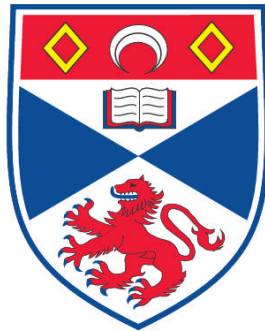


REAL IMPOSSIBLE WORLDS : THE BOUNDS OF POSSIBILITY

Ira Georgia Kiourti

**A Thesis Submitted for the Degree of PhD
at the
University of St. Andrews**



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Real Impossible Worlds: The Bounds of Possibility

Ira Georgia Kiourti

Submitted for the Degree of PhD in Philosophy

University of St. Andrews

18th December 2009

Abstract

Lewisian Genuine Realism (GR) about possible worlds is often deemed unable to accommodate impossible worlds and reap the benefits that these bestow to rival theories. This thesis explores two alternative extensions of GR into the terrain of impossible worlds. It is divided in six chapters. Chapter **I** outlines Lewis' theory, the motivations for impossible worlds, and the central problem that such worlds present for GR: How can GR even understand the notion of an impossible world, given Lewis' reductive theoretical framework? Since the desideratum is to incorporate impossible worlds into GR without compromising Lewis' reductive analysis of modality, Chapter **II** defends that analysis against (old and new) objections. The rest of the thesis is devoted to incorporating impossible worlds into GR. Chapter **III** explores GR-friendly impossible worlds in the form of set-theoretic constructions out of genuine possibilia. Then, Chapters **IV-VI** venture into concrete impossible worlds. Chapter **IV** addresses Lewis' objection against such worlds, to the effect that contradictions true at impossible worlds amount to true contradictions *tout court*. I argue that even if so, the relevant contradictions are only ever about the non-actual, and that Lewis' argument relies on a premise that cannot be non-question-beggingly upheld in the face of genuine impossible worlds in any case. Chapter **V** proposes that Lewis' reductive analysis can be preserved, even in the face of genuine impossibilia, if we differentiate the impossible from the possible by means of accessibility relations, understood non-modally in terms of similarity. Finally, Chapter **VI** counters objections to the effect that there are certain impossibilities, formulated in Lewis' theoretical language, which genuine impossibilia should, but cannot, represent. I conclude that Genuine Realism is still very much in the running when the discussion turns to impossible worlds.

Declarations

I, Ira Georgia Kiourti, hereby certify that this thesis, which is approximately 81000 words in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

I was admitted as a research student in September 2005 and as a candidate for the degree of PhD in September 2005; the higher study for which this is a record was carried out in the University of St Andrews between 2005 and 2009.

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I hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of PhD in the University of St Andrews and that the candidate is qualified to submit this thesis in application for that degree.

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Acknowledgements

My gratitude goes, first and foremost, to my supervisors Katherine Hawley and Graham Priest, for their seemingly infinite patience, unfailing support and intellectual inspiration over the years, and for going far beyond the call of duty to help me complete this study. I thank them for believing in me when I did not, for beckoning my thought to distant shores, and for inspiring me as shining examples of everything that is of value in the profession. Much that is of value in this dissertation, I owe to them.

I have also had the great pleasure of working with Stephen Read during the final years of my research, and I am very grateful for the interest he has shown in my work, for his painstakingly questioning of my ideas, and for always providing me with a fresh perspective. My work was much improved as a direct result of my interactions with him.

During the decisive first year of my research, I was, moreover, lucky enough to work under the supervision of Daniel Nolan, who inspired me and led me through some of the bewildering topics, for which I am very grateful. My thanks also go to Patrick Greenough, who also stimulated my thoughts and defiantly encouraged their pursuit during that first decisive year. I am also grateful to Crispin Wright for giving me the opportunity, in 2005, to carry out my doctoral research within the rich philosophical environment that is the Arché Philosophical Research Centre, in St Andrews. Finally, I wish to thank the Philosophy Department at the University of Glasgow for their excellent conversion course, and in particular Bob Hale, Gary Kemp, Dudley Knowles, Philip Percival and Adam Rieger for giving me a chance, guiding my first steps in philosophy, and inspiring in me the desire for further research.

Earlier drafts of chapters have been presented on various occasions. I am grateful to friends and colleagues for being present and for their lively discussion at various Arché and Departmental seminars at the University of St. Andrews, as well as the 2008 Leeds Graduate Conference, the Fourth World Congress on Paraconsistency in Melbourne, the AAP 2008, and the University of Kyoto. A special thanks goes to John Divers for his helpful comments and his support over the years. I would also like to acknowledge, for their helpful suggestions, Jacob Busch, Ross Cameron, Colin Caret, Peter Clark, Mike De, Philip Ebert, Ole Hjortland, Lloyd Humberstone, Carrie Jenkins, Charles Pigden, Simon Prosser, Denis Robinson, Marcus Rossberg, Jeremy Seligman, Jonathan Shaffer, Peter Simons, Martin Smith, Crispin Wright and Elia Zardini.

I have also been fortunate to travel and draft parts of this thesis in Japan, Australia and New York. Here, I am deeply grateful to Graham Priest for giving me the opportunity for such travel, to Katherine Hawley and Peter Clark for encouraging me to go, to Yasuo Deguchi and the wonderful students at the University of Kyoto for their overwhelming hospitality and for making my stay in Japan magical, and to the Arts and Humanities Research Council, the Philosophy Departments at the University of St. Andrews and the Arché Philosophical Research centre for their financial help in actualising these trips.

Equally, I have been exceedingly fortunate to receive a Doctoral Award by the Arts and Humanities Research Council and a Research Scholarship by the University of St Andrews. This work could not have been written without the generous financial support of these institutions, for which am truly grateful.

Last, but not least, I heartily thank the lovely crew at *Apostrophe* in London's Brunswick Centre for their exceedingly good cheer and coffee, my friends, especially Katerina and Dagmar, who offered their support from afar, my devoted family, whose unfailing love provides a bedrock for my creativity and, above all, I thank my partner Matt without whose love, support, vision and encouragement, in more ways than I can say, none of this would be, even remotely, possible.

Contents

Acknowledgements	iii
Introduction	1
I Genuine Realism and Impossible Worlds: Setting Things Up	5
1.1 Introduction	5
1.2 Impossible Worlds: Why This Topic?	5
<i>1.2.1 What are Impossible Worlds?</i>	5
<i>1.2.2 Why Bother with Impossible Worlds?</i>	8
<i>1.2.3 Squaring Impossible Worlds with GR: The Good Reasons</i>	13
<i>1.2.4 And the Bad...</i>	14
1.3 Genuine Realism about Possible Worlds	16
<i>1.3.1 The GR Basics</i>	16
<i>1.3.2 A Brief Defence</i>	21
1.4 Making Room for the Concept of an Impossible World in GR	23
<i>1.4.1 The Central Puzzle</i>	23
<i>1.4.2 Concreteness and Absoluteness: Two Alternative Solutions</i>	25
<i>1.4.3 An Existing Concretist Proposal</i>	26
<i>1.4.4 A Role for Impossible Worlds in the Analysis of Modality?</i>	28
1.5 The Many Obstacles to Concrete Impossibilia	30
<i>1.5.1 Literally True Contradictions and Other Logical Worries</i>	31
<i>1.5.2 Representational Challenges</i>	32
<i>1.5.3 The Question of Logical Laws</i>	33
<i>1.5.4 The Competition with Ersatz Constructions</i>	34
1.6 Conclusion	35
II Genuine Realism and the Reduction of Modality: A Defence	36
2.1 Introduction	36
2.2 The Reduction of Possibility, Its Value and the Accuracy Challenge	36
<i>2.2.1 The Value of (P)</i>	37
<i>2.2.2 The Accuracy Challenge</i>	39
<i>2.2.3 Recombination</i>	40
2.3 Accuracy and Epistemic Circularity	41
<i>2.3.1 Modal Beliefs and Analysis Construction</i>	41
<i>2.3.2 Modal Beliefs and Recombination</i>	43

2.3.3 <i>Methodological Circularity Worries</i>	44
2.4 Accuracy, Arbitrariness and Metaphysical Circularity	46
2.4.1 <i>Arbitrariness</i>	47
2.4.2 <i>Ontological Priority</i>	48
2.4.3 <i>Modal Conditions on (P)'s Accuracy?</i>	49
2.5 Conceptual Circularity & Inconsistency: Impossible Individuals	51
2.6 Conceptual Circularity & Incompleteness: The Plenitude of Alien Properties	54
2.6.1 <i>The Argument</i>	54
2.6.2 <i>What is Wrong with the Divers-Melia Argument: An Overview</i>	55
2.6.3 <i>Plenitude, Model Theoretic Completeness and Axiomatic Theories</i>	59
2.6.4 <i>Plenitude – 'Guarantee' as Axiomatic Entailment</i>	63
2.6.5 <i>Plenitude, Arbitrariness and (P)'s Conditions of Accuracy</i>	65
2.6.6 <i>Plenitude and Recombination</i>	68
2.6.7 <i>Summary</i>	69
2.7 Conclusion	70
III Genuine Realism with Impossible Worlds On The Cheap	71
3.1 Introduction	71
3.2 Abandoning Concreteness	72
3.3 Ersatz Impossible Worlds: Exploring Alternative Constructions	74
3.3.1 <i>Sets of Ways</i>	74
3.3.2 <i>Sets of Propositions</i>	79
3.3.3 <i>Sets of Finer Propositional Structures</i>	83
3.3.4 <i>Properties?</i>	89
3.3.5 <i>Summary</i>	91
3.4 Pros and Cons: Ontology, Methodology and Justification	92
3.4.1 <i>No Inconsistency Threat</i>	92
3.4.2 <i>Ad Hoc Ontological Distinctions?</i>	93
3.4.3 <i>A New Hybrid View?</i>	96
3.5 Why Still Bother with Concrete Impossibilia?	97
3.6 Conclusion	98
IV Genuine Impossible Worlds and Contradiction	100
4.1 Introduction	100
4.2 Lewis against Impossible Worlds	100
4.3 Classical Logic and Truth <i>Simpliciter</i>	103

4.3.1	<i>Truth about the Actual</i>	104
4.3.2	<i>Actual Truth, Necessary Truth and Truth Simpliciter</i>	105
4.3.3	<i>Why the New Theory Ought to Allow Contradiction</i>	108
4.3.4	<i>Classical Logic: Loss of Generality</i>	109
4.3.5	<i>Reasoning from GR's Hypotheses</i>	111
4.3.6	<i>Summary</i>	115
4.4	The Question of Negation Commutation	116
4.4.1	<i>Questioning (CP)</i>	116
4.4.2	<i>(CP), Negation and Negation-at-w</i>	120
4.4.3	<i>(CP) and Representation: The Metaphysics Behind (CP)</i>	121
4.4.4	<i>Summary</i>	128
4.5	Applications: Yagisawa and the Identity of Properties	128
4.5.1	<i>The Actual-Truth-versus-Truth-Simpliciter-Approach</i>	130
4.5.2	<i>The Amended-Truth-at-w-Conditions-for-Negation Approach</i>	131
4.6	Conclusion	132
V	Genuine Impossible Worlds and Relative Modalities	133
5.1	Introduction	133
5.2	Abandoning Absoluteness	134
5.3	The Paradigm: Nomological Modalities	137
5.3.1	<i>The Notion of a Natural Law</i>	138
5.3.2	<i>Nomological Similarity</i>	139
5.4	Extension: Logical Modalities	141
5.4.1	<i>The Appropriate Notion of a Logical Law</i>	143
5.4.2	<i>Logical Similarity Relations on Worlds?</i>	147
5.4.3	<i>Summary</i>	153
5.5	Further Questions	154
5.5.1	<i>Questions of Meaning</i>	154
5.5.2	<i>Characterising the Ontology</i>	156
5.5.3	<i>Metaphysical Necessity</i>	157
5.5.4	<i>Modality as World-Similarity</i>	158
5.6	Conclusion	159
VI	The Representational Power of Concrete Impossibilia	160
6.1	Introduction	160
6.2	Why Bother with GR-Theoretical Representation Objections	161

6.3 GR-Impossibilities about Worlds: The Proper Response to Vander Laan	163
<i>6.3.1 Reply to Vander Laan</i>	164
<i>6.3.2 Inconsistency and Representational Power</i>	165
6.4 Transworld GR-Impossibilities: The Proper Response to Nolan	167
<i>6.4.1 Reply to Nolan</i>	170
<i>6.4.2 Applications to GR-theoretical Impossibilities</i>	177
<i>6.4.3 Objections and Replies</i>	184
6.5 Conclusion	189
Conclusion	191
References	192

Introduction

The central purpose of this work is to address the following question: How can a Lewisian realist about possible worlds introduce impossible worlds into his theory without thereby compromising his reductive analysis of possibility? In order to give my full attention to this question I assume (a) that impossible worlds carry certain *prima facie* theoretical benefits and (b) that Lewis' reductive analysis of possibility (which I defend) is valuable hence worth preserving. In particular, I assume (a) that some of the key motivations for possible worlds – for instance the fact that they afford us an analysis of properties and propositional content, as well as truth-conditions for counterfactual conditionals – *prima facie* at least, also motivate impossible worlds. While I do outline these motivations, I am not concerned here with defending impossible worlds on first principles. Further, (b) I assume that having accepted Lewis' reductive theory of modality as superior to rival (non-reductive) theories, one might want to open it up to the benefits that impossible worlds have to offer (and have hitherto only bestowed to rival theories). But, while I defend Lewis' analysis, I do not (i) carry out an overall cost-benefit comparison of Lewis' theory against its rivals, nor (ii) do I repeat Lewis' old arguments (which I take to succeed) as to why rival theories, as a rule, fail to offer a reductive analysis of modality, nor (iii) do I enter into lengthy debate regarding the value of reductive analyses in general.

The work is divided in six chapters. Chapter I sets up the debate: it outlines the background assumptions regarding both Lewis' theory and impossible worlds, and sets forth the central research question. It then maps out some of the proposals that are taken up at length in subsequent chapters and the problems that these face. Given that the central desideratum is to incorporate impossible worlds into Lewis' theory without compromising his reductive analysis of possibility, Chapter II defends Lewis' reduction against objections. Then, chapters III-VI are devoted to incorporating impossible worlds into the theory. Chapters III and V are in direct response to the central question of how to accommodate such worlds without compromising Lewis' analysis and chapters IV and VI address obstacles particular to concrete impossible worlds. While these pages by no means present a fully developed theory of Lewis-friendly impossible worlds, I do hope to show that Genuine Realism need not lose out when it comes to impossible worlds and elucidate the commitments one might incur in constructing such a theory. For the most part, the chapters stand alone. This is especially so for Chapters I-III, although chapter I

acts as little more than an introduction and map of the topics that are taken up at length in following chapters. Of the remainder, I take it that the proposal of concrete impossible worlds can only be evaluated upon considering the entire triad IV-VI which together constitute a defence of genuine impossibilia. Of those, chapters IV and V can be read independently but chapter VI makes explicit reference to the solutions presented in chapter IV. What follows is a more detailed breakdown of each chapter.

In **Chapter I**, I outline the central tenets of Genuine Realism (GR), some of the key motivations and applications for impossible worlds, and finally the research question: assuming that impossible worlds do carry certain benefits, how can a genuine realist about possible worlds understand the notion of an impossible world within their own reductive theoretical framework? I propose two alternative solutions. According to the first, possible worlds are genuine Lewis-worlds, while impossible worlds are abstract constructions thereof. According to the second, possible and impossible worlds are on a par, but impossible worlds are merely inaccessible (given a base world) under some accessibility relation. I set these aside for fuller development in subsequent chapters to turn briefly to (i) discuss an existing proposal by Takashi Yagisawa and (ii) explain why the newly introduced impossible worlds ought not play a role in the analysis of modal notions. I close by charting some key problems that face the two proposals, especially any proposal involving concrete impossibilia.

In **Chapter II** I take a look at David Lewis' reductive analysis of possibility. Given that I consider this to be the single most powerful factor behind choosing Genuine Realism as one's theory of modality over its rivals; and given that my central question is how to incorporate impossible worlds into GR without compromising its reductive analysis of modality, I here defend that analysis against various kinds of circularity objections driven by questions of material adequacy. I examine doxastic, methodological, ontological and conceptual circularity objections and conclude that all such objections to Lewis' analysis fail.

In **Chapter III** I explore the first and cheapest solution to the problem of how to incorporate impossible worlds into GR. On this account, impossible worlds are abstract constructions out of possible worlds. This blend of genuine and ersatz worlds allows us to acquire many of the benefits of impossible worlds, while posing neither a logical, nor a conceptual threat to Lewis' theory. But this proposal also generates some questions. Are the relevant constructions fine-grained enough to differentiate between all kinds of distinct impossibilities? Can such a fundamental ontological distinction between possible and

impossible worlds be justified? Have we abandoned Lewisian realism for some sort of hybrid view? Despite the easy, if a little piecemeal, advantages of ersatz-impossibilia, I conclude that the option of concrete impossibilia is still worth exploring. Besides the fact that they might offer a more unified theory, I take their exploration to have interest in itself.

In **Chapter IV** I turn my attention toward constructing a genuine theory of concrete impossible worlds by addressing Lewis' own objection against such worlds. Lewis argues against genuine impossibilia on the basis that a contradiction within the scope of the modifier 'at w ' – at w (A & $\sim A$) – amounts to a plain contradiction with the modifier within it – (at w A) & \sim (at w A) – an unacceptable consequence. I push the line (a) that even if this is so, there is room to argue that this consequence is less objectionable than at first appears; and (b) that in any case the argument rests on the questionable assumption that the negation commutation principle (CP): 'at w ($\sim A$) iff \sim (at w A)' holds in the theory. I show that this principle not only *must* be rejected on the hypothesis of genuine impossibilia, but that it *can* be rejected without irrevocable damage to the theory. Finally I show how these replies to Lewis work against a similar worry originating with Yagisawa.

In **Chapter V** I turn to the question: How can we incorporate genuine impossible worlds into Lewis' theory while preserving his reductive analysis of possibility? I propose we salvage the reduction by emphasising that modality usually amounts to restricted quantification over worlds by means of accessibility relations. It turns out that an impossible world is simply an inaccessible world, whereby the various relevant accessibility relations are taken to be similarity relations on worlds. Taking the case of nomological modality as paradigmatic for the reduction of relative modalities, I extend the same methodology to the case of the logical modalities. It turns out that just as a nomologically impossible world, relative to ours, is a world that is dissimilar to our world with respect to our physical laws, a logically impossible world, relative to our world, is a world that is dissimilar from our world with respect to our logical laws. I suggest that just as the notion of our laws of nature can be given a non-modal analysis, so can the notion of the logical laws of a world. Under this proposal, modality amounts to similarity between worlds in certain respects; I close with a brief discussion of this and related ideas.

Finally, in **Chapter VI** I address objections to the effect that there are certain types of impossibilities, which any theory of impossible worlds should be able to represent as true at some impossible world, but which a theory of genuine impossibilia in particular finds it difficult to accommodate. These are GR-theoretical impossibilities, namely unrestrictedly

false theoretical claims about the Lewis-pluriverse. I argue that some of these impossibilities present no new challenges for concrete impossible worlds over and above those presented by Lewis' original objection (discussed in Ch IV), and that the remainder can receive a systematic treatment drawing on the usual resources in the theory. I conclude that none of the objections discussed here present insurmountable obstacles to a GR-theory of concrete impossible worlds.

CHAPTER I

Genuine Realism & Impossible Worlds: Setting Things Up

1.1 Introduction

Does the prospect of impossible worlds put David Lewis' Genuine Realism (GR)¹ about possible worlds into an impossible situation? It appears that most philosophers – Lewis included – are inclined to answer this question in the positive.² My aim here is to explore what it would take to answer it in the negative. I start by briefly outlining the motivations for impossible worlds in section 1.2, then move on to present the basics of Genuine Realism in section 1.3. Assuming that impossible worlds do carry certain benefits, my question in section 1.4 is: how can a genuine realist about possible worlds begin to understand the notion of an impossible world so as to incorporate such worlds into their theory? I propose two alternative solutions to this basic puzzle, which I set aside for fuller development in subsequent chapters, and turn my attention to an existing proposal by Takashi Yagisawa, and the role of impossible worlds, if any, in the analysis of modality. I close in section 1.5 by charting some further key problems facing the project which will require solution.

1.2 Impossible Worlds: Why This Topic?

What are impossible worlds? Why bother with them? And why bother to accommodate them from the Genuine Realist perspective?

1.2.1 What are impossible worlds?

Just as we intuitively think of possible worlds as 'ways things can be', impossible worlds are analogously considered as 'ways things cannot be'. So, one loose answer to the question 'what are impossible worlds?' is simply 'worlds where impossible things hold. But what sorts of things are impossible? Confining ourselves only to alethic modalities, we already have a variety of *restricted* notions of impossibility: for example,

¹ I borrow John Divers' (2002) nomenclature and acronym here as I think them apt.

² Lewis rejects impossible worlds in a footnote in his (1986a: 7 fn 3) and in his (1983c: 21) – see also Stalnaker (1996) – and most non-Lewisians concur on this score, c.f. Vander Laan (1997), Barwise (1997), Varzi (1997), Nolan (1997), Lycan (1994) as well as in a different vein, Naylor (1986). As Hazlett (unpublished) notes, concrete impossible worlds just serve to "increase the incredulity of the stare" (Hazlett unpublished: 3) For a collection of most existing ersatz impossible worlds proposals see *The Notre Dame Journal of Formal Logic* 38.4 (henceforth NDJFL 38.4).

nomologically impossible worlds – worlds with different laws of nature to ours – historically impossible worlds – worlds with a different past to ours – technologically impossible worlds – worlds at a more advanced technological stage of development from ours – and so on. But it is not such relatively impossible worlds that the term ‘impossible world’ picks out. What is at issue here is what is, by most, considered to be *absolute* impossibility.³ This latter is usually considered to be logical or even more broadly metaphysical impossibility. Starting with the former, one might consider the following specifications:

(1) On one straightforward understanding, a logically impossible world is one where contradictions are true: a world that renders true a proposition and its negation, or a world where things of the form $A \& \sim A$ hold: a world that allows for (so-called) ‘gluts’. (2) However, we may equally say that an impossible world is an incomplete or ‘gappy’ world, a world which renders true neither a proposition nor its negation, or a world where propositions of the form $A \vee \sim A$ fail to be true. (3) Generalising, we can take a logically impossible world to be a world where the classical logical truths, like the Law of Non Contradiction (LNC) or the Law of Excluded Middle (LEM), fail to hold.⁴ (4) Generalising further, we might say that an impossible world is not merely a world where classical truths fail to hold, but a world where certain classical inferences fail to preserve truth, for instance a world where Disjunctive Syllogism (DS), *Ex Falso Quodlibet* (EFQ), or *Modus Ponens* (MP) fail. Descriptions (3) and (4) often coincide, given that EFQ, at least, has to be rejected in order to reason about contradictory worlds. We might add the logically impossible worlds of paraconsistent logical systems (systems that reject EFQ) somewhere in this latter category.⁵

To the extent that Lewis’ Genuine Realism is developed as a theory using a classical framework, I will often take the logically impossible worlds I speak about here to be logically impossible under sense (3) and (4) above. (5) Generalising these conceptions, we can take a logically impossible world to be a world where (the truths of) whatever system we take to be our true, preferred or correct system, fail.⁶ Under this more general definition, for instance, if our favoured logic is one where LNC fails, then contradictory worlds will not count as logically impossible.⁷ (In that sense, the proposed conception of

³ I assume throughout the usual inter-definition of box and diamond.

⁴ See Priest (1997a: 482)

⁵ Again see Priest (1997a:482)

⁶ These might be the non-normal worlds of Priest (1992)

⁷ See, for instance, Rescher and Brandom (1980: 4).

‘impossible’ contrasts with a common usage of the term to mean ‘contradictory’.⁸) I think we can agree that there is sense, in which, if the actual world contains contradictions, then contradictions are certainly possible.⁹ Under (5), we might want to include worlds where (some) inference rules of one’s preferred logical system fail. This conception, then, will be in contrast with that of the impossible worlds of many paraconsistent logicians who, for instance, hold onto the rules for conjunction throughout all worlds. (6) In the extreme, we might allow certain logically impossible worlds to be completely logically anarchic; if so, worlds that count as impossible will extend beyond the impossible worlds of any logical system.¹⁰ Given Lewis’ classical framework, I will assume for present purposes that our preferred logic here is classical, and so that impossible worlds are, at least, worlds where classical laws and rules fail.¹¹ I will refrain, as far as I can, from posing a limit on the kinds of logically impossible worlds there are.

Now, absolute necessity is usually narrower than logical necessity, and so absolute impossibility should correspondingly be wider than logical impossibility. This means we have a further more general characterisation of impossible worlds, as worlds where broadly logical, metaphysical, or mathematical truths fail. These may be worlds where vixens are not female foxes, water isn’t H₂O, something is triangular and not trilateral, something is blue and green all over, or worlds where my round table is also square or where 2+2=5; or worlds where certain actually true metaphysical theories are false. There is much debate as to what notion of necessity should absolutely circumscribe the space of possible worlds, and there is no need to get caught up in that debate here.¹² I take the default position to be that absolutely impossible worlds are not just logically impossible, but impossible in most or all of the above senses, insofar as these can be differentiated; however I will focus mostly on logically and broadly logically impossible worlds here. In particular, I will not explore mathematically impossible worlds, trusting that whatever I say regarding the former can be adapted to develop appropriate conceptions of the latter.¹³ Maybe just as it is allowed that we have different restricted kinds of impossibility – nomological, historical etc – we should have different kinds of

⁸ See e.g. Priest (1997a: 482), (1997b: 581), and Priest (1992)

⁹ Uncontroversially, I would rather keep the T-axiom $P \rightarrow \Diamond P$ for the logical modalities.

¹⁰ C.f. Nolan (1997: 547)

¹¹ See Lewis (2004; 1982) for a representative sample on Lewis’ (evolving) views on paraconsistency.

¹² See for instance Hale (1996), Shalkowski (2004)

¹³ For discussions on inconsistent arithmetic see e.g. Mortensen (1987;1988). See also Priest (2006b:§10; 2006a: §10).

impossible worlds altogether: e.g. metaphysically, mathematically or logically impossible worlds. I am open to such an option.

1.2.2 Why bother with impossible worlds?

As I will now show, the case for impossible worlds, which is increasingly gaining in popularity, is quite convincing, at least for a proponent of possible worlds.¹⁴ As in the case of possible worlds, the central force of this demand stems from considerations of utility. For instance, if possible worlds are helpful in the evaluation of counterfactual conditionals, then impossible worlds extend that analysis to cover counterpossible conditionals. If possible worlds help us differentiate between distinct propositions extensionally, impossible worlds extend the same treatment to impossible or necessary propositions that we intuitively would take to be distinct. In particular, we know that *possible* worlds have proven conceptually useful in a variety of ways: For example, they afford (extensional) truth-conditional semantics for various intensional logics,¹⁵ and on a philosophically weightier interpretation, allow us to give semantic and metaphysical analyses of modal locutions, including counterfactual conditionals. Moreover, they can serve as tools for the analysis of properties and propositions, and afford us extensional identity criteria for such entities, and even help with the analysis of epistemic concepts, for instance justification, via the notions of sensitivity and safety. *Impossible* worlds have been proposed on the basis of a similar range of benefits.¹⁶ Again, besides constituting a useful heuristic tool in providing the semantics of various non-classical logics, they also have deeper philosophical or metaphysical applications, e.g. in the analysis of inconsistent belief-states and fictions,¹⁷ in affording us analyses (and extensional identity criteria) that allow us to differentiate between intuitively distinct necessarily coextensive propositions and properties, and in helping us give a semantic analysis of counterpossible conditionals which does not render them all vacuously true.¹⁸ I take the latter two applications here to make the most convincing case for impossible worlds, so let us look at them more closely.

¹⁴ See again NDJFL 38.4 which is wholly dedicated to the topic of impossible worlds, but also Vander Laan (2004), Lycan (1994) as well as the exchange between Yagisawa (1988) and Perszyk (1993).

¹⁵ For a possible worlds semantics of, e.g., intuitionist negation, see Priest (2001).

¹⁶ Allan Hazlett (unpublished) refers to impossible worlds in relation to the epistemic notion of justification.

¹⁷ Although Lewis (e.g. 1986a: §1.4) does a pretty impressive job on that front with possible worlds alone.

¹⁸ Again see the NDJFL 38.4 collection of works: Barwise (1997), Nolan (1997), Mares (1997), Priest (1997a,b), Restall (1997), Varzi (1997), Vander Laan (1997), Zalta (1997), as well as Yagisawa (1998), Vander Laan (2004), Priest (1992) & (2001), Salmon (1984), and Read (1995: 90-91).

One strong motivation behind impossible worlds stems from what is often called ‘the granularity problem’, namely the fact that insofar as possible worlds help us to individuate distinct propositions as distinct sets of possible worlds, the distinction they offer is too coarse-grained to adequately deal with intuitively distinct impossible propositions.¹⁹ Possible worlds alone don’t help us adequately differentiate one impossible proposition from another, since impossible propositions are true at no world and so are extensionally identified with (or otherwise modelled by) the empty set, \emptyset . Nor do they help us distinguish one necessary proposition from another, since necessary propositions are true at all worlds and so identified with (or modelled by) the set of all worlds, W .²⁰ But surely, the propositions $\langle 10 \text{ is a prime number} \rangle$ and $\langle \text{it is raining and not raining} \rangle$ are not identical, for it seems that one could entertain, believe or claim one without the other. Similarly one may know that $2+2=4$ but not know that $\text{water}=H_2O$. But without impossible worlds $\langle 10 \text{ is a prime number} \rangle = \langle \text{It is raining and not raining} \rangle = \emptyset$, and $\langle 2+2=4 \rangle = \langle \text{water}=H_2O \rangle = W$. So, the idea is that adding impossible worlds to an existing theory of possible worlds will give us worlds where $\langle 2+2=5 \rangle$ holds, but where it is false that $10 \text{ is a prime number}$ or that $\text{it is both raining and not raining}$ (at time t and location l). Equally, they will give us worlds where it is false, say, that $2+2=4$ but still true that $\text{water is } H_2O$, and so they will allow us to identify different necessary propositions with different sets of possible and impossible worlds. This in turn will allow us to differentiate between different hyperintensional contexts involving these propositions, and more generally between different epistemic possibilities, which may nonetheless constitute logical or metaphysical impossibilities.²¹

Another major motivation behind impossible worlds is the need to give a more fine-grained account of the truth conditions of counterfactual conditionals with impossible antecedents, i.e. ‘counterpossibles’.²² The popular Lewis-Stalnaker semantic analysis of counterfactual conditionals employing possible worlds seems to deal adequately with

¹⁹ See for example Barwise (1997), who calls the problem by that name, as well as Yagisawa (1998) and Nolan (1997) among others. For a view that explicitly renounces this use of impossible worlds see Zalta (1997: 652); Hazlett (unpublished) seems of similar persuasion.

²⁰ See also Plantinga (1987) on these limitations, although Plantinga’s attack (which is on the set-theoretic conception of propositions) strikes deeper.

²¹ Similarly, we may want to distinguish different necessarily coextensive properties from one another, so we can make sense of the idea that an agent can believe *de re* of a thing that it is a female fox, yet fail to believe of the same thing that it is a vixen; see Yagisawa (1988). For a criticism of the usefulness of Yagisawa’s proposal of impossible worlds to that end see Perszyk (1993) and Zalta (1997)

²² See among others Yagisawa (1988), Nolan (1997), Vander Laan (2004), Zalta (1997), Mares (1997), Read (1995: 91).

counterfactual claims.²³ According to Lewis, for instance, a counterfactual is actually true if and only if worlds where both antecedent and consequent are true are more similar to our world than worlds where the antecedent is true and the consequent false (Lewis 1973a; 1973b: 10). But, without impossible worlds, the same treatment does not extend to counterpossibles, since antecedents of such conditionals are false at all worlds, rendering the conditionals vacuously true. This result is counterintuitive in many cases: Say that the truths of arithmetic are necessary truths. Now compare the counterfactual that *if 10 was a prime number, then it would be (wholly) divisible only by 1 and itself* with the counterfactual that *if 10 was a prime number it would be divisible by 100*. Intuitively, the first seems true, while the second doesn't, yet the current possible-world analysis of counterfactuals renders them both true trivially. Or compare: *if my table was both round and square, then it would be a tourist attraction* and *if my table was both round and square then it would be a chair*. Again the first conditional seems to state something intuitive, but the second seems rather random. But, under the traditional analysis, both are trivially true. If these conditionals are to receive a more sensitive treatment alongside the rest of our counterfactuals, impossible worlds seem to offer the solution: by allowing for the existence of worlds where necessary truths fail, we have a uniform way to deal with counterfactuals of all kinds.²⁴

This question of counterpossible conditionals arguably carries deeper implications. Daniel Nolan, for instance, argues that we implicitly reason with counterpossibles more often than we think in philosophy (Nolan 1997: 544-546). For example, we regularly evaluate epistemically possible, yet competing, mutually exclusive metaphysical theories or logical systems to assess their consequences. But if one such theory is true, then, presumably, it is necessarily true and hence its competitors necessarily false, so that in effect, we are frequently reasoning under counterpossible suppositions. Yet not any old thing is true under such reasoning; we can coherently reason under such impossible hypotheses, and make both true and false assertions. If two people are discussing and evaluating a necessarily false (but not obviously so) philosophical theory for its consequences, it is unintuitive to think that they may strongly disagree, yet that everything

²³ Lewis (1973a, b), Stalnaker (1968), Lycan (1991b; 1994)

²⁴ The same arguably goes for counterfactuals with necessary consequents, although here the intuitions are less clear. It seems true that *if what I learned at my first logic class was true, then it would be the case that EFQ holds*. But is it true that *if I had been told in class that morning that there is a live debate among logicians whether classical logic is correct, then EFQ would be valid*? For a treatment of counterpossibles see Vander Laan (2004), and Nolan (1997), Mares (1997). Also see Frank Jackson (1989) for an epistemic approach to the puzzle of whether apparently irrelevant necessary truths are implied by any theory whatever.

they say is trivially true. A more reasonable and generous interpretation of the debate would be to say that they are capable of making both true and false assertions.

This insight by Nolan can serve as an argument that the usual assertability line is too weak to handle counterpossibles. Lewis, for example, suggests that our semantic intuitions about counterpossibles' variation in truth value are to be understood as intuitions about assertability.²⁵ So, for example, we would only assert the intuitively acceptable of the pairs of conditionals above. But if counterpossible reasoning is this insidious in philosophical debate, then assertability does not seem sufficient. Suppose that, necessarily, there are no composite objects. Even so, it seems false to say that *if there were composite objects then these would not be spatiotemporally located where their parts are*. Far from being a trivial truth, this subjunctive simply seems false, not merely unassertable. Moreover, if justification is correctly analysed in terms of either the notion of safety or that of sensitivity, then impossible worlds can help us differentiate between true and false counterfactual conditionals employed in the case of knowledge of necessary truths, and so allow such knowledge to be non-trivially safe or sensitive. The justification rule in the case of sensitivity employs a counterpossible conditional: *if not-P, then S wouldn't believe that P*; in the case of safety it employs a conditional with a necessary consequent: *if I were to believe that P then P*. Without an account of counterpossibles that does not render them all trivially true, any necessarily true belief is automatically deemed to be knowledge under these analyses. But, arguably, more is involved in knowing a necessary truth than just somehow coming to believe it. And again, we need not just unassertable but false counterpossibles in order for the sensitivity and safety conditions to apply to the case of knowledge of necessary truths.²⁶

I personally take the desire to extend the traditional Lewis-Stalnaker treatment of counterfactuals to counterpossibles to be one of the strongest motivations for impossible worlds, seconded only by the related desideratum to provide extensional identity criteria that differentiate between various impossible (and necessary) propositions and properties. While the overall motivations for impossible worlds may be open to question, it is not my aim here to question them. Since, as a proponent of possible worlds, I do find some of these intuitively compelling, I assume that such worlds do at least merit consideration by any possible world theorist.

²⁵ See e.g. Lewis (1973b: 24-26)

²⁶ C.f. Hazlett (unpublished)

What of arguments against impossible worlds? An early objection against such worlds originated with Robert Stalnaker to the effect (among other things) that the notion is poorly understood.²⁷ But, as Priest correctly notes (Priest 1997a: 485), arguments against the very coherence of a logically impossible world can no longer, in light of the expanded literature on the topic, be considered as serious obstacles to such worlds.²⁸ Now, one may argue that while great effort has been expended to clarify the notion and the precise *logical* nature of impossible worlds, the metaphysics of such worlds have been less discussed.²⁹ But arguably, there is not much to be said about impossible worlds metaphysically, either because the metaphysics of such worlds are purposefully left open once the logical issues have been ironed out, (e.g. Restall (1997), Mares (1997), Priest (1997b)), or because such worlds are taken to simply constitute an extension of one's already outlined conception of possible worlds. (e.g. Nolan 1997, Vander Laan 1997, Zalta 1997) . Beyond these general worries, the arguments are localised to particular accounts and debates over one or another motivation behind impossible worlds. For example, if one doesn't take propositions to be sets of worlds, then one will disagree that impossible worlds help us give more fine-grained identity criteria for propositions.³⁰ But, given that GR identifies propositions with sets, this argument does not apply here. Equally, one may look suspiciously at adding impossible worlds into one's ontology merely because they help us model paraconsistent logics – for, arguably this does not require the metaphysical postulation of such worlds in any robust sense, but at most their employment as heuristic tools.³¹ As Rescher and Brandom put it “...isn't the talk of non-standard possible worlds just a façon de parler to which no ontological weight should be attributed?” (Rescher & Brandom 1980:63)³² I would tend to agree with this complaint, as far as it goes. But, again it does not apply here, as our aim is to employ such worlds, for instance, for the purposes of ontological identifications. I will not defend impossible worlds further here, beyond looking at the particular objections that may be applicable to a Lewisian venture into such worlds.

²⁷ Stalnaker (1996), see also Lewis (1986a) and Perszyk (1993)

²⁸ See the (1997) collection in NDJFL 38.4.

²⁹ E.g. Zalta (1997: 641).

³⁰ E.g. Hazlett (unpublished)

³¹ Naturally, the same applies to possible worlds, merely as indices used to provide various meta-logical results, c.f. Lewis (1986a: 17-20)

³² See also Read (1995: 132-133)

1.2.3 Squaring impossible worlds with GR: The Good Reasons

One might ask, why bother to square impossible worlds with GR? The answer is that impossible worlds seem to have provided GR-rivals with a novel argument against Lewis, to the effect that, in not being able to accommodate impossible worlds, GR loses out against its rivals.³³ Now, whatever its ontological price, GR is one of the most well-developed, uniform, powerful theories of possible worlds around; indeed it served as an inspiration for the flourishing of rival theories. But when it comes to impossible worlds, while there is an array of actualist impossible world theories on offer, GR has consistently been charged with being unable to accommodate such worlds. Indeed much of the literature on impossible worlds begins by indulging in a good bit of GR-bashing under the new banner of impossible worlds.³⁴

Ersatz, abstractionist or actualist³⁵ accounts of possible and impossible worlds variably take worlds to be certain complex propositions or properties, or sets of propositions or states of affairs, or other linguistic entities; (see, e.g. Varzi (1997), or Nolan (1997) & Vander Laan (1997): worlds as complete world-books, or Mares (1997) & Barwise (1997): worlds as informational states, or Restall (1997): impossible worlds as set-theoretic constructs out of possible worlds. A notable exception is Zalta (1997) who takes worlds to be *sui generis* abstract objects).³⁶ Impossible worlds, understood in any of the above ways certainly seem to pose less of an ontological challenge than impossible worlds as concrete individuals. (It certainly seems less ontologically objectionable (to put it mildly) to allow for the existence of sets that include a proposition and its negation as

³³ This is explicitly stated in Lycan (1991b: 224; 1994: 59). But see also Nolan (1997), Varzi (1997), Vander Laan (1997), Barwise (1997).

³⁴ Again, see Vander Laan (1997), Nolan (1997), Varzi (1997).

³⁵ I will usually refer to rival views as 'ersatz' (Lewis 1986a: 136) or 'actualist' (Adams 1974: 224) (an alternative term for which is also 'abstractionism' (Van Inwagen 1986: 186)). Rival theories of worlds are abstractionist in the sense that their worlds are abstract entities; they are actualist because, whatever their differences, they maintain that only whatever is actual exists. Although some think the term 'ersatz' unfair, the term is merely a literal rendition of the idea of taking something other than worlds in the ordinary sense to stand-in for possible worlds (although Zalta (1997) may not fit under this category). As Nolan (2002: 5-14) puts it, the ersatzer employs the term 'world' in two senses – one ordinary sense referring to the mass of stuff we are part of and another theoretical sense referring to whatever plays the relevant theoretical role.

³⁶ Actualist *impossible world*-theories rest on a rich variety of actualist conceptions of *possible worlds*, traditional proponents of which, among others, include Adams (1974) (see also Carnap (1947)), Plantinga (1969; 1970; 1973; 1974; 1976), Van Inwagen (1986); Lycan (1994), Stalnaker (1976); Cresswell (1972). See also variations by Skyrms (1981) and Armstrong (1989) (although both may be classed as fictionalist conceptions of worlds (c.f. Divers 2002: 175)), Bigelow & Pargetter (1990), Forrest (1984) and Heller (1988), who builds on a proposal originally put forth by Quine (1969). See Divers (2002) for a good overview, as well as Loux (1979) for a collection. I take GR and actualism to be altogether distinct from Meinongian views on possible and impossible worlds (e.g. Routley 1980; Priest (2005: §7). Lycan (1979) originally classifies GR with Meinongian views, but he (correctly, since Lewis-worlds unashamedly exist) retracts this claim in his (1991b) and (1994), post the publication of Lewis (1986a).

members than to allow for the existence of concrete entities that render true contradictions.) But given the abundance of *prima facie* criticisms against GR-impossibilia in the literature, I think that GR deserves a closer and friendlier examination of its prospects when it comes to impossible worlds. In particular, it is worth exploring whether, in light of the recent demand for impossible worlds, GR indeed fails the test of impossibilia, hence losing out on an increasingly sought-after factor in the cost-benefit comparison of modality theories. As put in a hypothetical dialogue by Stalnaker between ‘Will’ and ‘Louis’, in Will’s words::

“...if...modal realism can find no room for impossible worlds, so much the worse for...modal realism. In the weighing of costs and benefits of concretism versus actualism it seems to me that it is a benefit of actualism that it can accommodate impossible worlds.” (Stalnaker 1996: 199)³⁷

It is thus worth seeing whether GR can rise to the challenge of impossible worlds.

1.2.4 And the Bad...

In some texts, the demand for GR to incorporate impossible worlds has gone beyond the urgency of GR losing out on a crucial benefit against its rival theories; instead concrete impossible worlds have been used to construct an *ad hominem reductio* of GR. Takashi Yagisawa (1988) and Margery Naylor (1986), for example, argue that any reasons for accepting possible worlds are *mutatis mutandis* reasons for accepting impossible worlds. But given that such worlds can only increase the incredulity of one’s stare (and in the worse case, render GR trivial), this conditional serves as a *reductio* against GR.³⁸

I do not think that such arguments survive scrutiny. Here, briefly, is why. Let ‘PGR’ stand for Possibilist-only GR, i.e. Lewis’ possible world theory; and let ‘IGR’ stand for Impossibilist GR, referring to any extension of Lewis’ theory into impossible worlds. The conditional thesis (CT) promoted by Yagisawa and Naylor is: If Possibilist-only GR (PGR) is to be accepted on the basis of Lewis’ arguments from ways and utility, then Impossibilist GR (IGR) is also to be accepted on the basis of the same arguments. And

³⁷ This view can also be found in the real-life Lycan (1991b: 224; 1994: 59)

³⁸ It is unclear whether Yagisawa (1988) takes the argument as an instance of modus ponens for concrete impossibilia rather as a modus tollens against GR.

so, purportedly, PGR and IGR stand or fall together. I take (CT) to have been successfully countered by Divers (2002 §5) and Perszyk (1993), who point out the following:

First, as both these authors correctly note, the argument from ways, to wit ‘there are ways things can be, call them possible worlds’, is not meant as a knock-down argument for possible worlds. So, the same argument applied to impossible worlds, to wit ‘there are ways things cannot be, call them impossible worlds’ ought not be a knock-down argument for impossible worlds. Lewis presents the argument from ways with caveats regarding the admissibility of taking such linguistic paraphrases involving existential quantification at face value (Lewis 1973a: 84).³⁹ He is careful to add that we should take existential quantification over ways at face value, *only if* it does not lead to trouble and its alternatives do. And so far, it seems that while possible worlds do not lead to trouble, impossible worlds do, at least for Lewis. (If they didn’t, then the argument from ways for impossible worlds could not be used to construct a *reductio* of the theory!) So the parity of reasoning here fails. Vander Laan asks: “Is there a principle of ontology which would justify our construing these similar parts of our modal language in such dissimilar ways?” (Vander Laan 1997: 600) The point is that if one is Lewis, *prima facie* at least, there is (c.f. Lewis 1986a: 7, fn3).

The second argument for the conditional thesis – the one I and most authors on impossible worlds (as indicated) take more seriously – is the argument from utility. We accept possible worlds because they are useful in a variety of ways, so, similarly, given the uses we could put impossible worlds to, we have good reason to accept impossible worlds. But, while I think that, if anything is, *utility* is a good argument for impossible worlds, I do not think that the utility argument can function as an *ad hominem* argument against Lewis. Again, as Divers (2002: 68) points out, Lewis’ argument from utility, when it comes to PGR in particular, is not as simple as ‘possible worlds are useful, so we ought to believe in them’. It is a more sophisticated argument to the effect that the theoretical benefits of possible worlds *outweigh* their ontological cost. So, to establish the parity of reasoning here, the proponents of (CT) must argue that the benefits of IGR also outweigh its costs. And they certainly cannot do so in the context of a *reductio* argument, for it is precisely the costs of adding impossible worlds to GR which gets the *reductio* going.⁴⁰ I will

³⁹ See also Divers (2002: 68) and Perszyk (1993: 206), as well as Sharlow (1988) for a reply specifically to Naylor’s argument.

⁴⁰ This is probably why Yagisawa (1988) leaves it open whether (CT) ought to function as a modus tollens of GR or a modus ponens for GR-impossibilia, depending on whether the reader thinks the benefits he outlined outweigh the costs.

reserve the term ‘GR’ for Lewis’ theory, only reverting to PGR when we need explicit differentiation from a proposed extension (IGR) into impossible worlds.

So, I think that the parity of reasoning *reductio* argument fails. What this means is this: GR is not *forced* to accept impossible worlds based on its own methodology. Nonetheless, it is worth seeing whether it *can* do so, and in particular, whether it can hope to reap any of the proposed benefits that impossible worlds have to offer, thus catching up with its rivals on this front, while keeping costs under control. As Divers diagnoses, ‘serious’ work needs to be done before one can even evaluate any claim to the effect that Impossible GR can maintain anything like the cost-benefit balance of Possibilist GR. (Divers 2002: 69) I here aim to start on that work.

1.3 Genuine Realism about Possible Worlds

First, a brief exposition of Lewis’ basic theory is in order, for it is in this metaphysical framework that impossible worlds will have to be incorporated.

1.3.1 The GR Basics

I take it that the following theoretical elements ought to be preserved more or less intact for any theory of impossible worlds to constitute an extension of Lewis’ original theory.

Basic GR-Ontology: According to GR (Lewis 1986a), there exists an infinite plurality of possible worlds. These worlds are causally and spatiotemporally isolated mereological sums of individuals, spatiotemporally related to all and only each other. They are just like our world in kind – for instance they may contain chairs, people, donkeys, stars and grains of sand – and only differ from our world (and each other) in what goes on in them. All the *possibilia* (i.e. the individuals) are world-bound, that is, every individual is part of only one world.⁴¹ Besides basic and composite individuals, we also have sets: pure sets constructed out of the empty set, as well as sets of individuals. The ontological primitives of the theory are, thus, sets and individuals, so that every entity is ultimately either a set or an individual.⁴²

⁴¹ Lewis is a fan of unrestricted mereological summation, which means that sums of individuals from different worlds also count as individuals. But individuals whose parts are not spatiotemporally related do not count as *possibilia*. And I will ignore such transworld individuals for the most part when I speak of GR-individuals. (Lewis 1983b: 211; Divers 2002: 67) Set-theoretic entities are not individuals, but exist, according to Lewis ‘from the standpoint’ of worlds (Lewis 1983b: 40; 1986a: 96, fn 61).

⁴² See Lewis (1986a), Divers (2002: 45-46). Melia (1992; 2003: 113-114) charges GR with an unparsimonious ontology on the basis that other worlds contain different *kinds* of entities to ours, such as

Actuality: From the perspective of each world, *it* is actual. (Lewis 1986a: §1.9) Just as the words ‘here’ ‘now’ and ‘I’ function as indexicals, picking out the utterer and his spatiotemporal location, the expression ‘actually’ picks out the utterer’s world. So, what we call the actual world is just the particular world of which *we* are part. We can still use a special actuality symbol ‘@’ to name or pick out the world that *we* are part from the totality of worlds, but this does not mean that our world is privileged in any metaphysically or ontologically sense.⁴³

The Reduction of Modality: Most importantly, the theory aims at an explicit, non-modal analysis of modal notions.⁴⁴ The theoretical primitives of the theory are exclusively non-modal allowing modal notions to be reduced to non-modal concepts. Those primitives consist in the concepts of ‘individual’, ‘set’, ‘parthood’, spatiotemporal relatedness’ and ‘similarity’ (Divers 2002: 50). According to GR (Lewis 1986a: §1.2) the following biconditionals serve as a fully explicit analysis of *de dicto* modality:

- (P) Possibly *A* iff there is a world, *w*, such that *A* is true at *w*
- (N) Necessarily *A* iff for all worlds, *w*, *A* is true at *w*

The crucial point here is that no modal terms are employed on the right-hand side. We only have the notion of *truth at a world*, not, for example, truth at a *possible* world, and, as we will see, both, the notion of a world *w*, and that of truth-at-*w*, are non-modally defined.⁴⁵

The Definition of a world: Worlds in turn are defined non-modally as maximal spatiotemporally unified isolated mereological sums of individuals (Lewis 1986a: §1.6):

- (W) *w* is a world iff *w* is a mereological sum of all and only individuals which are spatiotemporally related to each other.⁴⁶

flying pigs. But I do not see this: While the entities might instantiate different properties, they do not differ from entities in this world in kind: they are concrete individuals just like our pigs.

⁴³ E.g. Lewis (1970); (1986a)

⁴⁴ C.f. e.g. Divers (2002: 47)

⁴⁵ See for instance Lewis (1986a), Divers (2002), and Sider (2003) for arguments why ersatzism fails to reduce possibility. This is also admitted by Lycan (1988: 46; 1994: 87)

⁴⁶ C.f. Richard Miller (1989). John Divers offers the following more explicit definition: “An individual *x* is a world iff any parts of *x* are spatiotemporally related to each other, and anything spatiotemporally related to any part of *x* is itself a part of *x*”. (Divers 2002: 46) This also explicitly states that everything that is part of a world is spatiotemporally related to all and only every other part.

This non-modal definition of the notion of a world is (partly) what affords GR its reductive analysis of modality. As I take GR's reductive analysis of modality to be a crucial virtue, and central in making GR simpler and stronger than its ersatzist rivals, I discuss and defend it at more length in Ch II.⁴⁷

Recombination: While we may think of (P) as giving us the ontological *commitments* of the theory, we may need a little more to characterise the plenitude of GR-worlds, namely that there is a world for every possibility. (Lewis 1986a: §1.8) In that vein, Lewis gives an informal non-modal plenitude principle on worlds, to the effect that “patching together parts of different possible worlds yields another possible world” (1986a: 87). I examine the precise role of this recombination principle and questions which arise from its employment to characterise *possibilia* at more depth in Ch II.

Truth at a world: Truth at a world is non-modally analysed as truth just when we quantify over all the things in that world.⁴⁸ (Lewis 1986a: §1.2) The notion of truth-at-*w* that emerges according to GR is not only non-modal but also *alethic*, in the sense that it simply amounts to *truth tout court about* some particular domain.⁴⁹ The question of what truth-at-a-world amounts to for a particular theory is often put in terms of the question of how its worlds *represent* the truth of propositions.⁵⁰ In that sense, one may speak of a world *representing* a proposition (possibility) as true, thereby simply meaning that the proposition is true when we restrict our quantifiers to that world. Equally commonly however, one may speak of a world or individual *representing a possibility* (for another world or individual), by rendering true at it the relevant proposition (or instantiating the relevant property) that constitutes a possibility for another world or individual. Indeed, given that Lewis takes propositions to be properties of worlds, the representation of a proposition as true at some GR-world amounts to that world simply instantiating the

⁴⁷ There are some interesting proposals for dispensing with Lewis-worlds as *possibilia*-containers altogether, see Yagisawa (1992) and Rodriguez-Pereyra (2004)

⁴⁸ The original truth-at-*w* conditions are set forth in Lewis 1968. Lewis allows that quantification over sets can thereby be included if we think of sets as existing from the standpoint of a world. (Lewis 1983b: 40)

⁴⁹ Lycan (1991b; 1994) contrasts GR with actualist views on the basis that, for GR, truth-at-*w* (rather than truth *simpliciter*) is the primitive notion, whereas for actualist views truth-at-*w* is defined in terms of truth *simpliciter*. Strictly however, truth-at-*w* for GR simply is *truth simpliciter*, truth *about* some bit of reality. Lycan's distinction arises from the fact that actualist typically equate *truth simpliciter* with *actual truth*. But actual truth, for GR, is only a special instance of truth *simpliciter*, namely truth about the actual.

⁵⁰ Actualists often speak in those terms, given that ersatz-worlds are commonly *representations* of worlds, (c.f. Lewis 1986a: 137), hence *represent* propositions as true at possible worlds. In GR, the notion of representation enters the discussion more specifically concerning the *de re* representation of possibilities (properties and propositions) for various objects (including worlds) (e.g. Lewis 1986a: §4).

relevant proposition.⁵¹ I will therefore often use the notation ‘ $\exists w(Aw)$ ’ (or more complex versions thereof) to express the fact that there is a Lewis-world w such that A -at- w .

Truth Simpliciter, Existence and Actuality: An important feature of GR is that truth *simpliciter* and *actual* truth come apart: the quantifiers in our usual modal and non-modal speech are *restricted* to all things actual. When we say in our everyday speech that there are no talking donkeys, according to GR, we implicitly restrict our quantifiers to our world, just as we employ certain quantificational restrictions, when we say that there is no beer, meaning that there is no beer in the fridge. But, for GR, existence ranges beyond the actual. And so the theoretical quantifiers of GR range beyond what is actual, or in the domain of any particular world, over all logical space. What is true *simpliciter* is thus not actually true but true absolutely or unrestrictedly, irrespective of domain-restrictions; it is what is true *according* to GR, or in the GR-theoretical language – or *home-language* as I will sometimes call it – which employs unrestricted quantifiers. (Lewis 1986a: §1.1) Thus, if at every world swans are birds, then it is true unrestrictedly (whatever the domain) that swans are birds, thus it is true *simpliciter*. But, while actually true, it is not true *simpliciter* that snow is white, since there are, presumably, worlds, parts of all that is, where snow is not white.

Properties and Propositions: So far we have seen that GR’s reductive ambition is to give a fully explicit, non-modal analysis of modal notions. But GR’s reductive ambition does not stop there. It also aims to reduce or identify what are commonly thought as intensional entities such as propositions and properties with their extensions. A property is identified with the set of all individuals that instantiate it, and a proposition similarly identified with the set of all worlds where it holds. (Lewis 1986a: §1.5) It is in that sense that propositions are properties of worlds, namely that both properties and propositions are identified with the sets of their instances, whether these are parts of worlds or entire worlds. Thus, GR relies on a fully extensional ontology.⁵² Insofar as intensions are *entia non-grata* for being unable to receive adequate (extensional) identity conditions (at least not from the contents of actuality),⁵³ GR’s ontological identifications can be considered a further benefit of the theory, a way of rehabilitating propositions and properties as fully extensional entities defined as sets of possibilia.⁵⁴

⁵¹ Lewis (1986a: 53-54).

⁵² Again see Divers 2002: 50

⁵³ C.f. e.g. Quine (1956)

⁵⁴ See also Divers (2002: 9) and Yagisawa (1998): 176-177. Again, see Plantinga (1987) for an attack on this extensional Quinean programme. I will not defend GR on these grounds here.

Modality De Re: Just like with *de dicto* modality, GR similarly offers a reductive analysis of *de re* modality via the notion of counterpart (Lewis 1986a: §1.2):

- (F) An individual x is possibly F iff there is a world w and an individual y which is part of w such that y is a counterpart of x and y is F .⁵⁵

Given that every (ordinary) GR-individual exists only at a single world, (F) allows GR to analyse sentences like ‘Ira could have been an astronaut’ which are essentially of the form $\Diamond Fa$ by letting Fa be true at a world that does not contain the individual a , in virtue of that world containing another individual, a *counterpart* of a which is F . The notion of a counterpart is further grounded on that of similarity:

- (CP) x is a counterpart of y iff x is similar to y in some (contextually determined) respect r and to some (contextually determined) degree n .⁵⁶

A counterpart is thus a suitably selected part of some world, which represents that another (similar) individual is possibly a certain way. n and r are often determined by pragmatic and contextual factors.

Restricted modalities: These are treated in exactly the same manner as absolute modalities, as per (P) and (N), but in addition require the notion of accessible and inaccessible worlds. (Lewis 1986a: §1.2) In simplified terms: Necessarily, nothing travels faster than light iff at all worlds that are nomologically accessible from ours, nothing travels faster than light. The notion of accessibility serves to restrict the quantifier on the right-hand side to only those worlds which bear the relevant accessibility relation to the base world. Accessibility (whatever its formal properties) is once again analysed as similarity between two worlds in some particular respect (Lewis 1986a: 20). I take this understanding of accessibility as some sort of similarity to lend further credence to the idea that *de dicto* modality for GR can be seen as a special case of *de re* modality, where the similarity in question is that between entire worlds. In the case of *absolute de dicto* modalities, the notion becomes redundant, since the relevant similarity respects are supposedly satisfied by all worlds.

⁵⁵ C.f. Divers (2002: 50)

⁵⁶ Again, c.f. Divers (2002: 50)

Counterfactual Conditionals: Counterfactuals also receive extensional truth-conditions via the notions of similarity and truth at a world: A counterfactual ‘if it was that *A*, then it would have been that *C*’ is true *iff* some world where *A* and *C* are both true (if there are any) is closer than any world where *A* is true but *C* is not. (Lewis 1973a/ b; 1986a: §1.3) The notion of *closeness* involved here again comes down to the similarity between the two worlds, the starting world and the world to which the antecedent takes us. It is the ambiguities involved in this primitive notion of similarity, which allow this analysis to be sensitive to the contextual ambiguities often involved in evaluating counterfactuals.

Similarity: It turns out that the notion of similarity is pivotal in the theory, playing a crucial role not only in the evaluation of counterfactuals, but also in the evaluation of *de dicto* and *de re* modal claims. (Lewis 1986a: e.g. 8, 21-27, 234) Indeed, Lewis explicitly states: “Whether I speak of counterpart relations or accessibility relations ... I still mean some sort of relations of comparative similarity.” (Lewis 1986a: 234) Now, whether two worlds, or individuals, resemble each other in the required respect is often a matter of degree, and subject to pragmatic and contextual factors. I think this gives GR, despite its strong core, flexibility and richness, allowing it to offer precise truth-conditions for modal locutions which nonetheless can accommodate the usual ambiguities and fluidity of our modal speech and thought.

This concludes GR-exposition. Of course, in trying to make way for impossible worlds, some aspects of the current theory may have to be altered, and whatever theory results will certainly not be identical with Lewis’s original theory. However, I think that the virtues listed above are important for the preservation of the spirit, the aims and the overall appeal of the basic Lewisian theory. So I take it that the resulting theory will be appealing to the degree that it can retain the above virtues intact.

1.3.2 A Brief Defence

This is as good a place as any to say that I do not propose to carry out a thorough-going comparison between GR and rival actualist theories here. For one, this has been done to a good degree by others.⁵⁷ And in any case, I take some of the above advantages, for instance the fully reductive extensional nature of the theory, to at least speak of *my*

⁵⁷ For overview comparisons see e.g. Divers (2002) Sider (2003) and Lewis (1986a: §3) whose criticisms remain relevant today.

preference for GR over its rivals. I will venture a few comments against some of the most common objections to GR to further elucidate this preference.

Common Sense: It is often objected that the Lewisian ontology of non-actualia defies common sense and that *actualism* – the view that *everything* is actual – is instead the sensible position. Giving it the famous incredulous stare, opponents seem to balk at the suggestion of the existence of an infinite plurality of spatiotemporally isolated concrete worlds, like ours. But I find the idea that the actual world is unique rather arbitrary.⁵⁸ What reason have we to believe that our world is unique? None it seems to me that can be gathered from empirical evidence and no clear *a priori* arguments for it. Indeed, far from it being an advantage of actualist theories that they deem our world unique, I take it to be a drawback, lending an element of arbitrariness and thus inelegance to any actualist theory.⁵⁹ This is further reinforced by the fact that actualists need to employ an additional sense of the term ‘world’ in order to allow their theory to be properly called a theory of possible *worlds*.⁶⁰ One cannot but feel that such ersatz worlds are worlds only in name and that, as Lewis notes, ersatzers “...would do better to say that they reject possible worlds and know how to do without them.” (Lewis 1986a:140)⁶¹ As for the place of common sense in adjudicating between (carefully developed) metaphysical theories, I tend to side with Peter Van Inwagen when he says “...the office of common sense is to keep us from playing cards for high stakes with people we meet on trains, and not to endorse metaphysical opinions.” (Van Inwagen 1986: 197-8)⁶²

Tu Quoques: Now, one thing that arguably offends people is that GR-worlds are *concrete*. But, what exactly is better about the proliferation of *sui generis* abstracta? If these are merely taken to be intensional, non-set-theoretic abstracta of no particular further

⁵⁸ As does Lewis (1970, 1986a: §1.9). Along with Lewis, I too recognise that this constitutes no convincing argument against actualism. But my aim here is to state my own reasons for preferring GR.

⁵⁹ This thought is elucidated somewhat by Peter Unger (1984) who argues that the GR-ontological framework of a plurality of worlds may be appealing on the quite independent grounds that it minimises arbitrariness and the acceptance of *brute* facts in our scientific theories of this world. Unlike Lewis (1986a: 128) I take this to be a point in favour of GR.

⁶⁰ C.f. Nolan (2002: 5-14).

⁶¹ See also Stalnaker (1996: 200). Moreover, if all that is bothersome is this idea of ‘concrete’ worlds, it is worth remembering that the only sense in which Lewis-worlds, in their entirety are concrete is that they are *like* ours, namely they are not sets or universals, at least to the extent that our world is not. But GR-worlds are not spatiotemporally located, nor, in their entirety, accessible to anyone’s senses (except perhaps God?). While such a view is emphatically rejected by Lewis (1986a: 128-133), and would need proper defence, I find something intuitively appealing in the thought that a world is concrete only relative to everything else in it. The most important point is that GR-worlds do not differ from ours in *kind*.

⁶² I am thus less forgiving of this objection than Lewis, who takes the offence as a serious cost to the theory. (Lewis 1986a: 133-135)

description,⁶³ then it just seems like a case of “no worries, it’s all abstract” (Lewis 1986a: 137).⁶⁴ If on the other hand worlds are taken to be set theoretic entities, this opens the door to further strike-backs: van Inwagen, for instance, objects that even if we grant that the concrete non-actual GR-worlds exist, he asks, “[w]hat would such things and their parts have to do with modality?” (Van Inwagen 1986: 199)⁶⁵ But, exactly the same question can be put to set-theoretical ersatz conceptions of worlds: Equally, what do sets and their members have to do with modality? (As Trenton Merricks nicely puts it “[a] set just sits there.” (Merricks 2003: 535)) Another irrelevance objection that lends itself here is Kripke’s famous Humphrey objection against counterpart theory (Kripke 1972: 45 fn.13): He remarks: surely Humphrey cares whether *he* could have won the election, not whether some counterpart of his, i.e. some other bloke in some spatiotemporally disconnected reality, wins it instead. But, again things are not much better for set-theoretic ersatz theories. If Humphrey does not care about his counterparts, he ought to care even less whether some proposition or property about him winning belongs to some set.

For my own sensibilities, I find GR’s metaphysical honesty, for want of a better term, and the theoretical elegance it displays in its systematic and unified analyses of many philosophical notions based on a single comprehensive ontology, to render it a more attractive option than most ersatz theories. This concludes all I have to say in criticism of GR’s rivals here.

1.4 Making Room for the Concept of an Impossible World in GR

Time to turn our attention to the task at hand: How can we accommodate impossible worlds within Lewis’ theory? I will outline what I take to be the central conceptual difficulty that the notion of an impossible world causes for GR, and then discuss ways forward.

1.4.1. The Central Puzzle

In order to even begin to make way for a GR theory of impossible worlds there is a basic puzzle which needs to be addressed. In the words of Stalnaker’s character, ‘Louis’, it is this:

⁶³ As is arguably the case with possible worlds in the style of Stalnaker (1976), what Lewis (1986a: 141) calls ‘magical’ ersatzism.

⁶⁴ C.f. also Melia (2003: 141-142)

⁶⁵ See also Charles Chihara (1989: 86), Michael Jubien (1988: 306; 2007:100)

“My problem is that I don’t understand what I would be admitting if I admitted that there were impossible worlds or things. Here is how I understand the word “possible”: What is possible is what is in the domain of some world. The role of the modifier “possible” in “possible world” is not to restrict the class of worlds to a subset meeting some additional condition. The only role of the modifier is to make clear that by “world” I don’t mean something like a planet within the actual world. “Possible world” as I understand it, is otherwise just a redundancy, like “existent entity.””
(Stalnaker 1996: 195)

In short, the very notion of an impossible world makes no sense from within the perspective of the GR-theoretical framework. And so the question is, how can we begin to understand the very notion of an impossible world within the reductive framework of GR? Given the definition of modality in

(P) Possibly *A* iff there is a world, *w*, such that *A* is true at *w*.

all worlds are possible by definition. GR’s account of what it is for something to be impossible is simply:

(I) *Impossibly A* iff there is *no* world *w*, such that *A* is true at *w*.⁶⁶

Given that everything is laid out in terms of *worlds*, not *possible* worlds, all it takes for a world to be a ‘possible world’ is for it to exist; as also Perszyk notes, “the word ‘possible’ in the phrase ‘possible worlds’ is a misnomer and ought to be dropped.” (Perszyk 1993: 207) We just have worlds; and a world is a possible world *iff* it exists; contraposing, for a world to be impossible *is* by definition for it *not* to be among the plurality of existents.⁶⁷ Given this characterisation, we have a puzzle in the mind of the GR-proponent regarding the *referent* of ‘impossible world’: to demand the existence of impossible worlds in concretist terminology is to demand the existence of something which by definition does not exist. To have impossible worlds, if the expression means anything at all to the concretist, is just to have more worlds. And to have more worlds, is really just to have

⁶⁶ (I) is the contraposition of (P).

⁶⁷ Lewis follows in the tradition of Quine (1948) regarding the existential quantifier.

more *possible* worlds according to GR's analysis. As Kenneth Perszyk rightfully protests, "Impossible possible worlds" are pretenders to the throne." (Perszyk 1993: 210)⁶⁸

Notably, this is a challenge peculiar to GR, since, for ersatz theories, worlds are conceived as sets or linguistic entities, and whether a proposition or set of propositions is, say, consistent or maximal, seems to have nothing to do with whether it exists. (c.f. Vander Laan 1997: 599) So for such theories, the term 'impossible world' seems to be a natural complement to the term 'possible world'.⁶⁹ This situation is in stark contrast to that of GR. Of course, one solution would be to simply replace the reductive analysis of possibility with a modal analysis involving *possible* worlds – to contrast with the new-founded *impossible* worlds. But this is clearly a bad move. For it would mean to abandon a substantial GR-theoretical virtue – its reductive analysis of modality – arguably a central motive for anyone moved to espouse GR in the first place.

In short, while ersatz impossible worlds seem to augment the power and simplicity of ersatz theories of worlds – by making it the case, for instance, that all sets of propositions are worlds, whether or not maximal or consistent – impossibilia seem to threaten GR's reductive analysis and so decrease the theory's strength and appeal. As Divers puts it, "[i]f the claim to provide a thoroughly non-modal analysis of the family of modal concepts is to be sustained then, when the money is down, IGR [cannot]... characterise her ontology by speaking of impossible worlds" (Divers 2002: 69) And so the starting point for any extension of GR into the terrain of the impossible is to address the fundamental question as to what the notion of an impossible world amounts to in the non-modal framework of the theory. Otherwise GR cannot hope to retain its basic appeal as a thoroughly reductive theory – one of its main perceived advantages over its actualist rivals.

1.4.2 Concreteness and Absoluteness: Two Alternative Solutions

I propose that GR has two alternatives in accommodating impossible worlds while preserving its non-modal home-language, and so in differentiating the possible from the impossible worlds non-modally.

1. Abandoning Concreteness: One solution is to allow that even if *possible* worlds are *concrete* individuals *impossible* worlds are *abstract* constructions out of such individuals. This proposal draws from Lewis himself (1973b: 16; 1986a: 186), as well as from

⁶⁸ Perszyk (1993: 210). See also Lewis (1973a: 24) where Lewis speaks of "*impossible* possible worlds" for a pretend moment.

⁶⁹ C.f. Perszyk (1993: 207)

suggestions hinted at by other authors, for example, Stalnaker (1996), Restall (1997), Mares (1997) and Divers (2002). I develop and examine this proposal in Ch III.

2. *Abandoning Absoluteness*: The other solution is to decree that while we have a variety of restrictedly impossible worlds – even logically impossible ones – all worlds are unrestrictedly possible; there is no notion of absolute impossibility beyond that of inaccessibility between two worlds in a plurality of possibilia. This way forth also draws from Lewis (1986a: §1.2, 1968: 37), especially from the pragmatic aspects of GR – its notion of similarity and its analysis of restricted modalities. It is also inspired by an attractive proposal by Barwise (1997), an exchange between Yagisawa (1988) and Perszyk (1993), and comments by Salmon (1984), and Stalnaker (1996), among others. I develop this proposal in Ch V and address related obstacles in Ch IV and VI.

1.4.3 An Existing Concretist Proposal

There is an existing attempt to put concrete impossible worlds on the map due to Takashi Yagisawa (1988). Yagisawa's central idea is that just as GR posits worlds beyond ours to account for *possibility* it ought to posit logical spaces beyond ours in order to account for *impossibility*. So, central to his proposal is that there is a plurality of logical spaces beyond the one in which we find ourselves. He defines a logical space as follows:

“Let us assume that the largest accessibility relation (viz. logical accessibility) is an equivalence relation. A logical space consists of all and only worlds which form an equivalence class under the largest accessibility relation; for any world w , the logical space which includes w includes all and only worlds that are logically accessible from w . Within a logical space, any world is logically accessible from (i.e. possible relative to) any world. Any world that lies outside a given logical space is not accessible from (possible relative to) any world in that logical space and belongs to a different logical space.” (Yagisawa 1988: 182)

We here learn that what generates a logical space is mutual (symmetric, reflexive and transitive) logical accessibility between worlds, which Yagisawa takes to be the largest accessibility relation, forming equivalence classes of worlds which, so to speak, all see each other due to the fact that they all share the same logical laws. And according to Yagisawa, the impossible worlds are worlds in a different logical space; in particular, the worlds that are *actually* impossible are those that lie outside *our* logical space. This

places possibility and impossibility in the general spirit of GR's indexical nature of actuality; Yagisawa notes that under his extended ontology 'possible' is also indexical, for it means 'in our logical space'. Hence, while worlds in different logical spaces are absolutely impossible (for us), in the sense that they are inaccessible under all accessibility relations, worlds are not impossible absolutely, but only relative to some or other logical space. Indeed Yagisawa notes that we may sometimes use the word 'actually' to denote not only our world, but our logical space. (Yagisawa 1988: 202)

Now, I think there are many elements in this proposal that ought to be taken forward into any proposal of concrete impossibilia: One, it gives a clear answer to our original puzzle: What are GR-impossible worlds? They are worlds that inhabit separate logical spaces to ours. Two, it employs the existing GR notion of accessibility between worlds in order to generate and differentiate the impossible worlds from the possible ones. And I think that the concept of accessibility, exactly because it is already active in the case of restricted modalities, is key in attempting to extend GR into impossibilia. Three, Yagisawa retains and expands on many GR-theoretical virtues; for example he keeps GR's account of properties and propositions, its analysis of counterfactuals, and the indexical nature of actuality.

However Yagisawa's view also exhibits some important omissions. First, Yagisawa never explicitly addresses the crucial question of whether and how GR can differentiate the newly posited impossible worlds from the possible ones non-modally. Maybe this is because he takes it as read that the notion of distinct logical spaces (i.e. equivalence classes differentiated on the basis of logical laws) suffices for that. But, it is an open question whether the notion of worlds that obey distinct logical laws is properly non-modal. Can these equivalence classes of worlds be differentiated non-modally? What does logical accessibility amount to? It seems to amount to, in some sense, the 'sharing' of logical laws. But, as Divers points out, what these are, exactly, and what it is for worlds to 'share' such laws is left hazy:

“...we are offered no account of what it is for a world to have one logic rather than another – an account that would have to inform us, how (if at all) the logical laws at a world w differ from the laws of nature at w or, indeed from any other universal truths that obtain at w .” (Divers 2002: 76)

Moreover, Yagisawa does little to address Lewis' own (1986a) objection to impossible worlds and any further logical difficulties that might arise from his proposal. I take all these issues up in Chs IV-VI. Finally, Yagisawa posits an (unnecessarily abundant, in my view) plurality of logical spaces, and a plurality of super-logical spaces, and a plurality of spaces of super-logical spaces, and so on. As He puts it "[t]he hierarchy of (super)" logical space continues indefinitely." (Yagisawa 1988: 201-2) His argument for this is that it gives the theory the tools to evaluate how things might have been if they were different to how some particular universe of discourse says they are, and so exempts it from the kind of arguments he directs against original GR, like: "There could be more worlds than there actually are in our logical space" (Yagisawa 1988: 185), or " w could have been inaccessible from w " (1988: 184) or "[l]ogical facts, e.g. the law of excluded middle, could have failed to obtain" (1988:186). But the proposal is needlessly extravagant. Firstly, if the quoted are really *possibilities*, then they ought not motivate the existence different logical spaces but instead, require only possible worlds to be realised. It seems that for Yagisawa even to be speaking in that way, as Perszyk notes, "means that he has got to have a sense of possibility beyond accessibility...a possibility operator which can float over different logical spaces" (Perszyk 1993: 209). But why not simplify? In this vein, Perszyk notes that

"Lewisians too may be heard to say that it is a "genuine" possibility that there might be more possibilities than there actually are, but by this *we* mean that we (or our counterparts) are in a world W , such that more worlds are closer to us (in some appropriate sense) in W than to us (our counterparts) in some other worlds W^* ." (Perszyk 1993: 209)

Indeed, I think that a variety of accessibility relations and lack thereof between worlds in a single logical space – even if some of these relations, logical or otherwise, form equivalence classes – can do just as well. I develop such a view in Ch V and discuss the types of modal claims, which Yagisawa puts forth here, in Ch VI.

1.4.4 A Role for Impossible Worlds in the Analysis of Modality?

It is worth clarifying that the addition of impossible worlds into GR offers nothing over and above what possible worlds can do in terms of GR's analysis of modality. Say we have a way to differentiate the possible from the impossible worlds non-modally, and

let us call the possible worlds ‘worlds’ and the impossible worlds ‘imp-worlds’. One might ask whether the newly posited impossible worlds should feature in a new and improved definition of impossibility, so that instead of the traditional definition, as per (I):

(I) *Impossibly A iff* there is no world w such that A is true at w ,

we ought to have (I*):

(I*) *Impossibly A iff* there is some imp-world w , such that A is true at w

However, as Divers correctly notes, this thought is misguided (Divers 2002: 70). To see why, take A in (I*) to stand for $B \& \sim B$. Then, arguably, not only $B \& \sim B$, but also B and also $\sim B$ will be true at the imp-world in question. But then the right to left direction of (I*) may be false, since it may well be that both B and its negation are contingent and so each may be true at some genuine (possible) world. Divers considers the following kind of revision:

(I**) *Impossibly A iff* [there is some imp-world w such that A is true at w and there is no world v such that A is true at v]

But as he rightly notes (I**) seems too complex without any obvious theoretical benefits for, here it is really only the second conjunct in the analysis of impossibility that does all the work. (I**) in effect simply renders the original (I) into possible and impossible world-talk, without adding any further deciding content to it.

Is there any value in translating the relevant truth-conditions into possible-and-impossible-world talk? If so, then one might argue that the relevant procedure ought to be carried out with all truth-conditions of modal claims. But the result with (P) and (N) is less intuitive. The following, for example, is false:

(P*) *Possibly A iff* [there is some world w such that A is true at w and there is no imp-world v such that A is true at v]

Many propositions that are true at possible worlds may also be true at impossible worlds. All it takes for a world to be impossible is for it to verify some impossible proposition, not

all and only impossible propositions. (P) ought to be translated, instead, to the needlessly complex (P**), which again adds nothing new to the original (P):

(P**) *Possibly A iff* [there is some world w such that A is true at w *and* (either there is a world w such that A at w or there is no imp-world v such that A is true at v)]

Nor is this an intuitive rendition of what it is for something to be possible. It would seem, for instance, that nothing is both possible and impossible in one go, yet this intuition is not clearly captured by (P**) at least not in the sense that no possibility is true at an impossible world. It is easy to see that the same difficulties arise for emendations of the necessity principle (N).

The moral of this story is that whatever the theoretical benefits of impossible worlds the amelioration of GR's existing analysis of modal notions is not one of them.⁷⁰ And so, we should steer well clear of impossible worlds when we give the truth-conditions of modal claims, even when these latter are claims about impossibility. All we need impossible worlds for is, e.g., to extensionally differentiate impossibilities as sets of distinct worlds, and non-trivially evaluate counterpossibles.

1.5 The Many Obstacles to Concrete Impossibilia

Beyond the conceptual difficulties that impossible worlds pose for GR, there are well-known logical difficulties, particularly with concrete impossibilia. Concretist IGR, insofar as it shall have evolved from PGR, will have to endorse worlds and individuals that literally instantiate contradictions to allow these to be *true-at* impossible worlds. It will have to countenance, it seems, the literal existence of things like round square tables, blue and non-blue swans, vixens that are not female foxes, married bachelors, time-travellers both dead and not dead, and so forth, to represent such impossibilities as true at some world.⁷¹ Now, it is worth noting that, while it may be hard to *imagine* how concrete worlds can instantiate impossibilities, it is still a further step to conclude that for this reason GR cannot accommodate such worlds.⁷² First, for all we know, the actual world may be such a contradictory world, as a dialethist would have us believe, and there is

⁷⁰ C.f. Divers (2002: 69-71)

⁷¹ For my take on the time-travel autoinfanticide paradox see Kiourti (2008).

⁷² But for a preview see Priest (1999; 2006) and Mortensen (1997)

nothing particularly hard to visualise about our world.⁷³ Second, our imaginative capacities have nothing to do with this venture in any case – it is a venture into impossibility after all. Nonetheless, the way that truth-at-*w* generally works for GR presents particular problems for concretist IGR. I outline some of these below.

1.5.1 Literally True Contradictions and Other Logical Worries

The most famous objection against concrete impossibilia originates with Lewis himself. Lewis rejects impossible worlds on a par with possible worlds on the basis that for a contradiction to be true at some such impossible world means for a contradiction to be literally true (Lewis 1983c; 1986a: 7, fn3).⁷⁴ ‘Truth-at-*w*’ for GR is just truth *about* some particular bunch of individuals. As Lewis puts it, the modifier ‘at *w*’ has no particular effect on the truth-functional connectives. This means that ‘at *w* ($A \& \sim A$)’ is equivalent to the outright contradiction ‘(at *w* A) & \sim (at *w* A)’; i.e. a contradiction that is true-at-some-impossibilium is a true contradiction *about* some impossibilium. But, Lewis’ position is that “there is no subject-matter, however marvellous, about which you can tell the truth by contradicting yourself” (Lewis 1986a: 7, fn3). So, for him, there is nothing that you can describe truly in contradiction.⁷⁵

Yagisawa swiftly dismisses this objection by Lewis. He argues, impossible things are impossible after all – why shouldn’t we speak about them truly in contradiction? (Yagisawa 1988: 203)⁷⁶ This is a fair point. Nonetheless, if Lewis is right about the behaviour of ‘at *w*’, then, one must recognise that possibilist GR involves a commitment to dialethias, in Divers’ words, “a commitment to the existence of things about which we speak truly in contradiction, and so to an inconsistent hypothesis.” (Divers 2002: 76) At the least, this means that if possibilist GR is to be a non-trivial theory, it must abandon classical logic and hope to adopt a paraconsistent consequence relation to reason from its hypotheses.

However, while a rejection of EFQ may be necessary for an extension of GR into impossibilia, it is questionable whether it will suffice. Indeed, there is a real question whether *any* single notion of non-classical consequence can be adequately employed by GR to reason about its worlds, and so from its ontological hypotheses as a whole, if we put

⁷³ E.g. Priest seems to take our world to be contradictory (as the logical paradoxes demonstrate), although he does not take the ‘naked eye’ observable aspects of it to be so (Priest: 2006a,b; 1999)

⁷⁴ This objection also appears in the mouth of Stalnaker’s ‘Louis’ (1996).

⁷⁵ See also Lewis (1982: 434-35).

⁷⁶ See also Lycan (1991b; 1994). More on this in Ch IV.

no limit on the kinds of logically impossible worlds there are. Divers objects against Yagisawa's account for instance that if every logical space in Yagisawa's ontology obeys different laws, then concretist IGR is left with no set of logical laws to reason from its ontological hypotheses. He asks:

“Why should we expect that the logic of any one logical space should be applicable? There is no more reason to expect the logic of the actual world, and ‘our’ logical space, to be appropriate than there is to think that we can apply the actual laws of nature to (unrestrictedly) all that there is.” (Divers 2002: 77)

And abandoning Yagisawa's plurality of logical spaces is insufficient to alleviate this worry. For, to hold onto some overall logic for the theory is to decree that its rules and laws are truth-preserving about all parts of the pluriverse. But, given the way ‘at *w*’ functions for GR, this is to suppose that these rules and laws are valid at all worlds. But then, how do we non-vacuously evaluate, e.g., a counterfactual asking what would be the case if there was a world at which these rules failed? If, as per Lewis truth/falsity-at-an-impossibilium just amounts to literal truth or falsity *about* its domain, and if we want any principle to fail at some world, then no logical principles will be general enough for IGR to reason about its entire pluriverse, and so from its own hypotheses. Yet, as Nolan puts it, having to “...distinguish between the impossibilities which obtain in some impossible worlds, and those impossibilities which obtain in no worlds, even impossible ones...seems a distinctly uncomfortable half-way house...” (Nolan 1997: 547)⁷⁷ If any departure from complete permissiveness for impossibilities is a loss of elegance, the question is how to achieve the best balance, if trade off we must. I address Lewis' original objection and these further worries in Ch IV.

1.5.2 Representational Challenges

With absolute permissiveness being the representational ideal, another type of objection against a putative GR theory of impossible worlds takes hold. This involves the representation of GR-theoretical impossibilities, namely claims that constitute the negation of GR-postulates. If, as is commonly thought of metaphysical theories, GR's postulates are necessary true, then in principle, impossibilist GR ought to have the negations of its

⁷⁷ Stalnaker indeed thinks it an argument against impossible worlds to not be able to go ‘all the way’ (Stalnaker 1996: 201) Although, see Priest (1997a: 487) for a good point in response.

postulates be true at some impossible worlds. But, GR's ontological and theoretic postulates are usually unrestricted in content, so how can their negations (being impossibilities about the plurality) be represented as true by some particular world?⁷⁸

One such objection is put forth by David Vander Laan (1997) who questions the power of extended GR to represent the impossibility that the pluriverse contains an abstract world. As he poetically puts it “[T]he Achilles’ heel of a concretist theory of impossible worlds is the fact that there are certain things which concrete worlds cannot represent inaccurately...” (Vander Laan 1997: 607). Another couple are put forth by Nolan (1997): “The existing-at-all-possible-worlds God of Anselm’s imagination” does not possibly exist, and “simply fails to exist at this world, full stop – it is not that it both literally exists in this world and literally does not exist in this world” (Nolan 1997: 541). Another problematic claim involves an “impossibilium which *literally* makes all disjunctions false by its mere existence” (Nolan 1997: 541 *my italics*). I take up these questions of representation in Ch VI.

1.5.3 The Question of Logical Laws

Finally, any extension of GR into concrete impossibilia opens the door to deeper questions. Divers’ worry remains: What is it really for a concrete bunch of stuff to obey (or fail to obey) a *logic*? What is it for any logical law to hold at some concrete world and fail at another? And what conception of logical truth and logical consequence can go along with this picture? These questions become especially pertinent here, as it is a so-called ‘difference in logical laws’ which will presumably play some important role in distinguishing the logically impossible from the possible worlds. Nonetheless, while this is a key issue, it should not be considered a problem particular to concrete impossibilia. For, if we don’t have a very clear idea as to what it is for a Lewis-world to ‘obey’ one logic rather than another, it is only because we don’t really have a clear idea as to how the logical laws we take to be actually correct really tie into our world. One what basis, if any, in reality, do we choose one set of laws rather than another as applicable? (Indeed, if there was an obvious and straightforward answer, we may not have had the disagreements that abound in the philosophy of logic.⁷⁹) The venture into impossible worlds can thus be seen to merely highlight this existing question. In that sense, it may be that an attempt to

⁷⁸ Objections of this nature have also been presented to me in conversation by Ross Cameron and Charles Pigden.

⁷⁹ See, for instance, Priest (2001)

extend concretism into the realm of the impossible has some added instrumental value, even if concrete impossibilia prove too brutal for most logical or metaphysical sensibilities. I explore some of these issues in Ch V.

1.5.4 The Competition with Ersatz Constructions

Having spent quite a few pages outlining the problems facing concrete impossibilia, one may wonder why one would ever bother to espouse such a theory. I have already suggested that GR could simply allow for ersatz impossible worlds to complement its genuine possibilia. Besides avoiding some of the ugliest issues above, such a view also appears to have good prospects for preserving GR's reductive analysis (as we will see in Ch III). So, given the list of troubles awaiting the alternative, one may want to just opt for abstract impossibilia without further ado. As Perszyk writes,

“Just as Lewis... had to try to expose the disadvantages of constructing ersatz possible “worlds” and their inhabitants, an [impossibilist genuine] realist would have to try to expose the disadvantages of constructing ersatz impossible “worlds” and their inhabitants, whether they are constructed out of ersatz or genuine possibilia, in favour of the advantages of admitting genuine impossibilia. This would be no small task.”
(Perszyk 1993: 214, fn 5)

Indeed.

But I think that the concrete counterbid is not doomed at the start. To survey the goods fully, we have to see on the one hand, whether a proposal of concrete impossibilia can adequately reply to the above objections while retaining all the key advantages of original GR – among them chiefly GR's analysis of possibility – and on the other, whether or not one can buy more with a concretist proposal. Yes, if ersatz impossibilia can be bought, they look like a bargain. But the question is exactly how much of the desired goods one gets in return, and whether what looks like a bargain requires no less than for GR to sell its soul to acquire it: Are we, by admitting some ersatz worlds, abandoning the concretist spirit of GR? For, why should some of what we call ‘worlds’ be abstract and others concrete, as opposed to, say, all worlds being abstract, while some having a concrete realisations? (c.f. Mares 1997) Even then, can we justify positing such a fundamental ontological distinction between the possible and the impossible? (Priest: 1997b: 581) And even if all this can be overcome, does the ersatz view give us enough to

accommodate all kinds of impossibility or do we instead get an embarrassing half-way house? My aim in subsequent chapters is to develop both these views enough to be able to begin considering our options.

1.6 Conclusion

In sum, *prima facie* at least, there are good reasons for a proponent of possible worlds to buy into impossible worlds. And while a Lewisian about the former is not thereby forced to buy into the latter, it looks like he should at least make the effort, if he wants to keep up with the competition. The question is, how can a Lewisian about possible worlds even begin to understand the concept of an impossible world, given his reductive analysis of modality? I propose that he has two options: one, to take impossible worlds to be ersatz constructions out of *possibilia*; two, to understand the notion of an impossible world as that of an inaccessible world. These proposals are developed in chapters III and V respectively. Furthermore, we saw that whatever else they might bring to the table, impossible worlds ought not play any role in the analysis of modality; and moreover that while there is an existing concrete impossible worlds proposal in the literature, it leaves many important questions, especially questions of a conceptual and logical nature, unanswered. Finally, while concrete impossible worlds in particular seem to face more problems than their ersatz alternatives, it remains to be seen what the latter can deliver and whether the problems of the former can be sufficiently overcome to present an overall stronger option.

CHAPTER II

Genuine Realism and the Reduction of Modality: A Defence

2.1 Introduction

Before we discuss alternative extensions of Genuine Realism (GR) about possible worlds into the terrain of impossible worlds, it is worth pausing to take a look at GR's reductive analysis of possibility. For, I take this to be the single most powerful factor behind choosing GR as one's theory of modality over its actualist rivals – even in the face of a desire for impossible worlds, which would pose fewer challenges for an actualist. Moreover, given that the present work is mainly concerned with the question of how to incorporate impossible worlds into GR without compromising its reductive analysis of modality, it is worth taking a moment to show that the analysis works in the first place. The structure of this chapter is as follows:

Section 2.2 illustrates GR's reductive analysis in some detail and introduces the type of objection, driven by questions of 'accuracy' or 'material adequacy' (to be explained shortly), which forms the focus of this chapter. Section 2.3 discusses versions of the objection by Charles Chihara, Jon Bigelow and Robert Pargetter, and Ross Cameron, of a doxastic, justificatory, or methodological nature. Section 2.4 addresses a version understood as a metaphysical circularity objection due to Scott Shalkowski, and sections 2.5 and 2.6 respond to versions that attribute conceptual circularity to GR's analysis. In section 2.5 I respond to an objection by William Lycan to the effect that unless GR is viciously circular it is inconsistent. In section 2.6 I respond to the latest version of the accuracy objection, this time by John Divers and Joseph Melia, to the effect that, unless GR is conceptually modal, it is incomplete. I conclude that all such circularity objections to GR fail.

2.2 The Reduction of Possibility, Its Value, and the Accuracy Challenge

Lewis' proposed reduction of possibility to truth at some genuine Lewis-world proceeds via the (by now familiar) bi-conditional:

- (P) It is possible that A if and only if there is a world w and at w , A

(P) employs no modal terms in the (right-hand-side) analysans, as we have seen, since a ‘world’ is in turn characterised non-modally as a spatiotemporally isolated mereological sum of spatiotemporally related individuals. Hence (P) can be deemed properly reductive, in the sense that no modal terms occur, either explicitly or implicitly, in the analysans.⁸⁰ Moreover, not only the particular analysis of modality via (P), but also the rest of GR-theory is devised so as not to employ any primitive modal concepts. As we saw in Ch I, the theory’s primitive concepts are non-modal, such as ‘individual’, ‘similarity’ and ‘spatiotemporal relatedness’ alongside set-theoretic and mereological notions.⁸¹

2.2.1 The Value of (P)

Before we proceed, it is important to clarify what is of value in the analysis put forth in (P), and so why, in particular, it is worth defending. First, Lewis’ analysis brings Quine’s “creatures of darkness” (Quine 1956: 139), i.e. modal and other intensional notions into the light, by giving them extensional truth (and identity) conditions.⁸² Secondly, (P) produces economy in theoretical primitives. For as Quine tells us, one of the measures of success for any theory is the extent to which it can do more with less, that is, the extent to which it can explain or analyse more phenomena by employing fewer theoretical primitives:

“It is valuable to show the reducibility of any principle to another through definition of erstwhile primitives, for every such achievement reduces the number of presuppositions and simplifies and integrates the structure of our theories.” (Quine 1936: 106)⁸³

Whatever one may think of this old and simple maxim of theory construction, it often seems overlooked or even misunderstood by those who question the value of the proposed analysis.

One complaint I have repeatedly heard against Lewis’ reduction, is that since we know much more about possibility than we do about what goes on at non-actual worlds, our *understanding* of what is possible is not in any way improved by its reduction to facts

⁸⁰ C.f. Divers (1997: e.g. 147)

⁸¹ C.f. Divers (2002: 50)

⁸² See Quine’s criticisms of modality, in particular, for instance in his (1953; 1956; 1960: §VI; 1961b)

⁸³ The page reference is to the (1976) reprint. Ontological parsimony in the types of entities we employ fits the same pattern: with the minimum number of kinds of entities we are to account for the maximum number of phenomena.

about such worlds, hence that the reduction is of little value. But this objection misses the point. The value of (P) is not in helping us *judge* whether something is or isn't possible by somehow looking to see what goes on at non-actual worlds. It is instead in providing an understanding of the *notion of possible truth* via the simple and familiar notion of just *truth* about something or other. (P)'s overall value thus lies in its placement of modal properties in an extensional naturalistic framework. In that sense, the proposed analysis is unlike, say, the analysis of knowledge as justified true belief, which informs us as to when we really have a case of knowledge and when we don't, by reference to further concepts in the same overall family. It is rather more like that of heat as molecular motion, or the reduction of numbers to sets. In both cases, it is the analysandum which is, epistemically, the more familiar concept. We do not need to know set-theory to know that two plus two equals four, nor do we need to look at the precise molecular state of a pan to know that it is hot. Similarly, we do not look to see what happens in other worlds to know what is possible, yet this does not mean that such analyses lack value. Their value lies in (a) placing the proposed phenomenon in an extensional or naturalistic ontological framework and (b) helping us thereby better analyse its formal properties by examining those of its reductive base. Questions as to how we find out whether or not something is possible are thus quite beside the point.

On another note, Vander Laan objects that GR cannot propose (P) as any sort of *explanation* of possibility, to the effect that something is possible *because* it exists. For, if so, he argues, one can legitimately go on and ask why it exists. Vander Laan concludes that unless GR answers the existence question without using "ineliminable" modal terms, without saying, e.g. 'because it is possible', GR too "makes a mystery of modality". (Vander Laan 1997: 609) But this objection rests on the fallacious assumption that for (P) to have any value, GR has some further duty to give an answer, and a non-trivial answer at that, to the existence question. GR has no such obligation. For whatever the response to the existence question, one can ask, again, why should it be so? Indeed, why-questions can go on indefinitely, and it is legitimate to analyse a phenomenon without having to thereby enter into an infinite series of explanations. We can easily transpose Vander Laan's argument in the case of heat: Why is this pan hot? Because its molecules are moving very fast. This is where the task of the theory of heat ends. The theory does not also have to answer the deeper why-question as to why the pan's molecules are moving fast. Moreover, nor will the relevant reduction be rendered null and void if the theorist concedes that one reason that the pan's molecules are moving fast is arguably because the

pan is hot. Similarly, one reason why something exists might well be because it is a possible thing. But (P) is not thereby rendered null and void; after all, given (P) all it means to say that a thing is possible is to say that there is a world where it exists.⁸⁴ GR does not make a mystery of modality by not giving a deeper answer to the existence question. No further explanations are required.

I thus take the value of (P) not to lie in furnishing us with methods by which to discover whether something is possible, nor in responding to a never-ending stream of why-questions, but rather, in true Quinean fashion, in reducing the number of primitives in our theory of the world, and placing possibility in an overall naturalistic framework.⁸⁵

2.2.2 *The Accuracy Challenge*

Now, to our main topic of discussion: The reductive success of (P) itself has been challenged repeatedly.⁸⁶ Notably, such objections are often motivated by the question of how GR can ensure that (P) always gives the right results, namely the accuracy, or material adequacy, of (P). Although the argument takes various forms, in essence it consists in the following thought:

- (1) GR cannot put forth (P) as a *materially adequate* analysis, unless it supplements it with a principle that ensures that (P) gives the right results.
- (2) But the only principle that ensures the accuracy of (P) is an irreducibly modal principle.
- (3) Therefore GR's analysis of possibility, insofar as it relies on a modal background theory, is, after all, circular.

In particular, objectors suppose that for the required background principle to ensure the accuracy of the left-to-right direction of (P), it must be a principle to the effect that GR's ontology omits no possibilities. And for it to ensure that (P)'s right-to-left direction holds, it must be a principle to the effect that GR's ontology includes no impossibilities. Most objectors thus claim that the theory cannot meet one or both of these conditions without employing a primitive modal principle along the general lines of (M):

⁸⁴ Lewis is very careful not to talk in terms of offering explanations in his (1986a), but see Miller (1991) for an argument for taking philosophical analyses as a kind of explanation.

⁸⁵ Since other worlds do not differ from ours in *kind*, modal truth, as at such worlds, is no different to truth at our natural world.

⁸⁶ E.g. Bigelow and Pargetter (1981; 1987), Shalkowski (1994), Chihara (1989), Lycan (1988; 1991a; 1991b; 1994: §4), Divers & Melia (2002; 2003; 2006) Divers (2002: §7), Melia (2003: §5)

- (M) For every, and only every, way that a world (or individual) can be some world (or individual) is that way

Now, couched in the theoretical language of GR, (M) becomes trivial.⁸⁷ If we equate ways with worlds, for instance, (M) says that every world is identical with some world; if we equate ways with world-properties, i.e. singleton sets of worlds, (M) says that every (world-)unit set has a member. Neither of these renderings can capture the thought that there is a world for every way a world can be, since they are all equally well satisfied whether there are just two worlds, seventeen or infinitely many. So, (M) must somehow be left in its modal non-trivial version to meet the accuracy challenge, or so the objection goes, and then the analysis proposed by GR allegedly becomes circular. This is, thus, the general objection to GR's reductive analysis from considerations of accuracy, or material adequacy.

2.2.3 Recombination

Interestingly Lewis does see a need to supplement his analysis with some ontological principle that ensures the *plenitude* of worlds, namely the thought that his pluriverse omits no possibilities; that there are no gaps in logical space (Lewis 1986a: 86).⁸⁸ Happy to let (M) “go trivial” (Lewis 1986a: 87) and guided by his belief in “the Humean denial of necessary connections between distinct existences” (1986a: 87), Lewis proposes to recapture the idea that there are no gaps in logical space via what has come to be known as the principle of Recombination, namely the idea that “‘patching together’ parts of different possible worlds yields another possible world.” (1986a: 87-88)

Lewis further qualifies this informal formulation by noting that such recombination should be done “by means of coexisting duplicates” (1986a: 89), given that no individual exists in more than one world, and that “anything can coexist with anything else” (1986a: 88) under the provisos that “they occupy distinct spatiotemporal positions” (1986a: 88) and that the “the parts of a world must be able to fit together within some possible size and shape of spacetime.” (1986a: 89-90). John Divers offers a formal formulation of the principle:

⁸⁷ C.f. Lewis (1986a: 86-87). Lewis attributes the point to Van Inwagen.

⁸⁸ Given that Lewis rejects the very coherence of impossible worlds he does not perceive an equal need to ensure that no world is impossible. (c.f. Lewis 1986a: 7 fn 3)

- (R) “For any individuals x_1, x_2, \dots, x_n there is a world containing any number of duplicates of each, if there is a spacetime big enough to hold them all, and such that for any spatiotemporal relation [or analogue thereof, presumably excluding coincidence], the duplicates in question stand in that relation.” (Divers 2002: 46)

Lewis’ Recombination principle is a testament to the fact that Lewis does see a need to say something meaningful about the plenitude of possibilia. But the question is precisely what the role of Recombination is in the theory. Is it really to somehow ensure the accuracy of (P) by GR-lights? If so, in what sense? If not, why postulate Recombination in the first place? I propose that the answers to these questions will become clear as the discussion unfolds.

2.3 Accuracy and Epistemic Circularity

Let us first turn to epistemic versions of the objection to the effect that GR’s analysis is not accurate unless it is modal, therefore circular.

2.3.1 Modal Beliefs and Analysis Construction

First to object to GR’s reductive aims are Bigelow and Pargetter (BP 1987). BP argue that GR fails to provide a reductive analysis of modality on the grounds that its construction of accurate truth-conditions for particular instances of (P) is itself guided by pre-theoretical modal intuitions. In particular, they argue that in order for (P) to give us the correct truth-conditions for *de re* modal claims, the counterpart relations that are employed in the analysis of such claims need to be tailored according to our existing modal beliefs to give us the right results. In particular, they “must be constrained in such a way as to ensure that a concrete world never represents inconsistent possibilities *for* actual entities.” (BP 1987: 111) As a first example, BP point out that, even if an other-worldly car is a consistent object,

“... [this] is not by itself enough to ensure that it does not represent inconsistent possibilities for *your* car. If the other worldly car were to be counted as a counterpart of both your car and say Gorbachev, then that car would represent the possibility that Gorbachev could have been your car” (BP 1987: 111)

Similarly, they point out that while a counterpart of yours in another world is taller than you, it also happens to have numerically distinct parents:

“Height is one respect in which your counterpart differs from you, parentage is another. Does this mean that ... you could have had different parents from the ones you did have? Or that you could have had parents from another galaxy?” (BP 1987: 112)

They conclude that GR must “tailor the counterpart relation in such a way as to ensure that it generates the ‘right answers’” (BP 1987: 112) and that “this tailoring presupposes modal assumptions” thus “robbing” GR of its reductive analysis. (BP 1987:112)

Now, while it is true enough that GR is thus guided by pre-theoretical modal beliefs in providing the right truth-conditions for *de re* modal claims, this is only to be expected of any analysis of a pre-theoretical concept, if it is to accurately capture that very pre-theoretical concept.⁸⁹ In constructing a conceptual analysis of knowledge as justified true belief, for example, we are guided by our intuitions about our concept of knowledge in our choice of analysans. Similarly, if we want to construct a theory which identifies heat with some molecular state, we will be guided by our experience of the phenomenon of heat in our choice of the particular state for our identification. The point is that the question concerning reduction is not by what method we discern the correct truth-conditions for modal claims but rather whether the truth-conditions themselves are modal. As Lewis notes,

“Circularity is a matter of what you analyse in terms of what; it is not a matter of why you think your analysis is right. It is not circularity if you build your analysis to give the answers it ought to, exercising your understanding of the *analysandum* as you go.” (Lewis 1986a: 154)

And the fact that we are guided in our choice of counterpart relations by our modal intuitions does not mean that the notion of a counterpart is itself modal.

Moreover, and for what it’s worth, BP’s particular examples suffer from some misconceptions: While my counterpart’s parents are from a different world than I am, it is

⁸⁹ C.f. Divers (2002: 111)

not *a property* of any of my counterparts that their parents are from a different world (than their offspring). Then, according to the GR-analysis, to the extent that my counterparts have no such property of having other-worldly parents, I could not have such a property. Moreover, that my car could not have been Gorbachev is arguably merely a matter of general opinion about the kinds of counterpart relations that govern inanimate objects. To the extent that such essentialist intuitions vary, so should the proposed counterpart-theoretic truth-conditions of such (*de re*) modal claims. If anything the demonstrated flexibility in the construction of truth-conditions for modal claims within GR-theory should be considered a *virtue* of the GR-analysis, (catering to varying modal opinion).

In sum, Bigelow and Pargetter's objection is that (P) gives accurate results only if we allow ourselves to be guided by our pre-theoretical modal intuitions in choosing the right truth conditions for modal claims. And therefore that GR's analysis is accurate only if it is implicitly modal, i.e. circular. But, insofar as GR's task is to provide an analysis of our pre-theoretical modal concepts, as opposed to defining new ones from scratch, GR is allowed to be guided by pre-theoretical modal beliefs in choosing the right analysans, stated non-modally, for a given instance of the analysandum. So their arguments fail to establish that (P) cannot give the right results unless objectionably circular.⁹⁰

2.3.2 *Modal Beliefs and Recombination*

A similar objection, this time focusing on Recombination, is presented by Charles Chihara (1988). He argues that besides being guided by his modal intuitions in *testing the results* of his theory, Lewis allows irreducibly modal thought to form the very ground on which the theory is built. In particular, Chihara argues that since Lewis' postulation of Recombination is 'grounded' on Humean modal intuitions regarding the absence of necessary connections between distinct existences, primitive modality is never really dropped from the theory:

“The reason that Lewis thinks he can affirm his principle of recombination is because he believes he can affirm the Humean principle. It should now be clear that modal beliefs are not only guiding the very formulation of this principle of recombination, but also modal beliefs form the very ground of Lewis' conviction that the principle of recombination is true. We see that key assertions of Lewis' world theory are based on

⁹⁰ See also Divers (2002: 110-112).

modal intuitions. Thus, when Lewis produces his analysis of modal notions, the *intuitive modal theory is never really dropped; it continues to function within the new framework*. Because of this, I do not believe that Lewis's "reduction of modality to worlds" is a genuine reduction in any serious sense." (Chihara 1988: 286)

In short, the charge seems to be that Lewis is guided by his modal intuitions in constructing an appropriate theory of modality. But so what? Chihara's challenge fails to present a challenge beyond that by BP. He seems to think that while it is legitimate to be guided by one's modal intuitions in choosing the appropriate truth-conditions for some particular modal claim from within the GR-theoretical resources, it is somehow illegitimate to be guided by one's modal intuitions in constructing an analysis of the modal. But this is not so. For, if the final theory is to afford an analysis of our pre-theoretical modal beliefs, then its construction needs to proceed in light of those beliefs. Again, Lewis' acceptance of Recombination as true on the basis of his modal intuitions does not render the analysis circular, as long as Recombination itself (and the overall theory) is not laid out using irreducible explicit or implicit modal concepts. And so, Chihara's objection fails to present any new challenges to GR.

2.3.3 *Methodological Circularity Worries*

But maybe the kind of circularity that Chihara has in mind is methodological in nature. Leading up to his previous quote he writes:

"If I were attempting to give an analysis of the word 'cousin', I could use certain preanalytic truths of which I am certain, such as that Harry, Don and Sally could be correctly said to be cousins of mine. ... I know that Harry, Don and Sally have a mother who is my mother's sister. By analysing other such examples I can come to the conviction that a cousin is a child of a sibling of a parent. And there is no circularity in using my fund of preanalytic beliefs about cousins to test my analysis. But notice that, in this case, I establish on independent grounds that Harry has a mother, who this mother is, and that this mother is a sister of my mother. I do not use my beliefs about "cousin-hood" to discover these things or to convince myself that I know such things. This is where Lewis's procedure is very different. Lewis has no independent way of discovering what worlds there are, what the nature of these worlds are, or anything about these worlds (apart from "our world")." (Chihara 1998: 285)

Here the charge seems to be that, unlike one's epistemic access to (and so grounds on which to postulate), say, facts about mothers and siblings, on the basis of which to analyse cousin-hood, the only epistemic access we have to what worlds there are is via our modal beliefs (and indeed only when bridged with the analysis (P) itself). This is true enough, but it doesn't mean that GR thereby fails to reduce the concept of possibility to the non-modal concept of truth at some part of reality. Now, we face a separate question: is GR guilty of some sort of methodological circularity, a circularity in the kind of justification it offers for belief in its ontology, and so in the adequacy of its analysis?

To answer this question, let us look at an objection by Ross Cameron that elucidates this theme. In short, Cameron argues that GR cannot offer any independent justification for accepting Recombination, *outwith* acceptance of (P) itself, which entails a commitment to possibilia, and which Recombination is supposed to support. (Cameron 2007: 151) Thus, according to Cameron, we are trapped in a vicious justification-circle on which we can get no independent purchase: to believe (P), we need Recombination; to believe Recombination, we need (P). He concludes:

“Lewisian realism can only be said to be an explanation of the modal if there is the requisite correspondence between facts about worlds and modal facts; since I have no reason to believe such a correspondence holds I have no reason to think that Lewisian realism offers an explanation, let alone the best explanation, of the modal.” (Cameron 2007: 152)

Yet while it is true that GR offers no independent grounds for the acceptance of (P), it does not follow that GR is methodologically circular. This type of argument rests on an assumption that warrant for GR should proceed in a linear fashion, when Lewis (e.g. 1986a: 3, 135) is quite clear that the only way to endorse his proposed analysis is to endorse the theory wholesale, upon balancing up its costs against its merits and against those of its rivals. Although controversial, Cameron talks in terms of an ‘explanation’ (rather than ‘analysis’) of the modal, so let us follow him in that. Let us suppose that we have a (quite complex) inference to the best explanation (IBE) from modal truths to GR-truths about non-actual worlds. Now, Cameron seems to object that in order to believe that GR is to be accepted as the *best* explanation of modal truths we have to first believe that it is a *true* theory. Yet we have no independent grounds to suppose this to be so.

However, this reasoning gets things the wrong way around. Upon inspecting GR, either you come to believe that GR offers a superior analysis of the modal or you do not. If you do, then by (IBE) you can gain justification for accepting GR as a true theory. In short, if you think that GR offers the best theory around, then you have good reason to accept it as true. Of course, it is open to anyone to deny that GR is the best theory, on the basis that no good theory could ever entail the (novel) existential commitments of GR.⁹¹ Even Lewis (1986a: 135) concedes as much, noting that for some the price may be too high. But this has no bearing on the question of justification for GR. That the objector rejects the particular explanation offered by GR as best does not mean that GR offers no methodological entry point (via IBE) for a warranted acceptance of its hypotheses. Thus, Cameron's argument fails to make a justificatory dent on the GR-edifice.⁹² Relatedly, while Chihara is right that Lewis has no independent epistemic access to (or warrant for postulating) facts about other worlds, this does not represent an objectionable methodological shortcoming for the theory, since the postulated entities are to be endorsed or rejected upon considering their analytical or explanatory merits.

In short, epistemic circularity objections based on adequacy considerations, as seen so far, fall short of demonstrating that GR fails to provide a reductive analysis of modality. There is no objectionable doxastic circularity in using one's pre-theoretical modal beliefs to construct a theory that gives the right results, or in using these beliefs to choose the right analysans for a given analysandum. Nor is there methodological circularity in the postulation of the relevant reductive base for GR's analysis, or in accepting Lewis' analysis of modality as materially adequate.

2.4 Accuracy, Arbitrariness and Metaphysical Circularity

Next is a well-known objection by Scott Shalkowski (1994) to the effect that GR's analysis is inaccurate, or even arbitrary, unless implicitly modal in some metaphysical or

⁹¹ Thus, Cameron later compares GR to a proposal by Forrest (1984), which he argues to be superior based on these criteria.

⁹² Cameron further qualifies his rejection of IBE as follows: "While I accept that Lewisian realism might provide the best explanation of the modal from the point of view of the Lewisian realist, that is precisely because they deny the claims that are true by the lights of my current theory, or indeed by any neutral theory, that rule out Lewisian realism as being the best explanation of the modal." (Cameron 2007: 152) But the question of the acceptance of GR is not a matter of perspective. Besides it being debatable what a 'neutral theory' is, we can easily imagine someone who is initially ontologically neutral regarding the existence of other worlds, deciding to accept GR as the best theory of the modal once he has surveyed it and its rivals and found the latter wanting. No one was borne a Lewisian realist after all, yet the theory arguably does enjoy some followers.

ontological sense. Shalkowski begins, as usual, by noting that for GR to provide an accurate analysis it must meet the conditions “that all the objects in the reductive base...must be objects that possibly exist” (Shalkowski 1994: 677), and that “the set [of them] must be exhaustive” (Shalkowski 1994: 679). We can immediately see that Shalkowski’s two conditions encapsulate the adequacy conditions for (P) articulated in (M), namely that for (P) to be an accurate analysis, *it must be the case that all, and only, the possible worlds exist*. However he takes this to pose deeper constraints. He argues, that unless this condition is met, “the resulting reduction of modality is just as *arbitrary* as the reduction in terms of impossibilia or bottle caps” (Shalkowski 1994: 680, my italics). And he maintains that GR cannot meet this condition without abandoning its reductive aspirations: To allow such a modal constraint on worlds “...is to contradict the reductive modal realist’s hypothesis that the existence of worlds is the prior, or more basic feature, of reality and modality the posterior, or less basic, feature.” (Shalkowski 1994: 675-6)

In short, Shalkowski’s objection is not simply that unless GR’s ontology satisfies certain modal conditions, it fails to put forth an accurate analysis, but that unless modal facts are ontologically prior to world-facts, GR’s analysis of modality is arbitrary. However, in talking about arbitrariness Shalkowski conflates matters of accuracy with whether GR’s choice of reductive base is motivated any better than one of bottle caps. And, in talking of prior modal constraints, he conflates questions of ontological priority with questions of theoretical or even ontological reduction. But these extra layers of interpretation cloud the issue, and once stripped of them, the objection falls. Let us take these matters in turn.

2.4.1 Arbitrariness

First to the question of arbitrariness: What does it mean to say that, without (M), GR’s choice of objects at the reductive base is arbitrary? It seems to mean that we are given *no reason to believe* that the chosen objects are fit for the job, or any more fit than any other random choice of objects. But if so, it is clear that the arbitrariness objection is *epistemic* in nature, for it asks: *what reason do we have to believe* that the space of possibilia is plenitudinous in a way that the bottle-caps or pencils in one’s drawer are not? Now, to this one may immediately reply that if the Lewisian ontology were to be conceded, then there would certainly be more Lewis worlds than there are bottle-caps or pencils in one’s drawer; moreover, that Lewis’ Recombination gives us reason, *within* GR-lights, to believe

that there would be enough of them.⁹³ More importantly, whatever our reason to believe, even by GR lights, that GR's reductive base is better suited to the proposed reduction than bottle-caps, such epistemic or justificatory concerns, as we have seen, should not bear on the question of the reductive success of GR's analysis of possibility. As long as the theory employs no explicit or implicit modal concepts in setting forth its tenets, its analysis can be deemed properly reductive.

2.4.2 *Ontological Priority*

Now to the question of ontological priority: Robbed of its epistemic slant, the arbitrariness charge simply devolves into the charge that (P) is not materially adequate unless condition (M) acts as a prior modal ontological constraint on GR-worlds. Here, Shalkowski conflates questions of reduction with questions of ontological priority, when the latter need not have any bearing on whether a reduction of modality in terms of worlds succeeds. As Divers (2002: 113) correctly points out, God, or atoms, may be ontologically prior to everything else, but this doesn't mean that the concept of God, or that of an atom, is not amenable to successful theoretical reductive analysis.⁹⁴ Reductive success is only a question of what you analyse in terms of what; not whether your analysans is ontologically prior to your analysandum.

One may wonder: are we right to keep questions of conceptual reduction apart from deeper questions of metaphysical reduction? As Shalkowski reminds us:

“The question of whether modal facts are ultimately (perhaps complex) nonmodal facts becomes, then, the same as the question of whether theories that use modality are ultimately reducible to theories that do not. When thinking about science, one might ask whether chemical phenomena are, at bottom, physical phenomena. This puts the matter in metaphysical terms. Alternatively, one might ask whether chemical theory is reducible to physical theory. This puts the issue in terms of the relation between two

⁹³ C.f. Chihara: “Shalkowski evidently thought that the reducer would be in the untenable position of having no idea of whether the things in the domain of the theory could do the job they were being asked to do.” (Chihara 1989: 281) But the reducer is in no such position, for (a) outwith his own ontological principles he believes that his theory is the best and hence that it must be true; and (b) by his own lights, Recombination ensures his non-actualia are not an arbitrary bunch.

⁹⁴ Divers also notes that it is equally no threat to GR to think that worlds have modal properties, say, exist necessarily, since we can still reduce such properties to further facts about worlds and their relations. Similarly, he points out, people may have moral properties, but this doesn't block the reduction of moral properties to people and their actions; sets have numerical properties, but this doesn't prevent the reduction of numbers to sets, and so on. (Divers 2002: 113)

theories. If the theories are interpreted realistically, we can move uncontroversially between questions of ontological grounds and reducibility.” (Shalkowski 1994: 672)

True, like any good scientific reduction, a good reduction of modality ought not just reduce modal terms to non-modal terms, but truly reduce or ground the modal features of reality to its non-modal features. Nonetheless, it suffices to that end to *identify* modal properties with certain non-modal properties, without an additional thesis regarding the ontological priority of one over the other.⁹⁵ As, Shalkowski’s own quote suggests, all we need is the identification between different kinds of facts – that “modal facts are, ultimately...non-modal facts”. Building on Divers’ previous example, we might take God to be ontologically prior to everything else yet still identify both the concept of God, and God, the entity itself, with all-there-is. A theory can be metaphysically reductive because it offers an ontological identification between two different kinds of fact, giving one as the truth-condition for the other to obtain, without thereby making claims of priority. So Shalkowski’s claim that the reduction fails because there are metaphysically prior modal constraints on what worlds there are can be safely rejected.

2.4.3 Modal Conditions on (P)’s Accuracy

Thus robbed both of its epistemic and metaphysical loads, Shalkowski’s objection devolves into a charge that GR’s analysis is accurate, *only if* there are modal constraints on its ontology, and that therefore, GR’s analysis is accurate *only if* it is modal. In Shalkowski’s mind, for the reduction to work “there can be no modal restrictions on these worlds.” (Shalkowski 1994: 675) But this is simply wrong. Surely, there is something wrong in calling an analysis of modality circular merely on the basis that one cannot non-modally and non-trivially state its conditions of accuracy. When you reduce possibility to truth about some domain, then it is only to be expected that a *correctness* condition on that reduction is that the truths about the proposed domain are all and only the possibilities. Theodore Sider thus rightly protests to this unreasonable assumption in Shalkowski’s argument:

⁹⁵ C.f. Divers (2002: 114)

“If the existence of an *F*-ness condition of adequacy on an analysis of *F*-ness would render the analysis circular, then no analysis of *anything* would be non-circular.”

(Sider 2003: 197)

Indeed. Consider a reduction of a mental property, say, pain to a physical phenomenon, say for simplicity, C-fibres firing. So take the putative analysis:

(T) x is in pain if and only if x 's C-fibres are firing

Now, this is clearly a reductive analysis, for no mental terms occur on the right-hand-side of (T). But now, let us consider: What would it take for (T) to be an accurate reduction? Reality must obey certain *mental* constraints for the analysis to be accurate: in particular, all and only the pain incidents should be C-fibre incidents. Well, of course! For this is what the analysis says is the case. We can doubt (T)'s accuracy (or that the reductive base is appropriate for (T) to work, or that physical facts are prior to mental facts), but the fact remains that (T)'s condition of accuracy cannot be stated without the ineliminable use of mental terms. Yet this does not make (T) any less reductive.⁹⁶ Similarly, with (P). Of course, all and only the possible worlds must exist for (P) to be an accurate analysis of possibility. We can doubt the accuracy of (P) (or the appropriateness of the choice of analysans, or believe that modal facts are fundamental), but the fact remains that (P)'s conditions of adequacy cannot be stated without the use of ineliminable modal terms. And this does not make (P) any less reductive.

Along with Sider, we can distinguish two separate desiderata for any reductive analysis of modality to be successful.

[(i)] “An analysis is genuinely reductive if the terms in the analysis are non-modal;

[(ii)] it is materially adequate if the truth-values it assigns to modal sentences are the correct ones.” (Sider 2003: 197)

Condition (i) is clearly met by GR, since (P) involves no modal terms in its right-hand-side. Hence (P) is properly reductive. Now, it is a *further* question whether (P) is accurate, that is, whether it satisfies condition (ii), by assigning intuitively correct truth

⁹⁶ As Graham Priest has suggested to me, we could also compare (i) the definition of algorithms in terms of turing machines; (ii) the definition of a continuous function in terms of epsilon-delta; (iii) the definition of real numbers in terms of Dedekind sections.

values to various modal locutions. It is true that in order for condition (ii) to be met, the pluriverse must satisfy modal conditions, in particular be such that (P) always comes out true. But this should not be surprising or objectionable. This is just an instance of the general truth that “an adequacy condition on the analysis of *F*-ness as *G*-ness [is] that all and only *F*s are *G*s.” (Sider 2003: 197).⁹⁷

In sum, robbed both of its epistemic and metaphysical loads, Shalkowski’s objection becomes an unreasonable demand that GR non-modally and non-trivially state its own conditions of accuracy. But, as Sider correctly points out, if that was a legitimate demand on any putative reductive analysis, then no analysis of anything could ever be reductive. And so, too, Shalkowski’s objection fails.

2.5 Conceptual Circularity & Inconsistency: Impossible Individuals

Let us now move to a formulation of the accuracy objection, due to William Lycan (1988; 1991a; 1994) according to which GR is conceptually circular, i.e. relies on implicitly modal concepts to formulate an accurate analysis of modality.

Lycan objects that at least two of the primitive GR-concepts have to be implicitly modal, if GR is to provide an accurate analysis of possibility. He objects that unless by ‘individual’ GR really means *possible individual*, the right-to-left direction of (P) fails, for GR generates impossible worlds *qua* mereological sums of impossible individuals.⁹⁸ Similarly, unless by ‘spatiotemporal relation’ GR means *possible spatiotemporal relation*, again, (P) fails, for again GR generates impossible worlds *qua* impossibly related sums of individuals. In short, without a tacitly modal understanding of the GR-notions *individual* and *spatiotemporal relation* “any object including any given round square cupola *is* spatiotemporally related to the (actual) Sydney Harbour Bridge – albeit by some logically incoherent relation.” (Lycan 1990: 213)⁹⁹

Given that part of my overall aim is to outline and defend an extension of GR into concrete impossibilia, I am ultimately sympathetic to Lycan’s point. Nonetheless, it poses no threat to Lewis’ Possibilist-Only GR (PGR), which is set in a classical logical framework. The following quote by Miller captures the essence of this retort:

⁹⁷ C.f. also Chihara: “Might not the worlds satisfy these two conditions even though the theory makes no such modal assertion, as is claimed by Shalkowski?” (Chihara 1989: 281) Indeed.

⁹⁸ Lycan (1988) initially puts his point with respect to GR’s concept of ‘world’, but Miller (1989: 477) correctly responds that this is wrong insofar as a world is non-modally analysed as a mereological sum of spatiotemporally related individuals. Only then does Lycan (1990) put the worry in terms of *individuals*.

⁹⁹ For a related criticism to the effect that for any truth-at-a-world analysis of modality to be adequate that analysis must somehow restrict quantification to *possible* worlds, see Colin McGinn (2000: 70-72).

“‘Round square cupola’ purports to be a description of a possible object, but it is not. It is a contradictory description and so describes nothing. Hence it describes no individual.” (Miller 1993: 154)

Along similar lines, Divers and Melia note:

“...the hypothesis of the existence of impossible individuals is an inconsistent proposition, [so]... the existence of impossible individuals is inconsistent with the ontological postulates of [GR].” (DM 2002: 24, fn 16)

In short, as long as the background logical framework of PGR is classical, any inconsistent hypothesis can be safely rejected. It is in this very spirit that Lewis (1983c; 1986a: 7 fn 3) dismisses the hypothesis of concrete impossible worlds (see Ch IV). For if truth at other worlds is simply truth about parts of reality then the hypothesis of impossible worlds is a classically absurd hypothesis.¹⁰⁰

Crucially, the reply to Lycan should not be that GR-ontology is consistent, because nothing *can* violate the law of non-contradiction, or because all worlds are consistent, which is question-begging. Miller for example maintains that we can “define ‘contradictory’ as false in every world” without fear of circularity, unless, that is, “we needed the concept of contradiction to explicate world *and* needed the concept of a world to explicate the contradictory. But we only need the latter and not the former.” (Miller 1993: 160) But this response simply begs the question against Lycan, whose point precisely is that the contradictory is not false at every world, unless worlds are defined as sums of *possible* individuals (and relations). The right response instead involves no appeal to worlds. It notes that PGR-ontology is consistent, because any hypothesis that violates the law of non-contradiction is classically incoherent, therefore can safely be rejected. And while this stance is certainly logically dogmatic, there is no circularity in supposing your ontological postulates to be underwritten by your logical theory.

I think that this difference in basic logical assumptions explains the apparent stalemate that seems to have followed Lycan’s objection. Lycan (1994) notes, as an afterthought, his puzzlement that Lewis and Stalnaker seem “profoundly unconvinced” by his argument and

¹⁰⁰ Manuel Bremer might have this point in mind when he notes that “there is nothing logically special about the actual world”. (Bremer 2003: 80)

that “...both seem to reject [his] assumption that it is tendentious, stipulative, or otherwise committal to ignore impossible worlds.” (Lycan 1994: 93) The only plausible (or charitable) explanation for such outright rejection lies in recognising that a theorist is entitled to defend his conceptual analysis on the basis of his choice of background logical theory and that he is under no obligation to simultaneously defend both.¹⁰¹

In short, insofar as GR is couched within the larger confines of classical logic, it does not need to defend itself against an attack based on a hypothesis it deems incoherent. If, of course, the debate were to move onto the question of GR’s choice of logical theory itself, then it would be question-begging for GR to dismiss the hypothesis that some contradictions, somewhere, are true on the basis of the law of non-contradiction. But to the extent that this is not what is at issue here, Lycan’s objection can safely be countered. Looking ahead, the situation naturally changes for the concretist GR-impossibilist, who endorses Lycan’s supposition, thus allowing Recombination to range over inconsistent objects and relations. Concretist IGR thereby incurs two obligations: (i) a readjustment of either GR’s logical framework, or its truth-at-*w* conditions; and (ii) a non-modal modification of (P) in order to preserve its accuracy. These matters are taken up in Chs IV and V respectively.

Before we move on, it is worth noting that Divers and Melia (DM 2002: 23-24), and Divers (2002: 108-110) argue that to avoid Lycan’s objection PGR needs to amend Recombination to quantify only over actual individuals (and relations), and their duplicates (analogues), their argument being that actual individuals (our world-mates) are *a fortiori* possible individuals, hence so are the worlds consisting of their duplicates. But I find this response too limiting – indeed it paves the way for DM’s own objection to GR’s analysis, based on a perceived inability to generate alien individuals. If we can block Lycan’s objection simply by noting that PGR can legitimately reject any inconsistent hypothesis as incoherent given its classical logical framework, we can ignore this alternative and more limiting response. I believe we can. So Lycan’s objection that Lewis cannot offer an accurate analysis of modality, without rendering that analysis conceptually circular, fails.

¹⁰¹ Note, further, that a choice of logical theory can be made irrespective of what one thinks is or is not possible. (witness paraconsistent logics whose rules range over impossible worlds). Or, one may think that some contradictions, being actually true, are also possibly true, (yet still subscribe to LNC taking it to be always true (and sometimes false), e.g. see Priest 2001:§7).

2.6 Conceptual Circularity & Incompleteness: The Plenitude of Alien Properties

In the rest of this chapter, I will concern myself with a tricky “incompleteness” argument put forth by Divers and Melia against GR (DM 2002), which constitutes the newest circularity charge against GR on the basis of considerations of accuracy.¹⁰² The argument, in short, is that, even granting the truth (and consistency) of Recombination, GR cannot ensure that its space of worlds is complete with respect to alien properties, (which we suppose are infinite in number), without recourse to primitive modality.

2.6.1 The Argument

Divers and Melia begin by reminding us that Lewis accepts the hypothesis of *alien* natural properties, i.e. basic properties not instantiated by any actual individual, and not obtainable by recombining (duplicates of instances of) actually instantiated properties.¹⁰³ Moreover they correctly argue that, if we are to allow for such alien properties, the only plausible supposition is that they are infinite in number, since any supposition that there are, say, seventeen instead of eighteen (and so on up) seems arbitrary. Hence, even if GR is consistent with there being a finite number of such properties, the only warranted bet is for GR to allow for their number to be infinite. (DM 2002: 27-30) These assumptions are in step with Lewis’ own thoughts (e.g. Lewis 1986a: 1-2, 91-92) on the matter.

Now, the main argument by DM centres on the question of whether GR ensures that logical space is complete with respect to such properties. Granting that there are infinitely many alien properties, how can GR ensure that *all* of them are instantiated in its ontology? DM propose the following postulate to complement Recombination, let us call it an Alien-Completeness postulate:

(AC) “For any n there are n objects that, between them, instantiate n distinct alien natural properties” (DM 2002:30)¹⁰⁴

From that point, the DM argument from (AC) to a failure of completeness is this: (AC) cannot differentiate between two sets of worlds, both of which satisfy condition (AC) for

¹⁰² Their argument is repeated in Divers (2002:114-20) and Melia (2003: 114-121). I will focus on the joint paper here.

¹⁰³ GR’s ability to allow for alien properties is taken as an advantage, for instance, over Armstrong’s Combinatorialism (Armstrong 1989: 21; Lewis 1992), so should not be relinquished. In any case it seems reasonable to suppose that not all possible natural properties are actually instantiated (c.f. Lewis 1986a: 1-2, 91-92; 1992: 212)

¹⁰⁴ Where ‘ n ’ could be infinite.

the case where n is infinite, yet one of which omits certain alien properties. Therefore, even when supplemented by (AC), GR is alien-incomplete, so *a fortiori* incomplete. In particular, suppose (AC) expresses alien-completeness and take S to be the set of worlds which is alien-complete. *Ex hypothesi* n is infinite, so there is an infinite sequence of distinct alien properties $P_1, P_2, P_3, \dots, P_n$ instantiated in S . Now take S^* , consisting of individuals that only instantiate the alien properties P_2, P_4, \dots, P_{2n} , which also constitute an infinite sequence. Clearly, S^* is a proper subset of S , since it excludes properties included in S , and so not alien-complete.¹⁰⁵ But S^* instantiates the same infinite *number* n of alien properties as S – the elements in S and S^* stand in a one-one correspondence – and so S^* also satisfies (AC) for the case where n is infinite. So, it follows that (AC) does not guarantee that the space of worlds is alien-complete, as in S , since S^* also satisfies (AC) but is not alien-complete. So GR, even when supplemented by (AC) remains incomplete with respect to the total space of possibilities. (DM 2002: 26-32)

Divers and Melia briefly consider and dismiss some repair strategies for (AC). (DM 2002: 32-34) For instance, they note that trying to fix the situation by adding principles to the effect that $P_1, P_3, \dots, P_{2n+1}$ are instantiated fails because these stipulations are empty. I grant that since P_1, P_3, \dots are mere variables, and we have no *names* by which to refer to aliens, we seem unable to stipulate that particular aliens are instantiated by referring to them by name. Further proposed strategies seem clearly unattractive by being either obviously faulty or too costly. DM consider, for instance, the addition of universals into GR, or the denial of the infinitude of aliens, all of which rightly seem rather pricier than what a proponent of GR would like to pay. They finally submit that alien-completeness can only be non-trivially established by GR if an explicitly modal principle, to the effect that every way a world *could* be some world is, is left unreduced. (DM 2002: 34; 2003: 84). Thus, they conclude, GR cannot articulate an analysis of possibility that is complete, i.e. one that is underwritten (left-to-right) by GR's ontological principles, without becoming conceptually modal. (DM 2002: 35)

2.6.2 What is Wrong with the Divers-Melia Argument: An Overview

Now, this argument generates considerable suspicion. First of all, Lewis is the first to recognise that Recombination does not suffice to generate alien worlds; but he does not

¹⁰⁵ DM note that S^* being a subset of S is not enough to make S^* alien-incomplete, since there might be indiscernible worlds. It is the fact that S^* by definition omits some of the properties instantiated in S that makes S^* incomplete. (DM 2002: 31)

seem the slightest bit disconcerted by this. He simply comments that even though “...recombination will not generate alien worlds out of the parts of this world, it nevertheless applies to alien worlds. ... If there are some, there are many more.” (Lewis 1986a: 92) In that sense, the Divers-Melia argument establishes nothing new – and certainly nothing that Lewis thought objectionable – for GR. There is no talk in Lewis (1986a) of Recombination (or the rest of the theory), for instance, having to provide some sort of ‘guarantee’ that the space of worlds is complete with respect to all basic alien possibilities. So, it is hard to see why one should take the DM argument to constitute a serious objection to GR. Nonetheless, let us set this issue aside for a moment. What the DM-requirement for GR’s ontological principles to ‘underwrite’ its analysis of possibility may amount to, and why DM think GR should do so, will be examined shortly (sections 2.6.3-2.6.6).

However that may be, the particulars of the argument themselves generate suspicion. For one, the principle (AC) that Divers and Melia first put forth as an alien-completeness principle for GR and then strike down, simply fails to even intuitively capture the thought that *all* aliens exist in logical space. For (AC) talks about a *number* n of aliens and, surely, talk of *number* is irrelevant to stating universality: saying that *any* number of them are there, intuitively doesn’t answer the question of whether *all* of them are there. All in all, one is thus left with the feeling that even if (AC), which in any case is of DM’s own invention, cannot establish alien-completeness, then so much the worse for (AC) and for the argument which proceeds from it.

Especially disconcerting is the fact that the DM-argument to incompleteness crucially turns on the inessential numerical formulation of (AC). For, instead of focusing on features particular to GR, their argument simply exploits the general fact that infinite sets stand in a one-one correspondence with their infinite subsets. What Divers and Melia essentially establish is that, given an infinite number of F s, *any* theory trying to guarantee the existence (or instantiation or inclusion) of *all* the F s with a principle which states that for any number n of F s, n F s exist, is going to fail. But this is hardly surprising. The attempt is analogous to some putative realist about numbers trying to capture the fact that *every* natural number exists by making it an axiom that that for any n , there are n distinct natural numbers. Or, it is analogous to a reductionist about the mental trying to ensure that the space of occurrences of C-fibres firing is complete with respect to the (let us suppose, infinite number of) occurrences of pain, by postulating that for any n there are n occurrences of C-fibre’s firing. This still doesn’t ensure that there is no pain-occurrence

without a corresponding C-fibres firing occurrence. (Indeed, the only principle that ensures this is one that states that the truth-conditions for the analysis are satisfied.) Note, moreover, that the argument does not highlight a shortcoming particular to *reductive* theories. The fact that (AC) is satisfied by both S and S^* has nothing to do with whether (AC) employs primitive modality. For instance, (AC^M) ‘For any *possible* n , n *possible* objects exist across the GR-worlds and n *possible* distinct alien natural properties are instantiated among these objects’ is equally well satisfied by S and by S^* , for the case where n is infinite, hence also fails.

As we saw, Divers and Melia anticipate dissatisfaction with (AC) by dismissing alternatives. Of particular interest, however, is the following principle, dismissed as “no stronger than [AC]” (DM 2002: 33):

(AC*) For every alien property P , there is a world w and an individual x in w such that x instantiates P . (DM 2002: 33)

(AC*) is of course trivial, for it says merely that each (non-empty) set of individuals has some individual as a member, and so is satisfied whether there are ten such sets, seventeen, or infinitely many. However if GR was allowed to espouse (AC*), which is stated in terms of universality, an argument that (AC*) cannot ensure that the GR-space of possibilities is alien-complete because (AC*) is satisfied by S^* which *ex hypothesi* is not alien-complete, would be question-begging. Of course (AC*) is trivial. But, between (AC) and (AC*) the latter is clearly a far better principle. For while (AC*) might fail to distinguish between different totalities, at least it constitutes an intuitive expression of plenitude, whereas (AC) fails on both counts.

Also in favour of (AC*) is that its cost is not really comparable to the cost of a far broader trivial principle put forth by Manuel Bremer, who, noting that GR-worlds and individuals simply are there, “*all of them* are there” (Bremer 2003: 81), contends that, given that properties are sets of individuals, the following will thus suffice for alien-plenitude:

(AIC) “For every [world-bound] individual there is a world which contains that individual.” (Bremer 2003: 81; c.f. DM 2003: 83 for the qualification in brackets)

Naturally, Divers and Melia reject Bremer's proposal as trivial. (DM 2003: 84) For one, as they correctly note, while it is true that all the individuals 'are simply there', by the same token, so are all sets of individuals, so the distinction does little work here. (DM 2003: 85) They conclude that if GR were allowed to go with such a trivial proposal, it could, by the same token, take the even shorter route and say:

(AWC) "All the worlds exist." (DM 2003: 84)

DM rightly reject (AWC) and (AIC) on the basis that they don't do any work to capture the notion that there are 'no gaps in logical space.' (DM 2003: 85) But (AWC) and (AIC) are not comparable with (AC*). Bremer's proposal throws the baby out with the bath-water. For Lewis' Recombination already allows GR to non-trivially state that *all* non-alien individuals are there, by recombining actual individuals. Moreover, Recombination would be sufficient to ensure that the total space of worlds is alien-complete, given some *base* set of aliens to recombine. So it is only at the level of *alien* individuals, and indeed only *basic* aliens, that the question of triviality even arises. Bremer's simply grants too much. (AC*), although trivial, is not comparable in cost to (AIC), (AWC) or any other such trivial principle that constitutes an empty affirmation of the entire GR-ontology.

And besides, nothing prevents GR from adding a *further* principle, to the effect that the number of alien properties is infinite (call it (INF)), to supplement (AC*). (And while, just as with (AC), (AC*)+(INF) cannot rule out that logical space is as per S^* rather than S , they are nonetheless sufficient to block an argument proceeding in the manner of Divers and Melia: For, by definition (AC*) can distinguish between any two sets of worlds, when one of these is *ex hypothesi* alien-incomplete. Or else, what right do DM have to quantify over properties beyond those in the range of (AC*)?)

I think the best strategy for GR is to let (AC*) trivially capture the fact that *all* basic alien properties are there, and allow Recombination to recursively work from that basis to ensure alien-completeness. This is, after all, what Lewis seems to be doing when he says that "if there are some [alien worlds], there are many more." (Lewis 1986a: 92) DM might reply as they do to Bremer: "To see what a postulate adds to the theory – do not guess: consider which metaphysical scenarios its truth rules out and which it permits." (DM 2003: 84) In reply, I say two things: One, while (AC*) may be compatible with 'different metaphysical scenarios' as to the *number* of alien possibilities (which can be

taken care of by a different principle like INF), it is not compatible with a metaphysical scenario that *there are* aliens that fail to be instantiated. Two, as I will argue shortly, the Divers-Melia idea that GR must ‘rule out’ certain metaphysical scenarios and ‘permit’ others in order to be accepted as a theory of modality that gives the right results, seems ill-fitted for an informal metaphysical theory such as GR.

In sum, what Divers and Melia establish is that GR is unable to establish non-trivially the truth of a universal statement of infinite instances, especially not by talking about the *number* of instances. But so what? Any realist theory would fail in the attempt to ensure all of an infinite range of entities are accounted for, non-trivially, and especially by enumerating them. So their argument does not highlight limitations particular to GR. Moreover, Lewis is well aware that Recombination does not ‘guarantee’ that logical space is complete with respect to all (basic, natural) alien possibilities, yet does not perceive this state of affairs worthy of extended discussion. I say, as Lewis does, let the basic alien-plenitude principle go trivial (supplementing it, if need be, with an additional principle to the effect that the number of aliens is infinite) and let Recombination take it from there. There is enough content in the rest of the theory, I contend, to make up for this.

Why do Divers and Melia disagree? I examine their reasons in the next two sections. Sections 2.6.3 and 2.6.4 elucidate and reject the Divers-Melia requirement that GR must in some sense ‘guarantee’ that logical space is complete with respect to the (alien) possibilities. Sections 2.6.5 and 2.6.6 examine and reject possible reasons why DM might think that GR has to provide such a guarantee.

2.6.3 Plenitude, Model Theoretic Completeness and Axiomatic Theories

Let us, first, clarify the sense in which Divers and Melia require that GR ‘guarantee’ that its logical space is complete with respect to all (and *a fortiori* all alien) possibilities. As it turns out, the kind of ‘guarantee’ that Divers and Melia are after, when they say that that the ontological component of GR should ‘underwrite’ the truth of (P), is a rather *formal* notion along the lines of *axiomatic entailment*.

That DM are after a rather formal result is immediately apparent when we look at DM’s formal terminology and methodology. First, they call their conclusion an “incompleteness” result. (DM 2002: 26) Even though they do give reasons for replacing Lewis’ term plenitude (DM 2002: 18 fn 6), their choice of terminology is not innocuous. If not anything else, the term ‘completeness’ comes with its own baggage, putting one in

mind of completeness for axiomatic systems.¹⁰⁶ Second, DM admit that they model their objection on arguments that show that “[c]ertain model theoretic constructions produce models of set-theory where the powerset of infinite sets is not complete – in the sense that the powerset fails to contain all the subsets of the infinite set – without thereby producing a sentence of first order set-theory that the set-theoretician can add to his axiomatisation in order to remedy the defect.” (DM 2002: 30, fn 21) Third, they couch their discussion in a language suitable to axiomatic theories, talking of *axioms*, (DM 2002: 15-17, 19, 23, 24, etc.) *models* that satisfy said axioms (DM 2002: 19, fn 6, 28, 30 fn 21), and *counterexamples* to completeness claims. (DM 2002: 30) They thus present GR itself as if it were an axiomatic theory, a theory consisting of a series of ontological and explanatory *axioms*, which together *entail*, or fail to *entail*, further ontological hypotheses about the pluriverse (DM 2002: 15-17, 28, 31, 34). In short, when DM say that GR should guarantee that logical space is complete with respect to all possibilities, they really expect that GR, *as a series of ontological and explanatory axioms*, *entail* that logical space is thus complete. The metaphysical scenarios that GR’s ontological axioms should, thus, ‘rule out’ are those that are inconsistent with those axioms; the permitted scenarios, on the other hand, are those that are consistent with the GR-ontological axioms.

At this point it is worth mentioning a skirmish that resulted from DM’s formal terminology and methodology, the latter provoking the following exchange between Divers-Melia and Alexander Paseau. DM’s model-theoretic approach causes Paseau (2006) to reply by pointing out that the DM-argument does not establish failure of completeness in any formal model-theoretical sense. What it establishes, as Paseau argues, is that GR+(AC) is not satisfied by a *unique* model *S* of worlds, and that this failing is quite distinct from a failing, in any formal sense, of completeness. He notes that since *all* GR-models – like *S* and *S** here – are isomorphic, i.e. stand in a one-one correspondence, GR+(AC) is *categorical*. And this means that GR+(AC) is model-theoretically complete, since all its models (here, both *S* and *S**) satisfy the same sentences of the theory’s language (Paseau 2006: 276 fn 9). As Paseau points out, it is a “well-known model-theoretic fact that categoricity entails model-theoretic completeness” i.e. “sameness of structure entails sameness of sentences true in each structure.” (Paseau 2006: 726). The

¹⁰⁶ They abandon the term ‘plenitude’ on the grounds that it could be misunderstood to mean that “the set of worlds is exactly of a given size”, that GR “is required to determine the existence of a maximal number of worlds”. (DM 2002: 18, fn 6) But, this seems a little forced given that Lewis clearly explains that by ‘plenitude’ he means that there are no gaps in logical space, and given that the term ‘completeness’ has far more formal connotations.

fact that S and S^* are isomorphic, then, is sufficient to show that they satisfy the same (modal) sentences and so that GR+(AC) is model-theoretically complete. To reinforce the point, Paseau draws a parallel with respect to Arithmetic:

“Consider the analogous argument about second-order Peano Arithmetic. This theory is categorical, since all its models are isomorphic to the intended natural number structure. It follows that any two models of Peano Arithmetic satisfy the same sentences of the language of arithmetic. But as should be evident, the interpretation based on the domain N^* of the even numbers 0, 2, 4, ..., is also a model of Peano Arithmetic.” (Paseau 2006: 727)

He concludes that the Divers-Melia argument is indeed “fallacious in the same way as the argument that says that an interpretation of arithmetic whose domain omits the odd numbers must give rise to an incomplete theory of arithmetic.” (Paseau 2006: 728)

Divers and Melia (2007) respond to Paseau with a vigorous attempt to clarify why their target notion of completeness itself is *not* model-theoretic. They explain that the notion of completeness they are after is more basic, simple (or “genuine” as they originally call it (DM 2002: 22)), which they take “to be a property of a set of worlds *simpliciter*” (DM 2006: 737), and according to which, GR would be robustly-complete “by containing worlds of sufficiently many different types to represent all of the possibilities” (Divers Melia 2002: 18). Then, they proceed to argue (laboriously but correctly) that this robust metaphysical completeness of possibilities is not entailed by model-theoretical completeness which merely involves the satisfaction of sentences. (DM 2006: 272-279) Among other things, they correctly note, for instance, that, since GR is a fully interpreted philosophical theory, one is not free to reinterpret the GR-vocabulary in the way associated with model-theoretic completeness, reinterpreting, for instance, ‘positive charge’ as ‘negative charge’ or ‘talking donkey’ as ‘smiling horse’. Therefore, isomorphic interpretations (S and S^*) are unlikely to represent the *same* metaphysical *possibilities*. For instance, two isomorphic worlds, each of which contains a single particle, charged positively in one world and negatively in the other, may have the same structure but fail to represent the same possibilities, in the robust sense of the distinct *properties*, of positive and negative charge. (DM 2006: 732) So, even if GR plus (AC) is model-theoretically complete, it is not genuinely complete. They also note, e.g., that since (P) is an analysis of the concept of possibility it should be fully *general*, and should not be considered

adequate, merely when any of a range of true sentences in *our* language are satisfied by a model of GR, but when there is truly no *possibility* (whether we have a name for it or not) that provides a counterexample to the adequacy of (P) by not being instantiated in the GR-pluriverse. (DM 2006: 738)

Of particular interest (harking back to an earlier point in 2.6.2) is the DM-reply to Paseau's Peano Arithmetic analogy. DM note that, while the domain of all natural numbers N and the domain of all even numbers N^* ascribe the same truth-values to arithmetical sentences, N^* re-interprets 'is a successor of' compared to the standard model, and crucially, the relevant gap can arguably only be filled "by appealing to a substantive philosophical view about the meaning of arithmetical sentences and the nature of arithmetical facts." (DM 2006: 735) Truly, given a substantive, fully interpreted, and realist (presumably Platonist) metaphysical theory about numbers, the set N^* of all even numbers does not make for 'genuine' completeness, that is, it does not account for *all* the numbers in Platonic Heaven. So, here, we have it by DM's own admission that their argument applies *mutatis mutandis* to the arithmetical case. This makes one, again, question the importance of their incompleteness argument for GR, since, by the same token, no substantive theory of arithmetic would be able to ensure that all the numbers are there (especially via a principle along the lines of (AC)), and one cannot but take the case of alien-plenitude to be just a special case of this general problem regarding the axiomatic establishment of the totality of some infinite series of entities. Indeed, if anything, GR should not be worried about the DM-result at all, since it seems to be in rather good company.

The crucial point to extract from this exchange is that while DM agree that GR is a fully-fledged 'interpreted' metaphysical theory; while they agree that (P) is a substantial philosophical analysis of possibility as opposed to an abstract schema whose instances seek satisfaction in a model; while they agree that the two sets of worlds S (instantiating the total infinite range of aliens) and S^* (instantiating every other member of that range) should not be regarded as *models* of (GR)+(AC) but as sets of genuine full-fledged worlds representing possibilities that may surpass the resources of our language; Paseau may well be forgiven for taking DM to discuss a rather more formal, model-theoretic result. For one, DM are the first to call a set of worlds including at least one alien property a *model* of GR. (DM 2002: 28) But more importantly, despite DM's insistence that the relevant notion of completeness here is not model-theoretic but Lewis' good old *plenitude* – not a formal or logical notion, but a metaphysical result – in conceiving of GR as a series of

axioms as they do, they end up demanding, in the form of a completeness ‘guarantee’, that an informal metaphysical theory such as GR should be *axiomatisable so as to formally (non-trivially) entail the ontological completeness of its domain*. And this requirement is simply too strong, as I will now argue, and therefore can be safely ignored by GR.

2.6.4 Plenitude – ‘Guarantee’ as Axiomatic Entailment

Here is why I think that the Divers-Melia requirement (that GR, *qua* series of ontological and explanatory axioms, should *entail* that the space of worlds is complete with respect to all the possibilities) is too strong and should be rejected. While Divers and Melia note that they do not expect GR to “be able to prove every single modal truth” (Divers Melia 2002: 19 fn 6), there is a sense in which that is exactly what they expect. The requirement that GR be able to axiomatically entail that the space of worlds is complete with respect to all the possibilities means that DM, despite their protestations, expect GR to be able to *axiomatically entail* every true modal *proposition*. In this sense, DM do indeed expect GR to be able to ‘prove each modal truth’, whereby a ‘modal truth’ is understood in the robust, metaphysically interpreted sense of a true modal *proposition*, or simply a *possibility* (or necessity) – a faithful reading given DM’s reply to Paseau – and whereby the relevant notion of ‘proof’ here is that of *axiomatic entailment*. For suppose that GR+(AC) is thus *complete* in the Divers-Melia sense, i.e. that the ontological axioms of GR+(AC) together entail that logical space is complete with respect to all the possibilities. Now take some modal truth: *possibly Q*. Note that *Q* here is a possibly true *proposition*, and so according to GR and DM a full-fledged possibility.¹⁰⁷ Now, given that the space of GR-worlds is complete with respect to all the possibilities, it follows that *Q* holds at some GR-world. This means that we have a true instance of the right-hand-side of the robust (rather than schematic) analysis (P) for the robust possibility *Q*: there is a world *w* such that *Q* holds at *w*. But, then, given (P), it follows (right-to-left) that *possibly Q*. In short, if GR’s ontological axioms entail that logical space is robustly complete with respect to all the possibilities, together with (P), they entail every possibility. (Other true modal claims follow from the usual inter-definitions of the modal operators (and quantifiers), granting that there are no impossibilia, which DM do grant. (DM 2002: 24, fn 16)) This means that, if GR is complete in the sense of axiomatically entailing that for

¹⁰⁷ C.f. Lewis (1986a: 185)

every possibility there is a world where that possibility holds, then the total sum of GR axioms – ontological *and* explanatory – together to *entail* each modal truth.

And so, the DM requirement for completeness is simply a metaphysically loaded version of the usual model-theoretic completeness requirement applicable to formal axiomatic systems: in those cases, a formal theoretical system, consisting of a series of axioms, is complete whenever each truth in the theory's target-class follows from the axioms of the theory. Only, here, instead of models, we have worlds, instead of sentences, we have propositions. But, while the players have changed, the task remains the same: all of the target class of propositions must be similarly *entailed* by a set of axioms, by it being the case the only sets of worlds satisfying those axioms (namely, the set(s) of worlds where all possibilities are instantiated) are those which render the requisite propositions true. This is, after all, what Divers and Melia have in mind when they say that the ontological component of GR should 'underwrite' the truth of (P): That the ontological component of GR, seen as a series of axioms, ought to entail that there is a world for each possibility, and so that GR as a series of ontological axioms together with (P) should entail each (fully interpreted) modal truth.

But it is unreasonable for GR to be axiomatisable so as to (non-trivially) entail each modal truth. Indeed, it is unacceptable, for the same reasons that Shalkowski's demands on GR were deemed unacceptable in section 2.4. For the Divers-Melia demand that GR axiomatically *entail* that its space of worlds is complete with respect to the possibilities, is the demand that the ontological axioms of GR non-modally, non-trivially guarantee the absolute accuracy of (P). They thus render the sensible demand that GR informally yet meaningfully express the metaphysical concept that there are no gaps in logical space indistinguishable from the perverse demand that GR non-modally and non-trivially axiomatically entail the (right-to-left) accuracy of (P), which is an inherently *modal* condition, namely that for every way things *could* be there is a world where things are that way. And the only principle within GR bridging the modal with the non-modal, and hence capable of ensuring the truth of a modal condition on the basis of non-modal axioms, is (P) itself. It thus seems hardly reasonable to expect GR to entail what by definition is a *modal* condition of accuracy, namely that there is a world for each possibility, only on the basis of its non-modal ontological axioms. Yet this is exactly what Divers and Melia expect GR to be able to do. Why is this so?

2.6.5 Plenitude, Arbitrariness and (P)'s Conditions of Accuracy

I think the reason behind this background assumption in Divers-Melia that GR should ensure, by means of a series of ontological axioms, that its space of worlds is complete, and so that (P) is a materially adequate analysis, can be gathered from an earlier paper by Divers (1997) drawing from Shalkowski (1994). Shalkowski's argument (in section 2.4) was that for (P) to be accurate, it must be the case that for all and only ways a world can be, some world is; and consequently that (P) is an accurate analysis only if in some objectionable sense modal. We saw, with Sider (2003), that the latter simply doesn't hold, or else, no adequate reductive analysis of anything would ever be possible. Now, Divers also grants this point, saying "there can be no appropriate material conception of circularity – circularity in extension – since to require non-circularity in that sense is simply to require that the condition of material adequacy should not be satisfied" (Divers 1997: 146). But, as we also saw, Shalkowski seems to run together the question of whether (P) is materially adequate, which is merely a factual matter, with the question of whether (P) is *arbitrary*, which is a matter of *judgement*, thus requiring *demonstration*. And while Divers (1997) recognises the illegitimacy of the former, he fails to recognise the irrelevance of the latter, instead drawing special attention to its importance as a condition "on the success (qua *demonstrable* non-arbitrariness)" (Divers 1997: 157 *my italics*) of the proposed reduction.

So, Divers (1997) takes the challenge for justification inherent in Shalkowski's (1994) arbitrariness charge to constitute a legitimate request for GR to present, as part of its non-modal theoretical tenets, a defence of the adequacy of (P), in order for us to be able to *judge* the analysis put forth in (P), if only by GR-lights, as adequate. (Divers 1997: 155-157) In particular, it looks like Divers (1997) argues for the following triad:

- (I) For (P) to be *deemed adequate*, GR must defend (P) as non-arbitrary.
- (II) To defend (P) as *non-arbitrary*, GR must show that its ontology supports the truth of (P).
- (III) If GR is to remain *non-circular*, the defence of the non-arbitrariness of (P) must be presented in non-modal terms.

But whether this triad is acceptable or not depends entirely on what it means for GR to show that its ontology supports (P). If the relevant notion of support is taken to be the Divers-Melia strong notion of axiomatic entailment, then the conjunction of (I)-(III)

effectively amounts to the unreasonable demand that, to defend (P) as acceptable, GR must non-modally and non-trivially entail that the (inherently modal) satisfaction conditions of (P) are met in the theory. It seems to me that it is this illegitimately strong demand, which matures in Divers-Melia (2002) into the argument that unless objectionably modal, GR cannot put (P) forth as an adequate analysis of possibility.

Notably, even if we accept the reasonable claim in (II) that GR ought to be able to *justify* (P) as non-arbitrary, it simply doesn't follow that such a defence can only consist in an non-trivial entailment of (P)'s left-to-right accuracy condition by the theory. The non-arbitrariness challenge can more gently be met by any argument that gives (P) a *presumption of truth*, given the background ontology of the theory. Here is a nice one by Sider:

“Suppose reality is just the way Lewis thinks it is. [...] There is then the question of whether there is room in this reality for modality. Within this multiverse, is there a candidate property we can identify with the property of being a possible proposition? The answer seems to be yes—it is the property of being a proposition that is true at some Lewis-world. As shown, this property can be defined in entirely non-modal terms (in terms of spatiotemporal notions and the restriction of quantifiers). Thus, an adequate non-modal definition of ‘possible’ can be given, if Lewis’s ontology is indeed correct.” (Sider 2003: 197)¹⁰⁸

DM might object that this argument simply side-steps the problem by packing all contentious questions in the first sentence in the quote, asking us to ‘suppose reality is just the way Lewis thinks it is’. They might say, this is precisely the point, we do not have a non-modal ontological principle that establishes the Lewisian ontological picture that is supposed to accompany (P). But, the point is that we do not need any independent such principle in order to know what picture of reality GR puts forth; GR’s commitment to the truth of (P) (alongside, presumably, a commitment to modal truths) gives us that. For, GR is simply committed to the truth of (P), and, thereby, it is committed to reality being such that (P) is true. We can accept that much without also making the unreasonable demand that GR articulate (P)’s truth-condition non-modally.

¹⁰⁸ See relatedly Wright (2007: 163). Wright’s overall aims in his (2007) are strictly unrelated to the present endeavour. However Wright, too, suggests that in the case of a possible-world-semantical analysis of modal claims, “a theoretical explanation of content is achieved via an equivalence in truth-conditions *under the hypothesis of the ontology of the explicating theory*.” (Wright 2007: 163, my italics)

Now, we have a further question: Can we judge (P) as *adequate* for the job for which it has been put forward? The answer, as Sider points out, is yes. For the assumption of (P)'s truth allows us to proceed with the proposed reduction. In other words, upon assuming Lewis' pluriverse, an analysis of possibility *can* be had. But it is very doubtful that the same can be said, upon assuming, say, the existence of pencils in one's drawer. For while there is no reason to believe that there are not enough worlds in Lewis' pluriverse for (P) to offer an adequate analysis, there *is* reason to believe there are not enough pencils in one's drawer for an analogous analysis involving pencils. So, while the assumption of the truth of (P) allows us to proceed with the reduction, on the contrary, the assumption that for every possibility there is a (distinct) pencil in one's drawer will most likely lead to its own refutation.¹⁰⁹ In that sense, the GR-ontology *supports* the reduction in (P) in a way that pencils do not support a similar reduction of possibility to pencils.

Hence (P), unlike its pencil-analogue, can be judged an *adequate* analysis of modality.¹¹⁰ More than that, GR offers yet further support for (P) by putting forth Recombination, which strengthens the presumption of (P)'s truth, by giving us an idea as to what it would take for (P) to be true, thus strengthening our licence to judge (P) as adequate. Finally, as Sider remarks, there is the additional "...question of whether it is reasonable to believe that Lewis's ontology is correct". But as he continues "...here Lewis has his Quinean answer—we ought to believe in his ontology because of its theoretical utility." (Sider 2003: 197) Notice that this, too, allows us to increase our credence in (P).

In sum, putting emphasis on a need by GR to *defend* or *justify* the adequacy of its proposed analysis need not result in anything as strong as the DM (2002) demand that the ontological component of GR axiomatically entail the accuracy of (P). So the DM-demand on GR can safely be ignored as too strong and their incompleteness result as irrelevant to the question of the reductive success of the theory.

¹⁰⁹ Unless after all someone came up with an analysis of possibility via pencils, which did not require there to be so many of them. Indeed, if a reduction of possibility to pencils, bottle-caps or any other item were shown to be serviceable, then it is a good question on what basis we ought to reject it. For, what such analysis would have shown is that possibility can indeed be reduced to the properties of any small finite collection of objects and their interrelationships.

¹¹⁰ Even Divers (1997) remains partly unconvinced: "Why should the genuine modal realist not be thought to have discharged his theoretical obligations by expressing either belief or disbelief when confronted with any given ontological claim, rather than requiring—as it were—an informative characterisation of his intended domain of quantification as a whole? Are actualists in possession of such a characterisation, or are their existential beliefs best and adequately expressed in terms of belief in these and disbelief in those?" (Divers 1997: 154 fn 7) Indeed.

2.6.6 Plenitude and Recombination

But hold on. Mightn't one argue that Divers and Melia are merely pursuing what Lewis started, when he introduced Recombination to GR, to its natural conclusion? For it is Lewis who claims to make an effort to capture non-modally a plenitude principle, *that there is a world (or individual) for every possibility*, via Recombination. (Lewis 1986a: 87) And this simply *is* the left-to-right condition of accuracy for (P). Doesn't this mean that Lewis saw, along the lines perceived by Divers and Melia, an obligation to underwrite or guarantee the truth of (P) via some non-modal ontological principle?

No. Firstly, no non-modal principle can guarantee the truth of (P) anyway. Recombination, far from entailing that logical space is complete with respect to the possibilities, merely entails that logical space is complete with respect to rearrangements (by means of duplicates) of a bunch of individuals. In order to *bridge the gap* from the non-modal to the modal, we again require a *modal* principle to the effect that all these rearrangements of individuals are possibilities. Secondly, as we have seen in section 2.6.2, Lewis actually *tells us* that Recombination is not intended to fully recapture the notion that logical space is complete with respect to the possibilities, especially alien possibilities:

“We can't get the alien possibilities just by rearranging non-alien ones. Thus our principle of recombination falls short of capturing the plenitude of possibilities.”
(Lewis 1986a: 92)

So Lewis does not put forth recombination as an ontological axiom that guarantees (P)'s truth. And so Divers and Melia cannot (indeed do not (DM 2002: 27)) take themselves to show that Recombination does not achieve the aim Lewis intended it for. So, no extra support for DM's argument can be gained from suggesting that Lewis saw a need to put forth Recombination in the first place to guarantee the truth of (P).

But then what is the role of Recombination in the theory? Lewis says that “[a]lthough recombination will not generate alien worlds out of the parts of this world, it nevertheless applies to alien worlds. It rules out that there should be only a few alien worlds. If there are some, there are many more.” (Lewis 1986a: 92) Hence, the role of Recombination is to ensure that whatever base stuff there is, there are also all the combinations of it. Lewis perceives himself as under no additional obligation to non-trivially ensure that *all* his *base* materials are there. As Divers (1997) notes that would require the impossible feat

“that a first order language should be able to express that its own unrestricted quantifier is the absolutely unrestricted quantifier” (Divers 1997: 158). Divers recognises the questionable nature of this demand, yet he seems to persist with it in both (1997) and (2002). But no epistemic or methodological considerations can put such a strong obligation on the theory.

In short, Recombination is there to ensure that the GR ontology is such as to *allow* for (P)’s accuracy, not that it is such as to *entail* it. Thus, no support for the DM assumption that GR ought to axiomatically entail the truth of (P) can be garnered from the fact that Lewis makes Recombination a part of his theory.

2.6.7 Summary

Insofar as the Divers-Melia argument is an objection that unless GR is conceptually modal, it cannot put forth an adequate analysis of possibility, it fails. DM’s key background assumption that, in order to show that (P) is adequate, GR must non-trivially entail via a series of non-modal ontological axioms, that (P)’s accuracy conditions are satisfied, is an unreasonable, indeed impossible, demand to make on GR. For one, it is indistinguishable from the requirement, usually placed on *formal* axiomatic systems, that the totality of axioms should entail each of a target set of truths. For another, it is indistinguishable from the illegitimate demand that GR ought to be able to non-modally and non-trivially entail (P)’s conditions of accuracy. So, DM’s rather formal incompleteness result has no implications regarding whether the analysis put forth by GR succeeds in being both justifiably adequate as well as non-circular. The purpose of Lewis’ discussion of plenitude is to show that, given the GR-ontology, (P) *can* give the right results, not that it *must* do so. As for a statement of plenitude for *basic* alien properties, along with Lewis, we can let that go trivial.

It is worth noting, before we leave this subject, that the discussion applies *mutatis mutandis* to questions about plenitude for impossible worlds. Impossible GR is equally under no obligation to guarantee that logical space is complete with respect to possibilities *and* impossibilities. It can similarly assume that whatever aliens are there, Recombination (now free from classical consistency constraints) ensures there are many more. Thus, I take the present to cover all that needs to be said regarding the question of plenitude for PGR and IGR alike.

2.7 Conclusion

In sum, considerations of accuracy do not give rise to any legitimate circularity objections against GR, whether epistemic, metaphysical or conceptual. There is no objectionable circularity present either in using pre-theoretical modal beliefs to construct an adequate theory, or in accepting (P) as adequate. Nor is it objectionably circular to offer a series of ontological identifications without claims of ontological priority or to allow one's metaphysical theory be dictated by one's logical theory. Remaining objections fail because they make the unreasonable demand that GR non-modally and non-trivially guarantee or entail the truth of (P). But to the extent that only (P)'s accuracy conditions, which are modal by definition, can do this, no such demand can be considered legitimate. Crucially, demands by objectors that GR should motivate its analysis of possibility, as a being reasonable or adequate, can be met simply by showing that, (P) *can* give the right results, and that this, together with the fact that it fares better than rival theories, is grounds enough to accept it. I conclude that GR offers a reductive analysis of possibility in (P) that can, without fear of circularity, be considered materially adequate.

CHAPTER III

Genuine Realism with Impossible Worlds on the Cheap

3.1 Introduction

As we saw in Ch I, there are *prima facie* good reasons for a proponent of possible worlds to be interested in impossible worlds. For, if possible worlds are useful, for instance, in the evaluation of counterfactuals and the analysis of propositional content, then impossible worlds seem equally useful in allowing us to non-trivially extend such analyses to cases involving impossible or necessary propositions. Yet, impossible worlds do not seem to blend well with Lewis' Genuine Realism (GR) about possible worlds. In particular, allowing for impossible worlds on a par with the possible worlds seems to jeopardise one of the key advantages of GR over its rivals, namely its – successful as I argued in Ch II – reductive analysis of possibility. More than this, adding such worlds into GR, in the form of genuine concrete entities that really exhibit contradictory properties, seems to render the theory inconsistent by committing it to the existence of entities that one can truly describe in contradiction. So it looks like the price that GR must pay to avail itself of the proposed benefits of impossible worlds is too high to make it worthwhile for GR to even consider the exchange.

The aim of this chapter is to show that it need not be that way; indeed that an extension of GR into impossible worlds needn't cost much at all. The present constitutes an exploration of a cheap version of Impossible GR (IGR), according to which impossible worlds are mere ersatz set-theoretic constructions out of *possibilia*.¹¹¹ If this blend of genuine and ersatz worlds can be had, the advantages are considerable: We can allow GR to acquire many of the benefits of impossible worlds, without thereby sacrificing its reductive analysis of modality or being committed to the literal existence of entities which really instantiate impossible properties. This means that under this conception, impossible worlds pose neither a logical nor a conceptual threat to GR. But this proposal also generates some questions. For instance, will the relevant constructions be fine-

¹¹¹ I have recently been made aware that Francesco Berto develops a proposal very much like this in a forthcoming paper. (Berto forthcoming) Indeed his aims in that article are very much in tandem with mine. He promotes a hybrid view of genuine possible and ersatz impossible worlds on the basis that such a view gets the best of both ersatz and genuine worlds so to speak: a full reductive analysis of modality and impossible worlds to boot that neither threaten that analysis nor any inconsistency. Despite our common underlying aims, I try to explore some alternative constructions here to the ones proposed by Berto, as well reply to some further objections one might put to such a hybrid view of worlds.

grained enough to differentiate between all kinds of distinct impossibilities? Can such a fundamental ontological distinction between possible and impossible worlds be justified? And have we thereby abandoned GR altogether for some sort of hybrid view?

Section 3.2 sets forth the basic idea of impossible worlds as ersatz constructions. It draws inspiration from Lewis' own words, and shows how this conception of impossible worlds answers our central problem – namely how to preserve Lewis' reductive analysis of possibility upon the addition of such worlds into the theory. Section 3.3 explores the variety of ways, in which GR can approach the construction of ersatz impossible worlds, noting the uses and limitations of each approach. Finally section 3.4 evaluates further benefits and putative costs of the proposal and section 3.5 looks briefly at what motives might nonetheless drive one to reject the presently offered ontological free lunch for the pricier alternative.

3.2 Abandoning Concreteness

As John Divers sums it up, Lewis rejects the hypothesis of impossibilia on the assumption that it entails the “unrestricted existence of genuine world-bound individuals instantiating impossibilities”. (Divers 2002: 67). But nothing here stops GR from incorporating impossible worlds as ersatz set-theoretic constructions out of genuine Lewis-worlds. Support for such a view could be found in Lewis himself. In his (1973b) Lewis remarks on the topic of (certain) *impossible* worlds that

“...there is no reason not to reduce them to something less objectionable, such as sets of propositions or even sentences. I do not like a parallel reduction of possible worlds, chiefly because it is incredible in the case of the possible world *we* happen to live in, and other possible worlds do not differ in kind from ours. We do not live in one of those, and possible and impossible worlds do differ in kind.” (Lewis, 1973b: 16).

And in his (1986a), Lewis points out at length that GR is a veritable storehouse of material available for all sorts of set-theoretic constructions:

“The set of all and only those worlds that include a talking donkey as a part, for instance, is the state of affairs *there being a talking donkey*. The same set is also a way things might be, namely *that there might be a talking donkey*. It is also the possibility *that there is a talking donkey*. It is the proposition *that there is a talking*

donkey. And it is the structure *including a talking donkey*. ... If it is central to the conception you associate with ‘proposition’ that there should be some sort of quasi-syntactic structure...there are more complicated set-theoretic constructions out of possible individuals that could serve instead. ... If you associate with ‘state of affairs’ a role involving predication, I would recommend individual-property pairs, where a property in turn is taken as a set of possible individuals. And so on. ... *I could construct excellent ersatz worlds in ever so many ways, drawing on the genuine worlds for raw material;*” (Lewis 1986a: 185-86)

In short, GR has excellent tools out of which to construct ersatz set-theoretic entities that can play the role of impossible worlds in the theory: individuals, worlds, properties in the form of sets of individuals, and propositions in the form of sets of worlds, all of which can serve in the relevant constructions.

Moreover, thinking of impossible worlds as ersatz constructs rather than genuine worlds helps us overcome the circularity threat that such worlds pose for GR’s reductive analysis of possibility as per

(P) Possibly *A* iff there is a world *w*, such that *A* at *w*,

where worlds are further analysed non-modally as spatiotemporally isolated mereological sums of individuals. The addition of impossible worlds in the form of yet more spatiotemporally isolated mereological sums of individuals – i.e. genuine worlds – seems to render (P) false right-to-left; yet correcting this by modifying (P) to refer to ‘possible worlds’ renders the analysis circular. But deeming impossible worlds to be ersatz constructs and not worlds *qua* mereological sums of individuals solves this worry, for we can simply take (P) to refer to *genuine* worlds. And such worlds are easily differentiated from ersatz constructs non-modally, given that the former are (sums of) individuals, while the latter are set-theoretic entities, and that neither the concept of set or that of individual – which are both primitive for GR – are implicitly or explicitly modal. I take it as a mere matter of terminology whether one wishes to reserve the term ‘world’ for genuine worlds alone. If not, then the term ‘genuine world’ can officially replace that of a ‘world’ in (P) without any harm to the reductive analysis.

With the problem of reduction behind us, let us explore some alternative impossible world constructions. In exploring the form such constructions might take, I will also look

at a couple of existing ersatz-impossible-world proposals which allow for the construction of ersatz worlds out of the materials of GR. One is by Greg Restall who argues that one can accommodate impossible worlds, “not as extra ontology, but rather as a new way of looking at what was always there” (Restall 1997: 593).¹¹² Another is by John Divers who points out that GR “...contains the resources for constructing books *qua* sets of propositions.” (Divers 2002: 131, fn 19). Finally, Edwin Mares explicitly proposes that “...impossible worlds have a very different status than possible worlds.... If we pick, say, Lewis’s theory of possible worlds, then the difference between possible and impossible worlds is that the former are vertebrate real worlds ... and impossible worlds are ersatz constructions.” (Mares 1997: 518) Let us look at some of these alternatives.

3.3 Ersatz Impossible Worlds: Exploring Alternative Constructions

In what follows I will proceed to present a series of increasingly successful (and arguably increasingly complex) constructions of ersatz-impossibilia, each overcoming limitations of previous constructions. Again, I take impossible worlds to be worlds where both narrow and more broadly logical (or metaphysical) impossibilities are true.

3.3.1 Sets of Ways

One elegant idea, which can easily be appropriated by GR, is offered by Greg Restall (1997), who, identifying impossible worlds as ‘ways the world cannot be’, goes on to construct such ways as sets of ways the world can be. The idea intuitively is this: supposing x and y to be different ways a world can be, we paste together x and y , “like superimposing together two maps which inconsistently describe the landscape, or concatenating two stories which inconsistently describe the situation. ... The world could be like x and it could be like y for two different possible worlds x and y . However, it can’t be *both* like x and like y .” (Restall 1997: 586) The same elegant idea is found earlier in Rescher and Brandom (RB 1980) who also take impossible worlds to be fusions or concatenations of different possible worlds, “...something like an over-printing of discordant pictures [...] a synthesis or fusion of incompatible states of affairs.” (RB 1980: 6) I will focus on Restall’s proposal here, only because he takes impossible worlds to be set-theoretic constructs of some sort.¹¹³

¹¹² Along similar lines see also Rescher & Brandom (1980).

¹¹³ Rescher and Brandom, on the other hand, think of worlds as Meinongian objects, as far as I understand it, and take non-standard worlds, in particular, to be fusions of such objects, either creating superimposed,

Now, Restall is indifferent as to what the initial entities he calls ‘possible worlds’ are (Restall 1997: 589). However, he does take possible worlds to be literally identical with the ‘ways’ the world can be. And while Lewis also takes the matter of whether we take a ‘way a world can be’ as the singleton set of a genuine world or as its only member to be of utter unimportance (Lewis 1986a: 87 n.57),¹¹⁴ in the present context, we had better work with sets of ‘ways’ or world-properties, that is, with unit-sets of GR-worlds, rather than the worlds themselves. This also allows us to differentiate impossible worlds (as sets of world-singletons) from propositions which we take to be sets of worlds. We can simply deem that what is true at such a unit set is simply what is true at the genuine Lewis-world that is its sole member.

Impossible worlds, according to this proposal, amount to sets of incompatible ways a world can be, i.e. sets of unit-sets of genuine worlds. For example, if we have Lewis-worlds w and v ; then $\{w\}$ and $\{v\}$ are the properties respectively of being w and of being v , the two ‘ways’ w and v respective are, or equally, the two different long propositions describing w and v respectively. By constructing the set $\{\{w\}, \{v\}\}$, we get the ersatz impossible world, which represents our world inconsistently to be both like w and like v . Genuine worlds, according to Lewis, are consistent and maximal – for every A , either A or $\text{not-}A$ (and not both) is true at a given Lewis-world – so assuming that w and v are distinct (and discernible), there ought to be some A for which they give different verdicts. Then, we can define truth at an impossible world i as per Restall (1997: 587): An atomic proposition is true at an ersatz world i , just when it is true at some member (i.e. unit-set of a Lewis-world) of i ; its negation is similarly true at i just when it is true at some member of i . Then, if A is true at some genuine world, w (hence $\{w\}$), and $\text{not-}A$ true at some other world, v (hence $\{v\}$), then we have a world $i = \{\{w\}, \{v\}\}$, such that both A is true at i and $\text{not-}A$ is true there. Now, if, like Restall, we also define a conjunction as true at i just when each conjunct is true at some member of i , we get an ersatz world i such that the conjunction $A \ \& \ \sim A$ is true at it.¹¹⁵ (Restall gives more detailed truth and falsehood conditions for all of the truth-functional connectives, but employing these basics here is sufficient to establish the point.) One elegant metaphysical aspect of this proposal is that impossible worlds are in a sense “epiphenomenal” (Restall 1997: 590). For truth at such

inconsistent, overdetermined worlds, or producing schematic, incomplete, underdetermined worlds. (RB 1980: 9-14)

¹¹⁴ The important thing for Lewis is presumably that it is the genuine worlds which do the conceptual and metaphysical work in any case.

¹¹⁵ Rescher and Brandom, on the other hand, do not define the connectives recursively, thus do not accept that anything of the form $A \ \& \ \sim A$ is ever true at one of their constructions, even if A is and $\sim A$ is.

worlds is intuitively grounded on what is really true at various different parts of the plurality.¹¹⁶

The advantage of the present proposal is that the constructs provided are well-suited to play the role of distinct impossible worlds. As Restall points out “...the clash between w and v is *not* the same as the clash between two different worlds w' and v' . Both impossibilities exhibit contradictions but they exhibit *different* contradictions.” (Restall 1997: 593) Another virtue of this proposal is that the ersatz worlds it offers are not limited to the representation of explicit logical contradictions alone, but can also represent subtler (or more broadly logical) impossibilities. One instance is Lewis’ famous example of a three-way subtle inconsistency involving Nassau street and the railway, the impossibility that *<Nassau street runs north-south and the railway runs east-west and Nassau street and the railway run parallel>* (Lewis 1982: 436).¹¹⁷ The three conjuncts are pairwise consistent but all together form an inconsistent triad. The present proposal gives us a way forward. By superimposing two genuine worlds, say, one in which the first conjunct is true and another in which the second and third conjuncts are true we get an ersatz world at which the threefold conjunction is true.¹¹⁸ With some care, we could accommodate other sorts of subtle impossibilities like, for example, *<all swans are red all over and all swans are green all over>*, *<electron e is positively charged and electron e is negatively charged>*, and so on. Superimposing the ways two worlds w and v are, one of which has exclusively red swans, the other green, or, alternatively, one according to which e has positive charge and one according to which e has negative charge, for instance, one can render such subtle inconsistencies true at some ersatz world $i = \{\{w\}, \{v\}\}$.

Still, there are some technicalities to be overcome. First, according to GR, individuals (including electrons) cannot be parts of more than one world. Suppose electron e is part of world w ; then how can world v render anything true about electron e ? This might not be such a big problem however here. We can simply allow that world v represents facts about e vicariously, as it would, for instance, by means of e ’s counterparts

¹¹⁶ Another way to get the same results would be by eschewing talk of sets and going with plural quantification over the genuine worlds themselves (as in Bricker (2001)). This way, however, we would not get any new *entities* to play the role of impossible worlds. Lewis takes these ways to be equivalent in any case (Lewis 1986a: 50-51, n:37)

¹¹⁷ Restall (1997) uses this Lewis (1982) example.

¹¹⁸ We could also achieve the same result by superimposing different worlds, for instance one where the first and third conjunct are true together and another where the second is true. The two alternative impossible world constructs will then both render true the inconsistent triad. They will represent distinct entire ways the world cannot be to the extent that the base worlds used in the constructions themselves represent distinct ways the world can be. While, for example, the two constructs will both represent the three-way inconsistent conjunction, they may differ with respect to what other propositions are true at them.

at v . (see e.g. Lewis 1986a: 9-10) Then we can allow that the ersatz-world $i = \{\{w\}, \{v\}\}$ represents an impossibility about electron e , by having w and v , say, render true subtly contradictory propositions about e , even if e is only part of w and not part of v .¹¹⁹ Our second problem might prove trickier. According to GR, the domains of each genuine world do not merely vary, but are mutually completely disjoint. This means that more work needs to be done to create the domain of i not merely as the *union* of the domains of w and v , but as a proper superimposition of those domains, into a single domain that represents things inconsistently.

One way to circumvent this problem is by adopting the non-recursive truth-at- i conditions offered by Rescher and Brandom (1980), according to which, for *any* sentence (*atomic* and *non-atomic*) to be true at an impossible world, *qua* fusion of possible worlds, is simply for it to be true at one of its constituents (i.e. a possible world); and similarly for any sentence to be false at an impossible world is for it to be false at one of its constituents. The drawback of the RB-proposal is that by superimposing two worlds, one where A is true and another where $\sim A$ is true, we get an impossible world where A is true and $\sim A$ is true, but we do not thereby get a world where the conjunction $A \ \& \ \sim A$ holds: For, RB do not define conjunction (or indeed any of the other truth-functional connectives) recursively. This is a drawback to the extent that we want some of our impossible worlds not just to realise inconsistencies but to render true at them contradictory propositions of the form $A \ \& \ \sim A$. The advantage however is that the proposal by RB seems to make easier work of quantified sentences. Transposing their technique to our present proposal of impossible worlds *qua sets* of (singletons of) possible worlds, then just as we did in the case of atomic sentences, we can take propositions of the form $\forall x(Fx)$ to be true at such a set, just when they are true at *some* member of it, and false at such a set, just when they are false at some member of it. Then if $\forall x(Fx)$ is true at $\{w\}$ and false at $\{v\}$, it will be both true and false at a construction such as $\{\{w\}, \{v\}\}$, without us having to worry about mapping the domain of w to v so as to give us a single inconsistent domain, for which to evaluate quantified sentences.

Whatever may be the best way to define the behaviour of the logical terminology for the proposed constructions, this proposal allows considerable leeway with respect to what impossible worlds one can construct, in the sense that it allows both explicit and subtle

¹¹⁹ Alternatively, we can construct impossible individuals alongside impossible worlds as ‘ways individuals cannot be’. We could, for example, superimpose some two genuine electrons, one having negative charge, the other positive charge, creating an impossible electron that is both negatively and positively charged.

inconsistencies to be represented as true at some impossible world, and at apparently little cost. But there are also some limitations to this proposal, the most obvious one being that, given that each genuine world is gap-free, their superimposition, *qua* set of genuine worlds, is also considered to be gap-free, at least according to Restall's proposal, who employs these glutty structures to motivate Priest's three-valued LP. In particular, this means we cannot use these constructions to get *incomplete* worlds, according to which, for some *A*, neither *A*, nor *not-A*.¹²⁰ But we may well wish to have such worlds, for example in order to evaluate counterfactuals like *if there was no fact of the matter whether Nassau street ran parallel to the railway...* or *if it was neither the case that swans were white nor that they were not white then...* So, while we are at it, we may as well have as much as we can get. Rescher and Brandom do not face this problem, because they construct two different kinds of impossible worlds – worlds that are inconsistent and worlds that are incomplete – loosely speaking as the 'joins' and 'meets' between various possible worlds. But it is not straightforwardly clear how we can adapt their proposal to the case where worlds are set-theoretic constructions. At least more needs to be said about what would make one of an otherwise identical-looking pair of constructs inconsistent and the other incomplete. Unlike RB, who employ two different fusion relations, no obvious differentiation is available here in the way that the relevant constructions are put together.¹²¹

Moreover, one might object that any proposal that gives recursive truth-at-*i* conditions for the logical expressions will commit ersatz-impossibilist GR to some particular paraconsistent logic to govern truth-at such constructions and that taking all worlds to obey some logical system might arguably impose unnecessary restrictions on what sorts of impossible worlds there are. Here, considering the Rescher-Brandom variation of the proposal does not help. For, even if we give no recursive truth-conditions for the connectives, ersatz-IGR will still be committed to a paraconsistent logic – for instance a non-adjunctive logical system, whereby from *A-at-i*, *B-at-i*, we cannot infer *A&B-at-i*. (c.f. e.g. RB 1980: 7)

So, let us see if we can circumvent any of these issues by adopting a strategy that allows more leeway.

¹²⁰ Alternatively, changing the truth-at-*w* conditions for impossible worlds so that a proposition is true at one such construction just when it is true at *each* of its members would give us incomplete worlds but rob us of inconsistent ones.

¹²¹ Restall (1997) proposes taking yet more complex sets out of inconsistent worlds to play the role of incomplete worlds. But what would support such a distinction between the incomplete and the inconsistent?

3.3.2 Sets of Propositions

An alternative, allowing more freedom, is to think of our impossible worlds, alongside a great number of ersatz theories out there, as sets of propositions (c.f. Divers (2002), Berto (forthcoming)). Where Restall's constructions involved sets of world-properties, i.e. simple constructions out of complex maximal propositions (unit-sets of worlds), we can do the reverse: take simpler, shorter propositions, (incomplete world-descriptions) and create more elaborate constructions. By collecting all the propositions true at w and all the propositions true at v , for example – sets of worlds each including w or v as their member – we would get an ersatz world rendering true exactly the same propositions as the simpler construct $\{\{w\}, \{v\}\}$. Supposing, in a very simplified manner that the set of all worlds W comprises w, v, u , then the propositions true at w would be represented by the sets $\{w\}, \{w, v\}, \{w, u\}$ and $\{w, v, u\}$; the ones true at v $\{v\}, \{w, v\}, \{v, u\}$ and $\{w, v, u\}$. The construction equivalent to a world verifying all the propositions true at both worlds w and v , earlier symbolised by $\{\{w\}, \{v\}\}$, then, would be $\{\{v\}, \{w\}, \{w, v\}, \{v, u\}, \{w, u\}, \{w, v, u\}\}$.¹²² Under this conception, truth of a proposition A at an impossible world-construct, i , would amount to the proposition A – the set of all worlds, where A is true – being a member of that construct. Falseness of A at an impossible world i would similarly amount to the set of worlds where A is false (the complement of the set of worlds where it is true) being a member of i . In that sense, the proposal is very much like any ersatz-proposal of impossible worlds, according to which such worlds are sets of propositions, such as Nolan (1997) and Vander Laan (1997).

However, unlike those actualist views, the present proposal faces a dilemma, arising from the fact that GR-propositions are not primitive entities but sets of genuine Lewis-worlds. Do we take the relevant propositions to be atomic and define the truth-functional connectives recursively, or not? If we do, again, we commit IGR to some paraconsistent logical system governing these worlds. And that might be less-than-desirable, for (a) we may want what is true according to some impossible worlds to surpass the limits of any single logical system; and (b) we might prefer IGR not to have to adopt any specific non-classical logic alongside its classical theoretical base to reason about impossible worlds (although the cost of this would not be as great as Lewis argues in the case of concrete impossible worlds, as we see in section 3.4.1). On the other hand, if we do not define the

¹²² See also Berto (forthcoming)

connectives recursively and allow that the truth-at- i of all propositions, atomic or not, amounts to set-membership, we seem, again, unable to have worlds where, say, $A \& \sim A$ is true, but $B \& \sim B$ is not, for some different proposition B . For all such contradictory propositions are identified with the empty set of genuine worlds, according to GR. And if we include the empty set as part of one of our constructions, we thereby include all contradictory propositions and thus cannot use our constructions to differentiate between them. What we can do at most is have an ersatz-world, i , such that A is a member of i and so is $\sim A$, but B (or $\sim B$) is not. But we do not thereby get a world where a contradiction $A \& \sim A$ is true and differentiated from another contradiction $B \& \sim B$. And, presumably, since it is the conjunctions $A \& \sim A$, $B \& \sim B$ that constitute impossible propositions, if we do not define conjunction on our constructions recursively, we cannot employ our constructions to differentiate between such impossibilities by virtue of their holding at distinct impossible worlds.

It seems to be a limitation particular to IGR, due to the fact that propositions according to GR are sets of genuine worlds, that one must define the truth-functional connectives recursively for its ersatz-worlds, if one is to employ these ersatz-constructions to differentiate between distinct impossible propositions. In contrast, if we consider, e.g., Nolan's (1997) proposal, whereby propositions, which are the elements of worlds, are conceived of as primitive (intensional) entities, we can define truth at a world as set-membership for atomic and non-atomic propositions alike, and thereby have a world render true some contradictory proposition, such as *<donkeys talk and donkeys do not talk>* by including this proposition, *qua* basic entity, as a member. In this way, Nolan can allow his worlds to remain logically unstructured, so that any proposition may be a member of some world, irrespective of what other propositions are included in it. But for ersatz-IGR, if we wish to differentiate between different contradictions – *qua* conjunctions of contradictory propositions – true at an ersatz-world, we will, again, have to define conjunction (and so, arguably, all the logical connectives) recursively, and thereby commit IGR to a particular logical behaviour for the logical connectives at such worlds. (Berto (forthcoming) seems to overlook this rather important issue in his treatment of impossible propositions as sets of Lewis-style propositions. A strange oversight given that (a) many impossible propositions, being contradictory, are conjunctions of some sort and (b) Berto's main aim seems to be the identification of impossible propositions with sets of ersatz-worlds where they hold.)

For present purposes, let us say that a conjunction is true at an ersatz-world, i , just when both conjuncts are members of i ; a conjunction fails to be true at i just when one of its conjuncts fails to be a member of i . Similarly with disjunctions, the important point here being that a disjunction can fail to be true at an impossible world, construed as a set of Lewis-style propositions, when neither disjunct is a member of the world in question. This proposal transparently allows for both gluts – a proposition and its negation (i.e. its complement) being included in the set – and for gaps – neither a proposition nor its negation (complement) being a member of the set. So, we can now have incomplete as well as inconsistent worlds. Taking a slight enrichment of our previous simplistic model, where $W = \{w, v, u, x, y, z\}$, let us suppose $\langle \text{cats purr} \rangle$ is true at, say, worlds $w, u,$ and y and so identified with the set $\{w, u, y\}$ and false at v, x, z and so its negation is identified with $\{v, x, z\}$, (the complement of $\{w, u, y\}$). We can then construct a very simple impossible world which is both inconsistent and incomplete, by deeming it to be the set $i = \{\{v, x, z\}, \{w, u, y\}\}$. Then $\langle \text{cats purr} \rangle$ is true and false at i , namely the proposition and its negation (its complement) are both members of i . If we define a conjunction as true at i just when each conjunct is a member of i , then we can have $\langle \text{cats purr and it is not the case that cats purr} \rangle$ true at i . Again, the proposal allows us to represent distinct inconsistencies (whether conjoined or not) as true at various distinct impossible worlds. Now let us suppose that $\langle \text{dogs bark} \rangle$ is true at w and z and so identified with the set $\{w, z\}$. Then it is neither true nor false at i , as constructed, that dogs bark, since neither the relevant proposition nor its complement are members of i . So i is both glutty and gappy. If we wish, we can define a disjunction as true at i just when one of the disjuncts is a member of i (so, as failing to be true at i when neither disjunct is a member of i). Then, we can also deem the disjunction $\langle \text{either dogs bark or dogs don't bark} \rangle$ false at i . This again allows us to differentiate distinct logical necessities – *qua* disjunctions – as false at distinct impossible worlds.

We can generally say that, given the set of all worlds, W , an impossible world will be incomplete when for some subset of W it includes neither it nor its complement. Similarly, such a world will be inconsistent when some two of its members are “mutually disjoint sets of genuine worlds” (Divers 2002: 313 fn 19).¹²³

¹²³ Berto also defines his inconsistent ersatz worlds that way: “what makes them inconsistent is that their subsets have no common element. That no genuine world appears in each of them shows that the propositions such subsets consist in can be jointly true in no possible world.” (Berto forthcoming: 12)

Again, under this conception we can represent not just outright contradictions but more subtle impossibilities under the present proposal. Examples of such subtle inconsistencies are *<electron e is positively charged and electron e is negatively charged>*, *<individual a is a married bachelor>*, *<some vixen is not a fox>*, *<swans are red (all over) and swans are green (all over)>* and so on. For some reason Berto takes such broadly logical impossibilities to pose a problem for the present proposal, unless reduced to strictly logical impossibilities by means of bridge principles like ‘if something is a bachelor it is unmarried’.¹²⁴ But I do not see why he worries. There might be a separate worry, again, about the status of quantified sentences, and I am treating quantified propositions here as I would atomic propositions, for the sake of argument. But, however the matter of quantification is resolved, the distinctive question of bridge-principles never arises. For, the set of genuine worlds that render true the proposition *<swans are red>* will clearly be disjoint from the set of worlds that renders true the proposition *<swans are green>*, and so allowing such inconsistencies to be true at impossible worlds will be no different to allowing their explicitly contradictory versions be true at such worlds. Similarly, (again allowing that worlds can represent propositions as true about individuals that are not part of them vicariously), the set of genuine worlds according to which *a* is a bachelor will be disjoint from the set of worlds where *a* is (vicariously) married. So, implicit contradictions should be no harder to represent than their explicit counterparts, *contra* Berto. And so, the worry about bridge principles seems groundless.

In short, this proposal allows us to represent as true at some impossible world, via inclusion of the relevant disjoint sets, any subtle impossibility of the form *Fa & Ga*, where *F* and *G* are *incompatible properties*, and so together instantiated by no genuine individual, (or similarly anything of the form *Fab & Fba*, where ‘*F*’ stands for relations like, *is left of*). Thereby, it is not confined to the representation of outright contradictions. Again, ersatz worlds rendering true such impossibilities will be inconsistent in virtue of including mutually disjoint sets of worlds.

Nonetheless, it ought to be obvious at this stage that this proposal too comes with certain limitations. First, the proposal conflates certain subtle impossibilities with their explicit counterparts. In particular, the set of worlds where some shape, *b*, is trilateral will be identical with the set of worlds where *b* is triangular; and the set of worlds where *b* is not triangular will be identical with the set of worlds where *b* is not trilateral. Suppose

¹²⁴ See Berto (forthcoming: 14)

$W = \{w, v, u\}$. Then the two propositions $\langle b \text{ is triangular} \rangle$ and $\langle b \text{ is trilateral} \rangle$ will be identified with the same set of worlds, say $\{w, v\}$. Similarly, their respective negations will be identified with the complement of $\{w, v\}$, namely $\{u\}$. Then, an ersatz world $\{\{w, v\}, \{u\}\}$ that renders true the subtler impossibility $\langle b \text{ is trilateral but not triangular} \rangle$ will also render true its explicit contradiction $\langle b \text{ is triangular and not triangular} \rangle$. Since the subtler impossibility will be true at all the same constructions – those including $\{w, v\}$ and $\{u\}$ as members – as its explicit counterpart, the two will be conflated. Similarly with other impossibilities of this kind, like $\langle \text{electron } e \text{ is positively and negatively charged} \rangle$ and $\langle \text{electron } e \text{ is positively and not positively charged} \rangle$ and so on.

Second, the proposal conflates all impossibilities of a non-conjunctive or non-composite nature with each other (and similarly for all such necessities). For instance the proposition that $\langle \text{nothing is self-identical} \rangle$, since false at all genuine worlds, will still be represented by the empty set, as will propositions like $\langle \text{nothing exists} \rangle$ or $\langle \text{some things are spatiotemporally distinct from their parts} \rangle$ (if indeed those are distinct propositions). This will mean that if any impossible world includes one of these propositions as a member, in the form of the empty set, it includes them all. A more intuitively compelling case might be (true) mathematical propositions and their negations, the former of which are all again traditionally identified with the total set of worlds W and the latter with the empty set. This means that while the present proposal allows us to differentiate between distinct impossible propositions, when these are the result of conjoining two propositions that are not jointly true at any genuine world, it does not allow us to differentiate between impossibilities not of this conjunctive nature.

3.3.3 Sets of Finer Propositional Structures

Can we overcome any of these difficulties by adopting a structurally more fine-grained account? Let us examine finer-grained constructs made out of genuine individuals, properties and relations.¹²⁵ Edwin Mares (1997) offers such a proposal of finer grain, taking his constructions to constitute states of affairs, or informational states.¹²⁶ These are made of individuals, properties and relations, and some set-theory, as Mares happily notes, “tools standardly in the toolbox of possible worlds theorists.” (Mares 1997: 516) This renders Mares’ proposal easily amenable to GR appropriation.

¹²⁵ Berto also mentions the possibility of structured propositions (forthcoming: 17)

¹²⁶ Mares’ constructions are taken from Barwise and Perry’s situational semantics as expounded in their (1983).

Mares' resulting worlds are made of sequences of the form $\langle R, a_1, a_2 \dots a_n, \pi \rangle$, "where R is an n -place relation, $a_1 \dots a_n$ are individuals, and π is either 1 or 0." (Mares 1997: 519) In the present case, the relations (and properties) can be GR-sets of genuine individuals, as usual, and the individuals, $a_1 \dots a_n$, will simply be the genuine GR-individuals themselves, chosen from the total GR-domain of individuals (including worlds). As the introduction of the values 1 and 0 here suggests, we might want to think of these constructs as informational sequences (infons), rather than states of affairs, if we do not wish to countenance the idea of a negative state of affairs.¹²⁷ The informational sequences instead tell us whether relation R does (1) or does not (0) hold between the individuals in question. This allows us to distinguish between a state of affairs failing to obtain according to the sequence, and its negation obtaining instead. As Mares points out, negative information "does not just reduce to the absence of positive information." (Mares 1997: 519-20) So we define falsehood according to such constructions, not as failure of inclusion of the relevant state in that set, but instead as inclusion of the relevant 0-sequence in it. This also allows us to know exactly when one such set is an inconsistent world, including a proposition and its negation, a pair of (atomic) sequences like $\langle R, a, 1 \rangle$ and $\langle R, a, 0 \rangle$.

Although Mares takes his constructions to be gap-free (Mares 1997: 520), we can allow any set of sequences of the relevant form to constitute an ersatz world.¹²⁸ As before, when a proposition and its negation (two otherwise identical sequences bar in their value) are both members of a world, that world is inconsistent; when neither a proposition nor its negation are members of a world the world is incomplete. Only those constructions are impossible worlds, whose members do not together truly describe a genuine Lewis-world. This allows both the inconsistent and the incomplete constructions to count as impossible worlds.

Now, these constructions should at least offer us everything that our previous alternative constructions did. For instance, if we define the propositional connectives as usual, the constructions should be able to represent both explicit contradictions of the form $A \ \& \ \sim A$ and more subtle metaphysical impossibilities of the form $Fa \ \& \ Ga$, where F and G are together instantiated by no genuine individual, like, e.g., that some particular swan is red and green all over. Then, the impossibility that some particular swan is both green

¹²⁷ Although for convincing arguments for states of affairs involving negation see Priest (2006a: 300; 2000, 2006b: 51-54)

¹²⁸ As do Barwise and Perry (1983).

and not green will be represented at such a world by it including the following triad about a single object, a , where ‘ S ’ stands for *being a swan* and G for *being green*: $\langle S, a, 1 \rangle$, $\langle G, a, 1 \rangle$, $\langle G, a, 0 \rangle$. The latter two sequences represent the outright contradiction; moreover they are true together at no genuine world, rendering our ersatz-world impossible.

Similarly, the impossibility $\langle \text{swan } a \text{ is red and green all over} \rangle$ will be represented by the triad $\langle S, a, 1 \rangle$, $\langle R, a, 1 \rangle$, $\langle G, a, 1 \rangle$, which, together, is not true at any genuine world.

Moreover, any world consisting of only, say, these two sequences $\{ \langle S, a, 1 \rangle, \langle R, a, 1 \rangle \}$ will be incomplete, since it will render some propositions, say about things that are not swans, neither true nor false, since no proposition about non-swans is a member of that world. And such a world will be impossible too, since it will not thereby describe any entire genuine world. So, this proposal seems to incorporate everything in previous proposals. First, we are free to construct both incomplete and inconsistent ersatz worlds with the present tools, as before. Second, we can equally well construct worlds that represent subtler impossibilities as we can worlds that represent outright contradictions.

Can we do more? The main advantage of the fine-grained alternative is that it allows us to attribute properties and relations to things which do not exhibit such properties or stand in such relations according to any possible world. In other words the finer-grained account should allow us to differentiate between intuitively distinct necessarily coextensive propositions, to some greater degree than before. In what way is this an advantage?

A clear way to illustrate this is by considering GR-theoretical impossibilities. As one might argue, what is true according to GR-theory is necessarily true, and therefore its negation is impossible.¹²⁹ But, presumably, all GR-truths are identified with the total set of worlds W and their negations with the empty set. So there is no way to differentiate between the various distinct propositions that constitute GR-theory, and their negations, by identifying them with the set of worlds where they are true. However, under the current proposal, whereby we can construct the relevant propositions by using richer tools, we can differentiate between distinct GR-theoretical statements. By referring to worlds by name in the relevant constructions, for instance, we can allow some ersatz impossible world to render true a false theoretical claim, say, $\langle w_1 \text{ is spatiotemporally related to } w_2 \rangle$ by including the sequence $\langle S, w_1, w_2, 1 \rangle$ as a member, namely by having it be true at that world that w_1 and w_2 are thus related, when this is neither true according to the theory, nor

¹²⁹ C.f. Vander Laan (1997), Yagisawa (1988).

true according to any genuine possible world. Or they might allow us to represent other similar kinds of impossibilities, for instance $\langle world\ w\ is\ not\ concrete \rangle$,¹³⁰ by letting some ersatz world have as a member the sequence $\langle C, w, 0 \rangle$. Importantly, while both impossibilities here are traditionally true at no genuine world and so identified with the empty set, we can differentiate between them by having these distinct finer constructions belong to distinct impossible worlds. And since the set of concrete things and the set of spatiotemporally related things are, we suppose, distinct, the relevant constructions will attribute distinct properties to their chosen individuals.¹³¹

Insofar as such theoretical impossibilities ought to be accommodated, we here have a clear advantage of the present proposal over previous versions. But does this advantage only apply to this rather specialised case? One could argue that it might also apply to certain mathematical and other propositions involving higher order entities. We might be able, for instance, to construct ersatz-worlds where mathematical falsehoods like $\langle ten\ is\ odd \rangle$ or $\langle ten\ is\ prime \rangle$ are true, if, that is, we can find a way to allow pure set-theoretic constructs to stand for numbers and more complex such constructs to stand for mathematical properties in the relevant sequences. If so, then given that the property of *being odd* has distinct members from the property of *being prime*, the two relevant sequences would constitute two different states of affairs about the number 10 (involving different properties). In a similar manner, we could build sequences involving higher order properties (construed as sets of sets) whereby we can represent as true impossible propositions like $\langle red\ is\ not\ a\ colour \rangle$ and such like.

Finally, further applications could involve relations of self-identity, mereology and set-membership. For instance, it seems we can now construct ersatz-worlds according to which some x is not identical to itself by including the sequence $\langle I, a, a, 0 \rangle$, where 'I' stands for the identity relation and a for some individual. And it seems that such a construction is now distinct from another stating the impossibility that the singleton of Socrates fails to include Socrates, $\langle M, s, s^*, 0 \rangle$, where ' M ' stands for the relation of *set-membership*, ' s ' for Socrates and ' s^* ' for his singleton set. Similarly, those might be distinct from yet another impossibility to the effect that I do not (spatially) overlap some of my parts, by having the following two sequences be included in the ersatz-world:

¹³⁰ Vander Laan (1997).

¹³¹ For one, one constitutes a property, a set of instances, the other a relation, a set of instance-n-tuples.

$\langle O, a, b, 0 \rangle$, and $\langle P, b, a, 1 \rangle$.¹³² It seems that we can maintain that the propositions represented by those constructions are distinct on the basis that they involve not only distinct individuals but also extensionally distinct properties. For, the set of all self-identical things should be larger than the set of all things x, y , such that x spatially overlaps y , or the set of all things x, y , such that x is part of y . And all of these latter should be distinct altogether from the set of all things x, y , such that x is a member of y . So here, we arguably have a clear example of how these finer-grained impossible-world constructions allow us to differentiate between impossibilities that we could not distinguish under the previous proposals.

However, even these more complex constructions don't have the means to overcome all our initial problems involving necessarily co-extensive propositions. Previously our problem was that our *propositions* weren't fine-grained enough to make the requisite distinctions. Now, the problem is, in many cases, that our *properties* are not fine-grained enough to make the requisite distinctions. As long as we still take the properties in the relevant sequence-constructions to be sets of individuals, the structures will only be as fine-grained as that identification can allow.

A case in point might involve necessary (or impossible) intuitively distinct properties. As long as all necessary properties are identified with the total set of individuals and all impossible properties with the empty set, our constructions will not be able to differentiate between intuitively distinct such properties. Take the letters ' F ' and ' G ' to stand for two such intuitively distinct necessary properties, both of which are identified with the total set of individuals, I . Then $\langle F, a, 0 \rangle$ and $\langle G, a, 0 \rangle$ will not constitute distinct states of affairs. For, under the GR-understanding of the relevant constructions, they will both attribute to individual a the lack of the relevant property, constituted by the universal set of individuals, I . One question here, however, is exactly what we can bring up as examples of *simple*, non-composite such necessary or impossible properties beyond, for instance, disjunctive (thus necessary) properties like *either being F or not being F* or conjunctive (thus impossible) properties like *being F and not being F* . One plausible candidate, again, is the property of self-identity (rather than the relation of identity) for such a necessary property, (and the lack of it for its impossible counterpart). But the question is whether there are *other* candidates for such absolutely necessary properties that make it the case

¹³² While I am a perdurantist rather than an endurantist (see Lewis 1986a: 202), I focus on *spatial* overlap here, since, if stage-theory in particular is right (as per, e.g. Hawley (2001), Sider (2001)), then the personal pronoun refers to my various temporal stages at different times, rather than an a-temporal entity that overlaps its temporal parts (see e.g. Hawley (2001: 45-46)).

that when we construct informational sequences involving the property of self-identity, we thereby unwittingly conflate that property with some distinct property similarly had by all things. Maybe existence would be a candidate, although it is questionable whether this is a separate property, at least under the Quinean-Lewisian framework. Similarly, maybe *being spatiotemporally located where one's parts are located* could be another candidate, although, again, it is questionable whether this does not simply amount to being self-identical. To the extent that it is unclear that the case of absolutely necessary properties illustrates the case in point, we should look for clearer objectionable cases.

I think the problem can be better outlined when we consider merely necessarily *coextensive* properties, like *being triangular* and *being trilateral* which we intuitively take to be distinct, but which are instantiated by exactly the same genuine individuals. Then any construction intended to involve one property will simultaneously be a construction involving the other. For then, taking 'A', for instance, to stand for *being triangular* and 'L' for *being trilateral*, the set of things A will be identical to the set L. So, if $A=L$, the pair of sequences $\langle A, a, 1 \rangle$ and $\langle L, a, 0 \rangle$ will carry the same content as the pair $\langle L, a, 1 \rangle \langle L, a, 0 \rangle$. In short, this proposal makes no progress at all from the previous one when it comes to conflating explicit contradictions with intuitively more subtle impossibilities. A subtle impossibility like $\langle a \text{ is triangular but } a \text{ is not trilateral} \rangle$ is again indistinguishable from the explicit contradiction $\langle a \text{ is triangular but } a \text{ is not triangular} \rangle$ since they are both true at the same ersatz-worlds; that is, any worlds which involve constructions that attribute to *a* the property constituting the set of all triangular, i.e. trilateral things (and its complement). Similarly for other cases of this kind: For instance, worlds where some electron *e* is positively charged will be worlds where *e* is not negatively charged, worlds where Vivian is a vixen will be worlds where Vixen is a female fox, and so forth. So, while we can once again distinguish between two distinct subtle impossibilities, such as $\langle \text{electron } e \text{ is positively and negatively charged} \rangle$ and $\langle \text{shape } a \text{ is triangular but not trilateral} \rangle$, we cannot distinguish between each of these and their explicitly contradictory analogues.

In some cases this might not be so bad. For instance, we might want to concede that *being a vixen* simply is the property of *being a female fox*, for these are simply different terms for what is intuitively the very same property. Then it only stands to reason that any world where a vixen is not a female fox is a world where a vixen is not a vixen; and similarly with cases involving the property of *being a bachelor* and thereby arguably the property of *being an unmarried male*. But in other cases this identification might be less

intuitive. For instance, we tend to think of the property of *trilaterality* as distinct from that of *triangularity*. Then it might be that we want to have impossible worlds that render true the counterfactual *<if x was triangular but not trilateral then x would only be triangular>*. Similarly, we might want to have worlds where an electron *e* is both positively and negatively charged without thereby also failing to be positively charged or failing to be negatively charged.¹³³ In short, while this fine-grained proposal extends GR's ability to represent distinct impossible propositions as true at distinct ersatz-worlds to some extent, it still cannot differentiate between some intuitively distinct impossibilities that involve necessarily coextensive properties.

3.3.4 Properties?

The reason for these limitations is simply that none of the proposals, so far, do anything to extend or improve upon GR's existing account of properties, as none of them offer up any impossible individuals to collect into sets that individuate distinct necessarily coextensive properties from one another. An ersatz world, which renders true the proposition *<a is triangular and a is not trilateral>*, whether it is conceived as a set of sets of worlds or as a set of sequences involving GR-individuals and properties, does nothing to furnish us with any new *individuals* to collect into distinct sets of triangularity and trilaterality. Such constructions simply, one way or another, involve whatever genuine worlds or individuals are already there, complete with the basic properties that these instantiate.

Now, we could simply add to these proposals by constructing impossible individuals as bundles of properties, i.e. sets of sets of genuine individuals. But even then, it is the properties, rather than the ersatz individuals that are the more basic entities in such constructions, meaning that the constructions themselves cannot offer a meaningful further basis for the differentiation of impossible properties, beyond that afforded by traditional GR. Sure, we could individuate distinct conjunctive impossible properties, like *being positively charged and being negatively charged* and *being a vixen and not being a vixen*, as two distinct sets of (possible) properties, i.e. two distinct sets of sets of individuals. But we still make no progress in differentiating properties like *triangularity* and *trilaterality*. Suppose that we construct an impossible individual out of the two properties

¹³³ At least this obstacle does not occur across the board. The property of *being green* is distinct from (indeed a subset of) the property of *not being red*. So worlds where *all swans are green* will form a distinct set from the set of worlds where *no swan is red*.

having three angles and *having four sides*. Can this individual help us differentiate triangularity from trilaterality? Well, not unless we take the property of having three angles, which we used to construct the ersatz-individual in the first place, to be distinct from the property of having three sides. If properties are simply sets of genuine individuals, we do not. If we want to differentiate the two, then must take the original properties used to construct ersatz-individuals to *not* be sets of genuine individuals in the first place.

Of course, there are GR-friendly options by which to do this, i.e. analyse properties like *triangularity* and *trilaterality* in some other way extensionally. Indeed, just as we went for a finer-grained account of propositions we can go for a finer grained account of properties, analysing such properties structurally along the lines proposed by Lewis (1986a: 56). Lewis identifies *triangularity* with the structured property $\langle T, A \rangle$, where ‘A’ stands for *being an angle of*, and ‘T’ for a higher order relation holding between the property of being something to which exactly three things bear some relation to, and that relation (here A). And similarly for *trilaterality*, where ‘S’ in $\langle T, S \rangle$ stands for *being a side of*. Since the structures $\langle T, A \rangle$ and $\langle T, S \rangle$ differ with respect to their second member the structured properties of triangularity and trilaterality are thereby identified with distinct set-theoretic constructions. (Lewis 1986a: 56)

Now, we can use these structured properties to improve upon the finer-grained proposed ersatz-world constructions above, by allowing that a world that includes the constructions $\langle \langle T, A \rangle, a, 0 \rangle$, $\langle \langle T, S \rangle, a, 1 \rangle$ thereby renders true at it that some *a* is trilateral but not triangular, without the relevant sequence $\langle \langle T, A \rangle, a, 0 \rangle$ also carrying the content $\langle a \text{ is not trilateral} \rangle$. Thus, we can employ such constructions to differentiate between worlds according to which the subtle contradiction $\langle a \text{ is trilateral and } a \text{ is not triangular} \rangle$ is true and worlds that render true instead the explicit contradiction $\langle a \text{ is triangular and not triangular} \rangle$. Similarly, as we see fit with further examples of that category, like *having positive charge* and *having negative charge*, *being a bachelor* and *being a married male* and so on.

But, while we are free to construct impossible individuals by bundling such structural properties together, such constructions are of little interest: the extensional differentiation of the requisite properties has already taken place at a lower level. We already differentiated *triangularity* from *trilaterality* structurally, (as sets of sets of individuals), so lumping them together to create ersatz individuals *qua* bundles of properties offers nothing further: it is not the impossible individuals that help us give extensional identity criteria

that differentiate between distinct impossible properties here, but Lewis' structural account. (So, Berto in particular, seems wrong to suggest, relying on Lewis' structural account, that "[i]f properties are sets of individuals, in order to differentiate such properties while retaining extensionality we may need ersatz impossible individuals – something which is triangular but not trilateral, etc. ... taken as sets of (structured) properties." (Berto forthcoming: 15-16) We do not *need* such ersatz individuals for this purpose, given that we have already achieved the differentiation by structural means.)

In sum, while certainly available, it seems to me that, such complex structures have little to offer. To the extent that structured properties are themselves sets of (sets of) genuine individuals, they can already play the relevant roles. Curiously, the situation is not analogous in the case of structured propositions, used to construct finer-grained ersatz-worlds. For these sequences are not constructed by merely using worlds or sets of worlds; instead they draw from the level of individuals and properties. Thus, ersatz impossible worlds made of structured propositions *do* further the programme of identifying propositions uniformly with sets of worlds in a way that ersatz individuals made of structured properties do not.

3.3.5 Summary

In principle, GR can attach itself to most set-theoretic ersatz theories of worlds, by drawing on its own tools of individuals, worlds, sets of individuals, sets of worlds, or various combinations thereof for its own ersatz constructions. It can thus appropriate much of what is of value in ersatz theories of impossible worlds construed as maximal properties or propositions, sets of propositions, (sets of) states of affairs, informational states or whatnot. If GR conceives of its ersatz worlds as sets of propositions, then for most combinations of propositions, GR can have that combination; if it conceives its worlds as sets of states of affairs or informational states, then for most combinations of individuals and properties or relations, GR can get that combination.

Yet unlike ersatz theories of worlds, which take propositions and properties as primitive entities and so have a rich unconstrained base of entities by which to construct their ersatz worlds, the basic tools for GR are constrained by its concrete base. In that sense, the gains afforded by allowing set-theoretic constructs to play the role of impossible worlds for GR have some limitations, and while the latter are not insurmountable, they do seem to require a variety of approaches and devices. GR is invited to offer more and more complex constructions to play the needed theoretical roles. Impossible worlds as sets

of ways give way to impossible worlds as sets of propositions, which give way to worlds made of more complex structures of propositions to achieve finer distinctions, which still need the addition of more complex structures in the role of properties, to achieve yet finer distinctions. And none of these constructions come with impossible individuals as standard, which, if needed, have to be ‘built’ on the side. Moreover, GR must commit to a particular set of conditions for the behaviour of the connectives at its ersatz-worlds, it seems, if it is to accommodate, say, conjunctive or disjunctive impossibilities. Nonetheless, it looks like there are sufficient tools in the GR toolbox to construct a variety of ersatz impossible worlds and individuals.

3.4 Pros and Cons: Ontology, Methodology and Justification

We saw that ersatz impossible worlds allow GR to appropriate the benefits that impossible worlds have hitherto bestowed, almost exclusively, to ersatz theories, without terrible costs.¹³⁴ This makes (ersatz-) IGR a stronger theory, for it can now apply its analyses of counterfactuals and propositions to a larger domain. Moreover, unlike ersatz theories, IGR can do so (1) without relying on propositions or properties conceived of as primitive intensional entities, but by instead retaining its extensional analysis of propositions and properties already in place and (2) unlike ersatz theories, it can do so without relying on primitive modal notions. But is the proposed double-standards approach justifiable? And does it pose a threat to the concretist GR-spirit? Let us examine the pros and cons.

3.4.1 No Inconsistency Threat

Importantly, allowing GR to go ersatz when it comes to impossible worlds elegantly avoids Lewis’ objection against genuine impossible worlds in particular (Lewis 1986a: 7 fn. 3). He objects to such worlds on the basis that contradictions true *at* such worlds, amount to true contradictions *about* them. The locution ‘at *w*’, Lewis argues, merely being a modifier which restricts implicit and explicit quantification to a particular domain, distributes over the truth-functional connectives, so that: $\text{at } w (A \ \& \ \sim A) \text{ iff } \text{at } w A \ \& \ \sim(\text{at } w$

¹³⁴ Indeed, Berto’s central argument revolves around the fact that this hybrid view of possible and impossible worlds surpasses both GR and ersatz theories by not only accruing the theoretical benefits of impossible worlds, unlike traditional GR, but by also offering a reductive analysis of possibility, unlike ersatz theories. (Berto forthcoming) In this we disagree only in the sense that I do not take the proposed theory to be a *hybrid* theory of worlds at all, but only a very natural extension of what can only be termed a genuine theory of worlds. (See 3.4.3)

A). This means that contradictions true-at- w just are contradictions *tout court*.¹³⁵ But, as many proponents of ersatz impossibilia have soundly argued (e.g. Varzi (1997), Vander Laan (1997), Mares (1997)), Nolan (1997)), this objection no longer applies if we consider ersatz impossibilia.¹³⁶ For, if our impossible worlds are ersatz, then ‘at w ’ no longer functions as a quantifier-restrictor for such worlds. Contradictions ‘true at’ such worlds are not contradictory truths that describe the worlds in question. Instead, truth at such worlds often merely amounts to set-membership of some sort. And while a set can have a proposition and its negation as members, it does not thereby exhibit inconsistent properties, that is, no contradictions are true *about* the set itself. By identifying impossible worlds with such sets, just like ersatz conceptions of impossible worlds, the present proposal also avoids Lewis’ objection, which only concerns concrete impossibilia.¹³⁷

3.4.2 Ad Hoc *Ontological Distinctions?*

What of possible criticisms? One question is whether the outlined approach of deeming possible worlds to be genuine worlds and impossible worlds to be mere substitutes is a justified and principled approach. Graham Priest, among others, questions such a divided ontology as drawing an essentially unwarranted fundamental ontological distinction between the possible and the impossible:

“...there is, as far as I can see, absolutely no cogent (in particular, non-question-begging) reason to suppose that there is an *ontological* difference between merely possible worlds and impossible worlds – any more than there is for supposing there to be such a difference between merely possible worlds which are physically possible and those which are physically impossible. To differentiate between some non-actual worlds and others would seem entirely arbitrary.” (Priest: 1997b: 582)

This view is also echoed in Rescher & Brandom:

“It ought not to be concluded... that nonstandard worlds are ontologically derivative, *mere* constructions out of the ontologically more basic standard entities, however.

¹³⁵ I do my best to repudiate Lewis’ argument in Ch IV to open the way for concrete impossibilia.

¹³⁶ C.f., also, Rescher & Brandom (1980: 4).

¹³⁷ Although something will have to be said about how to define the behaviour of the logical connectives at such worlds (i.e. within the modifiers). For paraconsistent approaches, see again Restall (1997), Mares (1997), for restricted classical approaches Nolan (1997), Vander Laan (1997), Zalta (1997).

For...it is equally possible to treat non-standard worlds and their inhabitants as basic, reducing standard worlds and their inhabitants to ideal constructions out of those non-standard entities.” (Rescher & Brandom 1980: 66)

And, in discussing ways the world can or cannot be, we have Vander Laan:

“Is there a principle of ontology which would justify our construing these similar parts of our modal language in such dissimilar ways?” (Vander Laan 1997: 600)

So, the argument would be, it is well and good that GR can construct all sorts of ersatz impossibilia out of its genuine worlds, but what reasons can you give to justify this fundamental ontological divide between the possible and the impossible?

Now, whether a distinction in ontological kind between the possible and the impossible can be justified depends on how to construe both the ontology of the proposal and the relevant worry.

One might, for instance, construe the worry as questioning the dual employment of the term ‘world’ to refer to entities of fundamentally different ontological kinds: concrete entities on the one hand and abstract constructions on the other. But surely this thought cannot be the source of any kind of worry. For ersatzers too, after all, allow that there are two senses of the term ‘world’ – the abstract entities they call ‘worlds’ and the concrete thing we occupy. For them, too, each sense of the term ‘world’ picks out an entity of a fundamentally different ontological kind.¹³⁸ Why should the ersatzer be able to say that two things of fundamentally different ontological kinds may be called ‘worlds’, and the concretist not be equally allowed to say that there are worlds of fundamentally different ontological kinds? And why should the divide between the actual and the non-actual support such a fundamental ontological distinction on the part of the actualist, and the divide between the possible and the impossible not equally do so on the part of the concretist?

Moreover, it is unclear that the abstract-concrete distinction, however fundamental, entails exclusivity. Arguably there are sets which cut across the abstract-concrete divide; for example, pure sets can be argued to be abstract, while impure sets can be deemed concrete (by, say, being spatiotemporally located). But are not all sets similarly entities of

¹³⁸ C.f. e.g. Nolan (2002: 13)

a putative single ontological kind? If sets, why not worlds?¹³⁹ In any case, GR is not necessarily committed to deeming the ersatz constructs to be properly called ‘worlds’.¹⁴⁰ It is free to concede that only the maximal mereological sums are properly so-called worlds, while the set-theoretical constructs are just that, namely constructs out of worlds. Does it thereby no longer constitute a theory of *impossible* ‘worlds’ properly speaking? Maybe so, but if so, so what? If non-worlds can do the job of representation and differentiation, then they differ from worlds only in name. All that GR needs is some machinery by which to be able to represent different impossibilities, and set-theoretical constructs out of possibilia can give it that. So, I do not think that GR (in its present extension) is any worse off than ersatz-theories in promoting a fundamental ontological distinction between entities that should intuitively be of a kind, namely worlds, or generally in naming its ersatz constructions ‘worlds’.

This clarifies the question of whether entities of a different ontological kind can be properly deemed to be worlds. However, the relevant challenge arguably strikes deeper. Priest’s argument, in particular, is, in effect, a challenge against the thought that reality is essentially consistent and that therefore, if there are any impossible worlds, they cannot be of the same kind as possible worlds. Indeed, the supposition that (concrete) reality is consistent, and that it is classical logic – in the tradition of Frege and Russell – which reveals the structure of reality, is an assumption that underlies the whole GR edifice. Nowhere, for example, does Lewis bother to defend the Law of Non-Contradiction. It is merely assumed throughout as obvious. This presumption is, after all, the key reason for Lewis’ hostility to genuine impossibilia, as can be seen in comments to the effect that “there is no subject matter, however marvellous, about which you can tell the truth by contradicting yourself” (Lewis 1986a: 7 fn.3) and that we “do not live in one of those [impossible worlds].” (Lewis 1973b: 16) In that sense, there is no non-question-begging reply one can give to Priest for supposing possible and impossible worlds to be different in kind.

But while GR has no direct reply to Priest *et al*, there is a perfectly good reply that can be given from within the *GR methodological framework* itself, and it is this: As long as

¹³⁹ Moreover, it seems that by the same token we can take ersatz-worlds to be concrete or quasi concrete in the sense that they are not pure sets. However, if located, they would be located across many worlds.

¹⁴⁰ See also Stalnaker’s ‘Louis’: “I have no inclination to deny the existence of sets of propositions that are inconsistent, and if you think they can do some explanatory work for you in semantics, go right ahead and use them – you need not reject modal realism to have recourse to sets of propositions, either maximally consistent ones or those that fail to be either consistent or deductively closed. But you can’t buy any metaphysics by calling such sets “worlds”.” (Stalnaker 1996: 200)

our aim is to retain the original classical theory, yet still give extensional analyses of various intensions and reductive modal metaphysics, then a distinction in kind between the possible and the impossible is methodologically warranted by GR's lights insofar as it is instrumental to the achievement of that goal. The promoted distinction in kind is hence not unwarranted, *ad hoc* or unprincipled, but motivated by the very conceptual aims of the theory. Rescher and Brandom may still be right, that one may turn the tables and construct possible worlds from more basic impossible worlds. But, the logical and ontological views that would promote such a reversal are simply incompatible with the background views of GR-theory. And it is, after all, GR that it is our aim, here, to preserve.

In sum, GR can openly reply that the justification for the relevant ontological distinction can simply consist in the fact that the aim of the game is to extend an existing theory, which is classical in nature, and not to question the (logical) nature of reality. Moreover, one can point out that the theoretical benefits from such a mixed theory of worlds – namely its reductive analysis of possibility, as well as the other fully extensional identifications it offers – are enough by themselves to justify the ontological distinction that allows those benefits. Indeed, it is part of the success of GR's reductive analysis of modality that the possible and the impossible differ in ontological kind.

3.4.3 A New Hybrid View?

Next, one might worry that we have departed too radically from the concretist spirit of GR. One might worry that what we have here, instead, is a view that is neither a genuine realist theory of worlds, nor an ersatz theory, but instead an altogether new hybrid view whereby some worlds are concrete and some are not. However this simply isn't so. To see this, consider that while a Lewisian realist about worlds would need to change none of his ontological views to espouse the present proposal, no self-respecting ersatzter would ever embrace any of what has been put forward here. For, every ersatzter is first and foremost an *actualist* about what there is. And to be an actualist is by definition to reject the existence of non-actual worlds.

To demonstrate, let us look at a brief remark by Mares, as a case in point. Mares seems to suggest that an apparently ersatz theory of worlds, whereby worlds are conceived as possible and impossible indices, can similarly employ "...Lewis-style vertebrate worlds to determine which indices are possible" and therefore does "...not require a primitive notion of possibility any more than [Lewis] does." (Mares 1997: 520) Now, this is true enough, but it is unclear exactly what Mares is proposing here. He seems to be saying

that one could be an ersatz in the sense of believing possible and impossible worlds to be ersatz constructions, yet achieve a full non-modal analysis of modality by allowing that all and only the *possible* ersatz world-indices have concrete actualisations. But this is surely no solution to any true ersatz, given that the main reason that any possible world realist is an ersatz is that he is an actualist.¹⁴¹ Insofar as the present proposal commits one to the existence of non-actualia, it is Lewisian through and through. Similarly, insofar as the proposal achieves the central aims of GR, namely to give a reductive analysis of modality and a fully extensional metaphysics, again the proposal is essentially a Genuine Realist proposal of possible and impossible worlds. Any ersatz employing genuine worlds to effect a reductive analysis of possibility is no ersatz, even if he chooses to name the ersatz constructions ‘worlds’ and the genuine counterparts ‘concrete realisations’. This terminological distinction is, in any case, of little importance (c.f. Lewis 1986a: 87, fn 57). Nor does calling all and only the ersatz indices ‘worlds’, and letting the concreta merely be concrete actualisations, escape Priest’s challenge. For why should it be the case that all and only the consistent indices have concrete actualisations? In that sense, I take it that what Mares is proposing here is that one could achieve the proposed reductions by being a genuine realist about possible worlds. But we knew that already.

In short, I do not take the present proposal to offer a *hybrid* theory of worlds, at least not in any deep metaphysical or ontological sense. For we have not *added* anything to the ontology of GR that was not already there (nor detracted anything). We have merely used what is there to do more. Hence there is no danger whatsoever of the proposed extension of GR into set-theoretic impossibilia being deemed to have abandoned the genuine realist spirit of GR.

3.5 Why Still Bother With Concrete Impossibilia?

No doubt, the view presented here looks like the easiest and cheapest solution to the problem of how to accommodate impossible worlds into GR-theory. But this does not mean that the alternative of genuine impossibilia ought not to be explored. For it might be

¹⁴¹ As an interesting alternative one can compare this view with Zalta (1997) who allows that there may be concrete worlds besides abstract ones (and presumably besides ours). He proposes that “the worlds are all that is the case and not just the totality of things” and goes on to remark that this conception “is consistent with the existence of maximally large (mereological sums of) spatiotemporally-connected concrete objects” (Zalta 1997: 652). The crucial difference between Zalta’s proposal here and Mares’ proposal is that, in Zalta’s case, concrete worlds, if there is more than one, don’t play any theoretical role. In that sense he is certainly not a concretist (although he rejects the title of ersatzism and – given the above comment – seems not that bothered about actualism either).

that a conception of impossible GR-worlds on a par with genuine possibilia makes for a more unified, stronger theory – one which retains GR’s conceptual, ontological and semantic analyses intact and, in a single move, uniformly extends them to cover impossibilities. Of course, what might be gained in the form of a uniform ontology might be lost in the form of a more complex logical theory. However, it is still worth seeing how a theory of impossible worlds on a par with possible worlds would fare on the scale of strength.

Moreover, if the main obstacle to such a view is the acceptance of true contradiction, then one may consider taking Priest’s challenge seriously, and call GR’s classical presumption into question. For, arguably, if a view of genuine Lewis-impossibilia can indeed enjoy all the benefits of a reductive analysis, extensional metaphysics and extended modal and counterfactual semantics, then it would seem that a consistent reality was never essential for these virtues to be obtained.

Finally, the exploration of this alternative ought to have instrumental virtue in itself, beyond the exotic question of concrete impossibilia, highlighting questions as to the very nature of modality. If parts of reality are indeed inconsistent, does that forfeit all means of a reductive analysis of possibility? And, if reality is inconsistent, what does possibility really amount to then? Moreover, can we make sense of the notion of concrete worlds that logically behave differently? So, besides taking the alternative full blown genuine theory of impossibilia to still constitute a live option, I also take questions such as these to make it worthy of exploration.

3.6 Conclusion

In sum, an extension of GR into impossible worlds need not cost much at all. For, we can suppose that, while possible worlds are genuine Lewis-worlds, impossible worlds are ersatz set-theoretic constructions out of possibilia. Moreover, the ontological divide thereby promoted seems justifiable given the background methodology and overall aims of the theory. Of course, one could criticise the approach as somewhat piecemeal. For, each proposed construction only achieves so much, unless supplemented by yet more finely structured entities. Even the best proposal – the one that conceives of impossible ersatz-worlds as sets of structures made of genuine individuals and properties – still does not make any progress beyond original GR in the analysis of necessarily coextensive, intuitively distinct properties. Nonetheless, its benefits still far outweigh its costs, which are negligible. For, the benefits that can be had from impossible worlds are achieved,

under the present view, without sacrificing either GR's reductive analysis of modality or its adherence to classical logic for truth *simpliciter*. Still, the option remains open for someone to reject the present proposal in favour of its full-blown concretist alternative, if the latter turns out to be an equally strong but ontologically more uniform or simpler theory, despite its logical peculiarities. Hence, despite the easy advantages of ersatz-impossibilia, I take the alternative to still constitute a live option. And given that I also consider the exploration of genuine impossibilia to be of merit in itself, I devote the last three chapters of this work to that exploration.

CHAPTER IV

Genuine Impossible Worlds and Contradiction

4.1 Introduction

In this chapter I wish to make a beginning toward a genuine theory of concrete impossible worlds by addressing David Lewis' own objection against the extension of his theory (GR) into such worlds. Lewis argues against genuine impossibilia on the basis that a contradiction in the scope of the modifier 'at w ' amounts to a plain contradiction with the modifier within it, an unacceptable consequence. I reply that (a) even if this were so, there is room to argue that this consequence is less objectionable than at first appears; and that (b) in any case, the argument rests on the questionable assumption that the negation commutation principle 'at w ($\sim A$) iff \sim (at w A)' holds in the theory. I show that this principle *must* be rejected on the hypothesis of impossibilia, and indeed that it *can* be rejected without irrevocable damage to the theory.

Section 4.2 sets out the main argument by Lewis; section 4.3 argues for (a), namely that even if the main premise of the argument holds, we can still allow for a compromise that rescues the hypothesis of genuine impossibilia from the *reductio*; and section 4.4 pushes line (b), namely that the main premise of Lewis' argument must, and indeed can, be safely rejected. Finally in section 4.5 I explore a further application of the discussion. I assume that the default notion of logical consequence is classical, but only because the original Lewisian picture is cashed out in those terms: the discussion is aimed precisely at the question of how to accommodate impossible worlds into the original classical theory.

4.2 Lewis against Impossible Worlds

Lewis gives his reasons for the rejection of Lewis-style impossible worlds in a footnote in his *Plurality*. The argument turns on what it means in the Lewisian framework for a sentence (proposition) A to be true 'at w '. For Lewis, the expression 'at w ' serves only to restrict implicit and explicit quantifiers in A to the particular world in question. So, for example, the entire proposition 'at w : some swans are blue' is true if the proposition 'some swans are blue' is true when we restrict our attention to objects only in w . Starting with

this basic principle, Lewis' argument against impossibilia is a *reductio* to the following effect:¹⁴²

“[The] discussion of restricting modifiers enables me to say why I have no use for impossible worlds, on a par with the possible worlds. For comparison, suppose travellers told of a place in this world – a marvellous mountain, far away in the bush – where contradictions are true. Allegedly we have truths of the form ‘On the mountain both P and not P’. But if ‘on the mountain’ is a restricting modifier, which works by limiting domains of implicit and explicit quantification to a certain part of all that there is, then it has no effect on the truth-functional connectives. Then the order of modifier and connectives makes no difference. So ‘On the mountain both P and Q’ is equivalent to ‘On the mountain P and on the mountain Q’; likewise ‘On the mountain not P’ is equivalent to ‘Not: on the mountain P’; putting these together, the alleged truth ‘On the mountain P and not P’ is equivalent to the overt contradiction ‘On the mountain P, and not: on the mountain P’. That is, there is no difference between a contradiction within the scope of a modifier and a plain contradiction that has the modifier within it. So to tell the alleged truth about the marvellous contradictory things that happen on the mountain is no different from contradicting yourself. But there is no subject matter, however marvellous, about which you can tell the truth by contradicting yourself. Therefore there is no mountain where contradictions are true.” (Lewis 1986a: 7, fn 3)¹⁴³

Before we proceed, a brief note: The mere fact that the argument is presented in a footnote suggests that it is meant not as an all out attack against impossible worlds but more as a justification of Lewis' own methodological stance in this respect, namely that drawing the line at impossibilia is a straight consequence of Lewis' overall conceptual and metaphysical picture.¹⁴⁴ Yet, while this may be the case, it is worth exploring exactly what the minimum sacrifices would be by which to allow GR to incorporate impossible

¹⁴² Robert Stalnaker (1996: 196) presents a similar argument (explicitly borrowed from Lewis) against any venture into impossible worlds. However, in discussing this argument, Stalnaker is often accused of not distinguishing between a Lewisian understanding of ‘at *w*’ and an ersatz-understanding for which it seems the objection can more easily be countered. See for example Priest (1997a), Varzi (1997), Nolan, (1997), Vander Laan (1997), Zalta (1997).

¹⁴³ See also Lewis (1983c)

¹⁴⁴ For instance he explicitly recognises that an ersatzer can allow for impossibilia. (1986a: 7, fn 3)

worlds. More so, given that many ersatz theorists of impossible worlds are quick to pledge agreement with Lewis on this score, then go on to explain why the argument is not a problem for their own accounts. Naturally, it is worth seeing whether they also are right.¹⁴⁵

Lewis' argument in a few short steps is this:

- (Ass) There are Lewis-worlds at which $(A \& \sim A)$
- (P1) at w $(A \& \sim A)$ iff at w $A \& \sim(\text{at } w A)$: i.e. the alleged world-bound contradictions amount to literally true contradictions.
- (P2) No contradiction is ever literally true (LNC)
-
- (C) There are no Lewis-worlds at which $(A \& \sim A)$

To open the way for Lewis-style impossibilia we need to explain how either (P1) or (P2) could arguably be rejected with the least damage to the theory. (P2) is not explicitly argued for. The Law of Non-Contradiction (LNC) is simply an assumption which is part of the theory.¹⁴⁶ Still, to argue for a rejection of (P2) (while retaining a non-trivial theory), one has to explain why it would be a good move to change one's logical theory, apparently solely for the sake of Lewis-impossibilia – a tough challenge. (P1) in contrast is supported by this idea that 'at w ' serves only to restrict implicit and explicit quantifiers. For Lewis, this means that 'at w ' passes through the truth-functional connectives, so that a conjunction is true *at* w , just when each conjunct is true *at* w , a disjunction is true *at* w , just when either disjunct is true *at* w , and so on for the classical connectives.¹⁴⁷ In particular for negation, we have 'at w not: A ' is equivalent to 'not: at w A '. Let us call this the negation commutation principle:

- (CP) at w $(\sim A)$ if and only if $\sim(\text{at } w A)$

The idea is that (CP) holds because 'at w ' works just like any ordinary domain-pointer phrase like 'in the fridge'. Suppose it is true that 'in the fridge, there isn't any beer'. Then

¹⁴⁵ See for example: Varzi (1997), Nolan (1997), Vander Laan (1997).

¹⁴⁶ See also Lewis (1982) and later (2004) for his stance on LNC.

¹⁴⁷ See Lewis (1968: 30-31).

it seems equally true that ‘it is *not* the case that, in the fridge, there is beer’. (CP) (and the rules for conjunction ‘at w ’) give us (P1).

Another way to put the problem presented by Lewis’ argument for the supporter of Genuine impossibilism is in the form of an apparent trilemma; we seem to have three suppositions that cannot hold together:

- (I) Classical Logic
- (II) (CP) at w ($\sim A$) if and only if \sim (at w A)
- (III) There are worlds w such that at w (A & $\sim A$)

Lewis rejects the third supposition on the basis of the first and second. I believe that it is the second hypothesis here which needs to be rejected. However I will try out two alternative paths: In Section 4.3, I suppose (II) to be true and defend a position that holds onto (III) by justifying a rejection of (I) and so (P2) in the argument. In Section 4.4, I argue that (CP) (and so (II)) ought to be rejected under the hypothesis of impossibilia, so that (I) and (III) are compatible contra (P1).¹⁴⁸ In what follows, whenever I talk of truth/falsehood *simpliciter*, I just refer to truth and falsehood in the home-language of GR, as opposed to what is true-at- w , at the level of possible-world-semantics.

4.3 Classical Logic and Truth *Simpliciter*

Let us suppose for the purpose of this section that (CP) holds, and so that classical logic has to be sacrificed if we want to allow for genuine impossibilia in the theory. I will here argue that such a move is not as unwelcome or unwarranted as it first appears. The tone for the argument is set nicely by Takashi Yagisawa. In his (1998) paper, he dismisses Lewis’ stance by simply noting that it should not be surprising that we must contradict ourselves in order to speak *about* the impossible:

“When you contradict yourself, what you are saying could not possibly be true. That is indeed a good reason for the conclusion that you cannot tell the truth about anything *possible* by contradicting yourself. But it is hardly a good reason against impossibilia. Why can you not tell the truth about an impossible thing by contradicting yourself?” (Yagisawa 1988: 203)

¹⁴⁸ See also Stalnaker’s (1996: 196-97) (the words of ‘Will’) and the real-life Lycan (1991b: 277; 1994: 40).

The beautiful simplicity of such a reply of course carries a cost, namely it commits a theory of Lewis-impossibilia to the *existence* of things about which we can speak truly in contradiction, and so, to a relatively strong form of dialethism. (Divers 2002: 76) And going dialethic purely on the basis of impossible worlds seems like a bad move: commitment to impossible worlds should no more force us to amend our notion of logical consequence than commitment to worlds with different laws of nature ought to force us to change our physical laws. However, the reply also holds an intuitive appeal. For, what can truth *about* the impossible be, if not itself impossible? And, there may be a way to salvage the intuitive aspect of Yagisawa's reply by paying more attention to the distinction drawn between truths *about* the possible – the actual included – versus truths *about* the impossible.¹⁴⁹ This kind of distinction paves the way for a divide-and-conquer sort of approach. It can be shown in particular that:

1. No contradiction ever holds at or about the actual world; (this hypothesis is carried over from classical GR). Hence, we can say that the classical logical rules are still *actually* truth-preserving, indeed necessarily so.
2. This pragmatic stance that actual classical truth-preservation is sufficient for all usual intents and purposes can be justified using Lewis' own methodology.
3. The remaining theoretical inconsistencies and the consequent emendation of the logic, by which to reason from the theory's hypotheses, admits of deeper justification than first appears.

I will take these in turn.

4.3.1 Truth about the Actual

A theory of Lewis-impossibilia may embrace contradictions at impossible worlds, but it does not thereby tell us that anything contradictory is or could ever be true in *our* world.¹⁵⁰ And so, in particular, as long as we operate with our usual quantificational restrictions to all things actual when we say that nothing is both a swan and not a swan, we are always right, indeed we *cannot* go wrong. So, the argument is, we can retain our classical laws and rules of inference, when reasoning about our world, and so for all

¹⁴⁹ Stalnaker (1996: 204, fn 6) seems to take Yagisawa's response to entail that if some world is impossible then every world is impossible, the actual one included, i.e. that if a contradiction is true '*at*' some world, then it is true '*at*' every world (presumably about that impossible world). But this simply does not follow. If '*at*' functions as a restricting modifier, then what is true at a world is what is true when quantifying over things in that world. Then, what is true at a consistent world will not be contradictory.

¹⁵⁰ See in the same spirit Routley (1980: 87-88) in defence of Meinongian impossibilia.

practical purposes. More than this, we can maintain that the classical rules are *necessarily* truth preserving at our world. For exactly the same rules apply to all possible worlds – all the worlds which are accessible from ours – and so, these rules are necessarily truth-preserving at our world.¹⁵¹ The upshot is that not only is classical logic actually truth-preserving (quantifying only over our world), but it is also necessarily actually truth-preserving (quantifying over all logically accessible worlds). If so, then commitment to logically impossible worlds no more alters our notion of logical consequence than commitment to nomologically impossible worlds alters our natural laws. For something to be a law of nature at our world is for it to be (a) an exceptionless (appropriately chosen for, say, its simplicity and strength) general truth about our world, and (b) necessary, i.e. hold at all physically accessible worlds.¹⁵² Suppose that it is a natural law that nothing travels faster than the speed of light. When we say that nothing travels faster than velocity v , we only quantify over things in the actual world. There may be (unrestrictedly speaking) fish, which are part of some exotic world and swim twice as fast as v , but they do not concern us here; they do not force us to reconsider our natural laws. Similarly, when we say that nothing violates LNC (which can be expressed as a universal quantified statement: $\forall x \sim(Ax \ \& \ \sim Ax)$), we need only quantify over all things actual.¹⁵³ Moreover, when we say that *necessarily* nothing travels faster than v , we mean that nothing travels faster than v at any physically accessible world. When we say that LNC is *necessarily* true we similarly mean that LNC is true at all logically accessible worlds. In both cases, the laws hold because they are exceptionless truths *about* our world, and *about* each world relevantly accessible from ours. The upshot is that LNC actually holds and necessarily so.

4.3.2 Actual Truth, Necessary Truth and Truth Simpliciter:

Interestingly, we can find a form of justification for such a pragmatic proposal from within Lewis' own methodology. In particular, it is a well-known matter of contention that Lewis goes against supposed common sense opinion in differentiating between truth *simpliciter* and actual truth for statements that implicitly or explicitly carry ontological

¹⁵¹ I discuss the question of how the accessible, i.e. possible, worlds are to be individuated in Ch V. See Mares (2004: e.g. 52) for taking logical necessity to be truth at every world (of a single model), although I see no reason why should have a single model: the possible (logically accessible) worlds may simply be those worlds over which the models of a particular logic range. For a (less metaphysically loaded) worlds-plus-interpretations rendition of validity see Shapiro (1998).

¹⁵² C.f. Lewis (1973a; 1983d; 1986c).

¹⁵³ See also Routley (1980: 894) Priest (2006b: §8) for classical inferences holding at restricted domains. For a criticism of these approaches see Read (1988: §7).

commitments.¹⁵⁴ For, unlike actualist theories according to which all there is actually is all there is full stop, Lewis's ontology is committed to non-actualia, and so we have a failure of (SIM):

(SIM) *Actually A if and only if A*

For example, it is false that actually there are no talking donkeys if and only if there are no talking donkeys. While there actually are no talking donkeys, there are possibilia which are talking donkeys; i.e. while 'there are no talking donkeys' is true when quantifying only over actualia, it is false when we lift restrictions and quantify over all there is. Now, the claim that unrestrictedly there exist talking donkeys is usually followed by incredulous stares. Lewis' arguments in softening these stares and so, for (SIM) can also be applied to soften any incredulity regarding the unrestricted failure of LNC. So, let's examine the two cases, that of talking donkeys and that of LNC.

Let us suppose that received opinion says that there are no talking donkeys, *full stop*. But –Lewis argues – this opinion typically doesn't distinguish between *actual* truth and *just* truth. (Lewis 1986a: 133) Once these come apart the incredulity ought to be defused: received opinion is respected in that there *actually* are no talking donkeys (quantifiers restricted to the actual), and we only have to stretch that extra mile to accept the existence of talking donkeys *simpliciter*, a hypothesis about which we ought no longer to have the same intuitions that we associate with what is actually the case, once we are denied (SIM). Moreover, we can go on simply ignoring the unrestricted existence *simpliciter* of talking donkeys and go about our daily business as if they did not exist at all, given that to all intents and purposes they don't, since they *actually* don't.

A similar argument can be given for our situation with respect to the failure of LNC. Received opinion says that LNC is true, and necessarily so.¹⁵⁵ But it doesn't distinguish between actual truth and truth *simpliciter*. Once these come apart the incredulity ought to be defused: received opinion is respected in that no contradiction is ever *actually* true (quantifiers restricted to the actual); moreover, *necessarily* no contradiction is ever actually true, for no contradiction is true at any possible (accessible) world. We only have to

¹⁵⁴ All I mean by employing the notion of 'truth *simpliciter*' here is that reality is as Lewis' theory says it is. A correspondence theory of truth will do just as well as any other, whether Lewis' theory corresponds to the facts, or whether, minimally, GR-theoretical statements 'p' are true just when p.

¹⁵⁵ One cannot give a non-circular argument (or proof) for LNC in any case, since any proof must presuppose the principle in some form; (see Priest (1998; 2006a: §1) for some historic (Aristotelian) arguments in favour of the law).

stretch that extra mile to accept that there are *simpliciter* some true contradictions, a hypothesis about which we ought no longer to have the same intuitions that we had about what is actually the case, once we are denied (SIM). Moreover, we can go on simply ignoring these wider contradictions, given that they do not concern what is or could be true at our world. So we can go about our daily business as if no contradiction is or could ever be true, since no contradiction is true either at our world or any world accessible from ours.

There is something more to be said. Namely, if we are arguing against Lewis, it is not received opinion we must address, but Lewis' opinion. And, while Lewis' considered opinion rejects (SIM), he typically doesn't distinguish between (what we usually consider) absolute necessary truth and truth *simpliciter*; that is, between certain propositions which are true at every possible world, and propositions which are *simply* true. Such propositions would include: *nothing is both blue and not blue*, *if A&B then A*, *all vixens are female foxes*, $2+2=4$, and so on. These propositions are both true *simpliciter* –i.e. true with quantifiers ranging unbound over all that exists – and necessarily true – i.e. true with quantifiers bound to each (possible) world. Indeed Lewis often switches between truth-at-every-world and unrestricted truth *simpliciter*; the two for him are equivalent. For example he says:

“Necessarily all swans are birds iff, for any world W, quantifying over parts of W, all swans are birds. More simply: iff all swans, no matter what world they are part of, are birds.” (Lewis 1986a: 7)

We could express this in terms of (SIM*):

(SIM*) *Necessarily A if and only if A*

Necessarily, and so in each possible world, all swans are birds if and only if *all* swans (quantifiers unrestricted) are birds. Now, add impossible worlds into the picture, and (SIM*) fails. For, while it may be the case that in every *possible* world, all swans are birds, unrestrictedly speaking, there will be swans, one assumes, at some impossible worlds which are not birds. So while ‘all swans are birds’ is true when quantifying beyond the actual, only over all possible worlds, it fails to be true with quantifiers unrestricted over everything – and so it fails to be true *simpliciter*.

Now, we can run an *ad hominem* argument based on the failure of (SIM*) for LNC-violations, as Lewis did on that of (SIM) for talking donkeys: Lewis' considered opinion says that LNC is true *full stop*. But Lewis' opinion typically doesn't distinguish between *necessary* truth and truth *simpliciter*. Just as with actual truth and truth *simpliciter* in the case of *possibilia*, necessary truth and truth *simpliciter* in the case of *impossibilia* come apart. And once these come apart the incredulity ought to be defused in exactly the same way: Lewis' considered opinion as to what can or cannot be the case is respected in that LNC *cannot* fail (since it doesn't fail about any *possibilium*), and we only have to stretch that extra mile to accept that some things (in the extended slum) are both true and false *simpliciter*, a hypothesis about which we ought no longer to have the same intuitions that we associate with what is necessarily the case, once we deny (SIM*). Moreover, we can simply ignore the unrestricted *simpliciter* failure of LNC and go about our business as if it never *could* fail since it *cannot*.

4.3.3 Why the New Theory Ought to Allow Contradiction

So far so good. I have argued that we can hold onto classical logic to all intents and purposes, that we are just as justified in doing so as we are in believing that no donkeys talk, and that we can be safe in knowing that we *cannot* go wrong in applying our classical rules to reason about our world.

But what about *unrestricted* or *simpliciter* truth, that is, what is true according to the theory? What justification do we have for abandoning classical logic in this discourse? There is a straightforwardly innocent and simple answer, and it is this: Truth in the theory and so unrestricted truth *simpliciter* concerns ontology. If reality is inconsistent, then ontological discourse ought to be paraconsistent. The upshot of this is that it is not logically impossible worlds that force us to abandon classical logic but the metaphysically more robust fact that, unsurprisingly, if some parts of all that is are inconsistent, i.e. they provide false instances of LNC, then our ontological discourse ought to reflect that.¹⁵⁶ That is, if indeed the very nature of existence is such as to admit of inconsistency, then we ought to speak truly in contradiction when describing it.

This move is perfectly honest. Lewis starts his *reductio* by assuming the hypothesis he wants to reject, and so by assuming the existence of Lewis-impossible worlds. I follow

¹⁵⁶ One might argue that the notion of consistency applies to languages and not to reality conceived as consisting of chairs, tables etc. But logical laws like LNC are not only prescriptive but *descriptive*, they describe the way reality truly *is*. Then if there are parts of reality where LNC fails, that part of all that there is can be considered inconsistent. For discussion see Priest (2000; 2006a: 20.6; 2006b: 2.7).

him precisely in this step. Where Lewis uses the failure of LNC in order to justify his rejection of the starting hypothesis, I, by taking the hypothesis seriously, use it to identify and narrow down the field of LNC failures and then justify those. It is not simply a matter of flippantly viewing Lewis' modus tollens as a modus ponens. The point is that if the hypothesis of Lewis-impossibilia is taken seriously, then the only natural move is to question the ground for LNC and indeed *legitimately* so, given the novel hypothesis at issue.

In sum, the logical price payable in order to allow for genuine impossibilia is not as great as was hitherto supposed. For none of the required changes affect actual matters of fact, and whatever changes *are* required can be naturally justified, given the basic suppositions of the new theory.

4.3.4 Classical Logic: Loss of Generality

An immediate objection to this proposal might be that classical logic has been bought back at the cost of localising and so compromising its generality. But one of the key features of logic proper is usually that it is topic-neutral, i.e. that its scope of application is universal and not constrained by subject-matter.¹⁵⁷ So, this proposal, by localising the applicability of classical logic only to parts of all that is, sacrifices its topic-neutrality and so its status as a logic proper. So, the objection goes, the present proposal does not really go any way towards preserving the general classical notion of consequence operative in traditional GR.

I would say two things in reply. First, while our accepted notion of logical consequence is no longer absolutely general in the sense of being applicable to *everything* in reality, we can still accept that it is general or topic-neutral in the sense that, *ex hypothesi*, there is no aspect or sub-domain of the reality that *we* are part of, to which it does not apply. In that sense, classical logic is no less general for an impossibilist GR-theorist than for anyone who does not believe in the existence of other concrete worlds besides this one. For, the domain of application of classical logic (under all interpretations of the non-logical vocabulary) remains as it was under classical GR, namely everything in our world, and in every possible world.

Second, it is no surprise that *something* will have to give, if we are to accommodate genuine impossible worlds into the classical Lewisian picture. The very supposition of

¹⁵⁷ See also Routley (1980: 897)

impossible worlds stems from an altogether different non-classical logical tradition, so any proposed addition of such worlds into traditional classical GR will need the latter to be tailored so as to allow for the relevant modification. Since impossible worlds seem like a bad motivation for changing whatever logic we take to be correct for our usual reasoning, the only alternative is to restrict that logic to only a subset of all that is – that subset that includes our own reality, our world.¹⁵⁸ The upshot of such a restriction is that we can have impossible worlds without having to change any of our beliefs about what logic is appropriate for reasoning about reality, as we know it, namely truth in our world, no matter what that truth is about.

One may object that in talking of preservation of ‘actual’ truth, namely ‘truth-at-@’, where ‘@’ stands for the actual world, we are making a major faux pas: we are subsuming logic proper under the possible world semantic interpretation for Quantified Modal Logic (QML). But possible world semantics, and Lewis’ Counterpart Theory in particular, lack absolutely general meaning, for they are just that, *interpretations*, and, as such, they lack neutrality: the box and diamond are interpreted via quantification over worlds, and certain predicates like *is a counterpart of* or *is part of* are not up for reinterpretation. With the content of QML thus specified, it cannot serve as a basis on which to characterise logic proper, for instance, as necessary preservation of truth-at-@.¹⁵⁹ In defining the classical notion of consequence as preservation of ‘actual truth’, or so the objection goes, we are guilty of subsuming classical logical validity under what is effectively a semantic interpretation of reasoning with boxes and diamonds.

But the notion of *actual* truth here is not merely the notion of ‘truth-at-@’, in the language of possible world semantics. It is the same old notion of *truth*, even if restricted to truth *about* our particular domain. This means that the notion of correct logical consequence is not defined over some new technical conception of truth-at-*w* stemming from the QML language, but concerns truth proper (even if not about *everything*). So, the term ‘actual’, here, has less to do with possible world-semantics, and more to do with pointing to the particular bit of all that is, which is pertinent for our own reasoning – namely the actual.

In sum, we can hold onto classical logical validity, if we so wish, as long as it concerns truth about anything in our world. This allows our chosen notion of logical consequence to be general enough in the sense that it is applicable for reasoning about any

¹⁵⁸ See e.g. Nolan (1997)

¹⁵⁹ See e.g. Lewis (1968)

aspect of *our* reality, the notion of topic-neutrality here amounting to the notion of uniform applicability to everything that is part of the reality that we are part of, irrespective of subject-matter.

4.3.5 Reasoning from GR's Hypotheses

However, now a problem seems to face concrete possibilist GR (IGR) that does not face ersatz theories of impossible worlds. Ersatz theories identify actual truth with truth *simpliciter*, and so can allow that classical logic rules truth *simpliciter*, even if it fails for truth-at- w for their various ersatz-constructions, where w is impossible. So when a classical ersatzer about impossible worlds takes actual truth to be governed by classical logic, he thus takes truth *simpliciter* to be classical, and so he takes his theory (which, like the concretist, he takes to be true *simpliciter*) to be classical. For instance, suppose that worlds are sets of sentences for such an ersatzer. Then the ersatzer can allow that a sentence and its negation are members of some set of sentences – hence that a contradiction holds according to a world – but still allow that no contradiction holds according to his theory, since the required set-membership principles employed are consistent. So, once the ersatzer has answered the question regarding what logic he takes actual truth, or simply truth, to be governed by, he has answered the question regarding what logic we might employ to reason from his theory's hypotheses. By contrast IGR does not identify actual truth with truth *simpliciter* (as we saw with the rejection of (SIM)); so even if it manages to keep actual truth classical it still must answer the question of what – if any – notion of consequence truth *simpliciter* obeys. Is there any logic that can allow us to reason about the entire IGR-ontological picture? Is there any logic that governs truth *simpliciter* allowing us to reason from the extended theory's ontological hypotheses? The worry is, as Nolan notes, that “...if the motivation is to provide a logic, which applies to every situation, possible or not, then that logic will have few principles indeed”. (Nolan 1997: 157)

To see the problem, suppose we think that some weak paraconsistent (many valued) logic might do the trick, that some such logic is all that is needed for us to be able to reason from the hypotheses of the overall theory. One such candidate, seemingly weak enough to do the job might be FDE (First Degree Entailment), with the material conditional ' $A \supset B$ ' defined as ' $\sim A \vee B$ '. (I choose FDE here as, being a sub-logic of K_3 , it

allows for no logical truths, not even the law of identity in its conditional form: $A \supset A$.¹⁶⁰ Arguably then, we can allow for worlds where even identity, expressed as $A \supset A$ (indeed, any conditional), fails, while staying within the logical confines of the theory.) However, to quote Nolan again, "...if there is an impossible situation for every way things cannot be, there will be impossible situations where even the principles of subclassical logics fail..." (Nolan 1997: 547) For instance, even under FDE it is true that, whenever $A \& B$ is true, then A is true and B is true (even if A and / or B is also false), that is, the simplification rule holds for FDE. This means that IGR can apply this rule to reason about any part of its ontology without fear of error. And this means that for any world in the extended theory, whenever $A \& B$ is true at that world, A is true at it and B is true at it. Then, insofar as that *rule*, simplification, is valid in reasoning *about*, hence *at* all worlds, it is a rule that does not possibly fail, and so we ought to be able to infer, or so the argument goes, that there is an impossible world where that rule fails, that is, that there is a world such that $A \& B$ holds at it but A does not (or B does not).¹⁶¹ And so, from the supposition that rule R is general enough to allow us to reason about anything in the plurality, it follows that R fails to be general enough to allow us to reason about anything in the plurality. If this argument goes through, it looks like there is no set of principles that we can deem universally applicable, and so no set of logical principles that we can employ to reason from the new theory's overall hypotheses.¹⁶² To put the point differently, if there is no restriction on the kinds of impossible worlds that there are, then some impossible worlds might be so unruly as to obey no logical principle whatever. But if so, then how can IGR use any principled way to reason about all it has posited?

One might offer either of two compromises. One is to argue that one can still allow that anything can be *true* or anything can be *false* at a world, without this compromising one's notion of what *rules* one can employ in order to reason about the entire ontology. For instance, one may take it that all it takes for a logical principle to fail at a world is for the corresponding logical *conditional* – the intuitive statement of the relevant law – to be

¹⁶⁰ Details taken from Priest (2001: e.g. 121, 139, 144 and 147). Although see Priest (2006b: 82-83) against the material conditional as implication. Or, we could opt for a four-valued logic like BN4 here, which employs a stronger (non-material) conditional. (see Brady 1982; Restall 1993) BN4 however does take $A \rightarrow A$ as a logical truth, hence not only any inference from A to A , but the conditional $A \rightarrow A$ would have to be true at every world if we took the axioms of BN4 to hold at *all* GR-worlds.

¹⁶¹ See also Mares (2004: 53-54)

¹⁶² C.f. also Divers (2002: 77) in response to Yagisawa (1988)

false at that world. Such a reply would follow in the footsteps of Priest (1992).¹⁶³ Then we could arguably allow that while we may use simplification to reason about the implications of the overall theory, there are nonetheless worlds such that $A \& B \supset A$ fails to be true there. (I am allowing for argument's sake here that the material conditional can be employed to state logical laws: since there are no logical truths for FDE, then, arguably, this system allows that no conditional holds at all worlds regardless. Alternatively we could extend FDE into some proper relevant logic with a logical conditional ' \rightarrow ' that allows for conditional truths like ' $A \& B \rightarrow A$ ' to fail at impossible worlds.)¹⁶⁴ By thus distinguishing between the validity of logical laws and their truth at impossible worlds, we can allow IGR to adopt a non-classical logic to reason from its hypotheses.¹⁶⁵

But, one might object to this strategy on the grounds that it still puts limits on what kinds of impossible worlds there are. If we want no limits on what impossible worlds there are (and why should there be any?), then there ought to be no obstacle to expecting that for any *rule* $\langle A/B \rangle$ there should be an impossible world where the rule fails by having ' A ' be true there but ' B ' not true; namely that insofar as simplification, for instance, implies that it is impossible that $A \& B$ is true, yet A (or B) not true, then there should be some impossible world where precisely this happens, namely $A \& B$ is true at that world, yet A (or B) is not true there. To this one might reply that there are such worlds; namely there are worlds where $A \& B$ is true, because it is both true and false, and so A (or B) is true and false; and so that there are worlds, in particular, where $A \& B$ is true, but A (or B) false. Nolan anticipates this reply:

¹⁶³ For instance, Priest (1992: 295-97) makes a useful distinction between a law failing to hold because the relevant conditional fails to hold, and a law failing to hold in the sense that the relevant rule has counterexamples at that world.

¹⁶⁴ This can be done either by allowing that these are unruly worlds in which the usual truth-conditions for conditional statements do not apply (Priest 1992), or by building it into the logical theory that logical truths (expressed in the form of conditionals) do not hold at all situations (worlds) (Mares 2004). Mares (2004: 53) criticises the approach by Priest (and relatedly Kripke 1963), as involving a change in the *meaning* of the connectives. This naturally depends on whether we take truth-conditions to fix meaning. See also Routley (1980: 895, 898), where he discusses the prospects of a universal logic. He too draws these two distinctions: One distinction is between the rules of a logic applying to a situation as opposed to the relevant conditionals being true there; the other is between the obtaining of deductive versus non-deductive situations, namely non-logical situations where even the principles of a general logic fail to hold.

¹⁶⁵ One worry with taking conditionals to have arbitrary truth-values at impossible worlds, irrespective of the truth-values of their individual components, in Priest's words so that "...the laws of logic are, in a sense, intrinsic to these worlds", (Priest 1992: 296) is that this goes against the Humean supervenience picture: logical laws at such worlds do not supervene on particular matters of fact there. But even Lewis (1986b: x-xi) admits that Humean Supervenience may hold only contingently.

“By ‘would not be true’, I mean to rule out its being true or reject the claim that it is true: dialethic compromises, where the statement is not true, but is true as well are not good enough for the sense which I intend to be using here” (Nolan 1997: 569 fn 15)

Nolan’s point is this: Your chosen set of rules dictates that from $A \& B$ you can infer A and you can infer B ; taking correct inference to, at least, preserve truth I ask for a world where the inference from $A \& B$ to A (or B) *fails* to preserve truth. You reply by offering me a world where the rule preserves truth, where $A \& B$ is true but where, say, A true as well as false. But what I was really asking for was a world where your rule fails, and so a world where from $A \& B$ we cannot infer A ; a world where $A \& B$ is true yet A fails. Now, if IGR is to retain *some* universal principles by which to reason about its entire ontology, it must arguably go for the dialethic compromise. Under that compromise after all, as Priest notes, “there are still, for any sentence [or proposition in our case], worlds where it holds and worlds where it fails” (Priest 1997a: 485).

A further worry with this option might be that if we allow that the overall theory obeys some non-classical logic, we thereby allow such that a logic is absolutely general in a way that classical logic is not. Indeed we are subsuming classical logic as a special case of this supposed broader more general logic. Then, it is not really true that the supposition of impossible worlds does not force a change in our accepted notion of logical consequence. But, even if it is true that classical logic, as *ex hypothesi* applicable to our actual world, is only a special instance of a broader non-classical notion of logical consequence (representing the case where a world is consistent and complete), that broader notion, in having no applicability to our domain, is arguably of little real interest.¹⁶⁶ So, classical logic remains fully general, to all actual intents and purposes.

An alternative strategy IGR might pursue is to deem it that no logic is general enough to reason about its entire pluriverse (and so from the totality of its ontological hypotheses). Is this a viable option? It seems rather strange to think so. Still, one argument for not immediately dismissing this idea would be that if the totality of reality is truly such as to obey no logical principles then neither should our overall theory about that reality. Moreover, we can still allow that IGR can use a particular logical theory in order to reason about the subset of its ontology that obeys a chosen (most appropriate, however this is to

¹⁶⁶ We could also think of the applicability of classical logic to a sub-domain of all that is, in the way of Priest (2006b: §8) as recapturing classical validity as quasi-validity, or under the logical pluralist proposal of Beall and Restall (2000; 2006) whereby classical consequence is one good notion among many. See Priest (2006a: §12), Read (2006) for monist defences.

be defined) set of logical principles.¹⁶⁷ One might further support this suggestion by offering some subjunctive, (less-than-absolutely-truth-preserving) conditional to reason from the theory's hypotheses. We might try to appropriate a strategy employed by Nolan (for his own actualist theory) involving adding a counterpossible conditional to an otherwise classical logical theory. This would allow IGR to reason about this or that impossible world by asking what would be the case if such and such was the case. (Nolan 1997) Such a conditional would obey no rules without exception, (thus would not systematise the theory), but it would allow us to reason (based on rules of thumb and pragmatic considerations) about what would be the case if this or that ontological hypothesis, about the 'far reaches' of the pluriverse, was the case.

This discussion is by no means conclusive; at least it shows that IGR might be able to choose and develop one of a couple of alternative existing approaches to address questions regarding an overall logic for the theory.

4.3.6 Summary

In sum, if there truly are worlds that instantiate contradictions and other logical peculiarities, then it is only natural to suppose that IGR ought to reflect these peculiarities. That is, if reality is inconsistent, then the only theory appropriate for it would be paraconsistent. Worse, if reality as a whole admits of no logical formalisation (except in parts), then our theories of reality will similarly have limited logical reach. While this latter might seem hard to swallow, it is a good question why one should expect the entirety of reality to fit any logical system, and thereby be, as a whole, accessible to our reasoning capabilities. Despite these oddities, the crucial point is that, whatever changes to our theories of reality might be brought on by an admission of logically strange entities into our ontology, nothing need thereby change with respect to our reasoning about all things actual, which can remain classical. Further, the failure of classical logical laws at impossible worlds can be motivated using the same basic methodology (outwith Lewis' logical beliefs) that Lewis uses to motivate the existence of talking donkeys at possible worlds.

¹⁶⁷ See, again, Routley (1980: 898) who argues, in defence of Meinongian impossibilia, that it is only to be expected that the logic of the overall theory will not be applicable to *all* cases, in particular non-logical, or non-deductive situations (worlds in our case).

4.4 The Question of Negation Commutation

A second high-risk, high-reward line of attack against Lewis' argument is to just challenge (CP), namely the supposition that the modifier 'at w ' and negation, in particular, commute. This is the route I will explore here.

4.4.1 Questioning (CP)

Here are our three incongruent suppositions:

- (I) Classical logic holds
- (II) (CP): $(\sim A)$ at w if and only if $\sim(A$ at $w)$
- (III) There are worlds w such that, at w A & at w $(\sim A)$

As noted, Lewis rejects the third supposition on the basis of the first and second. In section 4.3, I kept the second and third supposition and justified a qualified denial of (I). I will now explore a strategy which retains (III) and (I), by instead abandoning (II), namely the commutation principle (CP).

This is in fact the line that all proponents of ersatz impossible worlds take. As Lewis notes, and as almost every non-concretist about worlds is eager to point out, (CP) does not hold if worlds are more like stories:

“‘According to the bible’ or ‘Fred says that’ are *not* restricting modifiers; they do not pass through the truth-functional connectives. ‘Fred says that not P’ and ‘Not: Fred says that P’ are independent: both, either, or neither might be true. If worlds were like stories or story-tellers, there would indeed be room for worlds according to which contradictions are true. The sad truth about the prevarications of these worlds would not itself be contradictory.” (Lewis 1986a: 7, fn 3)

While it is true that Lewis-worlds are concrete bits of reality and so unlike stories or story-tellers in that sense, it is not immediately obvious why this sanctifies (CP). We can construct the following line of argument. Consider (FRED):

- (FRED) Fred says $(\sim A)$ if and only if $\sim(\text{Fred says } A)$

What makes (FRED) false? Well, given it is a bi-conditional, it is false if the left- and right-hand-side truth-values do not co-vary. That is, as per Lewis's words, if 'both, either or neither' of the left and right hand side may be true. How can this happen? Well, 'Fred says ($\sim A$)' can be true and ' \sim (Fred says A)' false if Fred contradicts himself. For then, while it is true that he says that ($\sim A$), it is not thereby false that he says that A . Similarly, ' \sim (Fred says A)' can be true, while 'Fred says ($\sim A$)' is false: Fred may fail to say anything regarding A . And then, while it is false that he says that A , it is also false that he says that $\sim A$. A quicker way to put this is that (FRED) simply fails because what Fred says may be *inconsistent* or *incomplete*.

But, isn't it, *ex hypothesi*, exactly the same with impossible worlds, whether concrete or not? By definition, some impossible worlds will be inconsistent or incomplete. But then, according to this line of argument, (CP) ought also to fail for exactly the same reasons. If the world in question is inconsistent, then *ex hypothesi* ($\sim A$) being true at w , does not mean it's not the case that A is true there. And if the world is incomplete, it not being the case that A is true at w does not mean that ($\sim A$) is. If so, then Lewis' argument against concrete impossible worlds, insofar as it employs (CP), incorporates a hidden assumption to the effect that concrete worlds cannot be inconsistent or incomplete. But this begs the question against the hypothesis of concrete impossibilia. Whatever the conception of worlds in Lewis' overall theory, their all being consistent and complete cannot be retained under the current hypothesis.¹⁶⁸

Moreover, once we admit inconsistency and incompleteness, the fact that worlds are *concrete* things and that we can *quantify* over them, alone, doesn't give us (CP) either. To see this, let us run an intuitive test: Suppose *per impossibile* that the room next door, a concrete bit of all that is, is inconsistent. In particular, if we quantify only over the stuff in the room we get contradictions. In particular, it is true that in the room the furniture (quantifiers restricted in the room) both is made of wood and it is not the case that it is made of wood (all over). (Arguably, at this point we may even be reluctant to say that in the room the furniture is made of wood, and also that in the room the furniture is not made of wood – that is simplify our conjunction. The room is impossible, so all bets are off. For all we know, it just instantiates a strange inconsistent property. Nevertheless, suppose we can break the conjunction apart.) Now we are asked if the following holds:¹⁶⁹

¹⁶⁸ Lycan (1994: 40) briefly makes this point. See also Routley (1980: §1.10) and Stalnaker (1996).

¹⁶⁹ Let us skip over questions regarding 'truth-making' here. Let the expressions refer in an innocent manner to objects instantiating properties or something of that nature.

(ROOM) in the room ($\sim A$) if and only if \sim (in the room A)

We know that in the room A is false, so $\sim A$ true, namely ‘in the room, the furniture *isn't* made of wood’. We also know that in the room A is true, namely ‘in the room, the furniture *is* made of wood’. Now, would we agree that it is *not true* that in the room the furniture is made of wood? We just said that it is true.¹⁷⁰ Why suppose it is not true? The fact that in the room A is false, doesn't mean that it is not the case that in the room A is true. Hence, if we know that the room makes it the case that both A and $\sim A$, there is no basis on which to agree that (ROOM) holds, for it says that the room's rendering $\sim A$ true is mutually exclusive with the room's rendering A true. Concreteness and quantifier restrictions aside, inconsistency ought to block commutation.

So should incompleteness: say the room is indeterminate or silent on the matter of its furniture. Then, in the room it's neither true nor false that the furniture is made of wood. That is, quantifying only over furniture in the room, the relevant statement about the furniture being made of wood takes no truth-value. So, (ROOM) fails again. For while it is not true that in the room the furniture is made of wood (right-hand-side), it is not thereby true in the room that it the furniture is *not* made of wood (left-hand-side).

Moreover, applying the usual classical rules to incomplete worlds will get us an outright contradiction and a really unintuitive verdict of what goes on in such worlds. Suppose that *at w* $\sim(A \vee \sim A)$; if we move around the modifier as per Lewis' argument, then by De Morgan and Double Negation we have *at w* $A \ \& \ \sim \textit{at w} A$ – again an outright contradiction. But saying that something is both true and false according to a story which says nothing about the matter isn't usually the way we would interpret an incomplete story – why should it be so for an incomplete concrete thing? Take the story-book(s) of the Lord of the Rings, and let us say that it's neither true nor false according to the story that Frodo had a party for his sixth birthday. Now take the concrete world which realises precisely the Lord of the Rings story, omissions and inconsistencies included – never mind *how*. Why would we apply (CP) and conclude from the fact that it is not true at that world that Frodo had a sixth birthday party that it is true at it that he did not have one? That it may be easier to imagine what it would be for a story to be incomplete than what it would be for a world to be incomplete is another matter altogether. We are only asked to assume

¹⁷⁰ Friends and family, when tested, were all very critical of (ROOM).

for the sake of argument that the world in question *is* incomplete. And in that case again (CP) ought to fail.¹⁷¹

If the above is right, then even if ‘at w ’ is no different than the expression ‘in my fridge’, commutation only sounds convincing, if we take my fridge to give us a consistent domain. Given that assumption, it is reasonable to think that if it is the case that in my fridge there is no beer, then it is also *not* the case that there is beer in my fridge. But if I heard that your fridge is inconsistent, that it distorts space-time in such a way so that in your fridge there both is and isn’t beer, I would be more reluctant to jump to any conclusion about whether it is or isn’t the case that your fridge has beer in it. And this has nothing to do with whether or not I restrict my attention to the part of all that is which is your fridge. By hypothesis the domains that the quantifiers take us to in the case of impossible worlds are not all consistent, and hence less like my fridge and more like yours.

To summarise: Lewis argues that, given (CP) and classical logic, the hypothesis of impossible worlds has to be rejected. I have so far argued that the very hypothesis of impossible worlds makes (CP) an illegitimate assumption in the argument. For, maintaining (CP) in a classical framework is tantamount to maintaining that concrete worlds cannot be inconsistent or incomplete. The only way to maintain the (CP)-equivalence between ‘at w ($\sim A$)’ and ‘ \sim (at w A)’, as Lewis does under the hypothesis of incomplete and inconsistent worlds, is to let go of classical logic and allow ‘at w A ’ to be both true and false. This is the option that Lewis identifies as the only option and unacceptable. But why not reject (CP) altogether? The move is highly warranted under the hypothesis of impossibilia, because the truth of (CP) in the classical logical framework just amounts to the ruling out of inconsistent or incomplete worlds. If one wants to retain classical logic, why not reject the commutation principle rather than the impossibilia hypothesis? By abandoning (CP) – (II) from the incompatible trio – then one should be able to hold onto the remaining two suppositions, namely allow for impossible worlds (III) while holding onto classical logic (I). For if (CP) fails, then the support for (P1) is withdrawn, namely it is no longer the case that contradictions at such worlds become literal contradictions. For if at w ($\sim A$) is not equivalent to \sim (at w A) (contra (CP)), then a contradictory world w , such that at w ($A \& \sim A$), would at most give us ‘at w A & at w ($\sim A$)’ which is not a literal contradiction. So, the question becomes whether Lewis has

¹⁷¹ Even if imagination is a guide to possibility which is debatable (see e.g. the collection in Gendler & Hawthorne 2002), we are supposed to be talking about the impossible here. Imagination does not come into it.

independent good reasons for holding onto (CP), either because by abandoning (CP) we inadvertently abandon classical logic, or because abandoning (CP) is a major departure from Lewis' overall metaphysical framework. I explore both questions in the following sections.

4.4.2 (CP), Negation and Negation-at-w

I will here clarify briefly what is at issue with a rejection of (CP). One may object that to deny (CP) is to abandon classical logic, for one has abandoned the classical truth-conditions for negation. We have:

$$(CP) \quad \text{at } w (\sim A) \text{ iff } \sim (\text{at } w A)$$

In one sense, (CP) clearly states the classical truth- *at a world*-conditions for negation, namely that *the negation of A is true at a world iff it is not the case that A is true there*. That is, (CP) states:

$$(NEG^W) \quad (\sim A) \text{ is true at } w \text{ iff } (A) \text{ is not true at } w$$

And clearly, those truth-at-w conditions for negation cannot hold if we admit impossible worlds. For, then there will be worlds at which ($\sim A$) is true (A false), but at which (A) is also true. But who cares if (NEG^W) fails? What we are here concerned with is that the truth conditions for negation *simpliciter* remain classical, whatever the truth-at-w conditions for negation may turn out to be; and so with the preservation of (NEG):

$$(NEG) \quad (\sim A) \text{ is true iff } A \text{ is not true}$$

So, insofar as (CP) simply states (NEG^W), its rejection poses no threat to classical logic and the truth *simpliciter* conditions for negation, as per (NEG).

More importantly, however (CP) forms the vital link between (NEG) and (NEG^W). That is, (CP) doesn't merely state the GR-truth-at-w conditions for negation. It also speaks of an equivalence between the negation of a proposition A being *true at w* and the negation of a different proposition $B = \langle \text{at } w A \rangle$, being *true simpliciter*. So, if at some world both *at-w-A* and *at-w-($\sim A$)*, then, by (CP), we have it that for some proposition $B = \langle \text{at } w A \rangle$, both B and $\sim B$ hold *simpliciter*. In that sense (CP) links *falsehood at w* with *falsehood*

simpliciter. This reinforces the fact that to abandon (NEG^W) yet hold onto (NEG) – the classical truth-conditions for negation *simpliciter* – it is crucial we reject (CP). This allows us to maintain that even if negation-at-*w* is not classical, negation *simpliciter* is.¹⁷²

Now, one might argue that insofar as (CP) simply states Lewis' truth-at-*w* conditions for negation (Lewis 1968: 30), then that is sufficient grounds for the traditional Lewisian to hold onto (CP) and reject anything that requires its amendment. But this just isn't so. For Lewis' original truth-conditions are built on the assumption that all worlds are consistent and complete. So, the fact that (CP) states the truth-at-*w* conditions for negation according to traditional GR does not constitute grounds on which to hold onto (CP) while entertaining the hypothesis of concrete impossible worlds. Insofar as (CP) is a restatement of (NEG^W), which *ex hypothesi* ought to be rejected, (CP) ought to be rejected. More, insofar as (CP) creates a link between (NEG^W) and (NEG) by stating an equivalence between the negation at *w* of a proposition *A* and the negation *simpliciter* of another proposition *B*, again, it ought to be rejected. Indeed, the rejection of (CP), rather than threatening Lewis' classical framework, is precisely what allows the metatheory to remain classical.

4.4.3 (CP) and Representation: The Metaphysics behind (CP)

I argued so far that the very supposition of concrete impossible worlds entails the rejection of (CP), and indeed entails an amendment of the truth-at-*w* conditions for negation in Lewis' theory. That is so, at least, unless there are independent grounds (other than insisting that negation-at-*w* is classical) for asserting the truth of (CP), upon the supposition of concrete impossible worlds. So far, we have established that by sacrificing (CP) we lose the equivalence between *falsehood-at-w* of 'A' and *falsehood simpliciter* (i.e. falsehood in the language of the theory) of another proposition *B* about world *w*. The question then is whether Lewis has good independent reasons to hold onto that equivalence.

The strongest argument that a Lewisian about possible worlds must hold onto (CP) even upon the addition of impossible worlds into the theory rests on metaphysical grounds – namely on the grounds that the way that Lewis-worlds 'represent' the truth or falsehood of propositions *at* them requires the truth of (CP). Lewis' (1986a) background metaphysical picture involves an ontology of world-bound individuals and sets constructed

¹⁷² C.f. also Priest (1997a) in reply to Stalnaker's (1996).

out of these, where intensional entities like properties and propositions are identified with sets of individuals, or in the case of the latter, sets of worlds. So we have:

- F is a property *iff* F is a subset of the set of individuals
- P is a proposition *iff* P is a subset of the set of worlds

In that sense, propositions are just another kind of property: the kind instantiated by a world.¹⁷³ Lewis says as much:

“I identify propositions with certain properties – namely, with those that are instantiated only by entire worlds. Then if properties are in general the sets of their instances, a proposition is a set of possible worlds. A proposition is said to *hold* at a world, or to be *true at* a world. The proposition is the same thing as the property of being a world where that proposition holds; and that is the same thing as the set of worlds where that proposition holds. A proposition holds at just those worlds that are members of it” (Lewis 1986a: 53-54)

Now, for Lewis, a proposition is true-at- w just when it is true *about* w , namely just when it is true when we restrict any implicit or explicit quantifiers in it to everything in w . (Lewis 1986a: 6-7) Putting the two together, we can say that the *truth-at- w* of some proposition A in GR amounts to a kind of predication or instantiation, namely the predication of a particular proposition A of some world w , or the instantiation of A by w . Given this picture, we can formulate the objection clearly by treating propositions true at worlds as properties of worlds, and so by switching to the level of predication. So, what it means for a proposition ‘ A ’ to be true at a world w just means for A to be truly predicated of w :

(TW) $at-w-A \text{ iff } Aw$

And what it means for a proposition ‘ A ’ to be false at w just is for that proposition to be falsely predicated of w , which gives us again another form of (CP) namely:

(FW) $at w (\sim A) \text{ iff } \sim Aw$

¹⁷³ Ironically, one could therefore argue that truth-at- w amounts to set-membership for Lewis, just as much as it does for ersatz-theorists. Nonetheless, a proposition true at a Lewis-world truly *characterises* that world in a sense that propositions true at ersatz-worlds do not, something which e.g. Zalta finds objectionable about ersatz-theories. (Zalta 1997: 650-52)

If so, then for a proposition A to be both true and false at w just is for the contradiction *about* w , namely $Aw \& \sim Aw$, to be true *simpliciter* in the home-language. That is, (TW) and (FW) give us a literal contradiction in the home-language of the theory.

Now, a rejection of (CP) is simply a rejection of (FW). How can we justify rejecting (FW) under this picture? I think that this very formulation in terms of predication might show us the way. So far we have established that (CP) needs to be rejected because Lewis' traditional truth-at- w -conditions for *negation* ought not to hold when it comes to impossible worlds. And so the natural reply to this objection is to continue in the same general tack by challenging (FW). We make a point that (FW), as stated, fails to distinguish between two separate principles: the falsehood-at- w principle that drops out of the general notion that truth amounts to predication, on the one hand, and just another version of the rejected (CP) on the other. The first is true and harmless, while the latter need not follow and is false *ex hypothesi* when we consider impossible worlds. The battle turns on the scope of the negation on the right-hand-side of (FW). On a wide-scope reading, (FW) just states that worlds are consistent and complete, and so is false. This is, in fact, just another restatement of the principle (CP), where '*at- w - A* ' is simply written as ' Aw ':

$$\text{(FW-wide)} \quad \textit{at-}w\textit{-(}\sim A\textit{)} \textit{ iff } \sim(Aw)$$

This says that $\sim A$ is true at w just when it is not the case that A holds *of* w . Now, this is precisely what cannot be assumed. For, given impossible worlds, A can be false at w ($\sim A$ true), even if A is also true there, i.e. even if A does hold of w . The narrow-scope reading, on the other hand, states correctly that the predicate ($\sim A$) can be ascribed to the world w , whenever $\sim A$ is true there (A false), that is,

$$\text{(FW-narrow)} \quad \textit{at-}w\textit{-(}\sim A\textit{)} \textit{ iff } (\sim A)w$$

If we are to follow through with the argument presented so far, then we should reject (FW-wide) and only allow (FW-narrow) to give us the falsehood-at- w condition (or truth-at- w -condition for negation) that properly drops out of the account of truth-at- w as predication. But now, given the narrow reading we have no contradiction in the metatheory. We can, at most, infer that $Aw \& (\sim A)w$ is true in the metatheory – namely that two separate predicates are true of w , but not that a single proposition Aw is both true and false.

Moreover, choosing the narrow over the wide reading does not challenge the metaphysical GR-picture of truth-at- w as truly ascribing properties to worlds. Indeed, while (FW-narrow) is a consequence of the general Lewisian account of ‘truth-at- w ’ as predication and cannot be sacrificed without metaphysical cost to the theory, its equivalence with (FW-wide) is an assumption, which might be acceptable in the case of worlds that are consistent and complete but becomes question-begging in the face of impossible worlds. In sum, it is not the case that (CP) is supported by deeper metaphysical considerations, for the relevant considerations only support a weaker principle.

So far so good, but one may ask: And what property does (FW-narrow) ascribe to w ? What is the property denoted by the narrow reading of $\sim A$ here? For, if we want to keep GR-theory classical, which is the main objective of this discussion, then we must accept that the set of all things that (absolutely or *simpliciter*) instantiate $\sim A$, namely $|\sim A|$ is the *complement* (C) of the set of all things that (absolutely or *simpliciter*) instantiate A , namely $|A|$. In other words, in a classical metatheory $|\sim A| = C|A|$. And if so, then, in set-theoretic terms (TW) and (FW) would amount to this:

$$\begin{array}{ll} \text{(TW-set)} & \text{at-}w\text{-}A \text{ iff } w \in |A| \\ \text{(FW-set)} & \text{at-}w\text{-}(\sim A) \text{ iff } w \in C|A| \end{array}$$

And then, insofar as $|\sim A| = C|A|$, and given that classically $w \in C|A|$ if and only if $w \notin |A|$, we are once again committed to the truth of (CP):

$$\text{(CP)} \quad \text{at-}w\text{-}(\sim A) \text{ iff } \sim (\text{at-}w\text{-}A)$$

For we have a series of equivalences taking us all the way from $\text{at-}w\text{-}(\sim A)$, to $w \in C|A|$, $w \notin |A|$, $\sim(w \in |A|)$, $\sim(\text{at-}w\text{-}A)$ and back again. So, the argument goes, the proposed reply does nothing to substantiate a rejection of (CP).

Indeed, that is so, if we identify the ascription of the narrow property ($\sim A$) to a world with the denial of the ascription of the property A to that world. Whatever the property ($\sim A$) is, which we ascribe to some impossible world w just when A is false-at- w , it cannot be the absence, i.e. the complement of the property A , at least not if we want to have worlds where A and $\sim A$ are both true. However, we do want our metatheory to keep a Boolean negation; so nor can we deny that $|\sim A| = C|A|$. Then the only available option is

to distinguish between the negation of a proposition being true at a world and the proposition *not* being true there; to differentiate between the property explicitly ascribed to w in the claim $(\sim A)_w$ and the property implicitly (via classical complementation) ascribed to w in the negative claim $\sim(A_w)$. Thus we deny that the property (proposition) denoted by $(\sim A)$ in $(\sim A)_w$ is identical in set-theoretical terms to the complement of A . Instead, I propose we identify the relevant property in the narrow-scope reading of (FW) with a distinct set of things, call it $|A^*|$ such that $|A^*| \neq |\sim A|$, and so $|A^*| \neq C|A|$, such that:

$$\text{(FIW-set)} \quad \text{at } w (\sim A) \text{ iff } w \in |A^*|$$

In short, we take a world that renders true $\sim A$ to belong to the set of all things in the extension of what is intuitively a negated predicate A^* , which, when w is impossible, fails to be identical to the complement of A .¹⁷⁴

Here we finally have the real cost of the rejection of (CP) for IGR, namely that that for an impossible world to represent a claim $\sim A$ is not for that world simply and straightforwardly to instantiate the property $|\sim A|$ but instead for it to instantiate some other property $|A^*|$. How great a cost is this? While it is certainly a departure from the simpler picture presented by Lewis, the proposed amendment still allows impossible worlds to represent propositions as true at them via *instantiation*; it still allows for a proposition's being true-at- w to amount to predication. It is just that in the case of falsehood-at- w , that is, a negated proposition true at w , it is not always the case for all worlds w that the relevant proposition true at w is the one we normally associate with the operation of complementation. In the case of worlds that are consistent and complete, $|A^*| = |\sim A| = C|A|$.

¹⁷⁴ In one sense, the use of a star operator is reminiscent of the Routley star (see Priest (2001: 147-150) and originally Routley & Routley (1972)), according to which the truth-conditions of negation at a world w involve what goes on, not at w , but at some other world w^* . The present proposal certainly does not employ the Routley star. But, in a somewhat similar spirit here, the truth-conditions for the negation of a proposition A at a world involve the instantiation of some proposition other than the complement of A , namely A^* , by that world. This solution was originally inspired by thinking of the narrow-scope reading of (FW) as involving predicate-negation, rather than sentential negation. Laurence Horn in his (1989) first locates such use of such negation in Aristotle and follows it through to modern authors, noting that Aristotle took it to obey the law of excluded middle, for instance and that this negation might also be called *de re* negation, being of *things* and *not propositions*. (Horn 1989: 140-141) Routley (1980) also proposes the employment of such predicate-negation in order to give Meinong's ontology of possible and impossible objects a consistent reading (Routley 1980: 86-89 & 92-96). However, the newly introduced operator here does not function as any kind of negation, obeying any formal properties. The proposal should be mainly conceived as promoting a different metaphysical conception of the kinds of properties that hold of impossible worlds when such worlds represent contradictions. In that sense, the present proposal may also bear some methodological similarities to the one proposed by Zalta (1997), which introduces a different kind of predication (a world 'encoding' versus 'instantiating' a property) to avoid contradiction at impossible worlds from spilling out into the home-language.

But for impossible worlds this identity breaks down. It is this that allows a world w to render true-at- w a contradiction without thereby having a contradiction hold *of* it (namely both belonging to a relevant set and its complement). In that sense, the present proposal changes how representation works at impossible worlds when it comes to negative claims, adding extra resources to the existing theory, which allow it to remain classical, yet be able to have inconsistencies true at worlds where negation behaves strangely. So, the proposed changes do not compromise the metaphysical GR-picture according to which truth-at- w happens via the instantiation by w of the relevant properties; it is just that the relevant properties in the case of impossible worlds might be different. Moreover, nor do the proposed changes compromise the overall extensional nature of the theory: all we have introduced is a further classification – very natural for worlds where truth and falsehood fall apart – another range of sets of things to which some of the entities in the extended IGR-ontology may belong.

We may, if we wish, introduce ‘*’ into the home-language explicitly for a reformulation of the truth-at- w conditions for negation, so that :

$$(FW^*) \quad at-w-(\sim A) \text{ iff } A^*w$$

The relevant formula A^* predicated of the world in question here just denotes the relevant proposition that must be instantiated by that world in order for it to render true the given negated claim. (And, in the case where w is consistent and complete, then the proposition denoted by A^* is identical with the complement of A .) Thus we introduce extra expressive resources in the home-language allowing it to offer a translation schema that does not compromise the classical basis of the theory. The expression ‘ A^*w ’ functions in the home-language just like any other subject-predicate proposition, so that the conjunction $Aw \ \& \ A^*w$ simply amounts to a conjunction of two different (atomic) sentences, one involving the predicate ‘ A ’, and the other the predicate ‘ A^* ’, without creating inconsistencies in the home-language.

One may object that the present proposal doesn’t really give us *contradictions* true at impossible worlds, but some sort of ‘quasi-contradictions’;¹⁷⁵ that it merely gives us worlds where negation simply means something different. But this isn’t so. The proposal may give a consistent reading of what it is for a world to represent explicitly inconsistent

¹⁷⁵ C.f. Stalnaker (1996: 198)

claims, but this does not mean that negation at such worlds *means* something different. All we have done is propose a way to classically make sense of an impossible world rendering true a contradiction. The proposed translation of negation-at-impossible-worlds no more prevents the relevant worlds from representing real contradictions than a putative translation of ‘has-four-legs-and-a-tail-at- w ’ for some world w to mean ‘has five legs’ in the metatheory would mean that at- w dogs, horses and the like really have five legs.

Finally, it is important to note that the present reply opens the way to an objection that I can only briefly address here. Once we begin amending Lewis’ truth-at- w conditions for the truth-functional connectives we have to go all the way. For let us suppose that by amending Lewis truth-at- w condition for negation we have managed to incorporate worlds that represent contradictions. Then, taking a cue from our earlier example by Nolan, what about worlds where $A \& B$ is true, but neither A nor B true? Lewis’ (1968:30-31) truth-at- w conditions for ‘&’ do dictate that whenever $(A \& B)$ at w , then $(A$ at $w) \& (B$ at $w)$. How can we accommodate worlds where a conjunction is true-at- w but neither conjunct is true-at- w given these truth-at- w -conditions? I see two ways forward. One: it might well be that our only option for accommodating worlds where all sorts of impossible things take place is to uniformly alter the homophonic Lewisian truth-conditions, as we did in the case of negation. Generalising this technique, the replacement (non-homophonic) truth-conditions would be of the general form:

$$(TC) \quad \text{at } w A \text{ iff } A^+ w$$

Where w is a classically possible world, we can revert back to Lewis’ truth-at- w conditions to all intents and purposes, since in that case, $|A^+| = |A|$. (If $A = \langle B \& C \rangle$ for instance, then $|A^+| = |A| = |B \& C| = |B| \cap |C|$, and so forth.) But in the case of impossible worlds this identity breaks down. Then, the proposed truth-at- w conditions for the connectives no longer allow us to break these down to their individual components at such worlds, treating them instead as atomic predicates of worlds. This might seem extreme, but after all, if impossible worlds are worlds where anything goes, then it is only natural to suppose that a homophonic translation schema for such worlds cannot be sustained under a classical metatheory.

The alternative is to contain the changes to those made for the truth-conditions for negation alone, by simply going for the ‘dialethic compromise’ outlined in section 4.3.5.

The impossibility that $A \& B$ at w but A is false there would, then, be accommodated in the limited fashion of agreeing that whenever $A \& B$ is true at a world, A is true there and B is true there, but also allowing that $\sim A$ might also be true there as might $\sim B$. The resulting negation-at- w claims can then be translated as per the amended schema for negation-at- w , and thereby all manner of impossibilities represented, contained within the confines of the proposed alterations for the truth-at- w -conditions for negation alone.

4.4.4 Summary

In sum, it is only natural to reject (CP) upon the supposition of concrete impossible worlds. For, clearly, a proposition being false at such a world ought not to preclude that proposition also being true there. So to the extent that (CP) states the classical truth-at- w conditions for negation it ought to be rejected. But (CP) does more than that; it also states that the falsehood-at- w of a proposition A is equivalent to the falsehood *simpliciter* of another proposition B , thus entailing that if at- w - A and at- w - $(\sim A)$, then B and $\sim B$ are both true. This is yet more reason to reject (CP) if we want to keep the metatheory classical. Crucially, rejecting (CP) does not compromise the Lewisian extensional picture, whereby truth-at- w amounts to property instantiation. It is just that, when it comes to impossible worlds, for $\sim A$ to be true at a world w , this doesn't mean that w fails to instantiate A and so belongs to the complement of $|A|$; instead w simply instantiates A^* , so belongs to the set $|A^*|$, (where $|A^*| \neq C|A|$, unless w is consistent and complete). In that sense, a rejection of (CP) requires a rejection of the homophonic truth-at- w conditions for negation (and arguably the other truth-functional connectives). But this neither compromises the classical logical framework of the theory (or what we mean by 'not'), nor, crucially, its fully extensional metaphysical framework, whereby truth-at- w simply amounts to w instantiating a certain property. I conclude that while rejecting (CP) amounts to amending Lewis' truth-at- w conditions for negation, and the way that impossible worlds represent negative claims, these changes neither compromise the extensional ontology of the overall theory nor alter its basic account of representation as property instantiation. Hence (CP) not only must be, but indeed can be, safely rejected upon the hypothesis of concrete impossibilia.

4.5 Applications: Yagisawa and the Identity of Properties

It is worth noting that whatever solutions work on Lewis' objection to concrete

impossible worlds, can also be used to address a further worry discussed in the literature, this time due to Takashi Yagisawa (1988). In his own proposal regarding genuine impossible worlds, Yagisawa comes up with the following problem: One of the reasons we want to have impossible worlds is in order to differentiate between distinct yet necessarily coextensive properties, for instance, *triangularity* and *trilaterality*, by allowing for the existence of some impossible individual belonging to the extension of one but not the other. But as Yagisawa points out, unfortunately it seems that impossible worlds go too far:

“It...appears that no property is ever identical with any property... For any property P and any property Q , either it is possible for P and Q not to be coextensive or it is impossible. If it is possible, there is a possible world where P and Q are not coextensive. If it is impossible, there is an impossible world where P and Q are not coextensive. Either way, the set of all possibilia and impossibilia having P is different from the set of all possibilia and impossibilia having Q . Therefore, according to the above proposal, P and Q are not the same property. This is true for any P and Q whatsoever, including P and P . So according to the proposal, no property is the same as any property, including itself!” (Yagisawa 1988: 195)

True, the extension of a property P at any world w , under GR, just is a subset (or part)¹⁷⁶ of the absolute extension of P . And if for P to fail to be self-identical at w just is for a subset of P to fail to be self-identical, then for P to fail to be self-identical according to some world simply is for P to fail to be self-identical. And if there has to be an impossible world for every P such that the subset of P at that world fails to be identical with itself, then by that reasoning, every property P fails to be identical with itself *simpliciter*.

Clearly, however, Yagisawa’s outlined worry is just a special instance of Lewis’ original worry that inconsistencies true at some impossible worlds spill out into inconsistencies *tout court*. The worry is precisely this, that we cannot have some contradiction true at some impossible world without thus having some contradiction true *simpliciter*. The only reason that this case receives special mention by Yagisawa is that no one, not even a friend of contradiction would like to adhere to a theory according to which no property is ever identical with any property *simpliciter*. Nonetheless, we can solve

¹⁷⁶ C.f. Lewis (1991)

Yagisawa's worry by applying either of the two solutions offered in this chapter, in response to Lewis, as I will briefly show.

4.5.1 *The Actual-Truth-versus-Truth-Simpliciter-Approach*

We may choose to keep the truth-conditions for negation intact, thus go for an inconsistent possibilist GR theory, as per our first strategy, maintaining that, nonetheless, no contradiction is true about anything actual. But confining our attention to the actual subsets of properties, here, does not help, since we thereby end up conflating actually coextensive but intuitively distinct properties, like having a heart and having a kidney. So, we still need to find a way to consistently differentiate our properties. Interestingly, Yagisawa tries to solve the problem by distinguishing between the 'analytically familiar' and the 'analytically alien' worlds, taking our differentiation of properties to proceed by taking into account only analytically familiar worlds. (Yagisawa 1988: 196-97) However, as Perszyk (1990: 212-13) correctly points out, presumably, at all the analytically familiar worlds all triangular things are also trilateral, and all vixens are also female foxes. So, restricting our range to these worlds alone will not allow us to make any progress with the differentiation of necessarily coextensive properties.

I propose we refine Yagisawa's proposal and differentiate our properties instead by quantifying only over those worlds that are *logically consistent* (namely instantiate nothing of the form ' $A \& \sim A$ ' (or ' $A, \sim A$ '). Then, if *triangularity* and *trilaterality* truly *are* distinct, there will be impossible worlds where something is triangular but not trilateral, without that thing thereby also being triangular and not triangular (or trilateral and not trilateral). Namely there will be consistent worlds containing an item that belongs to one set but not the other. And then, by quantifying only over consistent worlds, we will get consistent and distinct properties of *triangularity* and *trilaterality*. The same goes for *vixenhood*. If the property of being a vixen is really distinct from the property of being a female fox, then we will get consistent worlds where something is a vixen but not a female fox, that is, worlds where something belongs to the set of vixens but not to that of female foxes without it also being true there that that thing both does and does not belong to the set of vixens (or female foxes). If on the other hand there are no such consistent worlds, that is, if even impossibilia do not instantiate what we deem to be one property without thereby instantiating what we deem to be the other, then we can only conclude that these are not distinct properties after all. And if the relevant properties are not distinct, then there is

clearly no need to differentiate between them.¹⁷⁷ The strategy of quantifying over all worlds that are consistent in our differentiation of properties may thus allow us to remain consistent in our usual talk of properties, while being able to make the requisite differentiations, speaking restrictedly, even if IGR has to bite the bullet and admit an unrestricted failure of self-identity for all properties.

4.5.2 *The Amended-Truth-at-w-Conditions-for-Negation Approach*

On the other hand, if we simply opt for the solution that alters the way that impossible worlds represent negation, then Yagisawa's worry evaporates altogether. For then, just because *at w* some contradictory claim of the form $\sim(P=P)$ is true does not mean that the subset of *P* thereby truly fails to be identical with itself *simpliciter*, so nor does it mean that *P* fails to be identical with *P simpliciter*. We might think of the relevant inconsistent claim rendered true-at-*w* as a claim about the extension of the relevant property *not* being identical with itself at that world. Or we might think of it as about some object at that world both belonging and *not* belonging to *P*. Either way, all we have is a contradictory claim true-at-*w*, and so a claim involving negation. Then, if we adopt the amended truth-at-*w*-conditions for negation proposed here, none of these contradictions-at-*w* will translate into an outright contradiction in the home-language. Then it can be true-at-*w* that some property *P* is not self-identical without this affecting the extension of that property *P simpliciter*. Nor does the solution affect the relation of property *P* to its subsets; it is rather about the way negation functions at contradictory worlds. Moreover, as before, this solution need not affect our ability to differentiate between what we take to be two distinct necessarily coextensive properties. Again, we can allow that *triangularity* and *trilaterality* are distinct properties, if there is at least one world which is consistent, and so where negation behaves normally, and which contains an object that belongs to the extension of one property but not the other.

Thus, we find that we can employ our chosen solution to Lewis' objection against

¹⁷⁷ Epistemic worries, e.g. how we find out whether the relevant properties are distinct are besides the point here. We never intended to find out whether the relevant properties are distinct or not in any case by examining possible and impossible worlds by telescope. We can of course consider what the relevant worlds would be like (via counterfactuals) and so think about what would be the case if something was a vixen but not a female fox. But, I take our job here to be to provide the ontological tools by which to extensionally differentiate between properties, provided we take them as distinct. Moreover, impossible worlds do not assist in the explanation as to why one may believe this *res* to be a vixen but not a female fox. In any case, Lewis (1986a: § 1.4) has already provided tools by which to make the relevant distinctions in such contexts. Equally, we can simply consider worlds where the word 'vixen' means something different than the expression 'female fox' in order to give an analysis of the relevant belief-state.

concrete impossible worlds to address further objections of this nature. (We will see another example in Ch VI.) No matter what the subject-matter of the objection, if it turns on the explicit or implicit representation of an inconsistent claim by a world, it offers no new challenges to possibilist GR beyond the original challenge extended by Lewis.

4.6 Conclusion

I conclude that, far from being faced with a logical dead-end when considering concrete impossible worlds, a Lewisian about possible worlds has options. On the one hand, we may opt for a non-classical home-language for the theory, on the basis that if, after all, reality is inconsistent, then the only theory appropriate for it is paraconsistent. Moreover, under this option, nothing need change with respect to our reasoning about all things actual. Alternatively, there are good reasons to think that upon the addition of concrete impossibilia into the theory, (CP) not only must, but indeed can, be rejected without major theoretical cost. If so, then GR can venture into concrete impossibilia yet retain its classical logical framework intact.

CHAPTER V

Genuine Impossible Worlds and Relative Modalities

5.1 Introduction

In Ch IV I endeavoured to remove a traditional objection, due to Lewis, against concrete impossibilia. It is time to turn our attention to our central question: How can we extend GR into concrete impossibilia yet preserve Lewis' reductive analysis of possibility? The reduction proceeds via the following schema:

(P) *Possibly A* iff there is a world w such that A at w

As we have seen (in Chs I, II), (P) employs no modal terms on its right-hand-side: neither the notion of a world nor that of truth at a world is implicitly modal. Now our problem, as outlined in Ch I, is that upon the addition of impossible worlds the schema seems to break down right-to-left. For then there will be a world w such that A is true at w , but it will not be true that A is a possibility. Moreover, this cannot be corrected by explicitly referring to some *possible* world w such A holds at w if the reductive nature of the schema is to be preserved. In Ch III, we saw that we can save (P) by deeming impossible worlds not to be real genuine worlds but instead ersatz constructions out of possibilia. While this proposal has its merits, it is now time to explore the alternative: a uniform genuine realist theory of possibilia and impossibilia. Whatever else may be the case, exploring the feasibility of a theory of concrete impossible worlds has interest in its own right. For instance, if absolute reality is inconsistent, can we still allow for a reductive analysis of possibility? And what does possibility amount to then?

The structure of the present chapter is as follows: In section 5.2 I propose that we salvage (P), in the face of concrete impossibilia, by drawing attention to the notion of restricted quantification over worlds. It turns out that the notion of an impossible world amounts to that of an inaccessible world, whereby the relevant accessibility relations are taken to be similarity relations on worlds. In section 5.3 I explore a paradigmatic employment of this methodology within Lewis' existing theory, namely nomological possibility. Finally, section 5.4 extends this methodology to the case of the logical modalities. To do so, the following questions have to be addressed: What is it for some world to be logically impossible? Can we make sense of the idea that logical laws hold at

some parts of reality and fail at others? And is there any conception of the notion of a logical law that could be compatible with this picture? I close in section 5.5 by briefly addressing further matters that arise from the discussion, pertaining, for instance, to the emerging picture of modality, and the ontology of (fully concrete) IGR.

5.2 Abandoning Absoluteness

Our question is: how do we add genuine impossible worlds into GR without compromising (P)? I propose the answer lies in drawing attention to the notion of accessibility. So, I propose we amend (P) to read:

(P') *Possibly A* iff there is an accessible world *w* such that *A* at *w*.

This answer draws on the relatively common idea that modality usually amounts to restricted quantification over worlds. When Lewis rejects concrete impossible worlds, he rejects these conceived of as absolute rather than relative impossibilia. This opens up the option of preserving (P) by conceiving of impossible worlds as worlds that are *restrictedly* impossible, worlds which are impossible in the sense that they are *inaccessible* from the perspective of some world, usually ours. The conception of modality as restricted quantification is strongly present in Lewis, both in his *Plurality of Worlds* and his *Counterfactuals*, for instance:

“More often than not, modality is restricted quantification; and restricted from the standpoint of a given world, perhaps ours, by means of so called ‘accessibility’ relations.” (Lewis 1986a: 7)

“A *necessity operator* in general, is an operator that acts like a restricted quantifier over possible worlds. ...we call these worlds *accessible* meaning thereby simply that they satisfy the restriction associated with the sort of necessity operator under consideration. Necessity is truth at all accessible worlds, and different sorts of necessity correspond to different accessibility restrictions. A *possibility operator* likewise, is an operator that acts like a restricted existential quantifier over worlds. Possibility is truth at some accessible world, and the accessibility restriction imposed depends on the sort of possibility under consideration. If a necessity and a possibility

operator correspond to the same accessibility restriction on the worlds quantified over, then they will be a dual interdefinable pair.” (Lewis 1973a: 4-5)¹⁷⁸

But as Robert Pargetter points out, “[w]hile care is taken with these formal accounts of possibility and necessity to see them as relative notions, when they are viewed metaphysically they seem to lose their relativity and take on an absoluteness.” (Pargetter 1984: 336) And so, the present proposal simply hopes to dispel this air of absoluteness. In more precise terms, the amended analysis reads as follows:

(P^M) it is *M*-possible at w_0 that *A* iff there is some world w_1 which is accessible from w_0 under the accessibility relation R_M , and at w_1 , *A*.

Then, for any family of modal notions *M*, *M*-possibility corresponds to the existence of some *M*-accessible world where the relevant claim holds, *M*-necessity corresponds to the relevant claim holding at all *M*-accessible worlds; and *M*-impossibility corresponds to it holding at none. The explicit introduction of accessibility relations thus allows us to preserve the accuracy of (P), in its more explicit form (P^M). Of course, we can allow that the original reductive analysis, (P) with its quantifiers unrestricted, still constitutes a generic absolute analysis of possibility. After all it is simply the trivial case where the accessibility relation is universal. The difference is that it is unlikely that this absolute unrestricted notion of possibility will, any longer, fit any of our common modal notions.¹⁷⁹

Now all that remains is to specify the details. And as Stalnaker notes, herein lies the real challenge:

“...if you want to interpret possibilities and impossibilities... in terms of restricted quantification – that is fine with me. And if you do, I shouldn’t even accuse you of ruining good old words, since modal words...are most commonly interpreted in terms

¹⁷⁸See also Lewis’ (1968: 37-38) and Divers (2002: 68). The importance of accessibility relations in the analysis of possibility is also highlighted in Stalnaker (1996), Perszyk (1993) and Salmon (1984). See also Lycan (1994: §8) and on a different note Barwise (1997), who also proposes that a world is impossible, not *simpliciter*, but relative to a state of information. See also Smiley (1963) for a notion of necessity relative to a body of propositions.

¹⁷⁹This is an intuitive idea. For instance, Barwise (1997), too, proposes that our common modal notions arise out of holding fixed a particular set of facts (about our world): in the case of physical possibility, for instance, the physical laws, in the case of logical or mathematical possibility, the logical laws and mathematical truths and in the case of metaphysical possibility, “those regularities that fall out of the way that humans individuate objects, properties and relations.” (Barwise 1997: 496)

of some proper subset of the possibilities, a set defined by an accessibility relation between worlds... All I need to know is what the basis is for your restriction.”

(Stalnaker: 1996: 200)

This request will be taken up at some length, here.

In the first place we need to say something about the nature of the relations that effect the relevant restrictions. While *accessibility* sounds very much like a modal term, it has a natural non-modal rendering given GR's existing conceptual tools, namely in terms of similarity. (Lewis 1986a: 8, 234) Thus, relations of accessibility reduce to basic non-modal relations of similarity: The basis of the relevant restriction is a matter of similarity between the base world w and the accessed world v in respect to the relevant set of facts M about w :¹⁸⁰

(R^M) a world w_1 is accessible from another world w_0 under the accessibility relation R_M if and only if w_1 is similar to w_0 with respect to a set of base facts M about w_0 .

It is worth noting that the notion of an impossible world that results from this picture is doubly relative: a world counts as an impossible world only relative to (a) some other world w and (b) to the particular similarity relation we choose to employ. Hence:

(IW) A world w_1 is impossible relative to another world w_2 if and only if w_1 is inaccessible from w_2 under some (specified) similarity relation R .

Intuitively this means that a world might be impossible relative to our world given some relation R_1 yet possible under the same relation (say, nomological similarity) from some other world w . Alternatively a world may be impossible relative to our world given some relation R_1 (nomological similarity) yet possible under another relation R_2 (say, logical similarity). Moreover, this understanding of accessibility as similarity between worlds paints a picture of *de dicto* modality very much along the lines on which GR accounts for modality *de re*, namely on the basis of similarity between individuals, this time worlds. If, as per Lewis (1986a: 53), propositions are properties of entire worlds, then the notion of

¹⁸⁰ I restrict discussion throughout to alethic modalities.

accessibility operative here is that of similarity between entire worlds with respect to certain propositions that hold of them.

Now, the (reductive) success of this proposal will depend on whether the relevant propositions, M , can be specified without appeal to modal terms. So the second part of an answer to the challenge voiced here by Stalnaker will be to show that the base set of facts M that fix the relevant similarity relation can be non-modally specified and their modal status, if any, reduced to truth at all M -accessible worlds. While I cannot address this latter for each particular family of modal notions here, I will try to show that the same arguments that show this desideratum to be met in the case of the nomological modalities can be employed to show that it can be met in the case of the (broadly) logical modalities.

5.3 The Paradigm: Nomological Modalities

So, let us make the proposal explicit by running an example with a common family of relative (alethic) modalities, namely nomological possibility and necessity. Let us, once more, take our cue from Lewis:

“Thus it is nomologically necessary, though not unrestrictedly necessary, that friction produces heat: at every world that obeys the laws of our world, friction produces heat. It is contingent which world is ours; hence what are the laws of our world; hence which worlds are nomologically ‘accessible’ from ours; hence what is true throughout these worlds, i.e. what is nomologically necessary.” (Lewis 1986a: 7)

So, we learn that the basis of our restriction in the case of the nomological modalities is accessibility, i.e. similarity, with respect to the natural laws of the base world, usually ours:

(P^N) It is nomologically possible at w_0 that A iff there is some world w_1 which is similar to w_0 with respect to its natural laws N , and at w_1 , A .¹⁸¹

This analysis of nomological possibility, informally taken here from Lewis, will be non-modal only insofar as the laws of the base world w_0 can be non-modally specified. In particular, we need first a non-modal definition of the notion of a natural law. Then we

¹⁸¹ ‘Similar’ in a sense to be explained.

must say a little about what similarity between two worlds with respect to their natural laws amounts to. Let us take these in turn.

5.3.1 *The Notion of a Natural Law*

The notion of natural law best suited for this purpose is Lewis' own regularity or 'best-system' theory of natural laws, according to which:

“...a contingent generalisation is a *law of nature* iff it appears as a theorem (or axiom) in each of the true deductive systems that achieves a best combination of simplicity and strength. A generalisation is a law at a world *i*, likewise, if and only if it appears as a theorem in each of the best deductive systems true at *i*.” (Lewis 1973a: 73)

Thus, what separates laws of nature from accidental generalisations, in essence, is not the modal status of the former, but the fact that unlike accidental generalisations, the laws feature as theorems in our strongest and simplest systematisations of particular matters of fact. Of course, unlike the accidental generalisations, the laws do have special modal status, but this is reducible to their theoretical role in our best systems. It is no straightforward matter of course to decide which statements should be the laws. The general guidelines, Lewis elucidates, are somewhat as follows:

“I take a suitable system to be one that has the virtues we aspire to in our own theory-building, and that has them in the greatest extent possible given the way the world is. It must be entirely true; it must be closed under strict implication; it must be as simple in axiomatisation as it can be without sacrificing too much information content; and it must have as much information content as it can have without sacrificing too much simplicity. A law is any regularity that earns inclusion in the ideal system. (Or, in the case of ties, in every ideal system.)” (Lewis 1983d: 367)

Lewis goes on to discuss this proposal at a little more detail.¹⁸² He notes, for instance, that the primitive vocabulary of the best systematisations had better refer only to perfectly natural properties, in order to avoid difficulties brought on by artificially perverse formulations of the relevant facts. (Lewis 1983d: 366-68) Giving the guidelines that

¹⁸² Besides Lewis (1973a) and (1983d), see also his (1986c). See also Beebe (2000) for a defence of the best-systems view of natural laws.

“simplicity without strength can be had from pure logic, strength without simplicity from (the deductive closure of) an almanac” (Lewis 1973a: 73), he notes that it is the purpose of scientific theory, with its existing (often vague and pragmatic) standards for evaluating competing systems, to decide which axiomatisation is to count as simplest and strongest and so which axioms are to count as the laws. We may additionally assume that if there are many non-overlapping systematisations, or an infinite ascending series of better and better systematisations, it may be a pragmatic matter which set of axioms to choose as the best, in the sense of being overall the most useful in scientific theorising. And we may allow that there are lawless worlds that cannot be systematised. (We may even remain open to a somewhat realist conception of natural laws that takes the axioms that constitute the laws to capture complex structural relations between sets of the world’s individuals (i.e. instantiated properties)).¹⁸³

The important feature about this account of natural laws is that the laws are individuated, not by virtue of being those generalisations that are necessarily true, but non-modally, by virtue of their offering the best – simplest and strongest – systematisation of particular matters of fact at a world. This allows us to characterise the natural laws of a world w non-modally and thereby fix the similarity, i.e. accessibility, relation applicable to nomological modalities without recourse to primitive modal notions. An analysis of nomological modality based on similarity with respect to natural laws can thus be deemed fully reductive. And the necessary status of the natural laws can be reduced to their truth at all nomologically accessible worlds.

5.3.2 *Nomological Similarity*

Now, let us turn to the question of nomological similarity between different worlds. We can choose alternative strengths of similarity. In the weakest case (for alethic modalities), where the accessibility relation is only reflexive, all we need for the accessed world to bear the requisite similarity to the base world, is for the former to simply render *true* all the laws of the latter. In the stronger case, where accessibility can also be deemed transitive, we may demand that the laws of the base world are also laws at the accessed

¹⁸³ This modest attempt at realism, involving higher order relations between properties is still a far cry from the Dretske (1977)-Tooley (1977)-Armstrong (1978) understanding of natural laws as relations of necessitation that hold between universals.

world. And in the strongest case, adding symmetry, we may demand that the base and accessed worlds share exactly the same laws.¹⁸⁴

There is one final important consideration here to note, namely that whatever else nomological accessibility may be, it ought never reach beyond worlds that are *logically* accessible from a base world. This is only to be expected given that the axioms that are to count as the natural laws at a given world are, after all, determined only upon a prior acceptance of a particular logical system that allows us to close the set of truths at a world under strict implication. Then, to specify the natural laws of a world we may need the notion of ‘the best systematisation’ to involve acceptance of a particular logical system L operative at w , with respect to which that systematisation is achieved. While I see no reason to deny that there may be cases that involve logical variations, it seems that the default position ought to be that nomological accessibility lies within the confines of logical accessibility. With these comments in mind we can think of nomological similarity in any of the following terms:

- (i) A world w_I is nomologically similar to a base world w_0 if and only if w_I renders true the natural laws w_0 .
- (ii) A world w_I is nomologically similar to a base world w_0 if and only if the natural laws of w_0 are also natural laws at w_I .
- (iii) A world w_I is nomologically similar to a base world w_0 if and only if w_0 and w_I share exactly the same natural laws.

While (i) seems rather weak to capture the physical accessibility relation, it might bear further discussion whether the physical accessibility relation should only be reflexive and transitive (ii), or whether it should be an equivalence relation (iii). I will not enter such a discussion here.¹⁸⁵ Additionally, we arguably want to nest nomological modalities within logical modalities in order to avoid having the explosion world, where every proposition is true, be nomologically similar (e.g. under (i)), hence possible. We might do this by only

¹⁸⁴ It may be, for instance, that two worlds render true the same universal generalisations yet one of them admits of a simpler systematisation than the other. Or, we may have further nuances and degrees of similarity by considering the accessed worlds as rendering true, or obeying, *almost* all the laws of the base world. See Pargetter (1984: 337-339) for a discussion of these matters.

¹⁸⁵ Again see Pargetter (1984).

evaluating for nomological similarity worlds that are deemed logically accessible (in a sense to be explained) from the base world.

While the details of this picture merit deeper discussion, what we have here is a strategy, which agrees with the existing Lewisian conception of restricted modalities, and by which to give an appropriate answer to our original question, namely what we should take to be the basis of the relevant restrictions that demarcate the possible from the impossible. In the uncontroversial case of the nomological (relative) modalities, the basis of the relevant restriction is similarity with respect to natural laws. So, given an appropriate conception of a natural law, we get an analysis of one kind of relative modalities, namely the nomological modalities, to be properly non-modal. Interestingly, under this picture, the nomologically necessary status of the natural laws simply reduces to truth at all nomologically accessible worlds. This means that it is nothing over and above the axiomatic status of certain truths in our best scientific theories that (rather uninterestingly) guarantees their nomological necessity.¹⁸⁶ Now, the idea is to apply the same strategy in order to specify the relevant restrictions for the broadly logical modalities.

5.4 Extension: Logical Modalities

If we are to give an analogous rendering of the logical modalities, we have the (unenviable) task of non-modally unpacking the notion of logical accessibility. Under the present proposal, this means unpacking the notion of logical similarity between worlds by filling out the blank in the following schema:

(P^L) It is logically possible at w_0 that A iff there is some world w_1 , which is similar to w_0 with respect to w_0 's _____, and at w_1 , A .

Now, just as the appropriate restriction in the case of the nomological modalities is given by a world's *natural laws*, the immediate thought here would be that the appropriate restriction in the case of the logical modalities is similarly given by a world's *logical laws*. But what counts as a logical law?

¹⁸⁶ Robert Pargetter (1984: 340) makes a similar case for nomological necessity. This may also provide an oblique answer to a worry by Marc Lange (2008) to the effect that Lewis' best systems account of natural laws cannot account for the laws' necessary status. We may argue that it is the laws' special status as axioms that leads to them being held fixed as a basis of nomological similarity between worlds, which in turn leads to only those worlds being nomologically possible that render those axioms (at least) true, and which in turn leads to these axioms being true at all nomologically accessible worlds; and so to their being necessarily true.

On the one hand we may have the axioms of some formal logical system that count as logical laws. But, logical possibility is not circumscribed merely by these formal logical truths. We usually take broader truths like that *nothing is red and green all over*, or that *all red things are coloured*, or that *all bachelors are unmarried men* to also count as true at all logically possible worlds. So the task is how to circumscribe this larger class of logically accessible worlds non-modally.

In fact, one might worry that there is no non-modal characterisation of the notion of a logical law and that our predicament parallels the one that Lewis takes the ersatzer to be in, in his attempt to differentiate the logically possible worlds from the impossible worlds. Lewis argues:

“The axioms to do the job may exist, but the ersatzer will not be in a position to specify them. He can only declare: the axioms shall include whichever sentences of such-and-such form are necessarily true. Once he says that, all his analyses from there on are modal.” (Lewis 1986a: 154)

In other words, the ersatzer, not knowing which truths to count as logical laws, is incapable of individuating the possible worlds non-modally by citing a list of axioms they should verify. In his ignorance, it seems the only available option is to declare that the logical laws are to be all and only the necessary truths, rendering his individuation of the possible worlds circular. Are we in the same position?

Not necessarily. Our aim is to define logical necessity as truth at all logically accessible worlds and analyse logical accessibility in terms of similarity with respect to a world's logical laws. But this does not require that we know whether some particular truth counts as a logical law or not, any more than we had to know whether some generalisation was to count as a physical law in order to give a non-modal characterisation of physical law-hood. All we need is to give a non-modal characterisation of logical law-hood, a criterion that candidates must meet if they are to count as logical laws, irrespective of any decision as to *which* candidates, if any, meet that criterion. And so, unlike Lewis' linguistic ersatzer who seems required to compile from scratch, as it were, a list of axioms by which to individuate those worlds – *qua* sets of sentences (or other linguistic

constructions) – that are to be the possible worlds, all we need is to find a way to successfully refer to that list, whatever may be on it.^{187, 188}

Just as before, we have two central questions. First, how can we give a non-modal characterisation of the logical laws? In particular, how do we individuate the logical laws of some world w and what differentiates these from its physical laws? Second, what does similarity between worlds with respect to their logical laws amount to? What is it, for example, for two worlds to ‘share’ the same logical laws? To give an answer here we need to say a little as to what it is for a set of logical laws to be the laws *of* w , *valid at* w , and thus serve as a similarity basis on which to compare w to another world v .

5.4.1 The Appropriate Notion of a Logical Law

Let us begin with the notion of a logical law at play here. Just as whether something is to count as a physical law at our world is decided by our best physical theory, whether something is to count as a logical law at our world should be decided by our best logical theory. How does our best physical theory systematise empirical fact at our world in order to give us our natural laws? Crudely speaking, by finding that set of axioms, (the laws), that is the simplest yet allows us to deduce the most individual matters of empirical actual fact, i.e. the simplest and strongest set of axioms. Now, we want to say something similar for our logical theories, namely that, by analogy, our best logical theory also systematises something or other at our world. What does it systematise and how does it do it? The intuitive answer would be that our best logical theory (or theories) systematises correct deductive inference at our world. Now, in the physical case, our laws systematise particular matters of fact; and such facts are simply the true propositions about the various parts of a world. But what type of facts do we refer to with the term ‘correct deductive inference’? Let us say for now we are referring to some set of *facts about* correct inference (where ‘correct inference’ will always henceforth mean correct *deductive* inference) at a world. What such facts may consist in needs further explication, to which we will return.

¹⁸⁷ And the ersatz has even more trouble ahead, for instance he must ensure he has a rich enough world-making language and even then provide bridge-principles by which to marry his macro with his micro-descriptions so that they do not end up contradicting each other. (Lewis 1986a: 150-165)

¹⁸⁸ Of some parallel interest may be Lewis’ comment in the case of arithmetic. He concedes that despite there being a “serious philosophical problem about how we can refer unequivocally to the standard models [of arithmetic] ... we do seem to manage it somehow”, which means that one could specify the arithmetical laws or axioms as “those sentences of the arithmetical part of the language that are true in standard models of arithmetic” (Lewis 1986a: 153). Lewis attributes this idea to Roper (1982). This may also give us an idea of what it would require to circumscribe mathematical modalities.

Now, supposing that our logical theory systematises correct inference, how is this systematisation to be achieved? In the physical case, the laws appear as axioms in all the best deductive systems of the truths of our world. But we cannot apply that same notion of systematisation here. For one, deciding on the best axiomatisation of a set of truths presupposes logical theory, i.e. a set of inference rules by which to systematise the relevant truths. For another, as Lewis Carroll's story 'What the Tortoise said to Achilles' beautifully illustrates, correct inference is an *act* of a certain sort; and the act of inferring A from B should not be confused with the truth of any kind of conditional like $A \rightarrow B$. For, one may accept the conditional yet fail to draw the inference.¹⁸⁹ So a systematisation of correct inference at a world ought to proceed not by listing a set of axioms, but by building a system of rules of inference. So, unlike the natural laws case, logical theory systematises correct reasoning by providing a set of *rules*, meaning that what we here call 'logical laws' are indeed logical rules of inference. The relevant systems in the logical case are, in short, systems of inference rules.¹⁹⁰

Now, in the case of formal logical theory, we have fully developed such systems, giving us formal inference rules (e.g. introduction and elimination rules, where axioms can naturally be regarded as zero-place such rules), alongside deeper structural rules that capture the nature of the consequence relation that governs correct inference. But facts about correct inference extend beyond facts about formally correct inference. For instance, from the fact that a is the brother of b and b is female we can deduce that b is the sister of a ; or from the fact that a is a bachelor, we can infer that a is unmarried; and so on. And so, our best systematisations of correct inference rules should be strong enough to capture facts about such broader correct deductive inference. I think that we can conceive of good overall systematisations of correct inference – the best of which are the simplest and strongest – to add a broader set of rules into whatever existing set of formal rules, adding, so to speak, to our existing set of logical constants.¹⁹¹ For instance we may get axioms like <all red things are coloured>, or rules like <__ is a mother | __ has a child>. Or the broader theory might add some synonymy substitution rules to the existing set of

¹⁸⁹ Carroll (1895), c.f. also Priest (1979: 291-92).

¹⁹⁰ We could say that just as a natural law is an axiom in all the best systematisations of empirical fact at our world, a logical law is a rule that is operative in all such best systematisations of empirical fact. But that would not get to the heart of the subject matter of logical theory. For, although our logical theory plays a crucial role in providing the rules by which to systematise particular matters of fact, its proper subject-matter is rather a systematisation of correct reasoning norms and so a systematisation of reasoning rules.

¹⁹¹ For an interesting position, allowing for a certain fluidity regarding what should count as a logical constant in the first place, see Etchemendy (2008).

narrower logical rules, allowing a rule like $\langle __ \text{is a bachelor} \mid __ \text{is an unmarried man} \rangle$, for example, to merely follow as an instance of the formal rule of identity by adding the equivalence (synonymy) between the relevant terms as part of the theory.¹⁹²

Of course, when it comes to formally correct inference, we appear to have rigorously and fully developed (competing) systems of rules, whereas we have no such rigorous systems of rules in the case of broader logical rules. Nonetheless, the broader logical laws should consist in those rules that would appear in our best systematisation of broadly correct inference at our world in the ideal case. This is much like the case of our natural laws, where we are not in possession of all the particular matters of fact about our world and so *a fortiori* are not in possession of fully developed competing systematisations of such facts. However the state of development of our theories is irrelevant. The natural laws are those that would appear in whatever would be our best systematisation of all the particular matters of fact in the epistemically ideal case (c.f. Lewis 1973a: 73). Similarly, our logical laws are those that would appear in our best systematisations of facts about correct inference, in the epistemically ideal case.

Moreover, as Priest notes, the lack of very clear guidelines in determining all the broad logical laws of our world is analogous with the situation that the grammarian is faced with when he tries to capture, in his theory of grammar, the rules that govern the English language:

“There is no straightforward sense in which the rules can be read off from the practice. Neither is it much use asking people whether a certain grammatical rule is correct, for of course they may be mistaken in virtue of obscure counter-examples. What we have, rather, is a set of data, namely a set of strings of words concerning which there is general agreement whether or not they are grammatical. The grammarian’s task is then to construct a theory of grammar which accounts for the data. During this process there is the characteristic interplay between theory and data. The data may serve to dispose of a theory if it clashes with it. On the other hand, a good theory may

¹⁹² I steer clear of the related notion of analyticity here, but we can adopt Priest’s definition of the analytic truths as the consequences of those logical conditionals that ‘correspond’ to the valid rules of inference (here the ones that appear in all best systems), where given any rule $\langle A \mid B \rangle$ the logical conditional that corresponds to it is $A \rightarrow B$. (Priest 1979: 293-294) If so, the resulting notion of a broadly logical (or analytic) truth is not weighed down with the positivist epistemic baggage that was Quine’s target in his *Two Dogmas* (1951) We can coherently suppose there to be a class of truths that we can deem to be the analytic without thereby requiring that these have some special epistemic status, are immune from revision or can function as the *a priori* and unassailable basis of the logical structure of the world.

undermine the initial data by showing that it is not correct. Thus theory construction is always a tentative procedure.” (Priest 1979: 294-95)

Similarly, any kind of endeavour to systematise the broader inference rules in our language will start with some data about correct inferences we seem to generally agree upon and try from that place to construct a theory that accounts for and unifies all the known relevant data.¹⁹³ Any difficulties in deciding whether something should gain entry as a logical law will then reflect real decision points in theory construction. For instance, will it be a logical law that no point particle has both positive and negative charge? (c.f. Lewis 1986a: 155) Well, that will depend on whether it is a matter of correct deductive inference to suppose that no matter what else is the case positive and negative charge are mutually exclusive. Maybe so. Maybe the expression ‘not-positive charge’ is a synonym with the expression ‘negative charge’ and so maybe the axiom of unique charge is really a purely logical truth. Or maybe not. Maybe it is simply a matter of empirical fact that no point particle ever is both positively and negatively charged. Then, our logical theory ought not deem the expression ‘negative charge’ as synonymous with ‘not-positive charge’. We do not need to answer the question of unique charge here, as we do not need to answer the question of exactly what will turn out to be a logical law, and so included in our best logical systems. All we need is to (non-modally) characterise the notion of a logical law. This we can do as follows, paralleling Lewis’ definition of a natural law:

- (L) A putative rule is a logical law iff it constitutes a rule in (each of) the systematisations(s) of correct deductive inference that achieves a best combination of simplicity and strength.

And in the world-specific case, this means that

- (L^w) A putative rule is a logical law at a world w iff it appears as a rule in (each of) the best systems of deductive inference rules of w .¹⁹⁴

¹⁹³ C.f. Priest (1979). Equally, we do not need to reply to the old and difficult question of what – if anything – distinguished the pure logical from the non-logical vocabulary here. These questions are for our overall logical theory to address.

¹⁹⁴ If there are many, equally good, systematisations that give us distinct sets of rules, then we may deem the world logically pluralistic; if there are none, we may deem the world lawless.

Here, we also have a (rudimentary) distinction between the physical laws and the logical laws. We can say for instance that whilst the natural laws systematise matters of empirical fact at a world, the logical laws systematise matters of correct inference at a world. We can say that while our natural laws consist in a set of axioms, our logical laws consist in a set of rules. We can say that while our physical theory systematises particular matters of fact at a world by providing a set of axioms from which to be able to deduce the multitude of such facts, our logical theory systematises correct reasoning at that world, and so provides the rules by which to carry out particular inferences. We can say that while our physical laws are given to us by our physical theories in the form of axiomatisations of particular matters of fact, our logical laws are given to us by our logical theories in the form of rule-systematisations of correct deductive inference. While this by no means offers a thorough discussion or rigorous differentiation between the logical and the physical laws, it at least suffices to allow us to proceed with our characterisation of the logical laws of some world w .¹⁹⁵

5.4.2 Logical Similarity Relations on Worlds?

Now, this still leaves a lot to be explained, especially when it comes to what we can make of the notion of the best systematisation of correct inference *at a world*; that is, the role that the relevant world plays in providing some fact or other for systematisation. This is important, for our ultimate goal is to be able to define a similarity relation on worlds with respect to their logical laws. And, unless we see how the relevant systematisations are systematisations of features of a particular *world*, it is unclear how there can be a notion of logical laws *of* a world, and so why the relevant similarity respects are not just comparisons between different sets of rules but, truly, comparisons between different worlds. And if we are to achieve that, we need to see exactly what properties the relevant worlds have that render them logically similar or dissimilar to each other.

¹⁹⁵ In the case of physical laws a systematisation is achieved by forming the deductive closure of the set of true sentences at a world. What is the relevant systematisation procedure in the logical case? Intuitively, it should be whatever we do when we construct a logical theory: a procedure of building a set of deductive rules into a unified logical system, such that particular correct inferences (at a world) are instances conforming to these rules. Relatedly, in the physical case there are *true* universal generalisations which are not laws. What is the equivalent in the logical case, namely the candidate rules that are *accidental* so fail to be included in our best system(s)? We might take the accidental rules to be particular inferences that happen to preserve truth but do not constitute a valid deductive rule in our best system. Various materially correct inferences might fall into this category, which are to be subsumed under more general valid rules. This can thus allow us to have a notion of an accidental rule analogous to that of an accidental generalisation, which nonetheless does not constitute a law.

If it is hard to see what it would mean for two different worlds to be similar or dissimilar with respect to their logical laws (c.f. e.g. Divers 2002), it is arguably because we barely have an idea of what it would be for this world (even if we were to take this world to constitute *all* of reality) to obey one logic rather than another. Nonetheless, we often find it said that no contradiction is ever *true*; or that some particular (formal) logical system is a *correct* or *true* system while others are not. And, surely, we take such statements to be truth-apt, to tie somehow with the way the world is. In virtue of what in the world do they receive their truth-value? In the present context, this question becomes pertinent.

In the physical case our world provides the data – all the particular matters of fact – which our theory systematises, and against which competing systems are tested for *truth* (at our world). That is why the relevant laws are the laws of *our* world. Then, theory decides which axiomatisations of those facts are simplest and strongest. In the logical case too, our world should provide some initial data for systematisation against which competing systems will be tested for truth (at our world) before more pragmatic considerations enter to decide which true systems offer the best systematisations. Moreover this data must be able to vary from world to world, so that their systematisations can vary from world to world, so that the logical laws can vary from world to world, so that we can have worlds that are dissimilar to each other given their logical laws, and so that we can have worlds that are logically impossible (inaccessible) from each other's perspective. So what are the relevant world-specific data here that logical theory systematises?

Well, we have said that the relevant systematisations are systematisations of facts about correct inference at a world. So what could such world-facts consist in? An inference is an act of reasoning; so facts about inference are facts about reasoning practices at a world. And facts about *correct* inference are facts about the *norms* that govern those practices; facts about the particular standards that inferential behaviour must meet if it is to be deemed acceptable or successful. But what in the world literally provides such *normative* facts or standards for successful inferential practices? One natural way to conceive of these facts in the world, and place the relevant norms in a naturalistic framework, is to take a regularity view – namely take the facts to be facts about regularities in behaviour and expectations of behaviour surrounding inference at a

world.¹⁹⁶ This parallels the regularity theory of natural laws adopted by Lewis (1973a; 1983d). One may object that we cannot reduce the *normative* to *de facto* behavioural regularities, even of an entire linguistic community, for isn't it conceivable to find a community that habitually engages in fallacious inference? But, here again I agree with Priest that "[i]t is easy enough to see what it would be for an individual to make a mistake in inferring, but what would it be for a whole practice of inferring to be mistaken?" (Priest 1979: 296) Any attribution of error to an entire community may be questioned on grounds of uncharitable interpretation of the relevant practice. If we came upon a community that systematically inferred 'A' from some complex sentence 'A*B', for instance, it would not be charitable to interpret '*' as 'or'.¹⁹⁷ Or, if we came upon a community that did not infer any old thing upon stumbling upon what we both agreed to be a blatant contradiction, then the best explanation might be that their behaviour is somehow grounded in the way that their world is, so that their practice is governed by somewhat different (among others, truth-preservation-) norms, rather than that their behaviour is an instance of their fundamentally mistaken inferential practices.

This naturalistic reductive picture allows us to place facts about correct inference in the world and so allows us to talk of the logical laws of a world. First it points at something in a world w for the phrase 'facts about correct inference at w ' to pick out, namely regularities in the inferential practice(s) at w . Second, it makes some sense of the notion of 'the logical laws of w ' as referring to those rules that best systematise the relevant regularities. However, there are (at least) two obvious puzzles that arise from this conception of the logical laws of a world:

First, what if a single world has a plethora of distinct inferential practices, each with different norms in force? What are the facts about *correct* inference at a world, then? Well, the best systematisations of inference at such a plethoric world would presumably try and systematise the common features in all such practices. Alternatively, if there are no common features, then we can allow that such a world has more than one set of logical laws valid at it, realising some logical pluralist picture. Classifying such a world as pluralistic seems like a justified move, if it is truly borne out by real failure to find any common ground between the distinct practices.

¹⁹⁶ This is in the general spirit of Lewis (1969), where he also suggests that we might view conventions as a kind of norm or rule (1969: 97, 100) although, of course, Lewis does not discuss the nature of logic in that context. For the latter see Priest (1979).

¹⁹⁷ C.f. Priest (1979: 296)

Second, and worse, if the relevant regularities pertain to the behaviour of a world's inhabitants, then a world's having logical laws is contingent on that world being inhabited by beings that reason. Thus, uninhabited worlds will turn out to have no logical laws, in virtue of having no inhabitants that offer up any regularities in inferential behaviour for systematisation. A systematisation of the null set of facts, after all, delivers nothing. And, while there may well be logically lawless worlds, it does seem strange to think that being uninhabited is sufficient to make a world logically lawless.

For one, this seems to make nonsense of the notion of a concrete impossible world. What we have is not a *world* that is logically inconsistent as such, but a *language* that is inconsistent, or a linguistic community with different habits. Of course, one may argue that it makes no sense to speak of the logical laws of a *world* in any case, but only of the logical laws that govern various inferential practices. In that case, worlds only enter the equation by proxy, as practice-locators, and do not even have an essential role in the individuation of practices as distinct from each other, since a world may contain no practices, or more than one distinct practice. While there is nothing wrong with this idea in principle, it is a good question in what sense it constitutes a proposal of concrete impossible worlds – i.e. worlds *qua* mereological sums of stuff that, say, invalidate EFQ. That is, if we take it that there is nothing in (concrete) reality that grounds logical laws, then the concept of a logically impossible world seems to hardly get off the ground. All we have is a variety of inferential practices entirely disconnected from what is essentially a logically undifferentiated reality, making a mockery of the concept of a logically impossible world, *qua* concrete mass of stuff. Among other things, we wanted to have Lewis-worlds that realise contradictions, and worlds where the logical laws of our world fail, not worlds with inhabitants that somehow go around behaving differently, without these differences in behaviour being grounded, somehow, in the way their world differs from ours.

Moreover, any inferential practice is surely (partly at least) characterised by the desire to preserve truth. (This need to preserve truth can receive a naturalistic explanation, whereby only those inferential practices survive which are aimed at the preservation of truth.) So, arguably, the particular world in which an inferential practice develops will have something to say about what is true at it, and so will have some say over the kinds of inferential regularities – *qua* practices aimed at preserving truth – that arise there. For instance, assuming there are contradictory Lewis-worlds, it does not serve the inhabitants of such a (non-explosive) world to adopt a set of rules that allow anything to be inferred

from a contradiction. And if there are such contradictory worlds, wouldn't they be contradictory, in the properties they instantiate, even in the absence of inhabitants?

Now, one way around the problem of uninhabited worlds might be to take a non-Humean view of concrete worlds and their logical laws, deeming that all Lewis-worlds instantiate certain primitive logical structural properties, which determine their logical laws. These might be, for instance, conjunctive properties of the form $A \& B$ that cannot be further broken down to their individual components, A and B (we can think of them as relations that hold between various propositions true at a world). Such non-Humean worlds will, then, be worlds, where simplification fails to be a valid rule of inference.

It should not count against this non-Humean proposal that we may be unable to fully grasp how a world may instantiate such properties. As Mortensen (1989) notes, if we consider complex equations of physics, like Quantum mechanics and General Relativity, in isolation from the concrete world they are supposed to characterise, we will see that they appear just as abstract as logical models. Similarly, it should not count against logical models that, when considered in isolation from the concrete world they are supposed to describe, they appear totally divorced from any kind of spatiotemporal totality. However, it might count against this proposal that it (i) rejects Humean Supervenience across all worlds, including our actual world (rather than, say, just for impossible worlds) and this goes against the traditional Lewisian Humean spirit. Moreover, (ii) we here move away from the proposed conception of a logical law as a rule that features in the best systematisations of correct inference behaviour at a world, moving, instead, toward a robust realist conception of logical laws that captures the complex logical structure of a the world itself. We can still take it, of course, that the practices of a world's inhabitants supervene on the way the world is. Nonetheless, it is the structural properties of a world, and not the practices that supervene on it, that truly give us its logical laws. In short, this way forward removes the problem of uninhabited worlds, but at the cost of compromising, both, the Humean Lewisian framework, and the proposed definition of a world's logical laws as those rules that best systematise inferential behaviour in it. Do we have to go this way?

I think that we can opt instead for a compromise that removes the worries surrounding uninhabited worlds, which lead down the non-Humean path. We can allow that, while not all concrete worlds have logical structural features (although some still might), all worlds

nonetheless are composed of both positive and negative particular matters of fact.¹⁹⁸ If so, then worlds will have *some* say over what kinds of inferential practices develop there – for instance, it is natural to think that inconsistent worlds will not witness practices that reason using something along the lines of EFQ – but it is only the practices that develop at a world that can give us the resources upon which to determine the full logical system that holds at that world. This way forward allows us, first, to make sense of the concept of a logically impossible Lewis-world as a world that realises both ends of a polarity of facts (or neither); and moreover, to preserve the Lewisian Humean picture (at least for some worlds), whereby all the complex facts of a world supervene on its (positive and negative) particulars.¹⁹⁹ Furthermore, we now have more leeway with respect to what we want to say about uninhabited worlds. We can still deem such worlds logically lawless, simply on the basis that only the null logical system can be read off of its practices (since the world lacks these latter). Or we can treat such worlds as a special case and take their laws to be those laws that *could* have developed, if the worlds were inhabited, i.e. those laws that *have* developed in suitably similar worlds. Uninhabited worlds may, further, either be deemed pluralistic, if there is a similarity-tie between closest worlds with different laws, or alternatively, they may obey a limited number of logical laws, namely only those, if any, that all suitably similar worlds have in common. (Of course, the precise proposed similarity relation for the evaluation of the relevant counterfactual here invites further questions, for instance, can we cleanly pull apart the facts about a world that relate to its inhabitants to facts about a world that do not?) However, if it can be made to work, this way forward removes the worry stemming from uninhabited worlds that led down the non-Humean path: Worlds are still Humean collections of particular matters of (positive and negative) facts, yet (a) may be glutty or gappy, (b) we are not forced to decree uninhabited worlds lawless, and (c) even if we choose to do so, the notion of a concrete impossible world is not thereby compromised.

¹⁹⁸ This is in the spirit of Priest (2006b: 299-302; 2006a: §2.7)

¹⁹⁹ This conception of the logical laws of a world seems to be partly realist: Consider an inconsistent world and two paraconsistent logics LP and RM3. Both logics reject EFQ, so seem *prima facie* appropriate for such a world. However, $P \& \sim P \rightarrow Q$, while not logically true in RM3, is a logical truth in LP. Now, if worlds have robust structural features, then a world might determine which logic holds at it, by having $P \& \sim P \rightarrow Q$ be part of its logical structure, so validate LP. This would give us a robustly realist conception of the logical laws of a world. But if worlds have no such structural features, then a world which is inconsistent will rule out, presumably classical or intuitionist inferential practices developing at that world, but will not thereby fully determine what inferential practices will develop there, and so will not fully determine whether, say, LP or RM3 will constitute the pure logical laws of that world. This seems to give us a part-realist part-antirealist picture of the logical laws of a world.

Let us finally turn to the question of what it means for a world to be logically similar to another. Weaker, non-transitive or non-symmetric, conceptions of similarity such as (i) and (ii) arguably have less applicability here. But, it may be of interest to consider whether a world where our logical rules preserve truth but are not laws there, for instance, ought to be considered a logically possible world, as per (i).

- (i) A world w_I is logically similar to a base world w_0 if and only if the logical laws of w_0 preserve truth at w_I

One level up, we have worlds, such that all our logical laws are also laws there, but not vice versa. Again, we still do not get the S5 model that is traditional for such modalities, but it may be that this weaker notion of logical accessibility has its uses (if for instance we were to think it logically possible for there to be more logical laws valid at our world than there actually are):

- (ii) A world w_I is logically similar to a base world w_0 if and only if the logical laws of w_0 are logical laws also at w_I

Finally, if we want logical accessibility to form an equivalence relation, as we usually do, we should opt for (iii):

- (iii) A world w_I is logically similar to a base world w_0 if and only if w_0 and w_I share exactly the same logical laws.

Insofar as we take the logical modalities to obey an S5 model (iii) is the most obvious formulation of the kind of similarity relation (namely exact similarity) that governs logical possibility and necessity.

5.4.3 Summary

In sum, it is logically possible at w_0 that A iff there is some world w_I , which is (exactly) similar to w_0 with respect to w_0 's logical laws and at w_I , A . Logical necessity (with respect to our world) is thus reduced to truth at all worlds that share our logical laws. Predictably, the bulk of the discussion was dedicated to non-modally unpacking the notion of a 'logical law', and particularly, that of 'the logical laws of a world'. The proposal, in

short, is that the logical laws of a world w are those rules of inference that appear in (all) the systematisations(s) of facts about correct deductive inference at w that achieve a best combination of simplicity and strength, where the relevant facts are about regularities in the inferential practices of w . Admittedly, what has been offered is but a sketch of a theory. But I hope that it throws some light on the concept of logical similarity, allowing us to begin to make sense of the idea that a logically impossible world can be analysed non-modally as a world that is logically dissimilar to another. If so, this affords us a reduction of logical modality to logical similarity between worlds.

5.5 Further Questions

I have proposed that just like the nomological modalities, the logical modalities can be thought of as relative modalities determined on the basis of logical similarity relations between worlds. I also tried to show that we can non-modally specify the relevant similarity respects operative in the logical modalities, in order to effect the requisite reduction. Naturally many more questions remain. I will try to say a little about some of these here.

5.5.1 Questions of Meaning

First, one may object to the proposed logically impossible worlds as Stalnaker and Perszyk do:

“...I am still in the dark about what these worlds are like. ...it is not that I disagree with your metaphysics – I don’t see that you have yet given me any metaphysics to disagree with.” (Stalnaker 1996: 198)

“But how could contradictions ever be true? This is a real puzzle for most philosophers.” (Perszyk: 206)

It is hard to see how to respond to these objections. If the charge is one of some sort of purposeful obscurantism, it should be noted that any proposal of concrete impossible worlds cannot do much more to explain its ontology than describe it using propositions that could not possibly be all true (and if applicable, illustrate the logical relations that hold between them). And it is no good saying that because the propositions used in these descriptions cannot possibly all be true, they do not describe anything, for this simply

amounts to an outright (question-begging) rejection of the hypothesis of impossible worlds. Nor is it an argument against impossible worlds that we cannot imagine what all these worlds would be like. It is in the nature of many of these worlds, after all, to be inconceivable.²⁰⁰

More, one might question the sense in which so-called logically impossible worlds are impossible. It should not be the case that we take the truth-functional connectives (or anything else for that matter) to simply *mean* something different at worlds that obey different logical laws. For as Perszyk notes:

“Whether words may mean something different from what they actually mean has nothing to do with ways the world could be. There are possible worlds in which words do not mean what they actually mean.” (Perszyk 1993: 212-213)

Indeed. Worlds where the words mean something different are not impossible. Logically impossible worlds, instead, are worlds where the logical terms have the same meaning but where the world is such as to make different sentences involving those terms true at it. The relevant differences in regularity facts about usage, then, rather than reflecting a change in meaning, are taken to reflect or arise from world-differences. Of course it is hard to draw the line clearly here, but we can give examples. A world containing talking donkeys, for instance, will make certain propositions about donkeys true which this world will not. For instance, it will render true ‘donkeys talk’, and the linguistic behaviour of its inhabitants will presumably reflect that. But this does not mean that ‘donkey’ means something different at that world. It is simply a world that behaves differently when it comes to donkeys. Similarly, then, why should the only explanation as to why different propositions involving negation are true at a world, that the meaning of ‘not’ has changed? A world may render true a contradiction, without this indicating that ‘not’ means something different at that world; it can simply be a world that behaves differently when it comes to negation.

Third, one may ask, what is it really for there to be worlds where a vixen is not a female fox? Well, if the words ‘vixen’ and ‘female fox’ just *mean* the same thing then clearly, worlds where something is a vixen but not a female fox will be worlds where something is female fox but not a female fox. For then we do not really have two

²⁰⁰ Although, see Priest (1999; 2006a) for the conceivability of various impossible situations.

necessarily coextensive properties at all, but only *one* property going by two names. However, if the words do not *mean* the same, but are taken instead to be necessarily co-referential (a more intuitive example of which might be ‘triangular’ and ‘trilateral’), then there would not be any change of meaning involved at a world where something is a vixen but not a female fox, just as we would not take ‘triangular’ to mean something other than ‘has three angles’ at some world containing an impossible individual that is triangular but not trilateral.

In short, I take the impossible worlds I propose here to be impossible in a very real sense.

5.5.2 Characterising the Ontology

Another question that arises is this: how can we characterise the ontology of impossibilist GR (IGR) in such a way as to differentiate it from that of traditional possibilist only GR (PGR)? Given that we want to avoid the use of modal terms in the basic theory, we cannot do so by saying that, unlike the original theory, IGR allows for *impossible* worlds. I propose, all we need is something that commits the new theory to the existence of worlds that PGR would reject. We could do this by deeming it that under IGR, but not PGR:

- (O1) For any proposition P there is a world where P holds and there is a world where P fails.

For instance, under IGR but not PGR, there are worlds that instantiate contradictions and other metaphysical impossibilities; similarly, under IGR but not PGR, no proposition is presumably true at all worlds. (O1) can differentiate between IGR and PGR, because, if (O1) is true, then no proposition is identified with the empty set of worlds, for instance, since every proposition holds at some world for IGR but not PGR; (similarly, no proposition is identified with the total set of worlds, since for any proposition, under IGR, but not PGR, there is a world where it fails). So (O1) is satisfied by IGR but not PGR. Alternatively, we could say that IGR but not PGR only is committed to the following:

- (O2) Given any world w_0 , proposition P and relation R , such that there is no R -accessible world w_1 from w_0 such that P -at- w_1 , there is some R -inaccessible world w_2 from w_0 such that P -at- w_2

[Formally, $\forall P \forall w_0 \forall R (\sim \exists w_1 (Rw_1w_0 \ \& \ Pw_1) \rightarrow \exists w_2 (\sim R w_2 w_0 \ \& \ Pw_2))$]

Again, while (O2) creates no obstacles for IGR, it fails to hold for PGR, for instance where the relevant proposition P is some metaphysical, classical logical, or mathematical falsehood. For then, while there will be no world and *a fortiori* no accessible world, for PGR, where that proposition holds, and so while the antecedent will be true, there will neither be an inaccessible world where that proposition holds and so the consequent will be false. On the contrary, for IGR (O2) will always hold. Namely for any proposition that fails to hold true at a world in an accessible range we can infer, under IGR, that there is a wider range including a world where that proposition holds. (I take the case where the relation R excludes no worlds to be unproblematic on the basis that then, the antecedent will be false.). (In the simplest case, we can simply differentiate the two theories by saying that '(O3) there is a world w such that at w (P and not- P)' holds for IGR but not PGR.)

Now, none of these principles are supposed to be plenitude principles for impossible worlds. Since GR identifies propositions with sets of worlds, (O1) cannot be used to non-trivially guarantee that all impossibilities are instantiated at some world. And (O2), being a conditional, does not commit IGR to any particular ontology. However, I take the pertinent question here to be the weaker question of how we can differentiate the ontologies of the two theories, not the stronger demand for a non-trivial principle of plenitude for impossible worlds. As argued in Ch II, I take Lewis' principle of plenitude (Recombination) for possible worlds to apply *mutatis mutandis* to the case of impossible worlds, freed from the constraints of classical logic. The sampled principles show that there are readily available ways to characterise that difference.

5.5.3 Metaphysical Necessity

I have said very little regarding the metaphysical modalities. Arguably there is a sense in which the notion of metaphysical necessity is subsumed under that of broadly logical necessity, at least insofar as we take metaphysical necessity to consist in the necessary truth of propositions like '*all red things are coloured*' and '*nothing is red and green all over*', and so forth. To the extent that there is a more robust notion of metaphysical necessity to be analysed here, I take an appropriate extension of the present proposal to

likely proceed by defining metaphysical accessibility between worlds as similarity with respect to facts regarding the individuation of objects, properties and kinds.²⁰¹

5.5.4 Modality as World-Similarity

I would like to close with a couple of comments about the conception of modality that seems to emerge from this picture. As it turns out, under the present proposal, necessity and possibility amount to truth at (all / some) worlds similar to ours in some relevant respects. As the relevant modal families change, so the relevant similarity respects change. It is a good question whether our usual notions of possibility and necessity, say for instance, logical possibility or nomological possibility, really track anything in reality, or whether they arise from pragmatic considerations that lead us to favour certain similarity relations over others.²⁰²

On the one hand, it is intuitive to take it as part and parcel of this similarity-driven picture of modality that the modal status of a proposition is a pragmatic matter; that it depends on our choices of certain similarity respects over others to be the ones that are pertinent in our modal reasoning. If so, then any world, w , can be deemed possible or impossible relative to ours depending on the similarity respects we choose. But some groupings will be more useful than others. The laws of nature seem to give us a more useful grouping than, say, truths about oysters. So we are more likely to pay attention to the former rather than the latter. If we take our most common similarity relations to track no special joints in reality then the picture of modality that emerges here is strongly pragmatic: In our modal talk, we simply ignore worlds which do not fit into our conceptual fixtures; that is, we ignore ontology that does not fit our ideology.

Alternatively, we could deem certain similarity relations to truly carve reality at the joints. After all, it is not unreasonable to think that some similarity groupings are more natural than others, so that whether something counts as a genuine possibility or impossibility (relative to a world) depends on whether it falls within or without certain natural bounds, of which, of course we can allow there to be more than one. Besides logical and nomological modalities, for instance, we might allow for technological modalities (based on similarity with respect to our stage of technological development), historical modalities (based on similarity with respect to our past) and other kinds modal

²⁰¹ Proposals of interest here might include Sidelle (1989), Fine (1994), Hale (2002), Sider (unpublished).

²⁰² See also Wright (1986) for an interesting sceptical take on the notion of logical necessity, from an epistemological perspective.

families. So, the analysis of modality proposed here is compatible with a more realist view of the basis of modal truth.

I will not adjudicate this here. Maybe epistemological concerns tip the scale toward the pragmatic end. For if it is nothing more than our choice to regard certain similarity respects between worlds as more salient that confers to a proposition its modal status, then it might be that our knowing facts about necessity and possibility is to a great degree simply our knowing which similarity relations are most salient in our reasoning. Then, the worlds and individuals just ‘rise up’ and fill our pre-set restrictions. What’s more, we still have room for error and disagreement under such a pragmatic picture. Error and disagreement can be about (i) what is true, and hence what similarity relations give us alethic modalities; (ii) which (systems of) facts give us the most useful similarity relations; (iii) which relations are applicable in the evaluation of particular modal claims; (iv) how strict or loose a notion of similarity to employ; or (v) if and how to nest the various groupings. If, on the other hand, modal truth really depends on where the relevant proposition falls in a brightly carved reality, then it might be a good question how we know where those divisions lie. Of course, that is no reason in itself to reject a realist picture of modality. All that is required is a separate epistemic story about how we know which relations carve at the joints, which at least constitutes no particularly *new* problem.

Whichever option works best, I think that the present similarity-based analysis of modality pays for itself handsomely: it shows us how to accommodate impossible worlds into Lewisian realism without thereby compromising GR’s reductive analysis of modality.

5.6 Conclusion

If I am right, a Lewisian about possible worlds can venture into the strange terrain of concrete impossible worlds without thereby compromising his reductive analysis of possibility. For, in effect, for someone like that, there are no possible or impossible worlds strictly speaking. There are just worlds, some of them similar to ours in some respects, and so accessible under some accessibility relations, and some not. Insofar as the relevant respects can be specified non-modally, as Lewis seems to believe it to be the case for nomological modalities, and as I have here argued it to be the case for logical modalities, then GR’s analysis of possibility by means of such similarity relations can remain non-modal. It is up to us to decide whether the relevant similarity relations track anything in reality, or whether they are merely the result of pragmatic considerations on our part.

CHAPTER VI

The Representational Power of Concrete Impossibilia

6.1 Introduction

In this final chapter, I wish to address a type of objection against concrete impossibilism, focusing on samples by David Vander Laan (1997) and Daniel Nolan (1997), to the effect that the uses we can get out of a genuine realist theory of impossible worlds have their limitations; in particular, that there are certain types of impossibility that IGR cannot accommodate. These representational limitations allegedly arise from the fact that truth at a world for GR is *alethic*, namely that “possibilia do in fact have the features which we associate with them” (Nolan 1997: 541), or that GR-truth-at-a-world really is “a species of truth, namely, truth regarding some particular domain.”²⁰³ (Vander Laan 1997: 611) As David Vander Laan sums it up, “...the Achilles’ heel of a concretist theory of impossible worlds is the fact that there are certain things which concrete worlds cannot represent inaccurately...” (Vander Laan 1997: 607)

Insofar as these charges revolve around the way that Lewis-worlds represent propositions as true, they are closely related to Lewis’ (1986a) objection against concrete impossible worlds, addressed in Ch IV. But their novelty lies in the fact that the types of impossibilities they bring to bear constitute false GR-theoretical claims, thus contradict GR-theory. They concern, for instance, impossibilities unrestrictedly about the nature of GR-worlds (Vander Laan 1997), or about beings that *per impossibile* exist at *all* worlds (Nolan 1997), or about magical objects that render some absurdity *literally true* (presumably in some objectionable sense) (Nolan 1997).²⁰⁴ What these examples have in common is that they concern false *simpliciter* claims, claims formulated in the unrestricted theoretical or ‘home-language’ of GR; they are impossibilities about worlds and their parts, or about the objects found in the extended GR-ontology.

One aim of the present chapter is to determine the extent to which these representation challenges add anything to the debate over and above Lewis’ original objection to concrete impossibilia, addressed in Ch IV. The other is to offer systematic responses, which not

²⁰³ By contrast, if worlds are ersatz-constructions, the operator ‘at *w*’ is very much a non-alethic (opaque) operator like ‘Fred believes’, or ‘according to the Bible’. And since from ‘according to the Bible *P*’ or ‘Fred believes that *P*’ we cannot automatically infer the truth of *P*, truth-at-an ersatz-world is not alethic in the intended sense.

²⁰⁴ C.f. also Lycan (1994: 35)

only counter the particular arguments offered, but which can block all objections of this type. I begin with a brief defence of the legitimacy of GR-theoretical objections in section 6.2. In section 6.3 I show that Vander Laan's objection offers no new challenges to concrete IGR, even though it is valuable in highlighting how representation, for IGR, works, when it comes to a certain class or theoretical claims. In section 6.4 I turn to a couple of brief objections by Nolan, which I take as precursors to certain types of GR-theoretical representation objections distinct from the one highlighted by Vander Laan. I argue that IGR has more than enough resources to represent the relevant types of impossibilities and conclude that none of the objections discussed here present insurmountable obstacles to a GR-theory of concrete impossible worlds.

6.2 Why Bother With GR-Theoretical Representation Objections

I want to begin by setting aside any doubts about the legitimacy of objections concerning GR-theoretical impossibilities. One may ask, why should the objector be permitted to thus blend object-language and theoretical or home-language? What right does the objector have to take GR-theoretical claims and embed them in modal operators? One may object to such constructions, in Edward Zalta's words on the basis that they represent "a kind of confusion of formal mode and material mode" (Zalta 1997: 654). Zalta elaborates:

"Lewis employs a theoretical language and offers a systematic way to render our modal beliefs in the theoretical language. It strikes me as illegitimate for someone to take as data to be explained sentences which employ both our pretheoretical modal notions and our theoretical notions." (Zalta 1997: 654)

Insofar as it is the aim of any theory of modality to rigorously systematise our pre-theoretical modal beliefs, arguments resting on such theoretical modal constructions do indeed smack of trickery. Whatever else may be true, modalities involving various GR-theoretical claims certainly do not constitute part of our pre-theoretical modal beliefs. Hence, one could argue then that it is beyond the call of duty of IGR to analyse these hybrid modal propositions on a par with the original material up for analysis, and that the relevant objections misidentify the object of analysis.

However, the evidence for the legitimacy of the relevant constructions, especially for an impossibilist theory, is overwhelming. First of all, given that GR is a metaphysical

theory, one assumes that its tenets are, if true, necessarily true. If so, then their negations should be necessarily false, i.e. impossible. In the context of impossibilist GR, then, such impossibilist claims, like any others, should be true at some impossible world. So, if GR is to venture into the land of impossible worlds, it must allow for worlds that represent false (i.e. impossible) GR-theoretical claims as true at them.²⁰⁵ Moreover, even granting the distinction between ‘formal’ and ‘material’ mode, arguably, if an analysis of modality is to be good or general enough, it should be able to handle not only our pre-theoretical modal beliefs but any extension to our modal attributions. That presumably includes new modal beliefs that any theoretical propositions may give rise to. And it seems plausible to think that the propositions that constitute philosophical theories also carry modal weight. The intuitive thought is that every proposition, no matter what it is *about*, has a modal status.²⁰⁶ The distinction between object-language and theoretical language arguably does little to dismiss that thought.

Second, to add insult to injury, rival ersatz theories about impossible worlds can easily accommodate the relevant class of impossibilities. Depending on the form such theories take, all they needs is the existence of the relevant property, state of affairs, proposition, or set, to accommodate the relevant impossibility. For instance, an ersatz theory whereby worlds are sets of propositions can easily allow for a world according to which, say, worlds are concrete objects simply by having the relevant proposition be a member of some appropriate set, without this adversely affecting what is really true according to the theory. In the face of such ease on the part of the ersatzer, rejecting the legitimacy of such claims for IGR not only sounds *ad hoc*, but also threatens favourable comparison of IGR with its ersatz rivals.

Thirdly, and most importantly, dismissing the legitimacy of GR-theoretical impossibilities goes against the very motivations that give rise to impossible worlds in the first place (c.f. Ch I). One, we wanted to be able to differentiate hitherto coextensive, necessarily true or necessarily false propositions by virtue of identifying them with the distinct sets of worlds at which they hold. Rejecting the existence of worlds at which GR-necessities fail to hold means that all GR-truths will be conflated with each other by being identified with the total set of worlds, and similarly all GR-falsehoods will be conflated

²⁰⁵ This might explain why the Zalta’s comment, hijacked here, is actually made in the context of whether traditional GR should accept impossible worlds on the basis of such constructions, not whether such constructions are admissible, once impossible worlds have already been accepted.

²⁰⁶ E.g. Divers takes the default position to regard that intuition as part of the “pre-theoretical data that any theory of modality must accommodate.” (Divers 1999: 217)

and identified with the empty set. In other words, extended GR will be unable to account for the distinctness of its own theoretical statements, given that they are all necessarily true, and their negations impossible, by its own lights, while being able to account for the distinctness of most other necessary or impossible propositions. This seems an odd and otherwise unmotivated exception to make. Two, we wanted to non-trivially evaluate distinct counterpossible conditionals (and conditionals with necessary consequents) for truth by virtue of the availability of worlds that render true their impossible antecedents (or false their necessary consequents). But if no necessarily true GR-claims are ever false-at-some-world, all counterpossibles involving the denial of such claims, and all counterfactuals with these claims in their consequent will be trivially true. This presumably would contravene one of the key reasons for venturing into impossible worlds in the first place, namely the intuition that some such conditionals ought to come out false. ‘If there was no plurality of worlds, then our world would be the only concrete world there is’, presumably is true, while ‘if there was no plurality of worlds, then our world would not exist at all’ is most likely false. Three, we wanted our new-found non-trivial truth conditions for counterpossible conditionals to help account for a large part of philosophical debate. If, as Nolan (1997) convincingly argues, the implicit and explicit use of such counterpossible conditionals is essential to philosophical reasoning, and given that GR is one such metaphysical theory among many, then GR cannot form the exception to the rule, so that while we can evaluate (under GR) any number of philosophical theories non-trivially, we cannot non-trivially evaluate any theory which denies the truth of GR.

So any doubts about the legitimacy of such claims should be set aside. Rather than fighting the battle of legitimacy, we should get on with it and find a way to represent such claims as true at some impossible world.

6.3 GR-Impossibilities About Worlds: The Proper Response to Vander Laan

Let us begin with a sample objection by David Vander Laan, which involves a theoretical impossibility about the nature of GR-worlds. After discussing Lewis’ well-known objection against concrete impossible worlds, Vander Laan proudly claims to “add an objection of [his] own” (Vander Laan 1997: 606) against such worlds to the mix. He argues:

“If there are impossible worlds, then some world does not represent itself as concrete. Let us say that none of the propositions which suggest that *W* is

concrete (*W is concrete, W has mass, W is not an abstract object...*) are true in *W*, and that their negations are. Could such a world be a concrete object? ... If Lewis' usual method applies here and a proposition is true at *W* just in case it is true when we quantify only over things in *W*, then *W* represents itself as concrete if and only if *W* is concrete (quantifiers restricted to things in *W*.) Here quantifier restrictions do very little work. If *W* is concrete (quantifiers restricted to things in *W*), then *W* is concrete, and vice versa. By hypothesis, *W* does not represent itself as concrete, so *W* is not concrete. If representation works this way, then any theory according to which all worlds are concrete is inconsistent." (Vander Laan 1997: 606-607)

What Vander Laan's somewhat convoluted talk of 'self-representation' here points to is simply the alethic nature of GR-representation, at least for traditional GR, namely that for a proposition to be true *at* a GR-world, it must truly hold *of* it, i.e. truly describe or characterise that world. (Vander Laan's *de re* talk of 'self-representation' here is inessential: whether we are concerned with *de re* or *de dicto* representation, according to GR *x* represents *y* as φ if and only if *x is φ* , whether *x* and *y* are identical or not, and whether they stand for individuals and φ for a property or they stand for worlds, and φ for a proposition.) In any case, Vander Laan proceeds to construct his *reductio*: Suppose GR plus impossible worlds, and suppose that it is impossible that there is a world that is not concrete. Then there is some world such that when we quantify over all things in it, it is true that some world is not concrete. But the only world there is when quantifying over some world is that world itself. So, for it to be true at a world that 'some world is not concrete' is for that very world to truly not be concrete. Yet according to GR all worlds are concrete. So a GR-extension into concrete impossible worlds is bound to be inconsistent.

6.3.1 Reply to Vander Laan

Insofar as Vander Laan's objection is simply another *reductio* against concrete impossible worlds on the basis that inconsistent worlds give rise to outright contradictions, it is truly puzzling why he thought this to constitute a *further* objection over and above that offered by Lewis (1986a). Of course, the theoretical impossibility he considers has some interest in itself, but it is the inconsistency it generates, rather than the metaphysical

impossibility itself, that drives the objection forward. The main thrust of Vander Laan's objection seems to be simply that if it is true *at* some world w that w is concrete and that w is not concrete, then possibilist GR will have to embrace contradictions, for instance the following: there is a world w such that w is concrete and it is not the case that w is concrete. But so what? We already encountered this in Lewis, and contradictions involving worlds which are both concrete and not concrete are no exception. Indeed, whatever replies we gave to Lewis in Ch IV apply here. If we simply opt for an inconsistent theory (as per 4.3) we can still maintain that, even if some world is concrete and not concrete, still no contradiction holds about the actual world. If on the other hand we amend the truth-at- w -conditions for negation for inconsistent worlds preserving the classical home-language (as per 4.4), then the *reductio* cannot get going; for it might well be that a contradiction is true-at- w , but that will not translate to an outright contradiction in the theory. Hence, both our replies to Lewis apply *mutatis mutandis* to Vander Laan. So Vander Laan's objection presents no new challenges to IGR. His apparently interesting question of how IGR can represent the metaphysical impossibility of the falsehood of one of its tenets collapses to the uninteresting charge that IGR cannot consistently represent contradictions.

6.3.2 Inconsistency and Representational Power

Vander Laan might now change direction, employing his objection toward different ends. He could argue, for instance, that the extended theory cannot really represent the relevant metaphysical impossibility of a non-concrete world that he puts forth here. He may retort that the proposition he put forth for representation is the perfectly consistent metaphysically impossible proposition that some world is non-concrete, whereas what we have represented instead is a logical impossibility, a contradiction, namely the proposition that some world both is and is not concrete. So, he may argue, possibilist GR cannot represent the metaphysical impossibility of some world being *only* not-concrete, since that impossibility is always conflated with the logical impossibility that a world both is and isn't concrete. Indeed, he might generalise saying that there seems to be a whole class of *metaphysical* impossibilities – those contradicting GR-tenets about worlds, for instance – which, it appears, will always be conflated with certain other, *logical* impossibilities. The new challenge is this: how can IGR really represent such metaphysical impossibilities without conflating them with outright contradictions?

I think that IGR can shamelessly reply here that since GR-worlds are concrete *by*

definition, from IGR's perspective Vander Laan's impossibility and others like it are contradictions in terms. For if GR *defines* the term 'world' as 'concrete mereological sum of spatiotemporally related individuals', then a GR-object thus defined, which is not concrete, simply is a contradictory object. It is not unintuitive to think that the proposition that some GR-world is not-concrete is indeed identical with the proposition that some GR-world both is and is not concrete, if worlds are defined as concrete objects. So, yes, impossibilist GR does seem to conflate certain apparently metaphysical impossibilities (regarding worlds) with certain contradictions. But this is only because what appear to be metaphysical impossibilities are, for IGR, logical impossibilities in disguise. We can generally say that whenever we have an objection of the form 'some world is *F*' that explicitly contradicts the definition of 'world' provided by GR, like 'some world is not a mereological sum of individuals', or 'some world contains spatiotemporally isolated parts', we can represent such claims by means of contradictory worlds. What makes these objects *worlds* in the GR-sense is that, whatever else is true about them, it is also true that they are concrete mereological sums of spatiotemporally interrelated individuals.²⁰⁷

Now, our hypothetical objector may wish to talk about worlds, outwith GR's definition of such objects. Surely, he may ask, there can be a sense of the word 'world' that allows for the metaphysical impossibility of a world that does not obey the GR-definition of the term? Sure; but if our objector wants to employ the term 'world' with a different sense, then IGR could make a good case that his objector was merely asking about cases – contrary to GR-theory – where the *term* 'world' is employed differently. Impossibilist GR can reply that a world where 'world' means something different can easily be accommodated within the representational elements of even possibilist GR. Indeed, this response would not be incompatible with what one assumes often lies behind objections such as Vander Laan's, namely the supposition that GR is false and ersatzism true, i.e. that worlds are not as GR defines them to be but as ersatz or other abstractionist theories define them. It is well-known that ersatz theorists explicitly and openly admit their decision to use the term 'world' in an added new theoretical sense, besides the one we use to refer to the mass of stuff we call this world. I think, given this ersatz terminological stance, IGR seems warranted in representing the impossibility of an abstract world, in the ersatz-sense of the term, via a world, (which sees no other and) according to which some set-theoretic objects are worlds.

²⁰⁷ While it may be hard to imagine how a concrete world could instantiate any of those things, what did we expect? They are impossible worlds after all and imagination arguably has to stop somewhere.

Lastly, our hypothetical objector may insist that his representational needs for the metaphysical impossibility of abstract worlds are still not satisfied. For what he had in mind was the real metaphysical impossibility of a GR world really having different essential properties than the ones it has. What he had in mind was the thought that if GR-worlds have the property of being concrete essentially then it is impossible for such worlds to be abstract objects. But, here IGR can point out that the relevant impossibility is in fact *de re* rather than *de dicto*. It concerns the question whether IGR has the means to represent the impossibility of some world lacking some of its *essential* properties. IGR can reply that the representation of such *de re* impossibilities is rather easy. The impossibility of a GR-world lacking some essential property can be represented by means of the existence of some other object that lacks the relevant property (and which presumably is not taken as a counterpart of that world). Indeed, any odd abstract thing can represent the *de re* impossibility of a world impossibly being abstract, without that thing itself having to be a world, just like any cat can represent the (essentialist) impossibility that I am a cat without having to be human.

I submit that Vander Laan's objection fails to present any new challenges to IGR over and beyond Lewis' original challenge. Moreover, that IGR has rich resources by which to represent GR-theoretical impossibilities contrary to its definition of 'world' and terms like it.

6.4 Transworld GR-Impossibilities: The Proper Response to Nolan

Let us turn to the representation of theoretical impossibilities of cross-world content. I will begin by blocking a couple of objections by Daniel Nolan that constitute a departure from Lewis' familiar challenge, then apply the same techniques to block GR-theoretical objections of a similar kind.

Lewis (1986a) argues that an extension of GR into impossible worlds results in outright contradiction. Nolan claims to go one better:

“The problem does not just arise either for the nondialetheists among us: there are other things which cannot possibly exist which would cause trouble. The existing-at-all-possible-worlds God of Anselm's imagination does not exist at every world – and it simply fails to exist at this world, full stop – it is not that it both literally exists in this world and literally does not exist in this world. There could not be a thing which made all disjunctions false by its mere existence: but if we are to infer from that that

there is an impossibilium which literally makes all disjunctions false by its mere existence, then we are in deep trouble.” (Nolan 1997: 541)

The sense in which Nolan’s impossibilities aim beyond Lewis’ (1986a) objection is that they are impossibilities which are explicitly supposed to affect what is *actually* the case. Nolan’s first objection concerns an impossibilium such that if it exists then it exists at all worlds, including our world. His second example seems to involve an impossibilium that has the power to render all disjunctions false, presumably not just false *at a world w*, but literally false in some objectionable sense, presumably false *simpliciter* or actually false. The ambiguity in Nolan’s speech here is probably down to the fact that, like any actualist, and unlike GR, he makes no distinction between truth *simpliciter* and actual truth. But whichever reading we were to choose it would have an undesirable consequence for the actual world, namely that all disjunctions are false about everything actual, or about everything, including everything actual. So the point of Nolan’s objection seems to be this: Lewis argues that concrete impossibilia force us to accept the literal truth of contradictions. But those contradictions were only ever about non-actual things. Well, the trouble does not stop there; impossibilist GR will also have to accept, or so Nolan seems to think, the truth *simpliciter* of various absurdities about *our* world, for instance that Anselm’s God exists at our world, or that all disjunctions are ‘literally’ false. It is in this sense that Nolan’s objections are aimed to go beyond that by Lewis.

I take Nolan’s case to be important, for to the extent that his examples involve impossibilities that in some sense are supposed to contradict what is the case about *all* worlds, or what is *actually* the case, we might take them as precursors to full-blown GR-theoretical impossibility claims about the entire plurality that can be put forth to challenge the extended theory. I divide these in two general categories:

1. *Theoretical Impossibilities involving Universal Quantification over Worlds:* Nolan’s first example, for instance, the existing-at-all-worlds God, uses an idiom of unrestricted quantification which strictly belongs to the home-language of the theory. Indeed it is *this* formulation that gives it its force – the problem does not arise from the existence of some impossible thing in some world, it arises from the claim that this thing exists at *all* worlds. In that sense, we can take it as a precursor of GR-theoretical impossibility claims of a universal nature – namely false *simpliciter* claims that employ the unrestricted quantifiers of the GR-language of worlds. Some examples might be, among other things ‘*there are no worlds that contain donkeys*’, ‘*there is no plurality of worlds*’,

'there is only one world', 'there are only two worlds', 'there are more worlds than there are', 'there is an x such that x is part of all worlds', and so on. One can obviously construct any number of examples.

2. *Theoretical Impossibilities Involving Rigid Reference to GR-individuals*: Our second class of objectionable impossibilities can be highlighted by giving a particular reading to Nolan's second objection, namely the impossibilium that renders false all disjunctions. We take Nolan's objection to read: it is impossible for there to be a thing that renders all disjunctions *actually* false by its mere existence, so there is a world which contains a thing which renders all disjunctions *actually* false by its mere existence. Formulations of this nature, which have repeatedly been put to me in conversation,²⁰⁸ employ the special operator '@' in the home-language, used simply as a name that picks out our world from the total GR-domain.²⁰⁹ Armed with such an operator, an objector can construct all kinds of absolutely false, so theoretically impossible claims like '*actually St Andrews is in Australia*', or '*actually Caesar killed Brutus*', or '*actually Brown is the prime minister of Timbuktu*', and generally *simpliciter* falsehoods of the form ' $P@$ ' constructed using actually false propositions P . GR-theoretical impossibilities of this nature are about ways that the entire plurality could not have been, that is, it could not have been other than it is. Thus they proceed by mis-attributing properties to parts of the plurality (or propositions to worlds) rigidly or absolutely picked out from the total GR-domain. 'Caesar killed Brutus' for instance, might be actually contingently false, but '*actually Caesar killed Brutus*' is false *simpliciter*, false according to the theory and in that sense necessarily so. It is not essential, of course, that the impossibility involve the actuality operator. It might involve a claim, say, about world seventeen (if we can successfully refer by such terms), or any world, or no world at all, for instance: '*Obama is part of world seventeen*',²¹⁰ '*world one accesses world two*' (*per impossibile*), '*Obama is spatiotemporally related to a talking donkey*'. In principle, any false *simpliciter* claim of the form Fa , where a absolutely picks out some specific individual from the total GR-domain and mis-ascribes F to it, will do.

Now, the point is this: Theoretical falsehoods of this sort create a powerful production line of home-language GR-impossibilities, since given any proposition (about all, this or that aspect of the pluriverse) true in the theory, its negation will constitute an impossibility.

²⁰⁸ Admittedly by the same person, Ross Cameron. William Lycan (1994: 35) however also draws attention to such problematic constructions involving the rigid actuality operator '@'.

²⁰⁹ C.f. Divers (2002: 46).

²¹⁰ Claims like these can be found in Yagisawa (1988).

Now, if Nolan is right that for a transworld impossibility claim to be considered as true at a Lewis-world, it must be the case that the world somehow transforms the relevant claim into a ‘literal’ truth about the plurality, then possibilist GR is in deep trouble. For then given any false theoretical GR-proposition about anything in the GR-ontology, including anything actual, that proposition will also be literally true. And then we end up with a trivial theory about everything, including everything actual. It is for this reason that I take these innocent looking examples by Nolan to merit discussion.

6.4.1 Reply to Nolan

However, Nolan’s reasoning is deeply mistaken. He is right that for a Lewis-world to represent a claim as true-at-it simply is for that world to *instantiate* that claim, i.e. for that claim to literally describe, or be true about, that world. (c.f. Nolan 1997: 541) But he is wrong to think that for a world to thus instantiate a claim, somehow means for that world to make that very claim *literally* – i.e. presumably actually, or *simpliciter* – true. This clearly isn’t so. For instance, it might be true at some world w that *grass is red*, but this does not mean that it is *literally* true that *grass is red*: it is certainly not thereby actually true that *grass is red*; nor is it true *simpliciter*. What is *simpliciter* true instead is some further proposition, namely that *grass is red in world w* . So it is simply not the case that the truth-at- w of a proposition for GR amounts to *literal* truth, in any objectionable sense, of the proposition in question.

Another way to put the point is by focusing on what truth-at- w amounts to in GR-theory. According to Lewis, the role of the modifier ‘at w ’ in ‘truth-at- w ’ claims is simply to restrict all domains of explicit and implicit quantification to a particular world w (Lewis 1986a: 5), so that the relevant claim is really a truth *about w* properly speaking. But if so, then all it takes for Nolan’s exotic impossibilities to be true at a world, w , is for them to be true when restrict our quantifiers to all things in w . And once we restrict our quantifiers to w , the expression ‘*all worlds*’ will simply refer to *all worlds in w* . Similarly atomic claims about the pluriverse will be true at a world, w , (vicariously) just when they are true when we quantify only over things at w . If so, then it may be a literal truth *about w* , i.e. when we restrict our quantifiers to w ’s domain, that *Anselm’s God exists at all worlds*, but it certainly won’t be true *simpliciter*, or actually true that *Anselm’s God exists at all worlds*. Similarly, it might be true, when we quantify over everything in some world, w , that *all disjunctions are false* there, or even that *all disjunctions are false* at whatever represents the actual world at w , but it certainly will not be true *simpliciter*, or actually,

that *all disjunctions are false*. (Moreover, I will take it as read that if any of the worlds that are required to represent these claims have to have inconsistencies true at them to do so, we can further apply the techniques we developed in response to Lewis in Ch IV to accommodate such worlds.)

In short, the crucial mistake that Nolan makes is in assuming that, just because GR's notion of truth at some world really amounts to literal *truth* about some domain or other, this means that for something to be true at a world it has to be literally true in an objectionable sense, whether *simpliciter* or actually true. All that is needed, according to traditional GR-theory, for a proposition to be true at a world w is for it to be literally true when we quantify over all things at w , not for it to be literally true, full-stop. So Nolan's conclusion that IGR gets into trouble when faced with these claims is a non-sequitor.

What follows shows how we can represent the two sample impossibilities brought up by Nolan. Nolan's first example, concerns the existence of an impossibilium (Anselm's God) such that it exists at all worlds. We can represent the existence of such a thing simply by having a world that fits the following description in the home-language of GR:

$$\exists w \exists x (Ixw \ \& \ Ax \ \& \ \forall y (Wy \ \& \ Iyw \supset \ \exists z (Izy \ \& \ Cxz)))^{211}$$

This tells us that there is a world w and an x in it such that x is Anselm's God and such that all worlds in w contain a z which is a counterpart of x .²¹² Of course, when we quantify over all worlds in a world, we are simply quantifying over that world itself. And since the world contains Anselm's God, it also thereby contains an item that is a counterpart of Anselm's God, namely, Anselm's God; for nothing is more similar to an individual than that individual itself. So we can have a world w that renders the relevant claim true at it, without causing us any problems.

Notably, we could understand Nolan's example of the impossible God as involving multiple modal operators, instead. Maybe what he means to say is that while Anselm's God doesn't possibly exist, if we take him to *impossibly* exist then he exists necessarily. Then, the claim to be represented is not really a claim about what goes on at *all* worlds (that is jumping the gun); it is really a claim about a necessary existent that cannot possibly exist. Namely it is an impossibility, embedding a modal operator, of the form:

²¹¹ I here use the notation $\exists w(Pw)$ to indicate that P is true at w , as indicated in Ch I.

²¹² The fact that all these worlds are impossible is not directly relevant here. We can assume that these worlds are in some sense inaccessible from ours, as per CH V, although it is a good further question precisely what kind of accessibility relation applies.

$$\Box \exists x(Ax)$$

Now, as we saw, under IGR, claims that are necessarily true relative to some world w are claims that are true at all worlds accessible from w . And so the above claim is not true at any world that is (metaphysically) accessible from our world. But it can still be true at some inaccessible world. All we need in order to represent the relevant impossibility, is simply a world w such that w contains Anselm's God and such that all worlds accessible from w contain counterparts of Anselm's God. Then, the representation of the relevant claim merely commits the theory to the existence of a world, w_1 , that fits the following description:

$$\exists w_1 \exists x(Ixw_1 \ \& \ Ax \ \& \ \forall w_2(Rw_1w_2 \supset \exists y(Iyw_2 \ \& \ Cyx))$$

Moreover, since we assume that the actual world is not accessible from w_1 , this formulation accommodates the intuition that the impossibilium Anselm's God is a necessary existent (at that world), without entailing the unacceptable consequence that Anselm's God actually exists.

Similar techniques apply to Nolan's second case. The impossibility that there is something that renders all disjunctions false by its mere existence can be easily represented by a world where all disjunctions fail. Such a world might fit the following description:

$$\exists w \exists x(Ixw \ \& \ \exists y(Iyw \ \& \ x=y \supset \forall D(\sim Dw))^{213}$$

Of course it is a good question exactly how to formulate the claim 'all disjunctions are false', since it seems to involve second order quantification. But whether the formulation I choose here works well enough is not the point. The point is rather that disjunctions, too, can be false at some world (a world where, under the usual truth-conditions for disjunction, presumably nothing is true), yet true at another. For instance it is true at this world that '*either St Andrews is in Fife or pigs fly*', but it might well be false when we quantify over some other world w , where both disjuncts are false. Similarly with all other disjunctions, and given impossible worlds, even with disjunctions of the form $A \vee \sim A$. So

²¹³ This is equivalent, of course to: $\exists w \exists x(Ixw \ \& \ \forall D(\sim Dw))$. Further, using the amended truth-conditions for negation from Ch IV, section 4.4, we get $\exists w \exists x(Ixw \ \& \ \forall D(D^*w))$.

all we need in order to represent Nolan's claim is to have a world where all disjunctions are false, not to have *all* disjunctions be literally false everywhere or *about* everything.

Finally, what if we want to interpret Nolan's second example as involving the operator 'actually'? There is a sense in which this interpretation involves no special challenges, or at least no special challenges along the lines outlined by Nolan. All we need, once more, is a world, w , such that when we quantify only over all things at w , the claim '*all disjunctions are false in @*' is *true at it*. And then, as before, it can be *true at w* that *all disjunctions are false in @*' but this latter won't be true *simpliciter*. What will be true *simpliciter* at most is that *all disjunctions are false in @ at w* (or *all disjunctions are actually false at w*). So whatever may be true-at- w will not affect what goes on at the actual world. In that sense, Nolan's objection fails no matter what interpretation we give to his claim. For it is not the case that for a world to instantiate the claim 'actually P ', for some actual falsehood P , the relevant falsehood must really hold of the actual world.

One may ask, exactly *how* can a GR-world represent claims of that nature? How can a world render true a proposition of the general form P -at- a , about some other world a ?²¹⁴ One might think that, given that there are no free variables in a sentence such as P -at- a , (or simply Pa), there is nothing for us to bind in the domain of quantification of the world, w , that is supposed to do the representing. So, one may think that for there to be a world where some theoretical falsehood Pa holds simply means for Pa to be true *simpliciter*, as per the equivalence:

$$(E) \quad \exists w(Pa) \text{ if and only if } Pa$$

If so, then Nolan would be right that IGR must embrace contradictions, since, if worlds represent atomic claims as per (E), for there to be a world where some theoretical falsehood Pa holds simply means for Pa to be true *simpliciter*.

But, while (E) is clearly true, ' $\exists w(Pa)$ ' is not how one would express the claim that Pa is true *at some world w* . Instead, one would translate such claims by recourse to counterparts. It is as much of a mistake to think that for a world to represent the claim Pa as true at it, it must be a world that fits the description ' $\exists w(Pa)$ ', as it is to think that for a world to represent any atomic possibility of the form Fa as true at it simply is for that world to fit the description $\exists w(Fa)$. The possibility, Fa , is after all a proposition true at a

²¹⁴The letter ' a ' simply names some world here, leaving '@' to denote the actual world.

set of worlds. And the members of that set do not just consist in the particular world that contains the individual a ; (for let us not forget that all GR-individuals are world-bound). If it were so, then a possible proposition about a , Ga , involving some property G that a contingently doesn't but could have, would be true at no worlds, (and *a fortiori* no accessible worlds), and so would not possibly be true. But *ex hypothesi* Ga is possibly true. So, there is some world, other than the one that contains a (where Ga is false) that renders Ga true. How does it do so? Vicariously, by having something other than a – a counterpart of a – be G at that world.²¹⁵ So the representation of ' Ga ' as true at a world, w , which doesn't contain a , does not involve w in the simple (vacuous) description $\exists w(Ga)$. Instead, what it means for Ga to be true at w is for w to fit this description, involving counterparts:

$$\exists w \exists x (Ixw \ \& \ Cxa \ \& \ Ga)$$

In short, while it is true that the relevant sentences that require representation here involve no (explicit) variables, this doesn't mean that they are insensitive to domain-shifts. And so, this interpretation of Nolan's argument also fails. What it takes for any claim ' Ga ' to be true at a world w is for w to contain some other individual b , which stands in for a , and which instantiates G . Similarly what it takes for claims Pa to be true-at- w (where a is a world and P a proposition that fails to hold at it) is for w to contain some other individual b , which stands in for a , and which instantiates P .

However, now a further question arises. We already know a lot about what it is for some individual in a world to represent a *possibility* for another individual, namely for the former to be a *counterpart* of the latter. (Lewis 1986a: 230-232) But here we are not considering possibilities, so whatever does the representing in this case ought not to be a counterpart, at least not under any of the usual counterpart relations. If anything, the relevant individual should be a counterpart under similarity relations, which we would think *inappropriate* for the evaluation of possibility. To avoid confusion, I propose we call such unorthodox counterparts *stand-ins*. We can define a stand-in of an individual x as an individual y that does not constitute a counterpart of x under any of the usual similarity relations that we take to govern possibility.²¹⁶ One notable feature of the

²¹⁵ C.f. Lewis (1986a: 10)

²¹⁶ The satisfaction conditions for something being a stand-in can be just as vague and utterly subject to contextual features as those that something has to satisfy to count as a counterpart.

introduction of stand-ins here (which are, in essence, inaccessible or dissimilar individuals) is that counterpart and accessibility relations can vary independently: an object can have a counterpart in an impossible (i.e. inaccessible) world under some unrelated accessibility relation, or have no counterparts at an accessible world. For instance a logically inaccessible world (as per Ch V) may contain an apple that is a counterpart of a this-worldly apple; equally there might be a world which is logically accessible from ours yet contains, say, only dragons, or entities we would normally not invoke in our usual counterpart relations for entities in this world. What particular individual might fill the role of a stand-in in any particular case will, as usual, be decided on the basis of pragmatic considerations, for instance, on the basis of whether it satisfies the properties that it needs to satisfy to represent the relevant claim as true at the world of which it is part.²¹⁷

Notably, such stand-ins are not only required for the representation of exotic atomic GR-theoretical impossibilities. They are equally needed in order to represent any ordinary atomic impossibility as true at a world. Consider the ordinary impossibility, for instance, that ‘Obama is a boiled egg’, or *Bo*. In the first instance, the usual truth-conditions for the relevant *modal* claim dictate that it is impossible that Obama is boiled egg if and only if there is no (accessible) world containing a counterpart of Obama that is a boiled egg:

$$\sim\Diamond Bo \equiv \sim\exists w\exists x(Rw@ \& Ixw \& Cxo \& Bx)$$

It is also true, strictly speaking, that Obama has no boiled-egg-counterparts, unrestrictedly speaking, at least under none of the similarity relations that govern *de re* possibility. (Lewis 1986a: 230) But the impossibility that ‘Obama is a boiled egg’ still needs to be represented as true at some inaccessible world under the extended theory. This is where stand-ins come in. Is there anything in such a world (indeed in the pluriverse) that can (vicariously) represent Obama *per impossibile* being a boiled egg? I think there is; indeed I think that any boiled egg will do, and so any (inaccessible) world that contains such an

²¹⁷ I take Lewis to pull a somewhat similar trick when he distinguishes the doxastic alternatives of a person from his counterparts. (Lewis 1986a §1.4) He takes, for instance, a proposition (the content of the belief) believed by Rene, namely that he is immaterial, to be represented by the set of those worlds where Rene has immaterial doxastic alternatives, thus allowing us to suppose that even if Rene is necessarily material, there are worlds that contain things which allow us to represent him otherwise. (1986a: 32-33) Along very similar lines, we here require individuals to be able to represent the content of claims involving certain other individuals, yet without the former being counterparts of the latter.

egg can represent the impossibility that Obama is a boiled egg.²¹⁸ It would strictly not be correct to say that the representing egg is a *counterpart* of Obama. Presumably, it bears no similarity to Obama with respect to his origins. Yet match of origins is often considered an important similarity respect governing *de re* possibility and so counterpart relations. So, let the egg simply *stand-in* for Obama at that world, thus allowing the world to render true (by proxy) the claim that Obama is a boiled egg.

The point is that whatever works for ordinary atomic impossibilities, works for extraordinary ones. For instance, is there anything in a world that can represent that all disjunctions are false at the actual world? I think there is; indeed I think that anything at which all disjunctions are false will do, and so will any world which contains such a thing. And given that we presumably still want the relevant proposition to constitute an impossibility for the actual world, we do not want it instantiated by a world that contains a *counterpart* of the actual world at which all disjunctions are false – at least not any kind of an ordinary counterpart. (If we take the representing individual to be the inaccessible world itself, the accessibility-relation and the counterpart-relation coincide: the world at which it is true that all disjunctions are actually false is neither accessible from the actual world nor, here, a counterpart of the actual world. Given the analysis of accessibility as similarity proposed in Ch V, we can simply say that the world that represents the relevant impossibility is not similar to the actual world under any of the usual respects that we take to govern possibility *de dicto* or *de re*.) Using the notation Sxy to express the claim that x stands-in for y then, a world that renders true-at-it the claim Pb is a world that fits the following description in the theory:

$$\exists w \exists x (Ixw \ \& \ Sxb \ \& \ Px)$$

And in particular, the contended reading of Nolan's second claim as involving the actuality operator '@' can be represented by a world that falls under the following description:

$$\exists w \exists x (Ixw \ \& \ Sx@ \ \& \ \exists y \exists z (Iyw \ \& \ (Izw \ \& \ z=y \ \supset \ \forall D (\sim Dx)))$$

where the latter part of the construction stands for the more elaborate formulation of the particular claim ' $P@$ ' in Nolan's example. If we take the most likely candidate to act as

²¹⁸ While the boiled egg represents the *de re* impossibility of Obama's being a boiled egg, the world containing it can represent the *de dicto* impossibility that Obama is a boiled egg.

such a stand-in in this case to be the world w itself, so that $w=x$, then both claims ‘there is an individual that renders all disjunctions false’ and ‘there is an individual that renders all disjunctions false at the actual world’ will be represented by the same world – namely a world that contains an individual, which renders all disjunctions false *at it*. This might be the most elegant way to understand the relevant claim. However, I do not think that it is the only way. These are impossible worlds after all. And a stand-in for the actual world at some world w need no more be a world itself, than the stand-in for Obama in the case of the boiled egg need be human. So there is no harm in equally supposing that there is some (proper) part of the relevant world, w , such that all disjunctions are false about *it*, and which stands-in for @.

I conclude that impossibilist GR has more than enough resources by which to accommodate Nolan’s impossibilities without any fuss. The rest of this chapter briefly showcases these resources on a small selection of GR-theoretical impossibility claims then addresses some objections that might be brought up against the proposed methods.

6.4.2 Applications to GR-theoretical Impossibilities

Taking a cue from the foregoing developments in response to Nolan, I think that we can represent all GR-theoretical impossibility claims, whether they involve atomic *simpliciter* falsehoods or such falsehoods involving unrestricted quantification over the entire plurality of worlds by simply allowing them to be true at some world, w , just when we quantify over w .

Let us begin with the case of universal claims. For any absolute universal claim

$$\forall x(Fx)$$

to be true at a world, w , whether x here stands for a world or an individual, is for that claim to be true just when we quantify over w , namely for the following to be true *simpliciter*:

$$\exists w\forall x(Ixw\supset Fx)$$

In that case, we can offer the following simple translations to some examples of such universal GR-theoretical impossibilities mentioned earlier:

1. *There are no worlds that contain donkeys:*

$$\exists w \sim \exists x \exists y (Wx \& Ixw \& Iyx \& Dy)$$

This description picks out a world, in which no world contains donkeys; such a world is one which, itself, contains no donkeys.

2. *There is no plurality of worlds/there is only one world:*

$$\exists w \exists x \forall y (Wx \& Ixw \& Iyw \& (Wy \supset x=y))$$

This description picks out a world, in which there is only one world. Clearly, if we restrict our quantifiers to a single world, it is true at that world that there is no plurality of worlds.

3. *There are only two worlds:*

$$\exists w \exists x \exists y \forall z (Ixw \& Iyw \& Izw \& Wx \& Wy \& x \neq y \& (Wz \supset (z=x \vee z=y))).$$

This description picks out a world, which contains only two distinct worlds. It picks out a world, which fails to be identical with itself.

4. *There are more worlds than there are:*

$$\exists w \exists x (Wx \& Ixw \& \forall y (Wy \& Iyw \supset y \neq x))$$

This description, too, can be satisfied by a world which is not identical with itself.

5. *There is an x such that x is part of all worlds:*

$$\exists w \exists x \forall y (Ixw \& Iyw \& (Wy \supset Ixy)),$$

This, too, is quite uncontroversial. All we need is a world that contains some x such that for all worlds in that world, namely that world itself, x is part of those worlds.

In short, there are no grounds for thinking that the representation of absolute universal false claims about the plurality as true at some impossible world creates unwelcome consequences for the theory. Whatever the theoretical claim, once put in the object-language as an impossibility eligible for truth at a world, it becomes subject to the usual world-restrictions. This allows the claim to be true at w when we restrict our quantifiers to w , and yet be false *simpliciter*.

Additionally, if the need should arise, drawing from the theory's truth-at- w conditions for *necessity* claims, we can develop a system whereby multi-world impossibility claims are represented as true at some impossible world w by being true at all worlds accessible (under some accessibility relation) from w . Under such a proposal any transworld universal claim like

$$\forall x(Fx)$$

can be represented as if it had a box in front, namely as true at some impossible world, w_1 , which fits the description:

$$\exists w_1 \forall w_2 (Rw_1w_2 \supset \forall x (Ixw_2 \supset Fx))$$

We can simplify notation for the case where x is a world(-variable) to read:

$$\exists w_1 \forall w_2 (Rw_1w_2 \supset Fw_2)$$

Under this option, we could take the case where our quantifiers are bound within a single world, as we saw before, to be the special case, where a world only accesses itself. This more elaborate proposal for the representation of universal transworld impossibilities would make little practical difference in some cases, for instance:

1. *There are no worlds that contain donkeys:*

$$\exists w_1 \sim \exists w_2 \exists x (Rw_1w_2 \ \& \ Ixw_2 \ \& \ Dx)$$

Here, instead of having a single world, w_1 , that contains no donkeys, we have a whole set

of worlds, accessible (under some contextually determined accessibility relation) from w_1 , which contain no donkeys. The proposed alteration would have no effect at all on claims like:

2. *There is no plurality of worlds/there is only one world:*

$$\exists w_1 \forall w_2 (Rw_1w_2 \supset w_1=w_2)$$

And

5. *There is an x such that x is part of all worlds:*

$$\exists w_1 \exists x (Ixw \ \& \ \forall w_2 (Rw_1w_2 \supset Ixw_2))$$

For, both are rendered true by a world that only accesses itself. However this alternative proposal might make a real difference in affording a consistent representation of claims like

3. *There are only two worlds:*

$$\exists w_1 \exists w_2 (Rw_1w_2 \ \& \ w_1 \neq w_2 \ \& \ \forall w_3 (Rw_3w_1 \supset (w_1=w_3 \vee w_2=w_3))).$$

by letting this be made true by a world which only accesses one other.

It might be that there is no need for such a more complex proposal. The reason I put it forth is to showcase the riches from which IGR can draw, if need be, to accommodate impossibilities of an absolutely universal nature by merely redeploying existing resources. Whichever proposal works best, IGR can simply fall back on its own resources to represent the relevant claims.

Let us now turn to the case of atomic claims. For any absolute atomic claim

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to be true at a world, w – whether a names a world or an individual – is for that claim to be true (by proxy) just when we quantify over everything in w , namely for the following to be

true *simpliciter*:

$$\exists w \exists x (Ixw \ \& \ Sxa \ \& \ Px)$$

For instance, we can offer the following translations for the series of atomic impossibility examples mentioned earlier. Samples like

6. *actually St Andrews is in Australia*
7. *actually Brown is the prime minister of Timbuktu*
8. *actually Caesar killed Brutus*

have pretty much the same form, so, let us translate just one of these here. A world which renders true, say (8), is a world that satisfies

$$\exists w \exists x \exists y \exists z (Ixw \ \& \ Iyw \ \& \ Izw \ \& \ Sxc \ \& \ Syb \ \& \ Sz@ \ \& \ Ixz \ \& \ Iyz \ \& \ Kxy)$$

It contains stand-ins x , y , z , for Caesar, Brutus and the actual world, such that z contains x and y and such that the counterpart of Caesar kills the counterpart of Brutus. Again, it might be that $w=z$ or it might equally be that the stand-in for the actual world is some proper part of w . Equally unproblematic are:

9. *Obama is spatiotemporally related to a talking donkey*

$$\exists w \exists x \exists y (Ixw \ \& \ Iyw \ \& \ Ty \ \& \ Sxo \ \& \ Rxy)$$

Again, all we have is a world that contains a stand-in for Obama that is spatiotemporally related to a talking donkey.²¹⁹ And

10. *Obama is part of w_{17}*

$$\exists w \exists x \exists y (Ixw \ \& \ Iyw \ \& \ Sxo \ \& \ Cyw_{17} \ \& \ Ixy)$$

²¹⁹ If the claim is about some particular donkey d , then we offer the slightly different translation:
 $\exists w \exists x \exists y (Ixw \ \& \ Iyw \ \& \ Sxo \ \& \ Syd \ \& \ Rxy)$

This is a world that contains stand-ins for Obama and world seventeen such that the former is part of the latter. Any individual in w that is part of another, also in w , can serve. Of some interest might be the following:

11. Obama is not part of the actual world

$$\exists w \exists x \exists y (Ixw \ \& \ Iyw \ \& \ Sxo \ \& \ Sy@ \ \& \ \sim Ixy)$$

This world contains a counterpart, x , of Obama, o , and one, y , of the actual world, $@$, and x is not part of y . What is of interest here is that if w itself acts as a stand-in for the actual world, i.e. if $y=w$, then w is inconsistent in that it both contains and does not contain x . To the extent that if Obama was not part of the actual world, then it would not also be the case that he *is* part of the actual world, we might not want w to act as a stand-in for $@$ here. So, this gives us positive reason to want individuals other than worlds to stand-in for worlds in our representations.

Lastly, we have a couple of mixed cases:

12. Everything is actual

This is of interest insofar as it combines universal quantification and the employment of the rigid operator denoting the actual world. We might give it different readings:

(a) If we understand it to use the rigid actuality operator (so, read: $\forall x(Ix@)$), then for a world, w , to represent this claim, it would satisfy:

$$\exists w \exists x (Ixw \ \& \ Sx@ \ \forall y (Iyw \supset Iyx))$$

Namely, it would contain an x as a stand-in for $@$, such that everything in w is in x .

Contrary to (11), for this translation to be consistent (and there seems to be no call for an logically inconsistent translation here), w itself would act as the stand-in for $@$, i.e. $w=x$.

(b) Alternatively, if we treat the expression ‘actually’ as an indexical, (12) simply states the GR-tautology that everything at w is part of w .

(c) Lastly, echoing the discussion on the GR-notion of a world in section 6.3.2, we could read the relevant impossibility, as an actualist might often think of it: namely to imply that actuality and existence are not just coextensive, but that for something to exist just *means* for it to be actual. But, then we can simply evaluate this claim at a world where ‘actual’ means ‘exists’.

The second mixed case of interest is this:

13. w_1 is accessible from w_2

On a straight-forward understanding, (13) does not present any further challenges. All we need is a world that contains two things, which stand-in for w_1 and w_2 , and which bear the relevant relation, possibly by being similar to each other in some relevant sense (I will use non-italicised lettering below to indicate w_1 and w_2 as rigid names of worlds):

$$\exists w \exists x \exists y (Ixw \ \& \ Iyw \ \& \ Sxw_1 \ \& \ Syw_2 \ \& \ Rxy)$$

(13) is of interest insofar as it might seem more intuitive to translate it employing both the stand-ins and accessibility relations of the above proposals:

$$\exists w_3 \exists w_4 \exists w_5 (Rw_3w_4 \ \& \ Rw_3w_5 \ \& \ Sw_4w_1 \ \& \ Sw_5w_2 \ \& \ Rw_4w_5)$$

This translation renders the relevant claim true at world w_3 in virtue of it accessing two worlds w_4 and w_5 which stand-in for w_1 and w_2 , such that Rw_4w_5 .

My aim was to show that the representation of GR-theoretical impossibilities can be accommodated using nothing more than the existing GR-theoretical tools of quantification over worlds, accessibility and counterpart relations.²²⁰ I hope to have demonstrated that IGR can fall back on familiar resources in order to reply, in a systematic manner, to any representational challenges of this nature.

²²⁰ I have not touched upon questions of how IGR can represent complex claims involving sets, here. Lewis comments that a set exists according to a world just when it exists *from the standpoint* of a world; moreover, he takes it that although some sets, numbers for instance, exist from the standpoint of all worlds, others, like singletons of concreta, exist only from the standpoint of some worlds. (Lewis 1983b: 40; c.f. also Lewis 1986a: 96 fn 61)) Needless to say, we need not take any sets to exist according to all worlds under impossibilist GR. We could make use of the notion of the existence of sets ‘from the standpoint’ of worlds, here, according to our needs. For instance there may be worlds that fail to have any arithmetical truths hold at them, for failing to contain the relevant sets; or it might be that there are worlds according to which properties are not identical with sets, since there are none of the latter.

6.4.3 Objections and Replies

I devote this final section to some objections and replies to the above proposals. While there is clear cross-over, I roughly divide these objections in two categories, starting with objections to my proposal regarding rigid atomic claims, then moving to a discussion of claims involving trans-world quantification.

1. *Rigid Claims*: There are those who would strongly object to the use of counterparts or any sort of (usual or unusual) entities in *our* logical space for the representation of atomic impossibility claims. Objections are presented using the notion of a counterpart, but they apply *mutatis mutandis* to the present proposal insofar as the stand-in relation is simply a counterpart relation that we would never use to analyse possibility claims. Yagisawa, for instance argues that atomic claims about the entire plurality are not to be confused with ordinary modal claims:

“I do not mean to say ... that there is a non-actual possible world in which my counterpart exists. [...] I mean to say that *I myself*, not anyone else in this logical space, not even any of my counterparts in this logical space, could have been located elsewhere in the logical space. [...] What I mean to be saying ... is that this fact about the logical space could have been otherwise.” (Yagisawa 1988: 187)

Divers agrees with Yagisawa on this score, noting that we can read the relevant statement as “a (transworld) modal claim about logical space” (Divers 1999: 236)

I agree that the claim ‘I am not part of the actual world’ is not a claim about me or about the actual world *properly* speaking but about the state of logical space. It is in this very sense that the relevant claim constitutes a GR-theoretical impossibility involving the overall GR-ontological picture. But I deny that this means that we cannot represent such impossibilities by ordinary means. For these atomic impossibilities misdescribe logical space, after all, by homing in on some particular bit of it. What am I, after all, if not one aspect of the totality that comprises logical space? And what is it for the totality of things that is logical space to be, *per impossibile*, some other way, after all, if not for the parts of that space that are picked out by the relevant claim to have, *per impossibile*, the properties it ascribes to them? And here we are back on familiar ground. For what it is for a part of logical space to be represented *per impossibile* as having certain properties is for other parts to represent it as having these properties. So, I think that there is a good rationale for

deeming these atomic propositions about the plurality representable via no more exotic means than the use of some appropriately loose notion of counterpart— what I here call a stand-in.

In any case, Yagisawa, too, resorts to counterparts-relations to represent the relevant impossibility, the only difference being that his chosen individuals inhabit a different logical space. (Yagisawa 1988:187-188) But why is another logical space, again full of individuals and worlds, any better suited to represent atomic impossibilities for this logical space than this logical space is? I say, let's keep things simple. Instead of needlessly multiplying logical spaces we can keep falling back on the rich resources of the plurality, and allow that a part of logical space a that is F can represent some other part b as being F , and thereby represent the theoretical impossibility about our space that Fb holds in it. So, while I agree that the relevant claims here are about logical space as such, I deny that we need anything more than the individuals in it to represent them as true at a world. Propositions about this or that bit of logical space, I propose, can simply be identified with propositions about this or that bit.

Finally, Yagisawa's proposal of an infinitely ascending hierarchy of logical spaces – where for our logical space to impossibly be different, there has to be some other logical space that is different; and for the super-logical space that contains the latter two to (impossibly) be different, there has to be a yet further space that represents that impossibility and so on –invites (with good reason it seems to me) the following complaint by Kenneth Perszyk:²²¹

“Whatever run-away ontology Yagisawa postulates will not be rich enough to accommodate all modal discourse, for one can always ask, ‘But isn't it possible that things be different from that postulated order?’ Speaking unrestrictedly, the answer must be ‘Yes’, in which case extended modal realism doesn't provide a paradise for accommodating all modal discourse in a way that Lewis does not.” (Perszyk 1993: 210)

I consider it a merit of my proposals that they elegantly avoid Perszyk's charge against Yagisawa. Whatever the alternative way that the plurality could (not) have been, we can represent it by restricting our quantifiers and thus simply falling back onto existing

²²¹ As Yagisawa puts it “[t]he hierarchy of (super)” logical space continues indefinitely.” (1988: 201-2).

resources. I thus take both of the proposals put forward here have the advantage of allowing us to get the most use out of the same ontology, whatever the charge, rather than indefinitely multiplying our ontology in order to respond to a never ending stream of impossibilities.

2. *Trans-world claims*: Let us turn our attention to objections to the proposed representation of universal impossibilities. I proposed that impossibilities that involve unrestricted quantification over the entire plurality be represented by restricting quantifiers to some world. One may complain that the original unrestricted proposition simply gets lost in translation and so never gets accommodated at all. Sure, IGR can represent these restricted or world-bound claims, our objector may say, but that is beside the point. The question is not whether IGR can represent those claims; it is rather whether it can represent impossibilities of absolute cross-world content. To put the point differently, the question is not whether some non-troublesome interpretation of the relevant absolutely universal claims is available, but rather whether there can be anything in the plurality to truly instantiate *those* absolute universal claims. The proposed translations simply change the subject, or so my interlocutor might argue, by making out that the content of the relevant claim, or that the property involved, is confined to a single world.

But this is not so. The relevant propositions are of a universal nature, for instance they are claims to the effect that Anselm's God exists at *all* worlds, or that *no* world contains donkeys, or that there is a world such that *all* others are identical to it. And whether these universal claims are instantiated by a single world or by a whole plurality of them, the claims remain the same, namely, they remain claims to the effect that whatever worlds there are, *all* of them are *F*. The change of domain of evaluation is irrelevant.

The putative objector may insist that the domain-change makes all the difference. The claims are properly *about* the total domain of worlds, he may say, not some subset of it. And that changing the domain amounts to changing the claim. The impossible claim is that there are no worlds containing talking donkeys *in the entire GR-pluriverse*, not that there are no such worlds at some sub-domain of it. For, it is hardly impossible for there to be talking donkeys when we bind our quantifiers to some world or even a subset of them. It is only the absolute nature of the impossibility claim that renders it impossible in the first place, yet this crucial absolute generality in the quantifier is left out in the proposed representations. In short, for the relevant claim to constitute the intended impossibility it must be a claim properly *about the plurality*. And for an object to instantiate *that* claim, it must truly render true a claim about all worlds.

There are a couple of points in reply. First of all, there is a sense in which the offered translations do indeed concern absolute claims. For, the quantifiers range over absolutely everything in a world, in particular, absolutely everything that has any say about what is true at that world. When it comes to truth-at- w , there is simply nothing more to quantify over. Secondly and importantly, the thought that for the claim to truly be *about* the entire plurality it must be instantiated by an object that somehow makes the entire plurality be that way is clearly faulty. The impossibility ‘Ira is a poached egg’ is properly speaking *about* me. Indeed, if it were about something else altogether – say a fried egg – it might not have been an impossibility at all. But this does not mean that whatever instantiates that impossibility about me has to magically turn me into a poached egg for it to truly instantiate an impossibility *about* me. Similarly, the GR-theoretical impossibility that no world contains donkeys is properly speaking *about* the entire plurality; indeed if it were not, then we would no longer be looking at an impossibility; but this does not mean that whatever instantiates that impossibility about the plurality has to magically render the plurality devoid of donkeys for it to truly instantiate an impossibility *about* the plurality. If the thought is, alternatively, that for the claim to retain its absolute character it must be instantiated by a similarly absolute domain, then it is equally faulty. The world that renders true ‘Ira is a poached egg’ does not do so by containing a human that is a poached egg, but merely by containing a poached egg. Similarly, something other than a totality of things can represent the impossibility of that totality being different, without making it the case that the relevant impossibility no longer concerns the totality of things. In the simplest case, I say, let it be a sub-totality of things, indeed a single world.

The objector may now argue that I am ignoring his purposeful introduction of exotic impossible objects, namely magically powerful truth-makers literally ‘making true’ falsehoods about the plurality. But I am not. Whatever these objects *per impossibile* do, IGR is allowed to represent the relevant impossibility as it sees fit. For, once the relevant claims have been put forth for representation, it is up to the GR-theorist to choose the representation method appropriate (from within his existing theoretical tools). As Lewis notes, the theorist ultimately is the master of his theoretical language, and it is he who judges the best translation for some particular claim (Lewis 1986a: 12). The objector might be within his rights to demand that IGR represent all sorts of exotic impossibilities, but he is not also within his rights to demand that a particular method of representation be used. It might be impossible for there to be an object that makes everything the case, but all this means is that there is an object in some world w , that represents as true *at* w , that

everything is the case, *there*. It might be impossible that there is an object that makes it the case that I have horns by its very existence. But all that this means is that there is an object in some world *w* that represents the relevant claim (vicariously about me) as *true at w*. Moreover, the representation methods proposed here, far from being *ad hoc*, simply draw on GR's existing resources: impossible claims can be represented as true at a world by the same method that GR represents any claim as true at a world, namely by restricting quantifiers to that world.

As a final stance, our putative objector may argue that the proposed translations do not follow in the footsteps of Lewis' discussion of cross-world claims, for instance, his proposed truth-conditions for the analysis of intra-world supervenience claims:

“We wanted to ask whether two worlds could differ in their laws without differing in their distribution of local qualitative character. But if we read the ‘could’ as a diamond, the thesis in question turns into this: it is not the case that, possibly, two worlds differ in their laws without differing in their distribution of local qualitative character. In other words: there is no world wherein two worlds differ in their laws without differing in their distribution of local qualitative character. That is trivial – there is no world wherein two worlds do anything. At any one world *W*, there is only the one single world *W*. The sentential modal operator disastrously restricts the quantification over worlds that lies within its scope. Better to leave it off. ... the real effect of the ‘could’ seems to be to *unrestrict* quantifiers which would normally range over this-worldly things.” (Lewis 1986a: 16-17)

Lewis proposes, in other words, that in order to do justice to the *content* of trans-world modal claims, such claims need to be evaluated not for truth at a world, but for truth *simpliciter*. So, our objector might argue that the proposals put forth here fall out of line with the methodology surrounding such claims inherent in GR.

But, such an argument rests on some confusion. For Lewis is here talking about the appropriate truth-conditions for the evaluation of trans-world *modal* claims. And we need have no quarrel with that. The proposal to represent cross-world claims as true at a world by having them be true when we quantify over everything at that world does not constitute any departure from Lewis' truth-conditions for transworld modal claims, for it does not constitute a departure from *any* kind of truth-condition for *modal* claims. The question of the appropriate truth-conditions for transworld modal claims is entirely orthogonal to the

question of how to have worlds, which instantiate impossibilities (even if about the plurality). To see this, consider the following truth-conditions for transworld modal claims proposed by Divers (1999: 230), which I take to be a systematisation of the general idea propounded here by Lewis, (although Divers focuses, in particular, on how to evaluate GR-theoretical transworld claims):

- (A) Possibly *A* iff *A*
- (B) Necessarily *A* iff *A*
- (C) Impossibly *A* iff not-*A*
- (D) Contingently *A* iff *A*-and-not-*A*

All that these definitions tell us is how to evaluate *modal* claims that cross world-bounds for truth. (C) tells us, in particular, that it is impossible that all worlds contain giant orange ducks if and only if it is false *simpliciter* that all worlds contain giant orange ducks. This is true enough even under IGR. Its truth is orthogonal to the question of whether there is any impossible world *w*, such that the impossibility ‘all worlds contain giant orange ducks’ is true at *w*. We are not seeking truth-conditions for modal claims here, be they possibilities or impossibilities; we are seeking instead worlds that render impossibilities true at them. And Lewis, having no interest, says nothing about *that* that we here disagree with. Indeed, (A)-(D) work just as well under IGR as they do under PGR and so can remain intact under the extended theory.²²²

I conclude that rather than *ad hoc* or unjustified, the methods proposed here for the accommodation of transworld claims form an elegant extension of the core representation methods of GR. If we are thus permitted to turn to existing GR-methods for the representation of GR-impossibilities, then impossible transworld universal claims can be false *simpliciter* (as per (C)), while still true at some impossible world.

6.5 Conclusion

I conclude that impossibilist GR can handle challenges to its representational power

²²² At most, some GR-claims might turn out contingent under condition (D) if we choose an inconsistent extension of the theory, as per Ch IV (section 4.3). For instance, then it will be true unrestrictedly speaking that all worlds are concrete and also that some world is not concrete. And then it will be contingent that all worlds are concrete as per (D). Additionally, where *A* does not stand for a GR-theoretical claim, we may understand our quantification not to range over *all* worlds unrestrictedly. For supervenience claims, for instance, when we say that no two worlds differ in their laws without differing in their distribution of local qualitative character, we might employ certain systematic restrictions in our quantifiers.

when it comes to GR-theoretical impossibility claims rather more easily than its detractors suppose. While objectors may be within their rights to demand the representation of GR-theoretical falsehoods as true at some world, they are not within their rights to dictate the specific representation methods that should be employed. In some cases, as showcased by Vander Laan, impossibilist GR does not face any new challenges beyond those presented by Lewis' (1986a) objection, in representing such GR-theoretical falsehoods as true at some world. In others, as extrapolated from Nolan's criticisms, impossibilist GR can represent the requisite impossibilities simply by falling back on existing resources: quantifier restrictions, accessibility and counterpart relations. If I am right, then any impossible claims that are false *simpliciter*, whether they are about some or all of the plurality or about some rigidly picked out object therein, can be represented as true at a world, without this affecting the coherence of the overall theory.

Conclusion

While the thesis by no means presents a fully developed extension of Genuine Realism into impossible worlds, I hope to have shown that there is more than one promising way to go about constructing such a theory, depending on one's metaphysical and logical sensibilities. Most importantly, the proposals put forth are designed to preserve Lewis' reductive analysis of modality, which I take to be of central importance to the theory's favourable comparison to rivals theories, and which, I have argued, is very much alive and kicking. Each alternative venture into GR-impossibilia comes with its own advantages and limitations. On the one hand, GR-impossible worlds might be conceived as ersatz constructions out of Lewis-worlds and their parts, and so need not cost much at all, while still preserving the reductive concretist spirit of Lewisian realism. Moreover, the resulting ontological distinction between the possible and the impossible is justifiable given the logical and methodological framework of the theory. However, the somewhat piecemeal and divided approach of this option might motivate one to seek out a more unified alternative in the form of a uniform ontology of concrete possible and impossible worlds on a par. Now, if I am right, even such a full blown genuine realism about impossible worlds can be had without (a) forcing one to abandon the classical logical framework of the theory, at least not if one does not wish to do so willingly, or (b) compromising Lewis' reductive analysis of modality, or (c) having to accept limitations as to the representational power of the resulting theory. Hence, far from losing out to its rivals when it comes to impossible worlds I submit that Genuine Realism about possible worlds is still very much in the game.

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