpart Theory and Essentialism" (in Korean), *Philosophical Forum* 41: 227-239
- 2012, "The Problem of Linguistic Community in Kripke's Skeptical Paradox" (in Korean), *Philosophical Forum* 40: 251-279

Honors and Awards

Dean's Scholar Fellowship (university-wide competition), UIC	2020 - 2021
Ruth Barcan Marcus Award (outstanding member of the graduate program), UIC	2020
Provost's Graduate Research Award (for interdisciplinary research), UIC	2020
Chicago Consular Corps Scholarship (outstanding international student), UIC	2020
Graduate Student Council Travel Award, UIC	Fall 2019
Graduate College Presenter Award, UIC	Fall 2019
LAS Philosophy Department Travel Award, UIC	Spring 2019, Fall 2019
Infrastructure Establishment Program for Basic Research Scholarship, South Korea	Fall 2014
KOSAF Graduate Research Scholarship for Humanities and Social Sciences	2013 - 2014
Merit-based Scholarship, Seoul National University	Fall 2012

Teaching Experience

As Primary Instructor

Buddhist Philosophy	UIC	Fall 2021

Metaphysics (upper-level)		UIC	Spring 2020
Introduction to Logic		UIC	Fall 2019

As Teaching Assistant

Introduction to Philosophy	*with Georgette Sinkler*	UIC	Spring 2019
Introduction to Philosophy	*with Sally Sedgwick*	UIC	Fall 2018
Critical Thinking	*with John Whipple*	UIC	Spring 2018
Introduction to Logic	*with Daniel Sutherland*	UIC	Fall 2017
Introduction to Logic	*with Mahrad Almotahari*	UIC	Spring 2017

As Grader

Introduction to Logic	*with Jon Jarrett*	UIC	Spring 2017
Introduction to Philosophy	*with Sukjae Lee*	SNU	Summer 2016
Modern Western Philosophy	*with Sukjae Lee*	SNU	Fall 2015
Understanding Western Philosophy	*with Sukjae Lee*	SNU	Spring 2015
Life and Humanities	*with Sungil Han*	SNU	Fall 2013

Other Experience

Workshop organizer, *UIC Work in Progress Series* 2019 - 2020

Secretary&Local Organizing Committee, *the 3rd Conference on Contemporary Philosophy in East Asia* (CCPEA 2016) 2016

Research Assistant, *Pluralisms Global Research Network*, funded by the National Research Foundation of Korea 2013 - 2014

Graduate Coursework (* = audited)

History of Philosophy

British Empiricism*	*Jeffrey McDonough*	Harvard	Spring 2021
Latin Philosophical Texts (Seneca)*	*Jeffrey McDonough*	Harvard	Fall 2020
The Problem of Evil*	*John Whipple*	UIC	Spring 2020
History of Analytic Philosophy*	*Peter Hylton*	UIC	Spring 2019
Plato and Aristotle on Arts	*Constance Meinwald*	UIC	Spring 2018
Kant's Philosophy of Mathematics	*Daniel Sutherland*	UIC	Fall 2017
Descartes	*John Whipple*	UIC	Spring 2017
Kant on Substance	*Sally Sedgwick*	UIC	Fall 2016
Causation in Early Modern Philosophy*	*Sukjae Lee*	SNU	Spring 2016
Leibniz	*Sukjae Lee*	SNU	Spring 2014

Metaphysics & Epistemology

Hyper-Intensional Metaphysics	*Mahrad Almotahari*	UIC	Spring 2018
Existence and Essence*	*Sungil Han*	SNU	Fall 2015
Modality and Essence	*Sungil Han*	SNU	Fall 2014
Modal Metaphysics 2*	*Hwan Sunwoo*	Yonsei	Fall 2014
Modal Metaphysics 1	*Hwan Sunwoo*	Yonsei	Spring 2014

Issues in Epistemology*	*Kihyeon Kim*	SNU	Fall 2013
Truthmaker	*Hwan Sunwoo*	Yonsei	Fall 2013
Metaphysical Grounding	*Sungil Han*	SNU	Fall 2013

Philosophy of Science, Mind & Language

The Format and Content of Representation	*Rachael Goodman*	UIC	Spring 2018
Philosophy of Quantum Mechanics	*Jon Jarrett*	UIC	Fall 2017
Philosophy of Science	*Nick Huggett*	UIC	Spring 2017
Meaning, Content, and Normativity*	*Jinho Kang*	SNU	Spring 2014
Two-Dimensional Semantics	*Jinho Kang*	SNU	Spring 2013

Logic & Formal Methods

Social Choice Theory*	*E. Maskin & A. Sen*	Harvard	Fall 2020
Game Theory*	*David Marker*	UIC (Math)	Spring 2019
Bayesian Epistemology*	*Nick Huggett*	UIC	Fall 2018
Formal Logic 1*	*Kostyantyn Slutskyy*	UIC (Math)	Spring 2017
Introduction to Formal Logic	*Jon Jarrett*	UIC	Spring 2017
Modal Logic*	*Joongol Kim*	Sungkyunkwan	Spring 2016

Value Theory & Others

Empathy and its Ethical Uses	*Samuel Fleischacker*	UIC	Fall 2017
Practical Reasoning	*Will Small*	UIC	Fall 2016
Writing in Philosophy	*Peter Hylton*	UIC	Fall 2016
Consequentialism*	*Hyun-Seop Kim*	SNU	Spring 2015
Philosophy of Emotion	*Sunny Yang*	SNU	Spring 2013

Professional Affiliation

Member of the American Philosophical Association (APA)

Languages

English (fluent), Korean (native), French (reading), Latin (basic reading)

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