Perspectives on Modal Metaphysics

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Abstract

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Contemporary modal metaphysics proceeds against an increasingly complex technical and conceptual backdrop. Intuitive hypotheses of modal metaphysics have become controversial, and have been replaced with complicated and contentious theories in many areas of modal-metaphysical theorizing. That is the case, for example, when it comes to recent thinking concerning the structure and logic of essence, and of metaphysical necessity; the nature of lawhood and the modal status of the laws of nature; the metaphysics of transworld identity and of modal representation *de re*; and the relation between existence, quantification, and modality. I argue in this dissertation that much of the recent methodological trajectory towards complexity in modal metaphysics has its source in a failure, on the part of contemporary theorists, to properly distinguish between *contingency* and *context dependence*.

Contingency is a matter of how things go relative to worlds of evaluation that are 'counterfactual', from the view of our own actual world. By contrast, the context dependence of modal metaphysics involves the sensitivity of modal-metaphysical questions, and their correct answers, to our capacity as theorists to imaginatively shift the possible world of the context. Such imaginative shifting of the world of context involves the consideration 'as actual' of possible worlds

other than our own, and the hypothetical supposition of perspectives *from which* modal metaphysics takes on a different character than it actually has.

Failure to appreciate the philosophical significance of context dependence is what explains the increasing technical and conceptual intricacy of contemporary modal metaphysics. Conceiving of the analytical tools of modal metaphysics as contextually-relativized, I show how systematic modal theorizing may be brought more evenly in line with the underlying simplicity of its subject-matter.

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Chapter 1

Introduction

1.1 Preliminaries

The theoretical significance of *context dependence* has long been noted in the philosophy of language, and in philosophical semantics more broadly construed. The theoretical significance of context for modal metaphysics has failed to be as widely appreciated. In this dissertation, I show how a cluster of interrelated topics in contemporary modal metaphysics may be helpfully illuminated by way of attention to the phenomenon of context relativity.

My aim in this introductory chapter, and the chapter that follows, is to set out the main contours of a theoretical framework that will be articulated and developed in greater depth over the course of the remainder of the dissertation. At the core of this framework is a distinction between two different roles the philosophical notion of a possible world is capable of playing in a representation of modal theorizing: that of *world of context*, and *world of index*. A related, and equally central, component of the framework I articulate here is our theoretical capacity to engage in *imaginative shifting* of the possible world of the context. I will be arguing over the course of the dissertation that a number of closely connected problems and puzzles of recent modal metaphysics have their ultimate source in the failure,

on the part of contemporary theorists, to sufficiently attend to the significance of this capacity for an adequate representation of modal deliberation.

As a means of illustrating the philosophical centrality of context dependence for contemporary thinking about modality, I begin this chapter by setting out a familiar modal puzzle that arises in connection with the notion of *actuality* (§1.2). Generating the puzzle is an error of modal reasoning that arises when the possible world of the context is *conflated* with that of the index; as we shall see, once the distinction between world of context and world of index is drawn and subsequently kept firmly in view, the modal puzzle of actuality evaporates (§§1.3–1.5). A central upshot of the discussion to come is that a number of familiar problems and puzzles of contemporary modal metaphysics are strikingly similar, at the structural level, to the puzzle of actuality discussed here. These problems and puzzles arise in connection with contemporary thinking concerning the nature, structure, and logic of *modality* (the primary topic of Chapter 3); the nature of *lawhood* (also Chapter 3); matters of (compositional) *essence*, and the metaphysics of 'transworld' *representation de re* (the topic of Chapter 4); and the various interconnections between *modality*, *existence*, and *quantification*, in connection with the modal status of ordinary existence claims (the topic of Chapter 5). Problems and puzzles in these core areas of contemporary modal metaphysics, I shall argue, similarly evaporate once the salient underlying metaphysical data is represented as relativized to the world of context.

1.2 Actuality

The notion of *actuality* generates a familiar modal puzzle.

Notice, to begin, that the way things are is just the way things *actually* are. Given that a Republican won in 2016, it is actually the case that a Republican won. Conversely, given that actually, a Democrat lost, it is the case that a Democrat lost. These are trivialities. But they are trivialities which reflect an important

underlying truth about the meaning of 'actually', together with cognate locutions ('it is actually the case that'). The underlying truth is that where φ is any sentence, φ and 'actually, φ' are *equivalent*.

But now consider: given the equivalence of φ and 'actually, φ', is the way things actually are a necessary, or a contingent, matter?

Considering this question in one way, the *non-contingency of actuality* would appear to prevail. For our world is essentially the way it is; consequently, our world is necessarily the way it is, given that matters of essence are non-contingent. But then, given that the way things are is just the way things actually are (equivalence), that things actually are a certain way is similarly non-contingent. Though it is contingent that a Republican won, it is necessarily the case that, *actually*, a Republican won.

Considering our question another way, however, the *contingency of actuality* seems equally intuitive. After all, it is a contingent matter that things be the way they are (a Democrat might have won). Given that how things are is just the way things actually are (equivalence), that things are possibly otherwise seems to imply that how things actually are is contingent. Apparently, it is possible that, actually, a Democrat won.

We may represent our data by employing a sentential operator A, symbolizing 'it is actually the case that':[1]

Equivalence: $\mathsf{A}\varphi \equiv \varphi$

Necessity: $\varphi \vdash \Box\mathsf{A}\varphi$

Contingency: For contingent φ: $\varphi \wedge \neg\Box\mathsf{A}\varphi$

Given *Equivalence*, each of *Necessity* and *Contingency* appear equally well-supported. Of course, that matters of actuality be *both* necessary and contingent is a manifest contradiction. What has gone wrong?

[1] I employ '$\vdash$' throughout to denote the entailment relation: thus '$\Psi \vdash \varphi$' indicates that a set of sentences Γ entails sentence φ.

1.3 The Significance of Context

Pioneering work in philosophical semantics by David Kaplan, later codified into its contemporary format by David Lewis, gave us the formal and conceptual tools required to solve the puzzle (Kaplan 1977, 1979*a*, 1989; Lewis 1980).

At the core of Kaplan's 1977 MS 'Demonstratives' is a theory of speech-act meaning, and more specifically an account of the dependence of the information encoded in a given speech act upon various features of the *context* in which that speech act occurs. Famously, Kaplan proposed to explain such dependence in terms of his distinction between *character* and *content* (Kaplan 1977, 500–7). Kaplan represents the character of a given sentence φ as encoding φ's fixed or context-invariant linguistic meaning, itself determined compositionally as a function of the character of the various sub-sentential expressions that φ contains (Kaplan 1977, 507). By contrast, on Kaplan's conception, a *context* is a package of extra-linguistic parameters determined by a given speech-act occurrence—in the typical case, the utterance or inscription of a particular sentence φ.[2] Among the salient parameters of a context c, Kaplan distinguished the *world* w_c of c, together with various further parameters drawn 'from within' w_c, including the *time* t_c of c, the *location* ℓ_c of c, and the *agent* (or 'speaker') a_c of c. Kaplan conceived of these contextual parameters as jointly determining the *content*, or propositional information, encoded by a sentence φ relative to that context, as a function of φ's character. In this way, Kaplan gave us the now-familiar view of content as determined by character, in conjunction with salient parameters of the context in which an expression is used.

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[2]This is a simplification. Kaplan (1977, Sec. XIII) distinguishes the *occurrence* of a given sentence from its utterance or inscription (see also Kaplan 1989, 584). Kaplan thus allows that a given sentence φ may have a content relative to some context c despite the fact that in c φ is not uttered or inscribed (consider: 'Everyone is silent'). Thus it is strictly speaking occurrences of expressions, and not their utterances or inscriptions, which Kaplan understands as determining a context, and accordingly as having contextual-content relative to that context. For simplicity, in what follows I shall bracket this complication in the main text.

Kaplan sharply distinguished between contexts and the more theoretically-entrenched notion of an *index of evaluation*. Indices, on Kaplan's conception, consist in packages of parameters of context, and accordingly may include such parameters as a world, a time or place, or a location. Notably, the parameters of an index need not coincide with the corresponding parameters of the context, nor is it the case that all indexical parameters need be drawn 'from within' a single possible world (compare Lewis 1980, 86). It is *relative to indices* that the contextual content of a sentence φ—the propositional information φ encodes, with respect to a specific context c—is evaluated for truth and falsity, on Kaplan's approach. Kaplan's contribution thus had the effect of replacing a long-standing formal conception of sentential truth in terms of *satisfaction* relative to an appropriate index of evaluation with something both more complex, and more adequate to the theoretical study of meaning: on the Kaplanian conception, a sentence φ is true, *relative to* an index of evaluation i, *as from* a particular context c.[3]

Return now to our puzzle about actuality. Suppressing reference to a model, Kaplan's idea was that sentences are to be evaluated for truth and falsity *relative to* an index i, *from* a context c: where φ is any sentence, we shall let '$\Vdash_c^i \varphi$' represent the fact that φ is true relative to i, as from c.[4] Kaplan proposed the following

[3]Theoretical precursors of Kaplan's framework include the 'double-indexing' approach to temporal semantics developed by Kamp (1968, 1971), and later expanded upon in early work in two-dimensional semantics by Åqvist (1973), Segerberg (1973), Crossley and Humberstone (1977), and Davies and Humberstone (1980). The important theoretical differences between Kaplan's notion of context and the more historically familiar notion of index are, however, not fully reflected on the 'double-indexical' model of sentential evaluation that Kamp pioneered. For example, and as Lewis (1980, 31) would later make explicit, Kaplan's (1977, VIII) prohibition of 'monsters' (construed as context-*shifting* operators) effectively requires that context be treated as a 'lower' parameter that is carved off from availability for binding by modal and temporal operators; that prohibition is not reflected in two-dimensional semantic frameworks inspired by Kamp's research, in which various 'diagonal' modal operators are often introduced as binding the lower parameter of the index (see, e.g., Åqvist 1973 in which the logic of such operators is the primary focus of investigation). The significance of such differences between Kaplan's contextual-relative semantics and the double-indexing approaches mentioned here will be noted at various further points in the discussion to follow.

[4]For present purposes, indices may be identified with possible worlds. Later, we shall consider the

truth-conditions for A-fronted sentences:

$$\Vdash_c^i \mathsf{A}\varphi \text{ just if } \Vdash_c^{w_c} \varphi$$

Thus the semantic effect of 'actually' on Kaplan's approach is to achieve a kind of 'back reference' to the *world of the context* w_c: on Kaplan's conception, 'actually, φ' is true, relative to an index of evaluation i and from a context c, just in case φ is true relative to w_c, the possible world of the context (Kaplan 1989, 594–5; see also Yalcin 2015 for discussion). Somewhat more formally, Kaplan conceived of the indexical operator A as *rigidifying* the truth-value of its operand sentence φ upon φ's truth-value at the world w_c of the context: on Kaplan's representation, $\mathsf{A}\varphi$ is true relative to an index of evaluation i from a context c whenever φ is true relative to the world w_c of the context; otherwise, $\mathsf{A}\varphi$ is false relative to each index of evaluation.

Kaplan's conception of the actuality operator A as a rigidifier on the truth-value of its operand sentence, relative to the possible world of the context, allows for a smooth explanation of the *equivalence* of φ and 'actually φ' noted at the outset of this chapter. To see this, let us return momentarily to a formal representation of Kaplan's (1977) speech-act theoretic conception of meaning. For present purposes, we shall identify the *contexts* with the set $C \subseteq W \times T \times L \times D$, where W is a (non-empty) set of possible worlds, T a corresponding set of times, L a set of locations, and D a set of possible individuals. Given $c \in C$, we let $w_c \in W$ represent the world of the context c, with t_c, ℓ_c, and d_c each drawn 'from within' w_c, and representing the salient time, location, and agent (or speaker) of c, respectively. We may conceive of a *speech act* ϵ as a concrete, particular, event, which Kaplan represents as determining both a *sentence* $\varphi(\epsilon)$ and a *context* $c(\epsilon) \in C$, such that $c(\epsilon)$ is the context in which ϵ occurs. Given a sentence φ, φ's *character*

result of complicating the index of evaluation to include a possible world w together with an assignment of values to variables, as a way of representing the index-relative satisfaction conditions of sentences of quantified modal languages.

$[\![\varphi]\!] : C \rightarrow \mathcal{P}$ may be represented as a function from contexts to the set of propositions $\mathcal{P}$; for present purposes, these may be identified with the set 2^W, i.e., with sets of possible worlds (compare Kaplan 1989, 568–71). Given $c \in C$, let '$[\![\varphi]\!]^c$' denote *the content of sentence* φ *in* c; thus $[\![\varphi]\!]^c \subseteq \mathcal{P}$. In this way, we represent Kaplan's core idea that the *content* of a given sentence occurrence $\varphi(\epsilon)$—that is, the propositional information $\varphi(\epsilon)$ encodes—is determined by the character of $\varphi(\epsilon)$ together with salient parameters of the context $c(\epsilon)$ in which ϵ occurs. A given sentence occurrence $\varphi(\epsilon)$ will then be true, in a context $c(\epsilon)$, just if the world $w_{c(\epsilon)}$ of the context $c(\epsilon)$ is a member of the *contextual content* expressed by φ in $c(\epsilon)$ given its character: that is, schematically, just in case $w_{c(\epsilon)} \in [\![\varphi(\epsilon)]\!]^{c(\epsilon)}$.

Kaplan conceived of *entailment relations* among sentences in terms of *truth-preservation relative to all contexts*: a set of sentences Ψ entails a conclusion φ, on Kaplan's conception, just if for every context c the contextual content of φ is true in c if the contextual-contents of each of the $\psi \in \Psi$ are.[5] Consequently, on Kaplan's approach, $\Psi \vdash \varphi$ ('Ψ entails φ') just in case whenever $w_c \in \cap_{\psi \in \Psi} [\![\psi]\!]^c$, $w_c \in [\![\varphi]\!]^c$. Where i and i' are any indices, let us write $i' \approx_w i$ to represent the fact that i' differs from i at most on $w_{i'}$; similarly, where i is any index, we shall write $i \propto_w c$ whenever $w_i = w_c$ (similarly, *modulo* subscripting, for other parameters of context). Notice that for any sentence φ, $[\![\varphi]\!]^c := \{w_{i'} : (\exists i : i' \approx_w i \propto_w c)(\Vdash_c^{i'} \varphi)\} \subseteq [\![\mathsf{A}\varphi]\!]^c := \{w_{i'} : (\exists i : i' \approx_w i \propto_w c)(\Vdash_c^{i'} \mathsf{A}\varphi)\}$; hence $w_c \in [\![\varphi]\!]^c$ only if $w_c \in [\![\mathsf{A}\varphi]\!]^c$; hence $\varphi \vdash \mathsf{A}\varphi$ on Kaplan's speech-act theoretic conception of entailment in terms of cross-contextual truth-preservation. Similarly, if $w_c \in [\![\mathsf{A}\varphi]\!]^c$ then $w_c \in [\![\varphi]\!]^c$, given that $\Vdash_c^i \mathsf{A}\varphi$ just if $\Vdash_c^{w_c} \varphi$ (as Kaplan proposed). Thus $\mathsf{A}\varphi \vdash \varphi$; putting these results together, φ and $\mathsf{A}\varphi$ are represented as equivalent on Kaplan's speech-act theoretic conception of meaning. What is the case is simply a matter of what is *actually* the case, and vice-versa.

[5] As Kaplan would later put the idea, validity is "universal truth in all contexts rather than universal truth in all possible worlds" (Kaplan 1989, 595). Compare Davies and Humberstone 1980 on the distinction between 'real-world' and 'general' validity.

Kaplan's treatment of the actuality operator as a rigidifer on the truth-value in context of its operand sentence provides for a similarly smooth explanation of our first way of thinking about the modal status of actuality noted earlier, according to which what is actually the case could not have been otherwise ('*Necessity*'; §1.2). As is standard, Kaplan conceived of necessity in terms of universal quantification over the world w_i of the index of evaluation (Kaplan 1977, 545). Continuing to suppress reference to a model for simplicity, we may represent that standard semantics for the necessity operator as follows:

$$\Vdash_c^i \Box\varphi \text{ just if, for all } i' \approx_w i, \Vdash_c^{i'} \varphi$$

(Recall that $i' \approx_w i$ just if i' differs from i at most on $w_{i'}$). As we have seen, Kaplan's treatment of the actuality operator requires that $\mathsf{A}\varphi$ is true relative to the world parameter of any index whenever φ is true relative to the world w_c of the context; otherwise, $\mathsf{A}\varphi$ is false relative to each world. Accordingly, given that φ is true, and so true relative to the world w_c of the *context* ($\Vdash_c^{w_c} \varphi$), Kaplan's semantics represents $\mathsf{A}\varphi$ as similarly true relative to the possible world of any index, and thus as necessary relative to the context ($\Vdash_c^{w_c} \Box\mathsf{A}\varphi$). Consequently, given Kaplan's conception of entailment in terms of cross-contextual truth-preservation, what is the case is *necessarily actually* the case on Kaplan's framework ($\varphi \vdash \Box\mathsf{A}\varphi$). More generally, Kaplan's semantics represents $\mathsf{A}\varphi$ as *non-contingent*: necessary whenever φ is true at w_c, and impossible otherwise. Given that a Republican won, it is necessarily the case that, actually, a Republican won; given that a Democrat lost, it is impossible that, actually, a Democrat won.

1.4 Imaginative Shifting of the Context

In somewhat less-technical terms, Kaplan's explanation of the non-contingency of actuality gives intuitive illumination to a familiar thought involving the consideration of other possible worlds 'as counterfactual'. According to the familiar

thought, in evaluating a sentence at a counterfactual world *w*, we fix our standpoint or perspective in our very own world as it happens to actually be, and treat *w* as a representation of a way things might have been from that standpoint or perspective. It is under this familiar mode of counterfactual 'consideration'—in effect, the informal counterpart of the more theoretical notion of a world construed as an index of evaluation—that other possible worlds most often figure in our modal theorizing, given that our ordinary interest in matters of contingency and non-contingency has to do with the ways things could or must be from our 'vantage point' here in the actual world (Stalnaker 2003; Einheuser 2012). Kaplan's approach to the semantics of 'actually' and its cognates meshes smoothly with the idea that how things are in our world is 'reflected back' by other counterfactual worlds as the way things *actually are*, and consequently explains the fact that how things actually are is non-contingent.

The analogy with possible worlds considered 'as counterfactual' suggests that an explanation of our tendency, noted at the outset of this chapter, to conceive of actuality as a contingent matter lies with our capacity to consider other possible worlds not as counterfactual, but rather 'as actual'.[6] Intuitively speaking, in considering another possible world as actual, we imaginatively 'untether' our standpoint from our very own world as it happens to actually be, and take up the hypothetical standpoint of an agent whose actual world is some other way. Kaplan's framework gives formal illumination to this familiar idea, by allowing that possible worlds other than our own may serve both as an *indexical* parameter relative to which sentences are evaluated, and additionally as alternative *worlds of context*.

Illustrating the general idea, Kaplan writes in his 'Afterthoughts' that

> [...] The terminology of 'context of use' evokes agents and utterances; the terminology 'it is actually the case that' does not. There is,

[6] On the notion of a possible world considered 'as actual', consult Davies and Humberstone 1980; Chalmers 1996, 2006; Jackson 1998; Stalnaker 2003, 2011; and Einheuser 2012.

> however, this common, underlying idea, one which I continue to think of as perspectival—the actual world is where we actually are...now. Recognizing that there are these two faces to the one notion makes me want to differentiate the possible worlds that can *play the role of actual-world* from those that are 'merely' possible, for example, by requiring that the former but not the latter not be empty; but not all will agree that there should be such differentiation. It is, in the end, a question of what you want to do with your logic. (Kaplan 1989, 595–6; emphasis added.)

Lewis (1980, 82) similarly writes:

> Every context is located not only in physical space but also in logical space. It is at some particular possible world—our world if it is an actual context, *another world if it is a merely possible context*. [...] It is a feature of any context, actual or otherwise, that its world is one where matters of contingent fact are a certain way. Just as truth-in-English may depend on the time of context, or the speaker, or the standards of precision, so likewise may it depend on *the world of the context*.[7]

Prima facie, the idea that possible worlds other than our own are capable of serving as the world of the *context* can seem somewhat obscure: after all, the world w_c of any context in which we find ourselves situated is always *our* world—the world we *in fact* inhabit, and call 'actual'. Nevertheless, we may gain some theoretical traction on the question of what it means for a possible world other than our own to serve as the world of the context by considering our capacity to *imaginatively shift* more 'local' parameters of the actual contexts in which we find ourselves, such as their times, locations, or even agents.

Consider: the time t_c of any actual context c is simply the *present moment* of that context. Nevertheless, whatever context c we find ourselves situated in, we may imaginatively shift our 'temporal perspective' around, and consider how

[7] Emphasis added.

things look from the vantage point of times other than the moment that is in fact present for us. This sort of imaginative shifting of the temporal coordinate of context is evidently what we engage in, for example, when we consider the way the stock market looks from the temporal vantage point of an agent whose present moment is October 29, 1929: from that temporal perspective, things may look considerably worse than they do from our own temporal vantage point now.

Consider also: the location ℓ_c of any actual context c is simply the *salient location* of that context. Thus, the location ℓ_c of my current context is where I am, now, while the location of your current context is whererever you are, now. Nevertheless, whatever location ℓ_c we happen to find ourselves in, we may imaginatively shift our 'locational perspective' around, and consider how things look from the vantage point of places we are not. Despite the fact that the salient location of my current context is Toronto, Canada, I may consider what things are like from the locational 'point of view' of an agent whose current location is Paris, France. That sort of imaginative shifting of the locational coordinate of context is evidently what I engage in when I consider the fact that 'it is raining here', though true for me, now, may not be for Pierre in Paris.

Consider, finally: the agent a_c of any actual context c is simply the 'salient individual' of c—typically, the speaker or thinker of that context. Thus, the salient agent of my current context is me, while that of your current context is you. Nevertheless, as Hellie (2011, MS*a*, Ch. 1) points out, whatever context c we happen to find ourselves in, we may imaginatively shift our 'agential perspective' around, and consider how things look from the first-personal point of view on the world held by agents other than ourselves. This sort of imaginative shifting of agential perspective is evidently what we engage in when making sense of the patterns of practical-rational engagement with the world manifested in the behavior of agents whose aims and interests differ from our own. I can suppose myself into an agential perspective on the world from which eating Vegemite might make good sense, given that from that agential perspective on the world, Vegemite is tasty. That is

compatible with the fact that, 'for me', eating Vegemite makes no sense.

Kaplan and Lewis each had the insight that what goes for the time t_c, location ℓ_c, and agent a_c of context goes for the *world* w_c of the context as well: just as we may imaginatively shift the temporal, locational, and agential parameters of context, we may similarly engage in imaginative shifting of the possible world w_c of the context as well. Such imaginative shifting is evidently what two-dimensional semanticists standardly have in mind in speaking of the 'consideration' of other possible worlds 'as actual'. For, plausibly, in taking up the vantage point or perspective of an agent whose actual world differs from our own (by considering another world 'as actual'), we effectively shift our contextual perspective to one in which the world w_c of the context is a different world than our own world, the world of any context that is *in fact* actual.

1.5 Solving the Puzzle

Return once more to the puzzle of actuality.

Attention to our capacity to imaginatively shift the world of context reveals that the intuitive contingency of actuality which generates that puzzle is *merely apparent* contingency. Given that the way things are is just the way things actually are, matters of actuality *are* strictly non-contingent, for reasons we have already seen (§1.3). But we may imaginatively suppose ourselves into contexts the world w_c of which is a different world from our very own; from within such imaginatively-entertained 'global' perspectives on the facts, it is indeed the case that how the facts actually are may fail to coincide with the facts that genuinely obtain from the perspective of our actual world. For example, imaginatively supposing ourselves into a context in which a Democrat wins in 2016, it is indeed the case, from within that contextual-perspective, that *actually*, a Democrat wins. Notice, however, that the way things are from within such imaginatively-entertained perspectives truly is **imaginary**: alternative worlds of context represent *hypothet-*

ical standpoints on the facts not as they (actually) are, but rather as we are capable of coherently supposing them to be. Accordingly, that a Democrat wins from within some hypothetical contextual perspective does not translate into genuine, *counterfactual*, contingency from the view of our own world when it comes to the question of how matters actually are.

That the cross-contextual 'non-rigidity' of actuality under discussion does not translate into genuine contingency at the level of what is actual reflects one dimension of Kaplan's more general prohibition of sentential operators that serve semantically as context-*shifters*, or 'monsters' (Kaplan 1977, VIII). Employing the notational conventions already introduced, such a 'monstrous' operator $\diamondsuit$ might be represented as governed by a truth-condition such as the following:

$$\Vdash^{i}_{c} \diamondsuit\varphi \text{ just if, for some } c' \text{ and } i' \propto_{w} c', \Vdash^{i'}_{c'} \varphi$$

So construed, $\diamondsuit$ would indeed allow for a representation of contingency of sorts in connection with A-fronted sentences (schematically: $\Vdash^{i}_{c} \mathsf{A}\varphi$ just if $\Vdash^{w_c}_{c} \varphi$; but if $\exists c' : (\exists i' : i' \propto_{w} c') \nVdash^{i'}_{c'} \varphi$, then $\nVdash^{i'}_{c'} \mathsf{A}\varphi$; consequently, for some φ, $\Vdash^{i}_{c} \mathsf{A}\varphi \wedge \diamondsuit\neg\mathsf{A}\varphi$). Kaplan's prohibition of such monstrous operators as $\diamondsuit$ as semantically illegitimate is what motivates Lewis's (1980, 31) representation of context as *unbindable*, encoded in the unavailability of the contextual lower parameter to scoping under modal operators.[8] But Kaplan's prohibition is similarly reflected at a less-technical level in the intuitive 'non-negotiability', noted already, of matters of actuality when it comes to how other possibilities represent things as being: that is the core moral of Kaplan's representation of the actuality operator A as a rigidifier on the truth-value in-context of its operand sentence φ. That A behaves semantically in this way is compatible with the fact that alternative hypothetical perspectives on the facts, as represented by other worlds of context, may disagree with the perspective of reality on how things are, and consequently may disagree with the

[8]Compare such 'diagonal' and other lower-index shifting operators as explored in, e.g., Åqvist 1973, Segerberg 1973, and later Stalnaker 1978.

perspective of reality on how things *actually* are. Those hypothetical contextual-perspectives are entered into via our capacity to imaginatively shift the possible world of the context, and consequently do not 'witness' genuinely possible ways things might *actually* have been.

Thus it is that our puzzle of actuality may be seen as having its ultimate source in a kind of *ambiguity* in the notion of how things go 'off at' other possible worlds. Fixing our perspective here in the actual world as we find it, it is genuinely non-contingent that matters of actuality be as they are: 'off at' other possible worlds, the way things actually are is just the way things are here in our world (the only possible world that is genuinely real). The temptation to suppose otherwise has its source in the theoretical conflation of how things are at other counterfactual worlds with how things are as from the view of alternative contexts.

1.6 Looking Ahead

1.6.1 Context and Modal Metaphysics

A central moral of the discussion thus far has been that certain aspects of modal reasoning are liable to become confused in the absence of attention to the context–index distinction. That is the case when it comes to modal reasoning concerning *actuality*, for example: it is due to our initial failure, at the outset of this chapter, to properly distinguish the possible world of the context from that of the index that we were led to suppose that the notion of actuality had an inconsistent or otherwise problematic modal character. It does not, of course. But recognizing this fact requires that we carefully distinguish our theoretical capacity to imaginatively shift the world of context from our more philosophically-familiar capacity to evaluate sentences relative to other worlds construed as indices of evaluation, or as representations of genuine (counterfactual) possibilities.

This central moral has not been widely incorporated into the contemporary

study of modal metaphysics. Over the course of each of the following chapters, I will document the significant implications this oversight has had for the general trajectory of contemporary modal metaphysics, and for the manner in which contemporary theorists have proposed to approach and resolve a range of interrelated modal-metaphysical problems. What we have seen so far is that the modal status of *actuality* is helpfully illuminated by way of attention to the context–index distinction. I will similarly demonstrate in what follows that a significant measure of conceptual and technical clarification comes onto the scene in modal metaphysics when the context–index contrast is kept firmly in theoretical view.

In broad outline, the discussion to come is structured as follows.

1.6.2 Structure

The fact that contemporary modal metaphysics has largely neglected the significance of the context–index distinction, and in particular that of the distinction between *world* of context and *world* of index, is in some ways surprising, given the centrality afforded to the notion of a 'possible world' in recent modal-metaphysical theorizing. Nevertheless, the failure of contemporary modal metaphysics to properly attend to the importance of the context-index contrast has a natural historical explanation. The *formal foundations* of contemporary modal metaphysics, which—in broad relief—trace back to early work in the model-theoretic tradition by Frege (1879, 1891), and which would subsequently be refined and extended by Tarski (1936, 1944) and Carnap (1946, 1947), developed largely in the absence of explicit attention to context and context relativity. These formal foundations loom large in the discussion to come; Chapter 2 therefore outlines a bird's-eye view of the development of the model-theoretic tradition up to Carnap 1947 ('Carnapean possible worlds semantics').

It was Carnap's contribution to the model-theoretic tradition in particular which laid the foundations for the now-familiar analysis of modality in terms of *quan-*

tification over possible worlds.[9] A signal feature of Carnap's contributions in these and other areas are their utter simplicity: in contrast with Kaplan's more sophisticated—and more meaning-theoretically adequate—analyses of the core theoretical notions of *truth* and *entailment* already considered, Carnap would represent truth and entailment for modal languages entirely in terms of the (contextually-unrelativized) *satisfaction* of sentences relative to possible worlds (or possible worlds together with assignments of values to variables, in the case of quantified modal languages). Despite these formal limitations underlying Carnap's contributions, the simplicity of Carnap's treatment of modality, and other related matters, manifests itself in a robust degree of cohesion with various equally simple and straightforward 'hypotheses of modal metaphysics'; that cohesion serves as a template from which the discussion in each of Chapters 3, 4, and 5 proceeds.

The primary focus of Chapter 3 lies with the nature, structure, and logic of modality. Simple, 'Carnapean' modal semantics represents modality as having a *simple* metaphysical structure: what is contingent, or non-contingent, on the Carnapean framework, is invariant across the space of possible worlds (in an appropriately constructed model), and consequently modality is represented as semantically 'insensitive' to shifts at the level of indexical world-parameter. That underlying simplicity meshes smoothly with Carnap's own conception of necessity as coinciding with what he called 'L-truth', understood roughly in terms of analyticity, or truth in virtue of meaning (Carnap 1947, 174). But Carnap's representation of modal structure as 'world invariant' meshes equally-well with standard thinking concerning the nature and logic of *metaphysical* modality, understood as coinciding with the broadest forms of genuine possibility and necessity there are (Shoemaker 1998; Rosen 2006).

The simple Carnapean view would soon come to be abandoned, to be replaced

[9]Or 'world-like' entities: salient differences between Carnap's early approach and contemporary treatments of modality in terms of quantification over possible worlds will be noted in the chapter which follows.

by a conception of modality as *complex* in character, and involving, at the semantical level, *restricted* quantification over spaces of 'relatively accessible' possible worlds (Meredith and Prior 1956; Prior 1962*a*,*b*). This departure from simple and straightforward modal semantics coincides with a general methodological theme in contemporary modal metaphysics that we shall have occasion to note at several points in the discussion to come; according to the general methodological theme, various aspects of simple and straightforward modal semantics, as embodied by the Carnapean picture I shall be sketching in Chapter 2, require *complexification* in order to accomodate certain *prima facie* recalcitrant metaphysical data. As our initial discussion of 'relative-accessibility' semantics in Chapter 3 shall make clear, such complexity largely manifests itself in the gradual incorporation of *further structure* into the index-relative satisfaction conditions for sentences of constructed modal languages beyond anything that Carnap himself envisaged.

I shall be arguing that *in general* the various manifestations of this methodological theme were in many ways theoretically premature, and that the predominance of the theme in contemporary modal metaphysics has obscured the theoretical availability of attractive positions that come onto the scene once the philosophical significance of context is made explicit. For example, and drawing on Murray and Wilson 2012, I articulate in Chapter 3 a conception of modality as structurally simple, but *cross-contextually non-rigid*, and show how that conception of modality may be profitably deployed in connection with current thinking about the nature of lawhood, and its relation to metaphysical necessity. Just as matters of actuality are best seen as non-contingent from the view of each context, but as 'unstable' *across* contexts, so too on the view I articulate is lawhood a matter that is (metaphysically) non-contingent, relative to each context, but potentially variable across contexts.[10] That is a way of thinking about lawhood and

[10]Murray and Wilson (2012) articulate a conception of metaphysical necessity and possibility as relativized to an 'indicative actuality', and allow that what is metaphysically necessary or possible relative to one indicative actuality may fail to coincide with what is similarly metaphysically necessary or possible relative to another indicative actuality. The notion of *indicative actuality* at issue

modality that has largely been neglected in contemporary modal metaphysics, due to the contemporary preoccupation with *index*-, as opposed to *context*-, relativity. It is also a view that has distinctive theoretical advantages over certain rival conceptions, as I shall explain in due course.

Chapter 4 extends this conception of lawhood and modality as contextually-relativized to the topics of *essence*, and essential property-attribution. My focus here is with 'Chisholm's Paradox', arising in connection with the thesis of *moderate compositional essentialism*, according to which the compositional essences of ordinary physical objects (such as artifacts) are such as to permit of slight, but not substantial variation from one possible world to the next (Chisholm 1967, 1973; Chandler 1976). As routinely formulated, Chisholm's Paradox is often supposed to show that moderate compositional essentialism is untenable, at least when construed against the backdrop of an intuitively simple propositional modal logic (the system S5). Competing solutions to the puzzle, variants of which are quite firmly established in the contemporary literature as constituting the 'available options', involve the *abandonment* of that simple logic for the case of *de re* metaphysical modality, and a concomitant departure from the simple and straightforward Carnapean modal metaphysics it supports. Such departures manifest themselves in the postulation of metaphysically 'inaccessible' possible worlds (Salmon 1984, 1989) or individual possibilities (so-called modal 'counterparts'; Lewis 1986*c*, 240–48) as a way of resolving the putative tension Chisholm is thought to have discovered. Both approaches are subject to compelling objections, as we shall see.

I show instead that the broad contours of the dialectic concerning Chisholm's

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contrasts with that of *counterfactual* actuality: sentences are evaluated at a counterfactual actuality *v*, *given that* a world *w* is indicatively actual (compare Jackson 1998 and Chalmers 1996, 2006). The approach to modality as cross-contextually non-rigid I develop in Chapter 3 is in many ways a simple continuation of that basic idea, transposed into the more formally perspicuous idiom of the Kaplanian context–index distinction. The primary concern of Chapter 3 will be to show that certain puzzles concerning the nature of lawhood, not initially considered by Murray and Wilson (2012), are naturally resolved given a conception of metaphysical necessity as cross-contextually non-rigid.

Paradox have been largely shaped by the failure of contemporary theorists to properly attend to the context-index distinction. What is required in order to solve the puzzle is not a general abandonment of simple and straightforward modal metaphysics (and its associated logic), but rather a view of compositional essence as *relativized* to the possible world w_c of the context. That approach treats the compositional essences of ordinary physical objects as moderately 'modally permissive' from the view of each possible context; it similarly explains the intuitive 'pull' of Chisholm-style reasoning in terms of our theoretical capacity to imaginatively shift the world of the context to one from which the compositional essence-facts appear differently than they do from our own actual vantage point.

In Chapter 5, I turn to *first-order*, or *quantified*, modal metaphysics. It has long been recognized that the simplicity of Carnapean modal semantics results in a representation of ontology as *non-contingent*: what exists is represented, on the Carnapean picture, as 'invariant' across the space of possible worlds, and consquently as strictly or metaphysically necessary. Such a representation of ontology as non-contingent is manifested in the validity of certain controversial principles of first-order modal metaphysics: central here are the *Barcan* and *Converse Barcan* formulae (after Barcan 1946). Taken in conjunction, the Barcan formulae represent the ontology of our actual world as comprising both an 'upper' and 'lower' limit on what it is possible for there to be.

Contemporary discussion of these principles has largely bifurcated into two distinctive strategies. On the one hand, we have various proposals to complicate our semantical *theory* beyond Carnap's intuitively simple approach, as a way of invalidating the Barcan formulae and consequently representing ontology as contingent (Kripke 1963; Plantinga 1974, 1976). On the other hand, we have proposals to complicate our *metaphysics of objects* in such a way as to render the non-contingency of ontology more philosophically palatable (Linsky and Zalta 1994, 1996; Williamson 1998, 2000, 2002, 2013*b*, Ch. 1). Such index- and ontology-complicating strategies are controversial; unsurprisingly, both strategies

have developed largely in the absence of attention to more theoretically attractive alternatives that become available once the role of the context–index distinction in modal theorizing is made fully explicit.

The alternative to both the index- and ontology-complicating strategies I articulate represents modal ontology as non-contingent relative to a context, but as non-rigid *across* contexts. From our own standpoint or perspective here in the actual world, it is indeed the case that matters of existence and nonexistence are metaphysically necessary, just as is presupposed by simple and straightforward modal semantics. Shifting our contextual standpoint around to other possible worlds, some of what is actual vanishes, and certain individuals that are modally 'alien' from our actual perspective appear. The net effect of this represention of ontology as necessary, but cross-contextually non-rigid, is a kind of *philosophical rehabilitation* of the Barcan formulae: these principles emerge as harmless truths of first-order metaphysical modal logic on my approach, and in a way that preserves a plausible metaphysics of objects that contemporary defenders of these principles, such as Williamson 2013*b*, have largely abandoned.

1.6.3 'Perspectives'

Broadly construed, the overall methodological approach to modal metaphysics I develop in this dissertation may be conceived of as follows.

We have the basic 'analytical toolkit' of contemporary modal metaphysics: that toolkit includes, variously, the theoretical notions of *modality*, of *lawhood*, and the closely-related notion of *essence*; the toolkit similarly includes such metaphysical concepts as that of a *possible individual*, and the related notions of (contingent) *existence* and *nonexistence*. What I do here is show how these core elements of the modal metaphysician's toolkit may be profitably understood as having a simple, but contextually-relativized, structure.

That structural simplicity is manifested in the fact that, from the view of our

very own actual world, historically-recalcitrant puzzles concerning the proper deployment of the tools of modal metaphysics have simple answers, the broad contours of which cohere, in a surprisingly pleasing manner, with various aspects of the simple and straightforward approach to possible-worlds model theory that Carnap pioneered. The contextually-relative structure of the toolkit manifests itself in the fact that the 'character' of modal-metaphysical questions, and of the answers we ought to give to those questions, is a matter that is sensitive to the contextual perspective *from which* those questions are considered.

Imaginatively shifting our contextual perspective around to other possible worlds, we find that the tools of modal metaphysics may be deployed to characterize a modal reality that is, in some cases and in some ways, differently structured from modal reality as it appears to us here in the actual world. Such imaginative shifting of the context may thus be likened to the hypothetical adoption of alternative **perspectives on modal metaphysics**. Keeping firmly in theoretical view that such hypothetical perspectives on modal metaphysics are imaginary, systematic modal metaphysics, from the vantage point of our own actual world, may be brought more evenly in-line with the underlying simplicity of its subject matter. That fact has been obscured in recent theorizing, due to the contemporary preoccupation in modal metaphysics with *index*-, as opposed to *context*-, relativity.

Chapter 2

Foundations

2.1 The Rise of Index-relativity

The philosophical significance of the context–index distinction has been neglected in the recent history of modal metaphysics. This fact has a natural historical explanation. The *formal foundations* of contemporary modal metaphysics, the broad contours of which were to be articulated by Carnap in his article 'Modalities and Quantification' (1946), and subsequently in *Meaning and Necessity* (Carnap 1947), developed at a time when the theoretical significance of context was not yet sufficiently well-understood. This chapter provides a general overview of the development of those formal foundations, and similarly provides the technical backdrop for the discussion in each subsequent chapter.

My methodology here shall be broadly 'ahistorical' in character. The aim is to outline the details of an intuitively simple and straightforward approach to possible-worlds model theory, much (but not all) of which may be traced back to Carnap's foundational work in modal and quantified modal semantics. In particular, the broadly 'Carnapean' model-theoretic framework I shall be outlining here diverges in key respects from Carnap's own views when it comes to the semantical representation of *denotation* (for individual names) and *quantification*. As I

proceed, I shall note in greater depth how the rationally-reconstructed picture developed here diverges from the specifics of Carnap's own treatment of these and other topics.

2.1.1 Truth and Entailment in a Model

Early developments in the model-theoretic tradition represented sentential truth in terms of the model-relative *satisfaction* of formulae of constructed languages. A model is a structure specifying interpretations, or stipulated meanings, for the non-logical elements of a language's vocabulary; a central methodological presupposition of the model-theoretic tradition is that the semantic contribution of the remaining logical elements of a language is illuminated by treating the interpretation of the logical fragment as fixed, or invariant, across models. The historical foundations of these ideas trace back to Frege (1879, 1891); updated and presented in modern formal notation those foundations are as follows.[1]

Let $\mathscr{L}$ be an elementary formal language with a lexicon comprising a stock of individual constant terms $a_1, \ldots$; a corresponding stock of n-place predicate parameters $F^n_1, \ldots$; a distinguished, two-place identity predicate, $=$; the Boolean connectives $\neg$, $\wedge$, and $\vee$; and delimiters $(,)$, $[,]$.[2] Atomic formulae of $\mathscr{L}$ are strings of form $F^n_1(\tau^1, \ldots \tau^n)$, where each of the τ is a constant term; each formula of the language is either an atomic formula, or a string of form $\neg\xi$, $\xi \wedge \zeta$, or $\xi \vee \zeta$, where each of ξ and ζ are formulae. We shall say that a string φ of $\mathscr{L}$ is a *sentence* just in case φ is a formula. A *model* $\mathfrak{M}$ for $\mathscr{L}$ is a pair-sequence $\langle \mathcal{F}, V \rangle$, in which

[1] Talk of 'models' is somewhat anachronistic in connection with these early works of Frege's, and would not become standard until significantly later: Hodges (2008) reports that it was Tarski (1956) who first coined the phrase 'theory of models'. Nevertheless, Frege's early work laid the foundations for the contemporary model-theoretic conception of sentential truth as determined compositionally as a function of the interpretation, or semantic value, assigned in a model to the sub-sentential, non-logical, fragment of a constructed formal language.

[2] As is customary, such delimiting devices will be omitted in what follows when doing so results in no ambiguity.

$\mathcal{F}$ is a *frame* comprising a one-place sequence $\langle D \rangle$, with D a (non-empty) set of individuals, and V is a *valuation function* for $\mathscr{L}$ defined as follows:[3]

- For each term τ^k of $\mathscr{L}$, $V(\tau^k) \in D$; and
- For each n-place predicate F^n_k of $\mathscr{L}$: $V(F^n_k) \subseteq D^n$.

Thus, the model-relative interpretation of an individual constant of $\mathscr{L}$, on this simple picture, is an individual in that model's 'ontology' D, while that of each n-place predicate F^n_k is a set of n-tuples of individuals from D. Intuitively, a model's valuation function V therefore assigns to each predicate its *extension* in that model, understood as the set of n-tuples in D to which the predicate applies.

Given a model $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ for $\mathscr{L}$, the model-relative *denotation* of a term τ^k of $\mathscr{L}$, $\delta_{\mathfrak{M}}(\tau^k)$, is identified with the individual in D assigned to τ^k by the model's valuation function V: thus, $\delta_{\mathfrak{M}}(\tau^k) = V(\tau^k)$.[4] *Satisfaction* is similarly relativized to a model on the simple foundational approach: we shall write $\Vdash_{\mathfrak{M}} \xi$ to denote that formula ξ is satisfied relative to model $\mathfrak{M}$. Such model-relative satisfaction may be defined recursively in the familiar way: for atomic formulae, the conditions are that $\Vdash_{\mathfrak{M}} F^n_k(\tau^1, \ldots \tau^n)$ just if $\langle \delta_{\mathfrak{M}}(\tau^1), \ldots, \delta_{\mathfrak{M}}(\tau^n) \rangle \subseteq V(F^n_k)$, and $\Vdash_{\mathfrak{M}} \tau^j = \tau^k$ just if $\delta_{\mathfrak{M}}(\tau^j) = \delta_{\mathfrak{M}}(\tau^k)$; for the remaining non-atomic, or molecular, fragment of $\mathscr{L}$, the conditions are as follows:

- $\Vdash_{\mathfrak{M}} \neg\xi$ just if $\nVdash_{\mathfrak{M}} \xi$
- $\Vdash_{\mathfrak{M}} \xi \wedge \zeta$ just if $\Vdash_{\mathfrak{M}} \xi$ and $\Vdash_{\mathfrak{M}} \zeta$
- $\Vdash_{\mathfrak{M}} \xi \vee \zeta$ just if $\Vdash_{\mathfrak{M}} \xi$ or $\Vdash_{\mathfrak{M}} \zeta$

[3] The rationale for treating $\mathcal{F}$ as a (one-place) *sequence* is to allow for the later addition of further structure into a frame, in order to model the notions of truth and entailment for languages more complex than $\mathscr{L}$. I turn shortly to such languages.

[4] This treatment of denotation shall become more complex shortly, once variable terms are taken into consideration.

Sentential truth relative to a model $\mathfrak{M} = \langle \mathcal{F}, V \rangle$, on the foundational approach, may be identified with *satisfaction relative to that model*: $\vDash_{\mathfrak{M}} \varphi$ ('sentence φ is true in model $\mathfrak{M}$') just if $\Vdash_{\mathfrak{M}} \varphi$. Entailment relations among sentences, on the foundational approach, may similarly be represented in terms of *truth-preservation across models*: a set of sentences Ψ entails a sentence φ ($\Psi \vdash \varphi$) just in case, for any $\mathfrak{M}$, if, for every $\psi \in \Psi$, $\vDash_{\mathfrak{M}} \psi$, then $\vDash_{\mathfrak{M}} \varphi$.

2.1.2 Extending the Foundations

Subsequent refinements to this foundational paradigm, due largely to Tarski (1936, 1944) and later Carnap (1946, 1947), extended the foregoing picture to formal languages capable of expressing both *quantification* and *modality*. In each case, the central insight involved the *relativization* of denotation, satisfaction, and truth not simply to a model, but rather to a model together with an appropriate index of evaluation. In the case of Tarski's work on the model theory of first-order (or 'quantified') languages, such indices of evaluation are identified with variable assignments, or functions mapping variable terms to individuals in a model's ontology. Carnap would later extend Tarski's insight, identifying indices of evaluation with possible worlds or (in the case of quantified modal languages) pairs of possible worlds and variable assignments.

This sub-section and the next review the details of Tarski and Carnap's respective contributions to the contemporary model-theoretic tradition.

2.1.2.1 Tarski

We begin with quantification.

Let $\mathscr{L}^{\forall}$ be a *quantificational extension* of the elementary formal language $\mathscr{L}$ introduced above at §2.2.1. Lexically, $\mathscr{L}^{\forall}$ extends $\mathscr{L}$ by way of a countable stock of *variable terms* $x_1, \ldots$; together with quantifiers $\forall$ and $\exists$ symbolizing 'all' and 'some', respectively. The formulae of $\mathscr{L}^{\forall}$ now include all those of $\mathscr{L}$,

together with $\forall x_k \xi$ and $\exists x_k \xi$, where x_k is any variable term and ξ is any formula. The *sentences* φ of $\mathscr{L}^{\forall}$ are now identified with those formulae containing no unbound (or 'free') occurrence of any variable term. Tarski's contribution was to our understanding of model-relative denotation, satisfaction, and sentential truth for such quantified languages as $\mathscr{L}^{\forall}$.

On the Tarskian approach, frames $\mathcal{F}$ and models $\langle \mathcal{F}, V \rangle$ for $\mathscr{L}^{\forall}$ remain understood as per §2.2.1; the (model-relative) semantic value of an individual constant a_k, $V(a_k)$, similarly remains an individual in that model's ontology D, while that of an n-place predicate F^n_k remains a set of n-tuples of individuals in D (thus $V(F^n_k) \subseteq D^n$). However, the denotation of *terms* of $\mathscr{L}^{\forall}$—the language's individual constants and variables—is now understood as relativized not simply to a model $\mathfrak{M}$, but rather to a model $\mathfrak{M}$ together with an *index* i for $\mathfrak{M}$, where $i = \langle g \rangle$ is a one-place sequence consisting of a variable assignment $g \in D^{\omega}$, i.e., a function mapping each natural number to a member of D such that, where x_k is any variable, $g_i(k) \in D$ is the temporary referent (or *value*) in D assigned by g_i to x_k (compare Tarski (1936, 189–93; 1944, 352–3).[5] Where τ^k is any term of $\mathscr{L}^{\forall}$ and $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ is any model, the model- and index-relative denotation of τ^k, $\delta^i_{\mathfrak{M}}(\tau^k)$, is now defined on the Tarskian approach as follows:

$$\delta^i_{\mathfrak{M}}(\tau^k) = \begin{cases} V(\tau^k), \text{ where } \tau^k \text{ is a constant;} \\ \\ g_i(k), \text{ where } \tau^k = x_k. \end{cases}$$

Thus the model- and index-relative denotation of an individual constant is the interpretation of that constant in that model, while that of a variable x_k is the temporary referent in the model's ontology coindexed with that variable on the basis of $g_i \in D^{\omega}$.

[5]Here again, the rationale for treating indices as one-place sequences lies in their amenability to further expansion: shortly, we shall consider such expansion in connection with the representation of truth and entailment for quantified modal languages.

Satisfaction and sentential truth are similarly relativized to a model $\mathfrak{M}$ and index $i = \langle g \rangle$ for $\mathfrak{M}$, on the Tarskian picture. Here, Tarski's central contribution was to our understanding of the model- and index-relative satisfaction conditions for quantified formulae of form $\forall x_k \xi$ and $\exists x_k \xi$. In order to represent Tarski's contribution, let us introduce a notational convention which will be in place throughout the remainder of this dissertation. Where $\mathfrak{M}$ is any model for $\mathscr{L}^{\forall}$ and $i = \langle g \rangle$ is an index for $\mathfrak{M}$, we shall let $i' \sim_k i$ just if i' and i differ at most on $g_{i'}(k)$ and $g_i(k)$: thus $i' \sim_k i$ just if, whenever $j \neq k$, $g_{i'}(j) = g_i(j)$. With that convention in place, the Tarskian definitions of satisfaction for quantified formulae may be represented as follows:

- $\Vdash^i_{\mathfrak{M}} \forall x_k \xi$ just if, for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
- $\Vdash^i_{\mathfrak{M}} \exists x_k \xi$ just if, for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$

In this way, the Tarskian picture explains the model- and index-relative satisfaction conditions of formulae of form $\forall x_k \xi$ and $\exists x_k \xi$ in terms of those of the embedded formula ξ, when each (some) individual d in the model's ontology D is assigned as temporary referent to any free occurrence of the variable x_k in ξ.[6] Tarski's contribution thus gives formal representation to the intuitive thought that claims involving generality are true just if appropriately 'witnessed' by (some or all) members of the domain of discourse D. More broadly, sentential truth in a model on the Tarskian paradigm is now defined in terms of satisfaction relative to all *indices* (i.e., assignments) for that model: $\vDash_{\mathfrak{M}} \varphi$ just if, for all i, $\Vdash^i_{\mathfrak{M}} \varphi$. Entailment remains understood as truth-preservation across models, as in the case of the foundational paradigm earlier introduced (§2.2.1).

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[6] Naturally, the model- and index-relative satisfaction conditions for the remaining non-quantified formulae of $\mathscr{L}^{\forall}$ mirror those of the foundational paradigm discussed above, given that these conditions are 'insensitive' to the variable assignment g_i of the index. For the atomic fragment, the conditions are that $\Vdash^i_{\mathfrak{M}} F^n_k(\tau^1, \ldots, \tau^k)$ just if $\langle \delta^i_{\mathfrak{M}}(\tau^1), \ldots, \delta^i_{\mathfrak{M}}(\tau^n) \rangle \subseteq V(F^n_k)$, and $\Vdash^i_{\mathfrak{M}} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}}(\tau^j) = \delta^i_{\mathfrak{M}}(\tau^k)$; for the remaining non-atomic, non-quantified fragment, the conditions are that $\Vdash^i_{\mathfrak{M}} \neg\xi$ just if $\nVdash^i_{\mathfrak{M}} \xi$; $\Vdash^i_{\mathfrak{M}} \xi \wedge \zeta$ just if $\Vdash^i_{\mathfrak{M}} \xi$ and $\Vdash^i_{\mathfrak{M}} \zeta$; and $\Vdash^i_{\mathfrak{M}} \xi \vee \zeta$ just if $\Vdash^i_{\mathfrak{M}} \xi$ or $\Vdash^i_{\mathfrak{M}} \zeta$.

Notice that this treatment of entailment differs markedly from Kaplan's (1977; 1989) representation of entailment relations in terms of truth-preservation relative to all *contexts* (§1.3). Such a conception of entailment in terms of cross-contextual truth-preservation was unavailable to Tarski, given that the theoretical significance of the context–index distinction was, at Tarski's time of writing, not yet sufficiently well-understood.

2.1.2.2 Carnap

Carnap (1946, 1947) extended Tarski's insight concerning quantification to languages containing modal operators. Just as Tarski proposed the now-current treatment of generality in terms of quantification over the specified 'ontology' of a model, it was Carnap who, in effect, first proposed the familiar semantical analysis of modality in terms of quantification over 'possible worlds'. Updated and presented in the contemporary idiom of possible-worlds semantics, the broad outlines of the Carnapean conception of modality are as follows.[7]

Let us begin with a *modal extension* $\mathscr{L}^{\Box}$ of the elementary formal language $\mathscr{L}$ discussed in §2.2.1: its lexicon comprises that of $\mathscr{L}$, now supplemented with the modal operators $\Box$ and $\Diamond$, understood as representing necessity and possibility, respectively (grammar: $\Box\xi$ and $\Diamond\xi$ are formulae of $\mathscr{L}^{\Box}$ whenever ξ is). A frame $\mathcal{F}$ for $\mathscr{L}^{\Box}$ is now a sequence $\langle W, D, @\rangle$: here D remains a non-empty set of individuals, while W is a non-empty set of possible worlds and $@ \in W$ is the 'actual world' of the frame. A model $\mathfrak{M}$ remains a pair-sequence $\langle \mathcal{F}, V\rangle$, with V a valuation function for $\mathfrak{M}$ assigning an interpretation to the language's terms and predicates, as follows:

[7]Carnap himself spoke of 'state-descriptions' where in what follows I shall speak of possible worlds. As Copeland (2002) notes, it would not be until the late 1950's that the 'possible worlds' idiom would become standard (here Meredith and Prior 1956 and Kripke 1959 are significant). Nevertheless, it is clear that Carnap's 'state-descriptions' play the same role as do possible worlds in contemporary modal model theory.

- Where τ^k is any term, $V(\tau^k) \in D$; and
- Where F^n_k is any n-place predicate, $V(F^n_k) : W \rightarrow D^n$ is a function assigning F^n_k an extension relative to each $w \in W$.

Intuitively, on the Carnapean approach V assigns to each predicate F^n_k of the language a possible-worlds *intension*, mapping each $w \in W$ to the extension of F^n_k at w, $V(F^n_k)(w)$. This treatment of predicate interpretations gives formal expression to the plausible thought that the extension of a predicate is a matter that potentially varies between possible worlds, given that the way things are in one world need not coincide with the way things are in all worlds.[8] Indices of evaluation i are now identified with one-place sequences $\langle w \rangle$, in which w is a possible world in W.

As with the Tarskian approach just considered, on the Carnapean treatment denotation and satisfaction are relativized to a model $\mathfrak{M}$ and index $i = \langle w \rangle$ for $\mathfrak{M}$. For atomic formulae of $\mathscr{L}^{\Box}$, the conditions are that $\Vdash^i_{\mathfrak{M}} F^n_k(\tau^1, \ldots, \tau^n)$ just if $\langle \delta^i_{\mathfrak{M}}(\tau^1), \ldots, \delta^i_{\mathfrak{M}}(\tau^n) \rangle \subseteq V(F^n_k)(w_i)$, and $\Vdash^i_{\mathfrak{M}} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}}(\tau^j) = \delta^i_{\mathfrak{M}}(\tau^k)$; here, w_i is the *world of the index i*, and $\delta^i_{\mathfrak{M}}(\tau^k) = V(\tau^k) \in D$ for any term τ^k of $\mathscr{L}^{\Box}$. For molecular, non-modal, formulae of $\mathscr{L}^{\Box}$, the conditions are as one would expect: $\Vdash^i_{\mathfrak{M}} \neg\xi$ just if $\nVdash^i_{\mathfrak{M}} \xi$; $\Vdash^i_{\mathfrak{M}} \xi \wedge \zeta$ just if $\Vdash^i_{\mathfrak{M}} \xi$ and $\Vdash^i_{\mathfrak{M}} \zeta$; and $\Vdash^i_{\mathfrak{M}} \xi \vee \zeta$ just if $\Vdash^i_{\mathfrak{M}} \xi$ or $\Vdash^i_{\mathfrak{M}} \zeta$. The contemporary significance of Carnap's work lies in its treatment of *modality*: it was Carnap who, in effect, proposed the familiar conception of the modal operators as quantifiers over the world-parameter of the index. As a further notational convention to be employed throughout the discussion to come, where i is any index, let $i' \approx_w i$ be any index differing from i at most on $w_{i'}$ (thus $i' \approx_w i$ if $w_{i'} \neq w_i$). The Carnapean analysis of the modal operators may then be represented as follows:

[8] Carnap (1947) similarly assigned to each individual *constant* a_k of the language a possible-worlds intension $V(a_k) : W \rightarrow D$, understood as a constant function from worlds to individuals in the ontology D of a model (Carnap referred to such possible-worlds intensions as 'individual concepts'). The above treatment of interpretations for constant terms, on which such interpretations are identified with *individuals* in a model's ontology, is that given in Carnap 1942. Consult Hellie MS*b* on the development of Carnap's thinking concerning these matters.

- $\Vdash^{i}_{\mathfrak{M}} \Box\xi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
- $\Vdash^{i}_{\mathfrak{M}} \Diamond\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$

In this way, the Carnapean treatment gives formal expression to the contemporary picture of modality on which necessity characterizes how things are in all possible worlds, while possibility characterizes how things are in some possible world or other. *Truth at a world* (in a model) is now defined as satisfaction relative to every *index* sharing that world: thus $\vDash^{w}_{\mathfrak{M}} \varphi$ just if $\Vdash^{i}_{\mathfrak{M}} \varphi$ whenever $w_i = w$. By contrast, truth relative to a *model* is defined in terms of truth relative to the actual-world coordinate of that model: thus, $\vDash_{\mathfrak{M}} \varphi$ just if $\vDash^{@}_{\mathfrak{M}} \varphi$. For our purposes, entailment relations between sentences may remain characterized in terms of truth-preservation relative to all models, with truth relative to a model now understood in terms of truth relative to that model's actual-world coordinate @: thus $\Psi \vdash \varphi$ just if, for all $\mathfrak{M}$, $\vDash_{\mathfrak{M}} \varphi$ if for all $\psi \in \Psi$, $\vDash_{\mathfrak{M}} \psi$.

The traditional model-theoretic analysis of truth for modal languages in terms of satisfaction relative to the *actual-world coordinate* of a model serves to highlight the later significance of a key aspect of Kaplan's (1977) framework, considered above in Chapter 1 in connection with the puzzle of actuality. Recall from §1.3 that Kaplan analyzed entailment relations among sentences in terms of truth-preservation relative to all *contexts*: on Kaplan's conception, $\Psi \vdash \varphi$ just if, for all contexts c, the contextual-content of φ in c is true in w_c if that of each $\psi \in \Psi$ in c is similarly true in w_c (Kaplan 1989, 595).[9] Kaplan's de-relativization of truth from the actual-world coordinate of a model, and his replacement of the traditional analysis with that of *truth relative to a context*, is a central element in the smooth explanation his framework affords of the entailment-structure of 'actually' and cognate locutions, as we have already seen.

Specifically, what Kaplan's de-relativization of truth from the actual-world co-

[9]More formally, and in terms of our earlier (§1.3) representation of Kaplan's speech-act theoretic framework, on Kaplan's approach $\Psi \vdash \varphi$ just in case whenever $w_c \in \cap_{\psi \in \Psi} [\![\psi]\!]^c$, $w_c \in [\![\varphi]\!]^c$.

ordinate of a model makes available is the capacity to represent not only the *equivalence* of φ and $\mathsf{A}\varphi$, as explained in §1.3, but additionally the *cross-contextual non-rigidity* of matters of actuality: for sentence φ and $c, c' \in C = W \times T \times L \times D$, it may be that $w_c \in [\![\varphi]\!]^c$ while $w_{c'} \notin [\![\varphi]\!]^{c'}$, and consequently that $w_c \in [\![\mathsf{A}\varphi]\!]^c$ while $w_{c'} \notin [\![\mathsf{A}\varphi]\!]^{c'}$. That implies that where $i \propto_w c$, $\Vdash^i_c \mathsf{A}\varphi$, and similarly that $\nVdash^{i'}_{c'} \mathsf{A}\varphi$, where $i' \propto_w c'$; concretely, such cross-contextual non-rigidity is how it is with 'actually, a Democrat lost in 2016' when $w_c = @$ and $w_{c'}$ is the world of a context in which a Democrat won. One of the things I will be doing over the course of subsequent chapters is documenting various further ways in which Kaplan's de-relativization of truth from the actual-world coordinate of a model makes available the means of representing certain novel theories in *modal metaphysics* that are in a certain sense 'unstateable' against the backdrop of the traditional Carnapean model-theoretic approach. Intuitively speaking, the actual-world coordinate @ of traditional possible-worlds model theory serves as a representation of *our world*, i.e., the world we inhabit, and call 'actual'. That notion, and with it the notion of *truth-in-@*, loses much of its theoretical significance once we allow, as Kaplan does, that other possible worlds can 'play the role of the actual-world' (Kaplan 1989, 595).

2.2 Quantified Modal Semantics

Aggregating the lexicon and grammar of the simple quantified and modal languages $\mathscr{L}^{\forall}$ and $\mathscr{L}^{\Box}$ discussed above yields a *quantified modal language* $\mathscr{L}^{\forall\Box}$. Similarly aggregating elements of the Tarskian approach to quantification and the Carnean approach to modality just considered yields a semantics for such a language. Here are the details, updated in a broadly contemporary format.

Models remain pair-sequences $\langle \mathcal{F}, V \rangle$, consisting of a frame $\mathcal{F} = \langle W, D, @ \rangle$ and valuation function V, with the latter defined as for the modal vocabulary $\mathscr{L}^{\Box}$ just considered (§2.2.2.2). Thus, the model-relative interpretation $V(a_k)$ of each

individual constant term a_k remains an individual in that model's ontology D, while that of each n-place predicate $V(F^n_k) : W \rightarrow D^n$ is a possible-worlds intension, assigning to F^n_k its extension relative to each world w of that model. Additional complexity enters into the picture at the level of the *index of evaluation*: given a model $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ for $\mathscr{L}^{\forall\Box}$, an index i is now a *pair-sequence* $\langle w, g \rangle$, consisting of a world w in $\mathfrak{M}$ and variable assignment $g \in D^\omega$, defined as on the Tarskian approach to quantification earlier discussed (§2.2.2.1).[10] Where $i = \langle w, g \rangle$, we shall speak of w_i as the *world*, and of g_i as the *assignment*, of the index i.

The denotation of *terms* (individual constants and variables) is relativized to a model $\mathfrak{M}$ and index $\langle w, g \rangle$ for $\mathfrak{M}$, as follows:

$$\delta^i_{\mathfrak{M}}(\tau^k) = \begin{cases} V(\tau^k), \text{ where } \tau^k \text{ is a constant;} \\ \\ g_i(k) \text{ where } \tau^k = x_k. \end{cases}$$

The conditions on world- and assignment-relative satisfaction of formulae similarly aggregate those of the simple model-theoretic approaches to quantification and modality already discussed. Going forward, it will be useful to have these details laid out in full. Where $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ is any model for $\mathscr{L}^{\forall\Box}$ and $i = \langle w, g \rangle$ is an index of evaluation for $\mathfrak{M}$, the conditions are as follows:

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[10] Here I depart once more from Carnap (1947). Unlike Tarski, Carnap employed a *substitutional* analysis of the quantifiers, on which (relative to a model $\mathfrak{M}$ and index i) formulae of form $\forall x_k \xi$ and $\exists x_k \xi$ are satisfied just if ξ is satisfied relative to i under a replacement of each occurrence of its free variable x_k by every ($\forall$) or some ($\exists$) individual constant of the language. Such substitutional approaches to the analysis of quantificational sentences face well-known difficulties when construed as representations of the meanings of 'all' and 'some' in natural language, however, given that a natural language such as English does not contain a name for every individual. For example, 'something is F' may be true in English for an appropriate value of F despite the fact that nothing *named* in English is F; similarly, 'everything is F' may be false even if all named objects are F (for example, let Fx represent 'x is named'). Thus a substitutional approach such as Carnap's risks a problematic mismatch between the analysis of satisfaction for quantified formulae of the constructed language and the truth-conditions of quantified sentences of natural language. The broadly Tarskian approach to variable assignments set out in previous sections will again be presupposed in what follows.

- For atomic formulae:
  - $\Vdash^{i}_{\mathfrak{M}} F^n_k(\tau^1, \ldots, \tau^n)$ just if $\langle \delta^i_{\mathfrak{M}}(\tau^1), \ldots, \delta^i_{\mathfrak{M}}(\tau^n)\rangle \subseteq V(F^n_k)(w_i)$
  - $\Vdash^{i}_{\mathfrak{M}} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}}(\tau^j) = \delta^i_{\mathfrak{M}}(\tau^k)$
- For Boolean, quantified, and modal formulae:
  - $\Vdash^{i}_{\mathfrak{M}} \neg\xi$ just if $\nVdash^{i}_{\mathfrak{M}} \xi$
  - $\Vdash^{i}_{\mathfrak{M}} \xi \wedge \zeta$ just if $\Vdash^{i}_{\mathfrak{M}} \xi$ and $\Vdash^{i}_{\mathfrak{M}} \zeta$
  - $\Vdash^{i}_{\mathfrak{M}} \xi \vee \zeta$ just if $\Vdash^{i}_{\mathfrak{M}} \xi$ or $\Vdash^{i}_{\mathfrak{M}} \zeta$
  - $\Vdash^{i}_{\mathfrak{M}} \forall x_k \xi$ just if, for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
  - $\Vdash^{i}_{\mathfrak{M}} \exists x_k \xi$ just if, for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
  - $\Vdash^{i}_{\mathfrak{M}} \Box\xi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
  - $\Vdash^{i}_{\mathfrak{M}} \Diamond\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$

Finally, the definitions of *truth* and *entailment* on the Carnapean picture similarly aggregate those considered independently above in connection with quantified and modal languages. Truth relative to an index i in a model is defined as satisfaction in that model relative to the *world* w_i of i; thus, where i/w^* is that index differing from i at most in that $w_{i/w^*} = w^*$, $\vDash^{i}_{\mathfrak{M}} \varphi$ just if, for all i', $\Vdash^{i'/w_i}_{\mathfrak{M}} \varphi$. Truth relative to a model $\mathfrak{M}$ is defined in terms of truth relative to all indices sharing the *actual-world* coordinate @ of $\mathfrak{M}$: thus $\vDash_{\mathfrak{M}} \varphi$ just if, for all indices i, $\vDash^{i/@}_{\mathfrak{M}} \varphi$. Finally, entailment on the simple Carnapean approach remains understood as truth-preservation across models, understood as above in terms of truth relative to all indices sharing a model's actual-world coordinate @.

2.3 The Rise of Modal Metaphysics

Due presumably in large measure to the conceptual clarification afforded by Carnap's work of the mid-1940's, the ensuing decades witnessed a period of renewed

interest in distinctively *metaphysical* questions about modality. It was during this period that many of the central theoretical contours of contemporary modal metaphysics would begin to take shape.

One of the tasks of each subsequent chapter will be to document the emergence, over the course of this formative period, of a surprisingly prevalent methodological trajectory. The trajectory involves the gradual abandonment of various intuitively natural hypotheses of 'simple and straightforward' modal metaphysics, each meshing smoothly with underlying aspects of the broadly Carnapean semantical framework set out in this chapter, and a concomitant move towards 'complicated and controversial' theorizing. That is how matters proceeded when it comes to contemporary thinking about the nature and structure of modality, for example, a topic to which we return shortly, in Chapter 3.

I shall be arguing that much of this general methodological trajectory was theoretically premature. As we will see, in each case the gradual move towards complicated and controversial theorizing was motivated, in large measure, by the assumption that certain *prima facie* recalcitrant modal-metaphysical data cannot be naturally represented or understood given only the theoretical resources of the Carnapean semantical model. And yet, for reasons we have already noted at several points in the discussion thus far, as it stands that framework is importantly *incomplete*, theoretically speaking. The crucial phenomenon of *context*-relativity, in contrast with the more philosophically-entrenched phenomenon of index-relativity, was not yet sufficiently well-understood during the period in which Carnap worked; the major step forward would not come until much later, with the eventual publication of Kaplan's 'Demonstratives'. It is these historically contingent limitations at the level of theoretical foundations, and not the character of the seemingly recalcitrant modal-metaphyiscal data *as such*, which explain the widespread assumption in contemporary modal metaphysics that simple problems and puzzles require complicated and controversial solutions.

They do not. Reconsidered through the lens of more theoretically adequate

foundations which incorporate *both* index- and context-relativity, data widely seen as militating in favor of increased complexity in modal metaphysics may be reconciled with the simple and straightforward semantical framework that Carnap pioneered.

Chapter 3

Laws and Modality

3.1 Modal Structure

Relativized to the possible world of the context, metaphysical modality may be viewed as having a simple, but cross-contextually non-rigid, structure. That view of modality makes available an attractive further conception of the structure of *lawhood*, and of the relation between lawhood and metaphysical necessity, that has been largely neglected in recent literature concerning the modal status of the laws of nature.

3.1.1 The Simple View

Carnap's contribution to the model-theoretic tradition laid the foundations for the familiar contemporary analysis of modality in terms of quantification over possible worlds.[1] Suppressing reference to a model, the core idea of the Carnapean treatment of modality is that a sentence φ is *possible* (or possibly *true*) relative

[1]Or world-like entities: I noted above, in Chapter 2, that Carnap (1947) conceived of modality in terms of quantification over 'state descriptions'. However, I shall continue in what follows to discuss Carnap's contribution in the contemporary idiom of possible-worlds semantics.

to world of evaluation w just when φ is true relative to some world w', and *necessary* just if φ is true relative to all worlds.[2] Notably, on the Carnapean picture of Chapter 2, such quantification is conceived as *universal* quantification over the world-parameter of the index. This straightforward treatment has the effect that a sentence's modal status is represented as *non-contingent*: given a sentence φ, both $\Diamond\varphi$ and $\Box\varphi$ are represented as necessary if true, and otherwise as impossible.[3]

This representation of modal status as non-contingent meshes smoothly with Carnap's own conception of the necessity operator $\Box$ as encoding what he called 'L-truth', understood (roughly) in terms of analyticity, or truth in virtue of meaning.[4] But the idea meshes equally well with a more contemporary interpretation of the modal operators as encoding *metaphysical* possibility and necessity, standardly viewed as coinciding with the broadest forms of possibility and necessity there are.[5] Supposing metaphysical modality to have this distinctive character, it is intuitively natural to conceive of matters of metaphysical possibility and necessity as 'invariant' across the space of possible worlds, and, consequently, as non-contingent.[6]

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[2]I temporarily ignore variable assignments for simplicity, and for present purposes we may take our background language to be the simple modal language $\mathscr{L}^{\Box}$ introduced in Chapter 2. I shall return to the topic of quantified modal semantics down the line in Chapters 4 and 5.

[3]More exactly: given the Carnapean treatment of the modal operators as unrestricted quantifiers over worlds, relative to a model all worlds enter into determining the truth or falsity of modal-fronted sentences, relative to any world of evaluation w. This has the effect that whether or not the truth-conditions of a modal-fronted sentence obtain is matter that is independent of the world parameter relative to which the sentence is evaluated. Consequently, Carnapean possible-worlds semantics represents sentences of form $\Diamond\varphi$ and $\Box\varphi$ as having a *constant* truth-value at each world in each model.

[4]Carnap held that a sentence φ is L-true, relative to a 'semantical system' S, if φ "is true in S in such a way that its truth can be established on the basis of the semantical rules of the system S alone, without reference to extra-linguistic facts" (Carnap 1947, 174). As Williamson (2013*b*, 46) notes, a more contemporary analogue of Carnap's notion of L-truth might be given by what philosophers now refer to as 'logical necessity'.

[5]See, e.g., Fine 1994, 2002, 2005*a*, Sider 2003, 2011, Ch. 12, and Rosen 2002, 2006 for discussion of the nature of metaphysical modality in the spirit of the standard characterization given here.

[6]The supposition that matters of metaphysical modality are world-invariant corresponds to an

Despite its straightforward character, the Carnapean treatment of modality is sometimes thought to obscure certain broadly structural features of possibility and necessity that cannot be adequately represented given a conception of the modal operators as unrestricted quantifiers over worlds. Central here is the important theoretical notion of *natural*, or *nomological*, necessity—that is, necessity as it attaches to the laws of nature that obtain in our world. Given certain conceptions of the nature of lawhood, it is plausible to suppose that the laws of our world are 'broken' off at other (metaphysically) possible worlds, and consequently that nomological necessity has a richer structure than simple Carnapean modal semantics would seem capable of representing. That is *prima facie* the case, for example, when it comes to an attractively austere conception of the nature of laws that derives historically from Mill (1868) and Ramsey (1928), and which has been defended more recently by Lewis (1973*b*,*a*, 1983) and Loewer (1996, 2007).

Lewis articulated the idea as follows:

> I adopt as a working hypothesis a theory of lawhood held by F. P. Ramsey in 1928: that laws are 'consequences of those propositions which we should take as axioms if we knew everything and organized it as simply as possible into a deductive system.' We need not state Ramsey's theory as a counterfactual about omniscience. Whatever we may or may not ever come to know, there exist (as abstract objects) innumerable true deductive systems: deductively closed, axiomatizable sets of true sentences. [...] [A] contingent generalization is a *law of nature* if and only if it appears as a theorem (or axiom) in each of the true deductive systems that achieves a best combination of simplicity and strength. (Lewis 1973*b*, 73–4)

More broadly, the view is that the laws of nature in a given possible world *w* are deductive consequences of the 'best system' of that world, where *w*'s best system

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intuitive conception of metaphysical modal logic as coinciding with the simple modal system S5. I shall return to discuss the status of S5 as the appropriate propositional logic of metaphysical modality in further depth below (§3.1.2), and in the subsequent chapter.

is construed as a theoretically ideal systematization of *w*'s 'local' qualitative character, itself typically supposed to be a matter that supervenes upon *w*'s distribution of *natural* (Lewis 1983) or *fundamental physical* (Loewer 2007) properties. Given such best-systems analyses of lawhood, the idea that nomological and metaphysical modal structure fail to coincide can seem very plausible. For example, it seems reasonable to suppose that various theoretically privileged and exceptionless regularities, or patterns, that emerge in the local qualitative structure of our world might have exceptions in other possible worlds: perhaps it is a theorem of *our* world's best system, for instance, that entities with mass uniformly attract in one law-like manner, despite its being the case that in other worlds massy entities uniformly behave altogether differently (compare Fine 2002). If so, then what is nomologically necessary from our own actual point of view is not 'strictly necessary' (Lewis 1986*c*, 7); more broadly, such considerations might reasonably support a view on which nomological necessity is a weaker form of necessity than the metaphysical, given that the latter is plausibly conceived as invariant from one possible world to the next.

Indeed, and abstracting away from the details of best-systems theories, it is intuitively the case that on any reasonable conception of lawhood matters of nomological necessity are such as to permit of at least *minor* variation from one possible world to the next: given the laws that prevail in one possible world *w*, worlds *w*′ which 'obey' the laws of *w* might nevertheless represent, as nomological possibilities, certain states of affairs that are modally precluded from the view of *w*.[7] *Prima facie*, that thought suggests that lawhood has a more complex structure, or fineness of grain, than is capable of being accurately represented given only the theoretical resources of Carnap's simple semantical picture. Such considerations have traditionally been seen as militating in favor of various *complications*

[7]For example, and as Wilson (2005) points out in connection with necessitist conceptions of lawhood as defended by, e.g., Shoemaker (1980, 1998) and others, it is reasonable to think that even on the assumption that our actual laws are strictly necessary any particular law might manifest itself slightly differently at worlds with somewhat different physical constants.

to the Carnapean picture of modality, together with associated restrictions on the principles of modal logic that are to be treated as valid for nomological necessity.

3.1.2 Priorean Accessibility

Drawing on influential work on the foundations of modal logic by C.A. Meredith and Arthur Prior in the late 1950's and early 1960's, such complications and constraints have historically taken the following, general form.

Notice to begin that model-theoretic representations of modality, such as Carnap's, which treat the modal operators as universal quantifiers over possible worlds validate each of the (T), (B) and (4) principles of S5 modal logic:[8]

(T) $\Box\varphi \vdash \varphi$

(B) $\varphi \vdash \Box\Diamond\varphi$

(4) $\Box\varphi \vdash \Box\Box\varphi$

Principle (T) says that what is necessary is the case, while principles (B) and (4) say, respectively, that what is the case is necessarily possible, and that what is necessary is necessarily necessary. Jointly, these principles are provably equivalent to the following 'characteristic' principle of S5 modal logic, according to which matters of possibility are non-contingent:

(5) $\Diamond\varphi \vdash \Box\Diamond\varphi$

Each of these principles of S5 corresponds to an intuitively plausible constraint on the inferential behavior of the modal operators on the assumption that matters of contingency and non-contingency are invariant across the space of possible worlds, as on the Carnapean conception.

[8] As axiomatized by Lewis and Langford (1932). See, e.g., Hughes and Cresswell 1996, Ch. 3 and Sider 2010, Ch. 6 for discussion of the validity of these and other logical principles on model-theoretic treatments of modality as involving unrestricted quantification over possible worlds.

Meredith and Prior's central contribution was to show that modal logics weaker than S5 could be generated by building into models for constructed formal languages a binary 'accessibility' relation R, holding between relevant indices of evaluation.[9] Specifically, Meredith and Prior showed that principle (B), $\varphi \vdash \Box\Diamond\varphi$, is falsifiable in models for which R is *non-symmetric*, and similarly that principle (4), $\Box\varphi \vdash \Box\Box\varphi$, is falsifiable in models for which R is *intransitive*. Combining these results, Meredith and Prior similarly showed that the characteristic non-contingency principle (5) of S5 modal logic, $\Diamond\varphi \vdash \Box\Diamond\varphi$, is falsifiable in any model for which R is *non-Euclidean.*

Though Meredith and Prior's initial research focused primarily on the applications of relative-accessibility semantics in temporal logics, in which R is conceived as an ordering relation on times, Prior (1962*a*, 1962*b*, §3) would subsequently extend these ideas to the realm of possible-worlds modal semantics. In contemporary terms, Prior's idea was as follows. Let a 'Priorean' frame $\mathcal{F}$ for a simple, non-quantified modal language such as $\mathscr{L}^{\Box}$ be a four-tuple $\langle W, D, @, R\rangle$ in which $R \subseteq W \times W$ is an accessibility relation over worlds in W. Intuitively, the idea is that $\langle w, w'\rangle \in R$ just in case what is true at w' is possible with respect to w, and hence just in case w' represents a possibility from the view of w. As Prior demonstrated, the incorporation of such an accessibility relation into our model theory enables a representation of the model- and index-relative satisfaction of modal-fronted sentences as a matter that involves *restricted* quantification over only those worlds relevantly accessible from the world of evaluation. Employing the notational conventions of previous chapters, Prior's accessibility semantics for the modal operators may be represented as follows:

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[9]For a useful overview of the Meredith-Prior contribution to contemporary modal model-theory, see Copeland 2002, 2006. Meredith and Prior's early work on these issues focused primarily on the case of temporal logics; accordingly, the indices of evaluation at issue were identified with *times* (see, e.g., Meredith and Prior 1956 and Prior 1956, 1958). It was Prior (1962*a*,*b*) who would later extend these ideas to modal logics for possibility and necessity, as will be explained shortly.

- $\Vdash^{i}_{\mathfrak{M}} \Box\varphi$ just if, for all $i' \approx_w i$ such that $\langle w_i, w_{i'} \rangle \in R$, $\Vdash^{i'}_{\mathfrak{M}} \varphi$
- $\Vdash^{i}_{\mathfrak{M}} \Diamond\varphi$ just if, for some $i' \approx_w i$ such that $\langle w_i, w_{i'} \rangle \in R$, $\Vdash^{i'}_{\mathfrak{M}} \varphi$

Thus on Prior's approach, necessity relative to a world w_i (in a model $\mathfrak{M}$) becomes truth relative to all w_i-accessible worlds, while possibility becomes truth relative to some accessible world or other.[10]

In contemporary modal metaphysics, Prior's technical innovation has become the default device for representing the idea that nomological necessity has a more finely-structured 'grain' than may be represented in semantical systems, such as Carnap's, which treat modality has having a constant structure across the space of possible worlds. Thus, for example, Lewis (1986*c*, 20) implicitly appeals to Priorean relations of relative accessibility in order to illustrate the failure of nomological necessity, on a best-systems account of lawhood, to satisfy the various principles of S5 modal logic noted above. Lewis writes:

> Is it so that whenever world w_1 obeys the laws of w_0, then w_0 also obeys the laws of w_1? Is it so that whenever w_2 obeys the laws of w_1 which in turn obeys the laws of w_0, then w_2 obeys the laws of w_0? Is it so that whenever w_1 and w_2 both obey the laws of w_0, then they obey each other's laws? Is it so that every world obeys its own laws? A theory of lawhood can be expected to answer these questions, and we can see how different theories would answer them differently. (For instance, my own views on lawhood answer all but the last in the negative).

Lewis conceives of nomological accessibility between worlds in terms of obedience to laws: on Lewis's conception, world w' represents a nomological possibility, relative to world w, just in case the local qualitative structure of w' may be

[10]Here we suppose that indices i are one-place sequences $\langle w \rangle$. The complication of the index by way of variable-assignment functions of the sort discussed in §2.3 adds no additional complexity to the above Priorean semantics for the modal operators, which are construed as semantically independent of such assignment-parameters (contrast the counterpart-theoretic semantics for *de re* modality discussed down the line in Chapter 4).

characterized in terms of lawful generalizations belonging to the best system for w. (Notice that w''s obedience to the laws of w need not imply that what is a law in w is similarly a *law* in w'—rather, the implication is merely that w's laws fail to be violated at w'. That fact will be relevant in the discussion to come). As the passage quoted above makes clear, Lewis views nomological accessibility as neither transitive nor symmetric; consequently, Lewis conceives of nomological necessity as appropriately characterized by a logic weaker than the intuitively-simple system S5. Specifically, it is plausible to read Lewis as holding that the weak system of T modal logic, characterized by the 'reflexivity' principle $\Box\varphi \vdash \varphi$, is the appropriate logical system for representing nomological necessity. For Lewis supposes, plausibly, that matters of lawhood and concomitant nomological necessity relative to a given world w reflect what is 'the case' in w.

Prior's formal technique affords us *one* historially influential mechanism for representing the fact that nomological modal structure fails to remain constant across the space of possible worlds. We will shortly consider the question of whether Prior's formal technique is the only—or *best*—means by which the complexity of nomological modal structure might be represented at the model-theoretic level.

3.2 Better Foundations

3.2.1 The Influence of Indexicality

Prior's formal technique represents an early manifestation of an historically significant methodological theme that begins to emerge at the intersection of modal metaphysics and modal semantics in the decades following Carnap's contributions. The theme is one according to which certain data which stand in *prima facie* tension with some element or other of the simple Carnapean picture are to be accomodated by incorporating further *structure* into the formal foundations of

modal metaphysics. Often, such further structure is implemented, as it is in the case of Prior's contribution, in terms of the gradual complexification of the index-relative satisfaction conditions for sentences of constructed modal languages such as $\mathscr{L}^{\Box}$. As we shall see over the course of subsequent chapters, this methodological trajectory towards *index-complication* is by no means limited to current thinking on the topic of modal structure, but extends broadly into other domains of contemporary modal metaphysics as well.

It is therefore equally historically significant that the formal foundations of modal metaphysics, which Prior proposed to complicate, were at the time of his contribution importantly incomplete. As we have had occasion to note at several points in the discussion thus far, the crucial phenomenon of *context* relativity, as opposed to the more philosophically-entrenched phenomenon of index relativity that was the focus of work in the model-theoretic tradition leading up to Carnap's contributions, was not yet sufficiently well-understood during the period in which both Meredith and Prior worked. This contingent historical fact suggests that the availability of certain theoretically attractive rival means of capturing the putative structural 'complexity' of modality may well have been obscured in the decades following Carnap's work. In particular, one might reasonably question whether the aim of representing the intuitive complexity, or 'fineness of grain', of *nomological* modal structure might be better-served by a conception of lawhood and nomological necessity as relativized to the possible world of the *context*.

3.2.2 Cross-contextual Non-rigidity

Here is one way in which the broad outlines of such a view might be represented.[11] As with our earlier discussion of Kaplan's speech-act theoretic framework in

[11]The following paragraphs set out a general template for the contextual relativization of modal metaphysics that will be further developed over the chapters to come. The template sketched here is incorporated into a (propositional) semantics for context-relative modality in §3.4 of the present chapter.

Chapters 1 and 2, let us continue to identify the available *contexts* with the set $C \subseteq W \times T \times L \times D$, with W a (non-empty) set of possible worlds, and T, L, and D similarly non-empty sets of times, locations, and individuals, respectively. A *context* $c \in C$ may thus be understood as a structure comprising a possible world w_c, together with a contextually salient time t_c, location ℓ_c, and agent d_c, each drawn 'from within' the possible world of the context w_c. Given $c \in C$, let us represent the space of (metaphysically) possible worlds that are available for quantificational purposes from the view of w_c as a non-empty set W_c; here the idea is that each $w \in W_c$ represents a metaphysical possibility from the contextual perspective represented by w_c. We stipulate that for each $c \in C$, $w_c \in W_c$: the world of any context is a metaphysical possibility, as from the view of that context.

Notice, crucially, that given $c, c' \in C$ it may be that $W_c \neq W_{c'}$: the (metaphysical) possibilities available from the view of w_c may fail to coincide with those available from the view of $w_{c'}$. That is a natural way of capturing the idea that *metaphysical* contingency and non-contingency are sensitive to a contextual standpoint: given $c \in C$, it may be that matters are a certain way 'throughout' W_c, and are consequently that way necessarily as from the view of w_c; imaginatively shifting the world of the context from w_c to $w_{c'}$, perhaps matters go differently throughout $W_{c'}$. If so, what is necessary, respectively, relative to c and c' fails to coincide (compare Murray and Wilson 2012). Let us describe such a scenario as one in which matters of metaphysical necessity are *cross-contextually non-rigid*.

Return now to the main theme. What the foregoing apparatus does is allow for a representation of lawhood, and of nomological necessity, as structurally simple from a context, but as non-rigid *across contexts*. Consider first the structural simplicity of nomological necessity. Given $c \in C$, let us represent the space of (metaphysically) possible worlds that 'obey' the laws of w_c—as it were, the 'nomological neighborhood' of w_c— as a non-empty set $w_c(\pounds)$. Suppose further that for each $c \in C$, $w_c(\pounds) = W_c$. Then the laws that prevail, relative to each *context* c, are obeyed throughout the space of metaphysical possibilities available from the view

of w_c, and are consequently metaphysically necessary from that contextual standpoint. Consider, second, the cross-contextual non-rigidity of lawhood. Suppressing reference to a model, matters of lawhood are cross-contextually non-rigid just in case, for some φ and $c, c' \in C$, $\Vdash_c^{w_c} \Box\varphi$ but $\nVdash_{c'}^{w_{c'}} \Box\varphi$, where $\Box$ encodes nomological necessity; that is achieved by allowing that the 'nomological neighborhoods' $w_c(\pounds)$ and $w_{c'}(\pounds)$ of w_c and $w_{c'}$ may in certain cases be non-coincident. Combining the two ideas, the present picture is thus one according to which (*a*) each law of nature that prevails from the view of a given context is a *metaphysical necessity*, from that contextual standpoint; and (*b*) different contextual standpoints disagree on the laws, and consequently on what counts as metaphysically necessary.

That is a way of representing the intuitive 'fineness of grain' of nomological modal structure—understood broadly in terms of the capacity for matters of lawhood to *vary* from one possible world to the next—that has been largely ignored in the recent literature. Before proceeding further, it will be instructive to briefly consider a concrete example of how this alternative picture handles data of the sort typically supposed to militate in favor of the more traditional, Priorean, picture noted earlier in §3.1.2.

Consider a possible world w in which the prevailing causal laws are *quasi-deterministic*, in the following sense. Given the laws in w, together with the fact that throughout interval t in w local matters have character κ, from the view of w the facts throughout t could have had character κ', but not character κ'' (things having character κ'' being modally precluded, as it were, by the quasi-deterministic laws of w). Concretely: perhaps in w a particular thunderstorm that endures throughout t has a certain intensity, but could—compatibly with w's quasi-deterministic causal laws—have had a slightly though not substantially different intensity instead.[12] Then presumably the same principle applies off at a possible world w' sharing the quasi-deterministic laws of w, but in which local

[12] I draw throughout this brief discussion on Lewis's conception of (strict) causal determinism, as developed in Lewis 1973*a*, 2000.

matters throughout t have character κ' and not character κ. In particular, given that the quasi-deterministic laws of w are similarly *laws* in w', one might reasonably suppose that from the view of w' local matters throughout t could have had character κ'' instead of κ'.

Prima facie, that is a picture that lends itself naturally to representation in terms of a Priorean conception of nomological accessibility as *intransitive*, as follows:

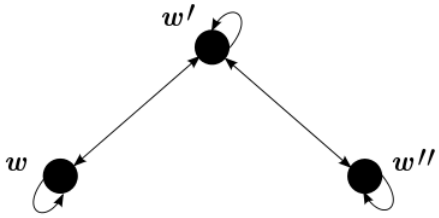

Figure 1. Intransitivity of nomological accessibility on the Priorean view. Arrows between worlds represent relations of relative nomological accessibility: world w' is nomologically possible relative to w, while w'' is possible relative to w'; however, world w'' is nomologically impossible relative to w.

Closely related considerations might reasonably be taken to imply that nomological accessibility between possible worlds is *non-symmetric* in Prior's sense. Plausibly, certain novel laws, alien to world w, emerge off at other possible worlds in which the quasi-deterministic causal laws of w are nevertheless obeyed. (Recall, from §3.1.2, that obedience to the laws of one world w off at another world w' need not imply *coincidence* of lawhood between w and w'; compare Lewis 1986*c*, 20). If so, then evidently from the view of worlds that are nomologically accessible from w, what is the case *in* w may no longer count as possible. More concretely, and to illustrate: suppose now that in w' the prevailing causal laws are *strongly deterministic*, and consequently that from the view of w' matters of local qualitative fact throughout t could not have had any character other than k' (given the laws of w'). Then from the view of w', our original world w represents a way

things could not have been, nomologically speaking, given that in w local matters throughout t have character κ.

Prima facie, that second scenario seems to imply that what is nomologically possible from the view of w is not *necessarily* (nomologically) possible. Again, that is a picture that lends itself naturally to representation in terms of a Priorean conception of nomological accessibility as non-symmetric. As follows:

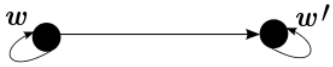

Figure 2. Non-symmetry of nomological accessibility on the Priorean view. World w' is (nomologically) possible relative to w, but w is (nomologically) impossible relative to w'.

It is abstract considerations such as these which have evidently led a number of contemporary philosophers, including not only Lewis (1973*b*,*a*, Ch. 4), but also Dretske 1977, Tooley (1977, 1987), and Armstrong (1983, 1997, Ch. 15), to the view that nomological and metaphysical necessity are structurally heterogeneous. For as we noted at the outset of this chapter, it is reasonable to suppose that matters of metaphysical non-contingency are not such as to vary from the standpoint of one possible world to another in this way.[13]

And yet such data as the foregoing is largely inconclusive when considered through the lens of the alternative picture of nomological modal structure I sketched a moment ago. Considered through that lens, the key notion of being 'off at' another possible world, such as w', is loose, and ambiguous between (*a*) a conception

[13]As we shall see over the course of subsequent discussion, Lewis's own views concerning the structure of metaphysical modality are in some ways more subtle than the present discussion reflects. Specifically, Lewis may be reasonably understood as maintaining that matters of *general*, or *de dicto*, metaphysical modality are invariant from one possible world to the next, as on standard models for propositional S5. However, Lewis departs from this conception when it comes to certain cases of (iterated) *de re* metaphysical modality: he allows, for example, that certain states of affairs may be metaphysically impossible but yet *possibly possible* from the standpoint of actuality, contra S4 and S5 modal logics. I return to these more finely grained aspects of Lewis's thinking on the topic of modality *de re* in greater depth in the following chapter.

of w' as a (counterfactual) possibility *from the view of* w, and (*b*) an alternative *context from which* matters of lawhood and nomological necessity might be evaluated. That is a distinction that cannot be drawn given only the resources of traditional possible-worlds modal semantics, which Prior proposed to complicate by way of the apparatus of relative accessibility; on that traditional picture, possible worlds figure solely as representations of counterfactual possibilities, or indices relative to which matters of truth and falsity are to be evaluated (§1.4). Once the Kaplanian notion of context is on the table, however, such data as the foregoing no longer militates univocally in favor of the Priorean picture, and is in fact entirely compatible with a conception of nomological modal structure as both simple and cross-contextually non-rigid.

As follows. Construing w' as the possible world of a context, the consideration of what is the case 'off at' w' involves the untethering of our imaginative standpoint from a world in which the laws of nature are as w represents them as being, and the imaginative shifting of our contextual perspective from w to w'. With the consideration of what is the case off at w' construed as involving the shifting of context from w to w' in this way, what the data surveyed above demonstrates is not that the laws as from our original 'source' perspective in w fail to be obeyed relative to every possibility: indeed, the picture is compatible with the view that from the contextual perspective of w, *all* possible worlds without restriction are such as to obey the quasi-deterministic causal laws that prevail in w. Instead, with w' construed as the world of a possible context, what consideration of lawhood from the view of w' demonstrates is that matters of lawhood and nomological necessity as from the contextual standpoints of w and w' fail to coincide. That is a reflection not of the sub-S5 structural complexity of nomological modality from the view of either w or w', but instead of the cross-contextual non-rigidity of lawhood, and of the *dependence* of nomological and metaphysical necessity upon a contextual perspective.

Indeed, that is in some ways just the nomological modal counterpart of the se-

mantic behavior of 'actually' in modal contexts, discussed in Chapter 1 in connection with the puzzle of actuality. Just as our theoretical capacity to imaginatively shift the possible world of the context does not show it to be genuinely contingent that a Republican *actually* won in 2016, the consideration of alternative 'systems' of nomological necessity from the view of different contexts does not imply that, as from any *particular* context, matters of lawhood could genuinely have been otherwise.

3.2.3 Contingency vs. Non-rigidity

Thus far we have two pictures.

The first—Prior's—involves complicating the index-relative satisfaction conditions of modal-fronted sentences of form $\Box\varphi$ and $\Diamond\varphi$: on this approach, necessity and possibility, as from the view of a world of *evaluation* w_i, are to be understood in terms of truth throughout all or some of the space of possibility *relevantly accessible* from w_i.

The second—mine—involves leaving the Carnapean, simple-index model of satisfaction for modal-fronted sentences alone: instead, unrestricted possibility and necessity are relativized to the world of the *context* w_c. Given $c, c' \in C$, the approach allows that it may be that $W_c \neq W_{c'}$, and consequently that modal matters from the view of w_c and $w_{c'}$ might fail to coincide. Both pictures afford a means of representing the intuitive 'localness' of lawhood from the view of a given possible world; consequently, both pictures explain the intuitive capacity for the laws of nature to *vary* from one world to the next. But my picture does so in a way that similarly construes the laws of nature that obtain from the view of any context as *metaphysical necessities*: that representation of nomological and metaphysical necessity as coincident, relative to a context c, is achieved by the identification $w_c(\text{£}) = W_c$: a construal of the nomological 'neighborhood' of each context as coincident with its space of unrestricted possibility.

That is a significant difference between the two pictures. As I will now show, distinctive explanatory advantages accrue on a conception of lawhood as metaphysically non-contingent, as from a context, that are unavailable on a more traditional Priorean conception of nomological and metaphysical modality as structurally heterogeneous.

3.3 Applying the Idea

3.3.1 Metaphysical Austerity

Recall the *best-systems analysis* of lawhood briefly discussed in §3.1: the laws of nature are theorems of the simplest, and most explanatorily powerful, systematic description of our world's local qualitative character, itself a matter that supervenes upon the distribution of natural or fundamental physical properties within our world.

Proponents of that view often cite its ability to explain the nature of lawhood in a metaphysically 'lightweight' fashion as among its central advantages over rival conceptions. To illustrate, consider a familiar puzzle of 'nomic demarcation' raised by the following pair:[14]

1. All solid spheres of enriched uranium (U235) have a diameter of less than one mile.

2. All solid spheres of gold (Au) have a diameter of less than one mile.

Each states a true, exceptionless, generalization about our world's qualitative character. Nevertheless, it is intuitively the case that what (2) reports is merely accidental, while what (1) reports is something that in some sense *must be*, as a matter of natural law (compare van Fraassen 1989, 21). The best-systems theorist maintains that the difference between (1) and (2) has nothing to do with any

[14]Due to Hempel and Oppenheim 1948.

metaphysically substantive feature that genuine laws alone exemplify. Instead, according to the best-systems theorist, if (1) alone express a law of nature of our world, that is merely because it alone is a logical consequence of a theoretically ideal systematization of what our world happens to be like.

The underlying metaphysical austerity of this way of thinking about lawhood is naturally seen as a central theoretical virtue of the besst-systems approach. Thus, for example, Loewer (2007, 313) maintains that the best-systems analysis is to be preferred over rival theories of lawhood on the basis of its eschewal of "metaphysically heavy-duty and suspect entities". Here, Loewer has in mind such metaphysically robust conceptions of lawhood as defended by Shoemaker (1980, 1998), Swoyer 1982, and others, according to which lawhood is to be explained in terms of metaphysically primitive dispositional, or causal, powers associated with the natures of the broadly-scientific properties which figure in the laws.[15] Similarly, as Lewis (1983, 366–68) points out, in explaining the intuitive force which attaches to genuine laws (such as (1)) but not mere accidental exceptionless regularities (such as (2)), the best-systems theorist has no need to appeal to metaphysically substantive 'governing relations', or relations of 'nomic necessitation', holding between properties, as have been postulated by such theorists as Armstrong (1983, 1997, Ch. 15).[16] As above, on Lewis's view the relevant difference between (1) and (2) is ultimately to be explained by the participation of the former, but not the latter, in the best system of actuality, and not—as Armstrong and others suppose—on the basis of some more metaphysically complex feature of nomological reality.

[15] See also, e.g., Ellis 2000, 2001 and Bird 2004, 2005 for similarly metaphysically substantive conceptions of the nature of lawhood.

[16] I shall return below in §3.3.2 to Armstrong's conception of the laws, and associated criticisms of the best-systems analysis.

3.3.2 Explanation

And yet despite the underlying metaphysical austerity of the best-systems approach, critics of the view maintain that certain aspects of the *theoretical role* of lawhood fail to be sufficiently accounted for on the assumption that laws are merely theorems of our world's best system.[17] Central here is the supposition that it is constitutive of the theoretical role of lawhood that the laws of nature be *explanatory*.

One dimension of this explanatory role is taken to lie in the capacity of laws to determine the way in which matters of particular fact unfold within our world: that our world has a particular 'nomic structure', reflected in the lawful dependence of matters of particular fact at one time upon such matters at other (presumably, earlier) times, is, it is supposed, something that ought be grounded in or otherwise explained by what the laws of our world happen to be like. Laws "constrain the evolution of states" (Loewer 1996). And yet it is maintained by many that laws construed as mere deductive consequences of our world's best system fail to be appropriately explanatory in this way.

Thus Armstrong (1983, 41), for example, objects to Lewis's version of the best-systems analysis on the grounds that it fails to provide a compelling, and non-circular, explanation of the non-accidental character of our world's nomic structure. Armstrong writes:

> Laws [...] explain regularities. Even if we take the Humean uniformity itself, that all Fs are Gs, it seems to be an explanation of this uniformity that it is a law that Fs are Gs. But, given the [best-systems analysis], this would involve using the law to explain itself. We need to put some 'distance' between the law and its manifestation if the law is to explain the manifestation.[18]

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[17] Loewer (1996, 110–11) provides a thorough overview of the issues considered in the following discussion.

[18] See also Maudlin 2007, 172 for a similar objection to Lewis's version of the best-systems view. The distinctively 'Humean' aspect of Lewis's own thinking about modality in connection with the

Armstrong's talk here of *distance* between law and manifestation is meant to convey the thought that laws cannot be identical to mere regularities—even those regularities which are theorems of our world's best system—if the laws are to provide a non-circular explanation of the fact that our world has the particular nomic structure that it does. Armstrong's supposition is that laws on a best-systems analysis are merely a certain (epistemically or theoretically) privileged aspect of that structure itself, and so cannot serve as an *independent* foundation for a non-circular account of why matters of particular fact in our world must unfold with (nomological) necessity in the way that they do.

Another, broadly epistemic, dimension of the supposed explanatory role of the laws is taken to lie in the capacity of lawhood to serve in grounding inductive success, and more generally in explaining the epistemic justification that attaches to reasoning concerning future or unobserved manifestations of a law of nature. Here again it is maintained by some that mere regularities in nature do not have the requisite capacity to explain inductive justification in this way, even if such regularities have the distinctive status of participating in an ideal theory of what reality is like.

Thus it is that Swoyer (1982, 208–9) objects to the best-systems analysis as follows:

> It is unclear what could justify accepting a mere generalisation (even one with pragmatic or epistemological trappings) short of checking all of its instances, for if laws merely record regularities, why should the fact that two properties have been found to be coinstantiated or to be instantiated in succession be thought to tell us anything about unobserved cases? Yet if a sentence telling us that all Gs are Fs is regarded as 'lawlike', we often feel justified in accepting it after observing just a few positive instances. This practice would seem to be warranted only if there is something about a thing's being G that at least *makes it probable* that it is also F.

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laws of nature will be discussed in greater detail below, in §3.4.

Swoyer's point is that the mere inclusion of some universal generalization in the deductive closure of our world's best system does not explain the epistemic justification which attaches to predictions about future manifestations of a given law. Returning to an earlier example: suppose that among the theorems of the simplest and most informative description of our world's structure is the fact that entities with mass attract in a certain (as yet) exceptionless way (an 'inverse-square' law of attraction, say). Why should we suppose, merely on that basis, that in the future entities with mass will not behave entirely differently, perhaps attracting instead according to an inverse-*cube* law?[19] Swoyer's concern is that the mere inclusion of a given regularity, or pattern, in an ideal systematization of our world's local character does not explain the probative force of the laws in justifying our belief that matters will manifest themselves according to that pattern in the future.

The conclusion drawn by Armstrong, Swoyer, and others is that the best-systems analysis is *explanatorily inadequate* when construed as a general theory of lawhood. That inadequacy is seen as independently motivating a more robust conception of laws as involving metaphysically substantive features of reality. Thus, for example, in his early work on these topics Armstrong proposed to explain the intuitive modal 'force' which attaches to the laws of nature in terms of a (metaphysically contingent) relation of 'nomic necessitation' holding between relevant universals (Armstrong 1983); in later work, Armstrong would come to identify the laws of nature with complex, structural, universals—or 'state of affairs-types'—the instantiation of which is taken to coincide with a token instance of a law of nature (Armstrong 1997, Ch. 9). And Swoyer (1982) similarly defends a metaphysically heavyweight conception of the laws, and of nomological necessity, as involving primitive dispositional powers, essential to the various scientific properties and kinds at issue in true-law statements (compare Shoemaker 1980, 1998). From the standpoint of the best-systems theorist, these and other metaphysically substantial analyses of lawhood have largely been viewed as needlessly

[19]Compare Fine 2002.

complex, at best, and at worst as metaphysically obscure.[20]

3.3.3 Best-systems Necessitism

The alternative to the Priorean picture I articulated in the previous section—lawhood as structurally simple, as from a context, but non-rigid *across* contexts—breaks the dialectical stalemate, providing the best-systems theorist with a straightforward solution to the explanatory challenge that has been largely neglected in the recent literature.

The core idea is that the best system of a world w determines what is metaphysically necessary, when w is construed as the world of a possible *context*. Call that view *best-systems necessitism*. Schematically: given $c \in C$, suppose we let $w_c(\Gamma)$ represent the deductive closure of an ideal theoretical systematization of local qualitative character as manifested from the view of w_c; then each $\varphi \in w_c(\Gamma)$ states a law of nature as from the perspective of w_c. Best-systems necessitism may then be represented as the view that $w_c(\Gamma)$ determines $w_c(\pounds)$—the nomological 'neighborhood' of w_c—which in turn coincides with W_c, the space of 'available' metaphysical possibilities relative to w_c. The best system of each context gives the laws of nature, as from that context, which in turn reflect the ways things must be, metaphysically speaking, from that contextual point of view.

Best-systems necessitism solves the explanatory challenge by locating the additional 'explanatory force' characteristic of each actual law of nature at the level of its metaphysical modal status. To see this, consider again Armstrong's idea that an adequate theory of lawhood must somehow illuminate how it is that the laws of nature of our world are capable of 'guiding' the nomologically necessary evolution of states within our world, in such a way that the manner in which matters of particular fact unfold is explained by the laws of nature being as they actually are.

[20] See, e.g., Lewis 1983, 366 and Loewer 2007 for criticism of Armstrong's general treatment of the laws of nature, and Lewis 1986*a*,*b* for arguments critical of the metaphysics of structured universals which underlies Armstrong's (1997) analysis.

The intuition underlying Armstrong's objection, recall, is that the world's having the particular nomic structure that it does is not explained merely by appeal to certain (epistemically or theoretically) privileged aspects of that structure itself. The best-systems necessitist concedes that Armstrong's concern here is partly correct: the mere fact that the world *must* have the particular nomic structure it does is not explained by the laws alone, according to the necessitist, for the laws merely state deductive consequences of a theoretically ideal systematization *of* that structure. Instead, according to the best-systems necessitist, it is the *further* fact that each law of nature determines, or 'fixes', a metaphyscally non-contingent structural truth about actuality that explains the capacity of the laws to constrain the evolution of states within our world.

More concretely, and to illustrate: let us suppose that it is a theorem of our world's best system that all *Fs* are *Gs*. *Given* that it is therefore a law of nature that all *Fs* be *Gs*, the best-systems necessitist maintains that it is metaphysically necessary from our actual point of view that any F is a G: the best system of actuality determines the law, which in turn fixes a metaphysical necessity from the perspective of actuality. Given that additional theoretical committment, it is not difficult to see how theoremhood with respect to our world's best system might then explain, in a non-circular fashion, the fact that *Fness* nomologically necessitates *Gness*. *Pace* Armstrong, Swoyer, and other critics of the best-systems analysis, it is the additional fact that the true-law statement that all Fs are Gs has the property of being metaphysically necessary that does the explanatory work in accounting for why matters of particular fact in our world *must* unfold in such a way that all instances of F are followed by instances of G.

That way of thinking about the modal status of lawhood has been largely overlooked because of the widespread presupposition that nomological and metaphysical modality must be viewed as structurally heterogeneous given a best-systems conception of the laws. After all, it is presumably the case that other worlds diverge substantially from our own at the level of local qualitative structure; con-

sequently, what shows up as a law of nature for us need not reflect how matters go off at other possible worlds. That shows that lawhood is metaphysically contingent from the view of actuality only if 'cross-world' variation at the level of best system is construed in terms of variation across *world of index*, however. And it need not be.

Instead, divergence between worlds at the level of best system may instead be construed in terms of the *cross-contextual* non-rigidity of lawhood. Fixing our standpoint here in actuality, the simplest and most informative true description of local qualitative matters as they are manifested to us determines metaphysical necessity *from the view of actuality*: the actual laws of nature, construed as theorems of our world's best system, are metaphysically non-contingent. Imaginatively shifting our contextual perspective around to other worlds, perhaps the theorems of an ideal systematization of local qualitative structure fail to coincide with the theorems of our world's best system; if so, matters of lawhood and concomitant metaphysical necessity from the view of such contexts fail to coincide with such matters as they are manifested to us. Yet such imaginative shifting of the context merely involves the *hypothesization* of ways for the laws of nature to actually be. It does not—as we have had occasion to note repeatedly over the course of the discussion thus far—translate to *genuine contingency* of lawhood from the view of actuality.

3.4 Refining the Picture

At the level of semantic representation, a construal of unrestricted modality as relativized to the possible world of the context requires minimal adjustment to the simple Carnapean model-theoretic paradigm introduced in Chapter 2. I shall close the present chapter by outlining that semantics for contextually-relativized metaphysical modality, and by addressing two lingering concerns that might be raised against the necessitist variant of best-systems theory I've developed here.

3.4.1 Semantics

We take as our background language the simple non-quantified modal language $\mathscr{L}^{\Box}$ introduced in Chapter 2 (subsequent chapters extend the ideas introduced here to languages capable of expressing both modality and generality). Our available *contexts* are drawn from the set $C \subseteq W \times T \times L \times D$, with W, T, L, and D each defined as in §3.2. Given $c \in C$, define a *c-relativized frame* (or 'c-frame') $\mathcal{F}_c$ as an ordered-triple $\langle W_c, D_c, w_c \rangle$, such that:

- W_c is a non-empty, contextually-relativized set of possible worlds;
- D_c is a similarly non-empty, contextually-relativized set of possible individuals; and
- $w_c \in W_c$ is the possible world of the context c.

Recall from §3.2 that W_c represents the set of possible worlds that are 'available', for quantificational purposes, from the view of w_c; here, D_c similarly represents the set of possible individuals that are existent from the view of w_c: D_c may thus be construed as a contextually-available ontology. It is relative to that ontology that the (model-relative) interpretation of terms and predicates of $\mathscr{L}^{\Box}$ are to be defined.[21]

As follows. Given $c \in C$, define a *c-relativized model* (or 'c-model') $\mathfrak{M}_c$ as a pair-sequence $\langle \mathcal{F}_c, V_c \rangle$, in which $\mathcal{F}_c = \langle W_c, D_c, w_c \rangle$ is c-frame and V_c is a contextually-relativized valuation function, defined such that:

- For each term τ^k of $\mathscr{L}^{\Box}$, $V_c(\tau^k) \in D_c$; and
- For each n-place predicate F^n_k of $\mathscr{L}^{\Box}$, $V_c(F^n_k) : W_c \rightarrow D^n_c$.

[21] The relativization of the available ontology to the possible world of the context shall figure centrally in the discussion of first-order modal metaphysics in Chapter 5. The ontology of a model is here relativized to the possible world of the context for the sake of compatibility with that later discussion.

Thus the c-relativized interpretation of a term (or individual constant) τ^k of $\mathscr{L}^{\Box}$ is identified with an individual in the ontology D_c available from the view of that context, while that of each n-place predicate F^n_k is identified with an intension mapping a (contextually-available) world $w \in W_c$ onto the predicate's w-relative extension in D_c.[22] Relative to a c-model $\mathfrak{M}_c$, the denotation of terms is relativized to a simple index $i = \langle w \rangle$, such that $w \in W_c$: given a term τ^k, model $\mathfrak{M}_c$, and index $i = \langle w \rangle$ for $\mathfrak{M}_c$, $\delta^i_{\mathfrak{M}_c}(\tau^k) = V_c(\tau^k) \in D_c$. Satisfaction in a c-model is similarly indexically-relativized. As follows:

- For atomic formulae of $\mathscr{L}^{\Box}$:
  - $\Vdash^i_{\mathfrak{M}_c} F^n_k(\tau^1, \ldots, \tau^n)$ just if $\langle \delta^i_{\mathfrak{M}_c}(\tau^k), \ldots, \delta^i_{\mathfrak{M}_c}(\tau^n) \rangle \subseteq V_c(F^n_k)(w_i)$
  - $\Vdash^i_{\mathfrak{M}_c} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}_c}(\tau^j) = \delta^i_{\mathfrak{M}_c}(\tau^k)$
- For Boolean and modal formulae of $\mathscr{L}^{\Box}$:
  - $\Vdash^i_{\mathfrak{M}_c} \neg\xi$ just if $\nVdash^i_{\mathfrak{M}_c} \xi$
  - $\Vdash^i_{\mathfrak{M}_c} \xi \wedge \zeta$ just if $\Vdash^i_{\mathfrak{M}_c} \xi$ and $\Vdash^i_{\mathfrak{M}_c} \zeta$
  - $\Vdash^i_{\mathfrak{M}_c} \xi \vee \zeta$ just if $\Vdash^i_{\mathfrak{M}_c} \xi$ or $\Vdash^i_{\mathfrak{M}_c} \zeta$
  - $\Vdash^i_{\mathfrak{M}_c} \Box\xi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$
  - $\Vdash^i_{\mathfrak{M}_c} \Diamond\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$

(Recall, from §2.3, that $i' \approx_w i$ just if i' differs from i at most on $w_{i'}$).

Truth and entailment are defined as follows. First, given $c \in C$, truth at a world w in a c-relativized model $\mathfrak{M}_c$ is defined in terms of satisfaction in that model relative to the index containing that world: thus $\vDash^w_{\mathfrak{M}_c} \varphi$ just in case when $i = \langle w \rangle$, $\Vdash^i_{\mathfrak{M}_c} \varphi$. Truth *simpliciter*, in a c-model, is defined in terms of satisfaction in that

[22] To prefigure somewhat: in Chapter 5 we will consider the effect of treating V_c as a *partial* function, reflecting the possibility that for $c, c' \in C$ a given term τ^k of the language may be such that $V_c(\tau^k)$ but not $V_{c'}(\tau^k)$ is defined.

model relative to the possible world w_c of c: employing the notational conventions of §1.3, $\vDash_{\mathfrak{M}_c} \varphi$ just if for all $i \propto_w c$, $\Vdash^{i}_{\mathfrak{M}_c} \varphi$. Finally, entailment is defined in terms of cross-contextual truth-preservation: $\Psi \vdash \varphi$ just if, for all $c \in C$ and $\psi \in \Psi$, if $\vDash_{\mathfrak{M}_c} \psi$ for any c-relativized model $\mathfrak{M}_c$, then $\vDash_{\mathfrak{M}_c} \varphi$ (compare Kaplan 1989, 595).

That is the semantics. Notice that the 'actual world' parameter @ of traditional possible-worlds modal semantics has dropped out of the picture. That parameter as it figures in traditional approaches serves as a representation of *our world*—that is, the world of any context in which we happen to find ourselves situated. But the present semantics is intended to represent modal reality as it appears, not only when $w_c = @$, but more broadly as it appears from the view of the possible world w_c of an arbitrary context $c \in C$. The traditional model-theoretic notion of actuality is not explanatorily privileged at the level of a contextually-relativized semantics for unrestricted modality.

The Priorean notion of 'relative accessibility', construed as a relation holding in a model between worlds of evaluation, similarly drops out of the picture as explanatorily otiose. Recall that on the Priorean picture, a model $\mathfrak{M}$ is a structure $\langle \mathcal{F}, V \rangle$ in which $\mathcal{F} = \langle W, D, @, R \rangle$, with $R \in W \times W$. Prior allows that when $R \subsetneq W \times W$, it may be that $\Vdash^{i}_{\mathfrak{M}} \Box\varphi$ but $\nVdash^{i'}_{\mathfrak{M}} \Box\varphi$, when $w_i \neq w_{i'}$: Prior relativizes necessity to the possible world of the *index* w_i, and treats necessity relative to the world w_i of the index as a matter of truth throughout the sub-region of W that is relevantly accessible from w_i. That is *one* way of representing the intuitive complexity, or 'fineness of grain', of nomological modal structure that has been our focus in this chapter. Our picture does things differently, allowing instead for a representation of modal 'complexity' in terms of the cross-contextual non-rigidity of (unrestricted) modality. Different contextually-relativized models $\mathfrak{M}_c$ and $\mathfrak{M}_{c'}$ may serve as representations of modal 'realities' that fail to agree on what is non-contingent: in particular, given $c, c' \in C$, it may be that when $W_c \neq W_{c'}$, $\Vdash^{w_c}_{\mathfrak{M}_c} \Box\varphi$ but $\nVdash^{w_{c'}}_{\mathfrak{M}_{c'}} \Box\varphi$. That is how things go with lawhood and nomological necessity, for example, on the necessitist variant of best-systems theory articulated in §3.3.

However, and in contrast with the Priorean representation of nomological modal structure, modality is here represented as having a *simple*, S5-structure. That is achieved by a construal of the modal operators $\Diamond$ and $\Box$ as unrestricted quantifiers over W_c, for each $c \in C$ (compare Hughes and Cresswell 1996, 59–64). Notice that, for all $i \propto_w c$, $\Vdash^{i}_{\mathfrak{M}_c} \Box\varphi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \varphi$; hence in particular only if $\Vdash^{w_c}_{\mathfrak{M}_c} \varphi$. Thus $\Box\varphi \vdash \varphi$ (*the T-schema*; §3.1.2). Similarly, given that for all $i \propto_w c$, $\Vdash^{i}_{\mathfrak{M}_c} \Box\varphi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \varphi$, then similarly $\Vdash^{w_c}_{\mathfrak{M}_c} \Box\varphi$ just if, for all $i'' \approx_w i' \propto_w c$, $\Vdash^{i''}_{\mathfrak{M}_c} \Box\varphi$; hence just if, for all $i \propto_w c$, $\Vdash^{i}_{\mathfrak{M}_c} \Box\Box\varphi$. Thus $\Box\varphi \vdash \Box\Box\varphi$ (*the 4-schema*). Finally, $\Vdash^{i}_{\mathfrak{M}_c} \Diamond\varphi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \varphi$; hence for all $i \propto_w c$, $\Vdash^{i}_{\mathfrak{M}_c} \varphi$ only if for each $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \Diamond\varphi$, and hence only if $\Vdash^{w_c}_{\mathfrak{M}_c} \Box\Diamond\varphi$. Thus $\varphi \vdash \Box\Diamond\varphi$ (*the B-schema*). The contemporary presupposition that the 'fineness of grain' of modal structure requires the abandonment of S5 is incorrect. (We revisit this important fact below in Chapter 4).

3.4.2 Rational Coherence and the Priorean Picture

Certain considerations not addressed thus far might reasonably be seen as supporting the traditional Priorean picture of modality as involving restricted quantification over accessible worlds, and consequently as militating against a conception of modality as structurally simple.

That is the case, for example, when it comes to considerations of *broadly epistemic* possibility, in connection with the scientific investigation of the laws of nature. The view that an adequate theoretical representation of such investigation requires a sphere of (metaphysically) inaccessible possible worlds is implicitly suggested by Chalmers (2009, 41), who writes:

> Let us pretend for a moment that all worlds with laws of nature that differ from ours are metaphysically impossible. Even so, it will still be tremendously useful to appeal to a wider space of logically possible worlds (or world-like entities) with different laws, to help analyze and explain the hypotheses and inferences of a scientist investigating the laws of nature. Such a scientist will be considering all

> sorts of rationally coherent possibilities involving different laws; she will make conditional claims and engage in counterfactual thinking about these possibilities; and she may have terms and concepts that are co-extensive at all worlds with our laws, but that intuitively differ in meaning because they come apart at worlds with different laws. To analyze these phenomena, the wider space of worlds is needed to play the role that possible worlds usually play.

Chalmers here supposes, as I have above, that the spaces of nomological and metaphysical modality coincide. Nevertheless, on the view Chalmers articulates, a 'wider space' of metaphysically impossible worlds is required in order to make sense of the rational practices of the working scientist. The idea is that worlds in such spaces are what a scientist concerned with the investigation of the (metaphysically necessary) laws will often be considering, when framing hypotheses about what the laws of nature might be like. For given the supposition that the laws are metaphysically non-contingent, certain of those hypotheses are, Chalmers supposes, bound to involve states of affairs that are both nomologically and metaphysically impossible from the view of actuality.[23]

Chalmers's talk of a 'wider space' of metaphysically impossible worlds naturally invokes the Priorean picture. Nevertheless, it is important to recognize that the intuitive data Chalmers is here concerned with may be represented equally well in terms of our capacity as theorists to imaginatively shift the possible world of the context. Supposing it to be a metaphysically necessary nomological truth that entities with mass attract according to an inverse-square law, on the alternative to the Priorean picture I have developed *no* world in modal space as it appears from our contextual perspective represents massy entities as behaving otherwise. That is compatible with a construal of Chalmers's data on which counterfactual reasoning about how entities with mass *would behave*, on the hypothetical supposition that mass attracts instead according to an inverse-cube law, involves the

[23] See also Soames 2007 and King 2007, each of which articulate a picture of the structure of epistemic possibility-space that is very similar to that here considered by Chalmers.

imaginative supposition that the world of our context is one from which matters of lawhood are otherwise than they are in @. *Pace* Chalmers, the analysis of the rationally coherent activities of the working scientist does not require the postulation of a wider sphere of metaphysically impossible worlds that are nevertheless in some sense 'real' from our actual point of view. Such worlds as here concern Chalmers may instead be represented as *imaginary*, existing only within the scope of the hypothetical supposition that the context is one from which the laws of nature diverge from those of actuality. That is achieved, on the present framework, in terms of the 'tethering' of the set of available possible worlds to the context c. Where $w_c \neq @$, it may be that, for some $w \in W_c$, w represents mass as entering into laws that are alien from the view of @. That does imply that w corresponds to a possible world that is real from the view of @, but only that w represents a possibility as from the hypothetical contextual standpoint of w_c.

3.4.3 Contextual Plenitude

Certain broadly Humean considerations, more internal to Lewisian modal metaphysics, might similarly be seen as motivating the Priorean picture, and consequently as militating against the simple, contextually-relativized, conception of modal structure I have articulated.

Lewis famously maintained, as did Hume, that there are no necessary connections between distinct, intrinsically-typed, entities.[24] Notably, Lewis took such an absence of necessary connection to underwrite a broadly 'combinatorial' conception of the space of metaphysical possibility, according to which the 'patching together' of qualitative duplicates of individuals located either within a single possible world or in distinct possible worlds always yields another possible world

[24]Here I follow Wilson (2015) on the characterization of 'Hume's Dictum' (HD) as it enters into Lewis's modal metaphysics. See also Wilson 2010 for general discussion and critical evaluation of arguments in favor of HD as, e.g., an analytic or synthetic *a priori* truth, or as providing an essential theoretical component of our understanding of counterfactual conditionals.

(*modulo* constraints on co-locatability imposed by the 'size and shape of space-time'; Lewis 1986*c*, 87–8).[25] Assuming, as Lewis does, that the laws of nature in a given world w coincide with theorems of w's best system, such a principle of combinatorial plenitude might reasonably be seen as grounding a conception of nomological and metaphysical modality as structurally heterogeneous. That was Lewis's own view, for example. He writes:

> Another use of my principle [of recombination on qualitative duplicates] is to settle—or as opponents might say, to beg—the question whether laws of nature are strictly necessary. They are not; or at least laws that constrain what can coexist in different positions are not. Episodes of bread-eating are possible because actual; as are episodes of starvation. Juxtapose duplicates of the two, on the grounds that anything can follow anything; here is a possible world to violate the law that bread nourishes. So likewise against the necessity of more serious candidates for fundamental laws of nature [...]. (Lewis 1986*c*, 91)

Lewis's idea is that free recombination on qualitative duplicates guarantees the existence of worlds in which certain structural regularies of our world are violated, and in which novel regularities, 'alien' to our world, come onto the scene. Assuming, as Lewis does, that lawhood with respect to a world is to be understood in terms of participation in that world's best system, Lewis takes such broadly Humean, combinatorial, considerations to demonstrate that the laws of our world are metaphysically contingent.

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[25] A bit more precisely: Lewis's idea is that for any distinct possible individuals $\alpha_1, \ldots, \alpha_n$, there exists a possible world w containing duplicates $\alpha_1^*, \ldots, \alpha_n^*$ of $\alpha_1, \ldots, \alpha_n$, in any configuration. The restriction here to *duplicates* of individuals reflects Lewis's conception of ordinary individuals as 'world-bound' (Lewis 1986*c*, 69–71), and represented as existing at more than one possible world only counterpart-theoretically (Lewis 1968, 1971); more on Lewis's counterpart theory in Chapter 4 below. Lewis here conceives of duplication in terms of the sharing of perfectly natural, and hence intrinsic, properties: individuals α and α^* are duplicates, in Lewis's sense, just if α and α^* are in exact agreement at the level of their natural instrinsic properties, and are similarly such that their parts may be put into 1:1 natural-qualitative correspondence. See Lewis 1986*c*, 86–92 for discussion.

Two points. First, it is important to recognize that such principles of modal recombination as Lewis's are orthogonal to a best-systems analysis of lawhood as such: construed merely as a theory of what the laws of nature *are*, the best-systems analysis is silent on such generative principles concerning the space of metaphysical modality (compare Loewer 1996). For example, the version of best-systems theory I have articulated construes the space of metaphysical possibility as instead constrained by the underlying structural facts about our world's local character, as systematized by a theoretically ideal true description of our world's qualitative structure. The idea that the space of metaphysical possibility is given by a broadly Humean principle of plenitude such as Lewis's is an extra bit of Lewisian modal-methodology that is both controversial in its own right, and no part of best-systems theory *per se*.[26]

Second, even supposing that Lewis is correct and that our best theoretical handle on the 'constitution' of logical space is in some sense given by a broadly Humean principle of recombination, considered through the lens of the context-index distinction that fact alone does not demonstrate that a necessitist conception of lawhood to be incorrect. For talk of 'possible worlds' in connection with such plenitude principles is *loose*, and ambiguous between a conception of other worlds as indices of evaluation, or worlds of *context*. Considered in that second way, perhaps what is right about Lewis's view is that the space of available contexts is (at least partially) generated by recombination on actually existent individuals (here I drop Lewis's idiom of 'duplication': that idea is tethered to further aspects of Lewis's 'concrete' modal realism that I do not presuppose, namely the analysis of modality *de re* in terms of counterparthood. Lewis's counterpart theory is discussed in depth in the following chapter). To be sure, recombination on *actu-*

[26]On the controversial character of Lewis's principle of combinatorial plenitude, see Wilson 2005, who points out that Lewis's (1986*c*, 88) contention that the absence of a possible world containing "a talking head separate from the rest of a human body" would amount to an unacceptable 'gap' in modal space would be unlikely to convince the working scientist that the laws of nature are metaphysically contingent.

alia will not generate the entirety of 'contextual space': certain contexts are ones from which individuals that are 'alien' from our actual point of view are existent (Chapter 5), and moreover certain contexts are presumably ones from which alien natural properties nowhere exemplified in actuality figure in similarly alien laws of nature. But no matter: as deRosset (2011) points out, and as Lewis (1986*c*, 91–2) admits, Lewis's own principle of plenitude, involving the recombination of qualitative duplicates of actually existing individuals, is itself insufficient on its own to fully generate all of logical space.

3.5 Simplicity Prevails

This chapter has documented one way in which modal metaphysics would come to be complicated in the years immediately following Carnap's contributions to the model-theoretic tradition; namely, via the incorporation of *relative accessibility* into the formal truth-conditions of sentences concerning what is possible or necessary. Prior's technical device provided for a way of representing the intuitive fineness of grain of nomological modal structure, and of the idea that matters of nomological necessity are such as to vary from the standpoints of different possible worlds. However, as we have seen, Prior's contribution similarly had the effect of obscuring other, more theoretically attractive, methods of doing the same. Those methods come onto the scene once the formal foundations of modal metaphysics are broadened in ways that neither Carnap nor Prior originally envisaged, to include not only index relativity, but also *context dependence*.

The philosophical significance of context for modal metaphysics is not restricted to issues concerning lawhood, and the relation between the laws of nature and metaphysical necessity. As we shall now see, matters of *essence* and modality *de re* are similarly illuminated by appeal to the context–index distinction.

Chapter 4

Origin and Essence

4.1 Essence Relative to a Context

Plausibly, certain essential properties are modally 'flexible', permitting a degree of qualitative leeway in how things go with their bearers at other possible worlds. That is the case, for example, when it comes to the *compositional* essences of ordinary physical objects, such as artifacts: these essences allow for slight, but not substantial, counterfactual variation in the underlying materials that compose their bearers. Flexible essentialist theories collapse, paradoxically, into *anti-essentialism* when framed against the theoretical backdrop of Carnap's simple semantical framework. Relativizing flexible compositional essence to the world of the context resolves the puzzle, and does so in a way that requires no substantial departure from intuitive modal metaphysics—in contrast with what others have supposed.

4.1.1 Modal Paradox

In broad relief, the paradox of flexible essentialism arises given the observation that chaining together a series minor qualitative differences, across a series of

possible worlds, may result in a substantial difference; the net effect is then that an individual is represented, off at some world w, as being some way that individual essentially is not. It is now standard to refer to the general form of such puzzles of flexible essentialism as 'Chisholm's Paradox', after discussion in Chisholm 1967, 1973. Here is one way of articulating the supposed problem Chisholm discovered in greater detail.[1]

Following the *moderate compositional essentialist*, let us suppose that artifact α, originally composed of matter m in world w, could have been composed instead of distinct matter m' overlapping m to some sufficiently high degree, but could not have been composed of substantially different matter m''. (Let us further stipulate, for simplicity, that the degree of relevant overlap at issue is such that any matter sharing at least 50% of the constituent particles of an artifact's originally composing matter is such as to count as a 'compositional' possibility for that artifact, but that matter above that threshold is modally off-limits, given the artifact's essence. Such artificial constraints make for smoother presentation of the puzzle, and may easily be abstracted away for something more metaphysically plausible: compare Salmon 1986 and Leslie 2011).[2] Then presumably the same principle concerning α's compositional essence applies off at a possible world w' at which α exists and is composed of m': in particular, off at w', it may be possible for α to be composed of matter m'', assuming m'' overlaps m' to a sufficiently-high degree. Consequently, from the view of our original 'source' world w, it is *possibly possible* that α be composed of m''; equivalently, from the view of w, it is not *necessarily necessary* that α fail to be so composed.

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[1]Chisholm's paradox of flexible essentialism has generated a rich literature: see, e.g., Forbes 1982, 1984, 1986; Lewis 1986*c*, 240-48; Salmon 1984, 1986, 1989, 1993; Roca Royes 2006; Leslie 2011; and Williamson 2013*a*, Ch. 5 for discussion. The views of both Lewis and Salmon on the problem are discussed in depth below.

[2]The classic contemporary discussion of moderate compositional essentialism is Kripke 1980, 110-15, though see also Robertson 1998, 2000; Hawthorne and Gendler 2000; Rohrbaugh and deRosset 2004; deRosset 2009; and Ballarin 2013 for critical discussion and reconstruction of Kripke's original argument sketch in defense of the view.

And yet, plausibly, what is essential to a thing could not have been otherwise; consequently, given that what is essential is (metaphysically) non-contingent, if an object is essentially some way, it is necessarily necessary that it be that way. Thus the reasoning of the paradox appears to show that the notion of moderately 'tolerant' essence is incoherent, collapsing under scrutiny into anti-essentialism given reasonable presuppositions about the logic and structure of essence.[3]

4.1.2 Context-index Conflation

Canonical solutions to the paradox in the contemporary literature, due to Salmon (1984, 1989) and Lewis (1986*c*, 240-48), further manifest the methodological theme of *index complication* noted above in Chapter 3 in connection with Prior and Meredith's contributions to the model-theoretic tradition. Such solutions involve the abandonment of the simple and intuitive logic of S5 for the special case of essence (and *de re* metaphysical modality more generally), and a concomitant abandonment of the idea that what is essential to a thing is necessarily essential to it. In Lewis's case, this abandonment of intuitive modal metaphysics is exacerbated by way of a deeply metaphysically controversial, *counterpart-theoretic*, conception of the truth-conditions of *de re* modal discourse. Unsurprisingly, such proposals to complicate our modal semantics and modal metaphysics in light of Chisholm's puzzle saddle each of Salmon and Lewis with implausible theoretical committments one might reasonably wish to resist (§4.2).

In contrast with the canonical solutions, I will show instead how attention to

[3]Such paradoxes of 'essentialist sorites' are not exclusive to the moderate compositional essentialist framework, though the latter will be my exclusive focus here. Consider the view that the (metaphysically necessary) laws of nature are grounded in essential facts about the nature, or identity, of the underlying scientific properties and kinds that figure in the laws (Shoemaker 1980, 1998). As Wilson 2005 points out, that view ought to allow that relative to worlds in which the underlying physical constants are somewhat differently realized than here in actuality, the laws are similarly somewhat different (modal tolerance). Thus what is grounded is essence—the laws being as they are—is apparently not itself necessary, in contradiction with reasonable presuppositions concerning the modal status of essentialist claims.

the role of context in a representation of metaphysical-modal theorizing makes available a simple solution to the paradox which contemporary philosophers have largely overlooked. What is required in order to resolve Chisholm's Paradox is not complicated and controversial modal metaphysics, but rather a conception of modally tolerant essence as relativized to the possible world of the context (§4.3). As with matters of lawhood and nomological necessity, discussed above in Chapter 3, the central moral of Chisholm's Paradox is that matters of tolerant essence should be conceived as both modally simple in character, and yet as *cross-contextually non-rigid*.

4.2 Index-complication Strategies

4.2.1 The Priorean Response

On its routine formulation, Chisholm's Paradox arises against the backdrop of a simple, S5-semantics, in which matters of (metaphysical) possibility and necessity are represented as non-contingent. One strategy for defusing the paradox, first articulated by Chandler (1976) and later developed by Salmon (1984, 1989, 1993), involves the rejection of that simple semantics, and the adoption of a Priorean construal of the metaphysical modal operators as restricted quantifiers over 'accessible' worlds (§3.1.2). At the core of the proposal is a conception of metaphysical accessibility between worlds as an intransitive relation, and a concomitant representation of *possible metaphysical possibility* as outstripping genuine possibility *tout court*.

Illustrating the idea, Salmon (1989) invites us to consider a version of Chisholm's Paradox involving a table ("Woody") originally built from material m.[4] Salmon writes:

[4]For reasons of clarity and continuity with earlier discussion, I here depart from Salmon on matters of notation.

> Wherever one may choose to draw the line between what matter Woody might have originated from and what matter Woody could not have originated from, it would seem that, by stretching things to the limit, we may select some (presumably scattered) matter m'' such that, although Woody could not have originated from m'', m'' is close enough to being a possibility for Woody that if Woody had originated from certain matter m' that is *in fact* possible for Woody [...] it *would have been* possible for Woody to have originated from m'', even though it is not *actually* possible. (Salmon 1989, 130)[5]

Letting '$\Box\!\!\rightarrow$' symbolize the subjunctive conditional, and adopting a natural abbreviation scheme on which φ' and φ'' represent sentences to the effect that Woody is composed of the corresponding materials m' and m'', we may represent Salmon's reasoning as follows:

1. $\neg\Diamond\varphi''$
2. $\Diamond\varphi'$
3. $\varphi' \Box\!\!\rightarrow \Diamond\varphi''$
4. $\Diamond\Diamond\varphi''$ (2, 3)
5. $\neg\Diamond\varphi'' \,\&\, \Diamond\Diamond\varphi''$ (1, 4)

The crucial premise is (3): it says that if Woody the table had been composed of matter m', it *would have been* possible for Woody to be composed of matter m''. I shall revisit that premise in greater depth down the line, in §4.3.

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[5] Again, while helpful in isolating the core presuppositions of the paradox that Salmon wishes to reject, the setup in the Woody case Salmon discusses is admittedly somewhat artificial. A more plausible conception of the modal data will presumably be one such that, for certain portions of matter, it is indeterminate whether an artifact might have been originally composed of that matter, given the artifact's original material composition. Such indeterminacy might be understood as broadly epistemic or semantic in character, or instead—following Wilson (2013, forthcoming)—in terms of the object-level obtaining of a metaphysically indeterminate state of affairs.

The conclusion (5) of Salmon's argument says that it is both impossible and possibly possible that Woody be composed of m''; equivalently, though necessary, it is not *necessarily necessary* that Woody fail to be so composed. Salmon endorses that conclusion, and accordingly maintains that consideration of the data in the Woody case demonstrates that the correct system of propositional modal logic for the moderate compositional essentialist is something weaker than the intuitive system S4, in which matters of essence, and consequently of metaphysical necessity, are represented as non-contingent.[6] Thus it is that Salmon proposes to dissolve Chisholm's Paradox by abandoning its core underlying logical presupposition concerning the non-contingent structure of modality.

A bit more precisely. Recall, from Chapter 3, that Meredith and Prior (1956) showed us how logics weaker than S5 may be generated by imposing certain formal constraints upon the accessibility relation R of a model. Extending that insight to possible-worlds modal semantics, Prior (1962*a*,*b*) proposed the following model- and index-relative semantic clauses for the modal operators $\Box$ and $\Diamond$:

- $\Vdash^{i}_{\mathfrak{M}} \Box\varphi$ just if, for all $i' \approx_w i$ such that $\langle w_i, w_{i'}\rangle \in R$, $\Vdash^{i'}_{\mathfrak{M}} \varphi$
- $\Vdash^{i}_{\mathfrak{M}} \Diamond\varphi$ just if, for some $i' \approx_w i$ such that $\langle w_i, w_{i'}\rangle \in R$, $\Vdash^{i'}_{\mathfrak{M}} \varphi$

Notice that where $\mathfrak{M} = \langle \mathcal{F}, V\rangle$ is a Priorean model, its accessibility relation R is *intransitive* just if, for some w, v, and $u \in W$, $\{\langle w, v\rangle, \langle v, u\rangle\} \in R$ but $\langle w, u\rangle \notin R$. Salmon, in effect, takes the upshot of Chisholm's Paradox to be that such models serve as accurate formal representations of metaphysical modal reality. Specifically, Salmon maintains that a world w'' in which Woody is composed of m'' will be accessible from a world w' in which Woody is composed of m', but inaccessible, or 'impossible', from the view of a world w in which Woody is composed of

[6]This coincides with Salmon's more general contention, articulated at Salmon 1989, 4, that the merely reflexive system T "may well be the one and only (strongest) correct system of (first-order) propositional modal logic" for metaphysical modal reasoning.

m.[7] In this way, Salmon's inaccessibility strategy involves the construal of such 'problem' worlds as *w″* not as *absolute* metaphysical impossibilities, but rather as impossibilities relative to certain worlds and not others.

Salmon's appeal to accessibility semantics in connection with Chisholm's Paradox is revisionary, however, and flies in the face of standard thinking about the nature and structure of *metaphysical* necessity. Notice that it is clearly under such a metaphysical interpretation that the moderate essentialist's modal commitments are naturally understood: the moderate essentialist maintains that it is of the *essence* of a physical artifact, such as Woody, to be composed of matter substantially similar to its actually composing materials, and it is plausible that a thing is essentially a certain way only if its being that way is metaphysically necessary (see Fine 1994 on the plausibility of the converse implication). And yet metaphysical necessity is most naturally viewed as necessity of the broadest kind, and as consequently involving the way things are in *all* worlds, without restriction. Salmon's inaccessibility-based solution to Chisholm's Paradox commits him to the rejection of this plausible conception of the nature and structure of metaphysical modality, in favor of an unorthodox and obscure conception of metaphysical necessity as involving how things go within a restricted sphere of 'genuine' possibility.[8]

Indeed, Salmon's own discussion fails to illuminate what is properly distinctive about metaphysical modality on his view. For example, Salmon (1989, 13) characterizes metaphysical necessity and possibility as "necessity and possibility *tout court*"; and yet how could it be, one naturally wonders, that a given state of

[7]More generally, Salmon maintains that $\{\langle w, w'\rangle, \langle w', w''\rangle, \langle w', w\rangle\} \in R$ but that $\langle w, w''\rangle \notin R$, with R construed as the relation of metaphysical accessibility between worlds.

[8]On the standard conception of metaphysical necessity invoked here, see Burgess 2012, 46; Burgess writes that "we may distinguish the species of *physical* necessity, or what could not have been otherwise so long as the laws of nature remained the same, from *metaphysical* necessity, what could not have been otherwise no matter what". Similar conceptions of metaphysical necessity as distinctively unrestricted in character are articulated in, e.g., Shoemaker 1980, 1998; Fine 2002; Rosen 2002, 2006; Williamson 2007, 155-61; and Williamson 2013*b*, 3; 43-4.

affairs could be properly characterized as necessary '*tout court*', as Salmon suggests, while at the same time failing to obtain relative to some possible world or other? The general awkwardness of this picture is what underlies Lewis's (1986*c*, 246-48) criticism of Salmon's inaccessibility solution to the paradox, as when Lewis writes:

> [. . .] this is no defence [of moderate compositional essentialism], this is capitulation [to radical contingentism about material composition]. In these questions of haecceitism and essence, by what right do we ignore worlds that are deemed inaccessible? Accessible or not, they're still worlds. We still believe in them. Why don't they count? (Lewis 1986*c*, 246)

Reiterating the complaint a couple of pages later, Lewis writes:

> [. . .] we look in vain [. . .] for an account of what it means to deny that some world is 'relatively possible'. I think it is like saying: there are things such that, ignoring them, there are no such things. Ignoring all the worlds where such-and-such obnoxious things happen, it is impossible that such things happen. Yes. Small comfort. (Lewis 1986*c*, 248)

Lewis's point here is that talk of 'inaccessible' worlds makes little sense in contexts in which our interests lie with matters of essence, and correspondingly with *metaphysical* necessity *de re*. That point seems entirely correct, and illustrates one way in which a *prima facie* straightforward complication to the simple Carnapean semantical picture may give rise to philosophical difficulties at least as substantial as those the complication was introduced to resolve.[9]

[9] As we will shortly see, Lewis's own, counterpart-theoretic, solution to the moderate essentialist's paradox faces a structurally identical, and equally plausible, 'objection from irrelevance' (compare the *Generalized Humphrey Problem* discussed in Hellie, Murray, and Wilson forthcoming).

4.2.2 Vicarious Representation

Where Salmon postulates inaccessible worlds, Lewis postulates inaccessible *individual possibilities*. These are construed in terms of *counterparts of counterparts* of an object, which on Lewis's view need not themselves be construed as among that object's counterparts *simpliciter*.

Lewis originally articulated the core idea underlying counterpart theory in the following passage:

> The counterpart relation is our substitute for identity between different things in different worlds. Where some would say that you are in several worlds, in which you have somewhat different properties and somewhat different things happen to you, I prefer to say that you are in the actual world and no other, but that you have counterparts in several other worlds. Your counterparts resemble you closely in content and context in important respects. They resemble you more closely than do the other things in their worlds. (Lewis 1968, 114)

Notably, given that counterparthood is a relation of overall qualitative *similiarity* between distinct, and typically 'world-bound', individuals, it lacks certain formal properties of the identity relation, including in particular *transitivity*. Lewis (1968, 115) made that clear as follows:

> Suppose x_1 in world w_1 resembles you closely in many respects, far more closely than anything else in w_1 does. And suppose x_2 in world w_2 resembles x_1 closely, far more closely than anything else in w_2 does. So x_2 is a counterpart of your counterpart x_1. Yet x_2 might not resemble you very closely, and something else in w_2 might resemble you more closely. If so, x_2 is not your counterpart.

Later, in *On the Plurality of Worlds*, Lewis would invoke the intransitivity of modal counterparthood in his solution to Chisholm's paradox of flexible essentialism (Lewis 1986*c*, 240-48). In broad relief, the core idea is as follows.

Like all ordinary physical objects, on the Lewisian conception Woody the table exists in exactly one possible world (world w).[10] But Woody has counterparts in other worlds, including a qualitatively similar table Woody′ composed of m' at world w'.[11] That is why, for Lewis, in w Woody has the *de re* modal property of *being possibly composed of* m'. Similarly, Woody′ has as a counterpart at world w'' a qualitatively similar table Woody″ composed of m'': that is why, on Lewis's view, at w it is *possibly possible* that Woody be composed of matter m'' (Lewis 1986*c*, 246). However, as on Salmon's approach to the paradox, Lewis rejects the idea that possible possibility *de re* reduces to possibility *simpliciter*: possibility *de re* is a matter of what an object's counterparts are like; and counterparthood, on the Lewisian view, is intransitive. In particular, on the Lewisian picture, it may be that Woody″ is too different, qualitatively speaking, from Woody in world w to be a Woody-counterpart, despite being a counterpart of a counterpart of Woody's. That is why, on the counterpart-theoretic solution to the paradox, it is impossible that Woody be composed of m''.[12]

Naturally, a model-theoretic representation of the Lewisian solution requires substantial complication to our possible-worlds modal semantics. In particular, a

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[10]Lewis's *Plurality* discussion proceeds by way of attention to a slightly different case, involving the gradual qualitative convergence of two distinct individuals across series of possible worlds (the "Adam-Noah" paradox originally discussed in Chisholm 1967). But the details of Lewis's counterpart-theoretic strategy generalize straightforwardly to the puzzle as it arises in connection with moderate compositional essentialism. See also Forbes 1982, 1986 for related discussion and development of counterpart theory in connection with certain closely-related puzzles of iterated modality *de re*.

[11]Here I suppress the qualification that such matter as m', m'', and so forth is equally 'world-bound' on Lewis's view, and hence that properly speaking Woody's counterpart Woody′ at w' is composed of a *counterpart* of the matter m' of world w.

[12]A bit more carefully: on the Lewisian conception Woody has no individual counterpart at w'' under whatever contextual resolution of qualitative similarity it is that requires any counterpart of Woody's to be composed of matter substantially similar to m. Lewis is happy to grant that other contexts of *de re* modal deliberation may invoke counterpart relations under which, e.g., 'Woody might have been composed of m'''' comes out true. See, e.g., Lewis 1986*c*, 248-63 on the contextual inconstancy of the counterpart relation.

construal of counterparthood as intransitive requires that we abandon not only S5 as our underlying modal logic for the special case of *de re* modality, but in addition that we give up an intuitively plausible conception of denotation and modality as semantically independent.

Recall that on the simple, broadly Carnapean, modal semantics articulated in §2.3 the (model- and index-relative) denotation of each constant term τ^k is identified with its *interpretation* $V(\tau^k)$. Given that the interpretation of any constant term may be represented, on the simple approach, as a 'fixed' individual in the ontology D of a model, this identification has the effect that the (model-relative) denotation of terms is represented on the simple approach as insensitive to shifts at the level of the possible-world parameter of the index. That insensitivity of denotation to shifting of the indexical world-parameter has the pleasing effect that an ordinary proper name is represented as picking out a single, fixed individual relative to every possible world (in a model).[13] Lewis's counterpart theory requires that we abandon this intuitive picture: what possible individual a term τ^k picks out, relative to a world w, must now be represented as sensitive to what individual in w (if any) is the *counterpart* of τ^k's semantic value, or interpretation. 'Woody', for example, denotes Woody the table relative to world w' in only a loose or attenuated sense, by virtue of picking out (relative to w') a counterpart of Woody's (Woody′).[14]

What follows is one way in which the underlying complications required by

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[13] As I noted in Chapter 2, this was not exactly the treatment of interpretation for individual constants that Carnap himself proposed: on Carnap's (1947) approach, the model-relative interpretation of each individual constant τ^k is identified with an *individual concept*, which Carnap represents as a possible-words intension $V(\tau^k) : W \rightarrow D$ mapping worlds to τ^k's extension in the ontology D of a model.

[14] See, e.g., Fine 2005*b*, 294 for further discussion of this point. Lewis (1968) does not make these consequences of counterpart theory for the semantics of terms explicit, given that he presents counterpart theory as a modification of classical first-order logic with identity (with the result that possible worlds drop out of the semantics altogether).

Lewis's approach might be implemented.[15] To begin, let a *Lewis-frame* $\mathcal{F}$ for a constructed, quantified modal language such as $\mathscr{L}^{\forall\Box}$ be a four-tuple $\langle W, D, @, \mathsf{S}\rangle$, defined such that:

- W is a non-empty set of possible worlds;
- D is a similarly non-empy set of possible individuals;
- $@ \in W$ is the designated 'actual world' of the frame; and
- $\mathsf{S} \subseteq D^{W\times D\times W}$ is a partial similarity function, mapping a 'source-world' $v \in W$, possible individual $d \in D$, and 'target-world' $u \in W$ onto a possible individual $d' \in D$.

Intuitively, S pairs (potentially distinct) individuals in (potentially distinct) worlds as a function of their overall similarity: the idea is that $\mathsf{S}(v, d, u)$ is the individual in u that is most similar overall to d, given the way d is in v. Here the operative presupposition, following Lewis (1968), is that ordinary physical individuals such as Woody the table are 'world-bound'; consequently, the value of the world-variable v in $\mathsf{S}(v, d, u)$ shall be understood as provided by the 'home' world of the individual d. We allow that $\mathsf{S}(v, d, u) = d$ when $v = u$, on the grounds that an individual is its own counterpart in its own world.[16] Notice that since S is a partial function, $\mathsf{S}(v, d, u)$ may be undefined, if nothing in u is relevantly similar to d given the way d is in v. That is how things go, for example, when it comes to the counterpart-theoretic representation of *Woody*: at w'', we may suppose that Woody has no individual counterpart, despite having a counterpart at w'.[17]

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[15] My discussion throughout this section draws on the work of Hazen (1979); Kaplan (1979*b*); Salmon (1986); and more recently Fara (2008, 2012).

[16] This constraint corresponds to Postulate 6 of Lewis 1968.

[17] Or at least, no individual counterpart at w'' under whatever contextual resolution of similarity is at issue when moderate compositional essentialism is being presupposed. See fn. 12 above.

A counterpart-theoretic model $\mathfrak{M}$ for $\mathscr{L}^{\forall\Box}$ is a pair-sequence $\langle \mathcal{F}, V\rangle$, in which $\mathcal{F} = \langle W, D, @, \mathsf{S}\rangle$ is a Lewis-frame and V is a valuation function, defined such that:

- For each individual constant term τ^k of $\mathscr{L}^{\forall\Box}$, $V(\tau^k) \in D$; and
- For each n-place predicate F^n_k of $\mathscr{L}^{\forall\Box}$, $V(F^n_k) : W \rightarrow D^n$.

Thus the interpretation of an individual constant term τ^k, $V(\tau^k)$, remains a 'fixed' individual in the ontology D of a model, while that of any n-place predicate is a possible-worlds intension. However, and in contrast with simple modal semantics, the model-relative denotation of terms is a matter that requires a more complex treatment: as above, the denotation of a term at a world w must now be represented as sensitive to what individual in w, if any, is the counterpart of that term's (world-invariant) semantic value. That sensitivity of world-relative denotation to a contextually salient measure of similarity may be represented by relativizing denotation in a model $\mathfrak{M}$ to a complex index of evaluation $i = \langle w, g, f\rangle$ for $\mathfrak{M}$; here, $w \in W$ is a possible world, $g \in D^\omega$ is a variable assignment (defined as in §2.3), and f_i is a (world relativized) *counterpart-assignment* function. The latter is defined as follows:

$$\text{For any term } \tau^k \text{ of } \mathscr{L}^{\forall\Box},\ f_i(\tau^k) = \begin{cases} \mathsf{S}(v, V(\tau^k), w_i), \text{ if } \tau^k \text{ is a constant term;} \\ \\ \mathsf{S}(v, g_i(k), w_i), \text{ if } \tau^k = x_k. \end{cases}$$

The intuitive idea is that f_i maps each term τ^k of the language to the *counterpart* of that term's fixed (i.e., world-invariant) semantic value relative to the world of the index: the latter is $V(\tau^k)$ when τ^k is a constant term or proper name, and $g_i(k)$ otherwise. Relative to a model $\mathfrak{M}$ and index $i = \langle w, g, f\rangle$, the denotation of terms may then be defined such that $\delta^i_{\mathfrak{M}}(\tau^k) = f_i(\tau^k)$. By way of illustration, notice that this treatment results in the following course of values for the denotations of 'Woody' and 'Woody'' relative to each of w, w', and w'' (here we suppress reference to a model for simplicity):

- Letting t ='Woody':
  - $\delta^{i/w}(t) = \mathsf{S}(w, V(t), w)$ = Woody
  - $\delta^{i/w'}(t) = \mathsf{S}(w, V(t), w')$ = Woody′
  - $\delta^{i/w''}(t) = \mathsf{S}(w, V(t), w'')$, which is *undefined*.
- Letting t' ='Woody'':
  - $\delta^{i/w}(t') = \mathsf{S}(w', V(t'), w)$ = Woody
  - $\delta^{i/w'}(t') = \mathsf{S}(w', V(t'), w')$ = Woody′
  - $\delta^{i/w''}(t') = \mathsf{S}(w', V(t'), w'')$= Woody″

Given this apparatus, the index-relative satisfaction conditions for the *non-modal* fragment of $\mathscr{L}^{\forall\Box}$ may be defined in the usual way: for atomic formulae, the conditions are that $\Vdash^{i}_{\mathfrak{M}} F^n_k(\tau^1, \ldots, \tau^n)$ just if $\langle \delta^i_{\mathfrak{M}}(\tau^1), \ldots, \delta^i_{\mathfrak{M}}(\tau^n)\rangle \in V(F^n_k)(w_i)$ and $\Vdash^{i}_{\mathfrak{M}} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}}(\tau^j) = \delta^i_{\mathfrak{M}}(\tau^k)$; for Boolean and quantified formulae, the conditions are that $\Vdash^{i}_{\mathfrak{M}} \neg\xi$ just if $\nVdash^{i}_{\mathfrak{M}} \xi$, $\Vdash^{i}_{\mathfrak{M}} \xi \wedge \zeta$ just if $\Vdash^{i}_{\mathfrak{M}} \xi$ and $\Vdash^{i}_{\mathfrak{M}} \zeta$, $\Vdash^{i}_{\mathfrak{M}} \xi \vee \zeta$ just if $\Vdash^{i}_{\mathfrak{M}} \xi$ or $\Vdash^{i}_{\mathfrak{M}} \zeta$, $\Vdash^{i}_{\mathfrak{M}} \forall x_k \xi$ just if for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$, and $\Vdash^{i'}_{\mathfrak{M}} \exists x_k \xi$ just if for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$.[18]

Representing Lewis's counterpart-theoretic analysis of (iterated) *de re* modality requires a final complication to the satisfaction-conditions of modally fronted sentences. Where $i' \approx_w i$, we let i^*/i' be that index differing from i' at most on f_{i^*}; the latter is defined such that, for each term τ^k of $\mathscr{L}^{\forall\Box}$, $f_{i^*}(\tau^k) = \mathsf{S}(w_i, f_i(\tau^k), w_{i'})$. Thus, where $i' \approx_w i$, relative to $w_{i'}$ f_{i^*} assigns to τ^k (as its denotation) that individual most similar to $f_i(\tau^k)$, given what $f_i(\tau^k)$ is like in *its* 'home-world' w_i. What this additional complexity does is allow the modal operators, construed as unrestricted quantifiers over worlds, to shift the value of the source-world v in $\mathsf{S}(v, d, u)$

[18]Recall from §2.3 that $i' \sim_k i$ just if i' differs from i at most in that $g_{i'}$ and g_i are x_k-variants, that is, just if for all $j \neq k$, $g_i(j) = g_{i'}(j)$.

to the home-world of an individual's *counterpart*. The satisfaction-conditions for modal fronted sentences are as follows:

- $\Vdash^{i}_{\mathfrak{M}} \Box\xi$ just if, for all $i' \approx_w i$, $\Vdash^{i^*/i'}_{\mathfrak{M}} \xi$
- $\Vdash^{i}_{\mathfrak{M}} \Diamond\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i^*/i'}_{\mathfrak{M}} \xi$

It is this further complexity which enables a representation of iterated modality *de re* as a matter which involves the way the *counterparts of* an individual's counterparts are at other possible worlds.

To see this, it will be instructive to consider a representation of the data in the Woody case against the foregoing technical backdrop. For the ease of such representation, let us introduce into our language a (multigrade) 'composition' predicate '$\leq$' , understood such that, where β and $\tau^1, \ldots, \tau^n$ are any terms, sentences of form $\beta \leq \tau^1, \ldots, \tau^n$ say that β is (jointly) composed of each of the τ's. Relative to $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ and $i = \langle w, g, f \rangle$, the satisfaction of such sentences shall be understood as governed by the following condition:

$$\Vdash^{i}_{\mathfrak{M}} \beta \leq \tau^1, \ldots, \tau^n \text{ just if } \langle \delta^{i}_{\mathfrak{M}}(\beta), \{\delta^{i}_{\mathfrak{M}}(\tau^1), \ldots, \delta^{i}_{\mathfrak{M}}(\tau^n)\}\rangle \subseteq V(\leq)(w_i)$$

Fix $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ such that $W = \{w, w', w''\}$ (thus ignoring irrelevant possible worlds), and consider constant terms t, t', t'', m, m', and m'', each defined such that:

- $V(t)$= Woody
- $V(t')$ = Woody′
- $V(t'')$ = Woody″
- $V(m)$ = matter m
- $V(m')$ = matter m'
- $V(m'')$ = matter m''

Given these conventions, we stipulate the following, world-relative, compositional data: $\langle \delta^{i/w}_{\mathfrak{M}}(t), \delta^{i/w}_{\mathfrak{M}}(m)\rangle \subset V(\leq)(w)$; $\langle \delta^{i/w'}_{\mathfrak{M}}(t'), \delta^{i/w'}_{\mathfrak{M}}(m')\rangle \subset V(\leq)(w')$; $\langle \delta^{i/w''}_{\mathfrak{M}}(t''), \delta^{i/w''}_{\mathfrak{M}}(m'')\rangle \subset$

$V(\leq)(w'')$. Thus, each of Woody, Woody′, and Woody″ is composed from the corresponding portion of wooden matter, relative to their respective 'home-worlds' w, w', and w''.[19]

We turn now to the Woody data proper. Considering, first, Woody at world w:

- Notice that where $w' = w_{i'}$, for some $i' \approx_w i/w$, $\delta^{i'}_{\mathfrak{M}}(t) = f_{i^*}(t) = \mathsf{S}(w, f_{i/w}(t), w_{i'}) = V(t') = \text{Woody}'$; similarly, $\delta^{i'}_{\mathfrak{M}}(m') = f_{i^*}(m') = \mathsf{S}(w, f_{i/w}(m'), w_{i'}) = V(m') =$ matter m'.

- Notice, moreover, that $\langle \delta^{i/w'}_{\mathfrak{M}}(t'), \delta^{i/w'}_{\mathfrak{M}}(m') \rangle \subset V(\leq)(w')$ (by stipulation, above).

  - Consequently, for some $i' \approx_w i/w$, $\Vdash^{i^*/i'}_{\mathfrak{M}} t \leq m'$.
  - Consequently: $\Vdash^{i/w}_{\mathfrak{M}} \Diamond t \leq m'$.[20]

- Notice, also, that for all $i' \approx_w i/w$, $\delta^{i'}_{\mathfrak{M}}(t) = f_{i^*}(t) = \mathsf{S}(w, f_{i/w}(t), w_{i'})$; however, the latter is *undefined* when $w_{i'} = w''$.

  - Consequently: $\langle \delta^{i/w''}_{\mathfrak{M}}(t), \delta^{i/w''}_{\mathfrak{M}}(m'') \rangle \not\subset V(\leq)(w'')$.
  - Consequently, for no $i' \approx_w i/w$, $\Vdash^{i^*/i'}_{\mathfrak{M}} t \leq m''$.
  - Consequently: $\nVdash^{i/w}_{\mathfrak{M}} \Diamond t \leq m''$.[21]

Considering, second, Woody′ at w':

- Notice that $\delta^{i/w'}_{\mathfrak{M}}(t') = f_{i/w'}(t') = \mathsf{S}(w', f_{i/w'}(t'), w') = \text{Woody}'$, and that where $w'' = w_{i'}$, $f_{i^*}(t') = \mathsf{S}(w', f_{i/w'}(t'), w'') = \delta^{i/w''}_{\mathfrak{M}}(t'') = \text{Woody}''$.

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[19] I continue for simplicity to construe each of m, m', and m'' as transworld 'continuants'. Thus the supposition is that the denotation of each of the relevant m-terms is constant across worlds, and that, e.g., Woody′ at w' may be properly seen as composed of the matter m' of world w. This simplification is intended merely to avoid additional extraneous complication in the representation of the Woody data that follows.

[20] More colloquially: given that Woody has a counterpart composed of m' at w', relative to w it is *possible* that Woody be so composed.

[21] More colloquially: given that Woody lacks (at w'') a counterpart composed of m'', relative to w it is *impossible* that Woody be so composed.

- Notice, moreover, that $\langle \delta_{\mathfrak{M}}^{i/w''}(t''), \delta_{\mathfrak{M}}^{i/w''}(m'')\rangle \subset V(\leq)(w'')$ (by stipulation, above).

    - Consequently, for some $i' \approx_w i/w'$, $\Vdash_{\mathfrak{M}}^{i^*/i'} t' \leq m''$.[22]
    - Consequently, $\Vdash_{\mathfrak{M}}^{i/w'} \Diamond t' \leq m''$.[23]

Combining the above, notice, finally, that where $w' = w_{i'}$, $f_{i^*}(t) = \mathsf{S}(w, f_{i/w}(t), w') = \delta_{\mathfrak{M}}^{i/w'}(t') = \text{Woody}'$.

- Consequently, for some $i' \approx_w i/w$, $\Vdash_{\mathfrak{M}}^{i^*/i'} \Diamond t \leq m''$.
- Hence $\Vdash_{\mathfrak{M}}^{i/w} \Diamond\Diamond t \leq m''$.[24]

Thus the above treatment represents 'Woody is composed of m''' as *impossible* relative to w, on the grounds that no world, under any counterpart-assignment, satisfies 'Woody is composed of m'''. But that sentence is nevertheless *possibly possible*, relative to w: Woody$'$ is possibly so composed relative to w'; thus where $w = w_i$ and $w' = w_{i'}$ 'possibly, Woody is composed of m''' is satisfied relative to w' under a counterpart-assignment f_{i^*} of 'Woody' to the table's w'-counterpart Woody$'$. Thus what is essential—Woody's failing to be composed of m''—is represented as *contingent* (contra S5), thus dissolving Chisholm's puzzle of modally flexible essence.

The Lewisian solution circumvents the obscurity noted earlier in connection with Salmon's 'Priorean' approach. *All* worlds, without restriction, are represented as relevantly entering into determining the truth-conditions of *de re* modal sentences on the Lewisian approach: there are no metaphysically inaccessible

[22]Which is just to say, in less technical terms, that Woody$'$ has a counterpart that is composed of m'' at w'' (namely, Woody$''$).

[23]Which is just to say that, relative to w', it is possible that Woody$'$ be so composed.

[24]Which is just to say that, relative to w, it is *possibly possible* that Woody be composed of matter m''.

worlds, only inaccessible individual possibilities (counterparts of counterparts). That theoretical difference between Salmon and Lewis makes for an important difference at the level of formal semantics: the modal operators $\Diamond$ and $\Box$ are each represented, on the Lewisian approach, as quantifying over all worlds in a model, and not merely over a subset of accessible worlds as on Salmon's Priorean solution to Chisholm's puzzle. Instead, the Lewisian solution requires semantical complication elsewhere at the level of the index of evaluation: the representation of satisfaction as relativized, not merely to a world and variable assignment, but additionally to a world-relativized assignment f_i mapping each individual to its *counterpart* at w_i (if such a counterpart exists).

It is important to recognize the fact that underlying this additional bit of semantical complexity is a dramatic departure from 'common sense' modal metaphysics, as reflected in the abandonment of an intuitively natural metaphysics of cross-world modal representation. Kripke (1980, 44) famously articulated the natural view as follows:

> Why can't it be part of the *description* of a possible world that it contain *Nixon* and that in that world *Nixon* didn't win the election? It might be a question, of course, whether such a world *is* possible. [...] But, once we see that such a situation is possible, then we are given that the man who might have lost the election or did lose the election in this possible world is Nixon, because that's part of the description of the world. [...] There is no reason why we cannot *stipulate* that, in talking about what would have happened to Nixon in a certain counterfactual situation, we are talking about what would have happened to *him*.

Kripke's metaphysical idea seems plainly correct, at least in the abstract.[25] The idea is that ordinary physical individuals, such as Nixon, should be understood as transworld 'continuants', existing not only relative to our actual world but rela-

[25] See additionally Plantinga 1973, 1974; van Inwagen 1985; and Salmon 1986, 1996 for further development and defense of the metaphysical idea Kripke here articulates.

tive to other possible worlds as well. That idea underwrites a view of the truth-conditions of *de re* modal discourse as *semantically transparent*, directly involving the subject matter of that discourse relative to possible worlds other than our own. It is because of how *Nixon*, and not some other-worldly surrogate or representation of Nixon, is at other worlds that here in actuality Nixon has the *de re* modal features we attribute to him.[26]

Lewis's view requires that we give up both the metaphysics and the semantics in favor of a view on which the truth conditions of *de re* modal discourse are satisfied in *absentia*, by qualitative surrogates of the subject-matter of that discourse. Kripke (1980, 45) complains against counterpart theory that such a conception of modality *de re* is simply "not the way we ordinarily think of counterfactual situations". More broadly, and as Kripke points out, such satisfaction in *absentia* is intuitively *irrelevant* to what the *de re* modal features of things are like here in our world. Thus Kripke's famous critique of counterpart theory:

> The counterpart of something in another possible world is *never* identical with the thing itself. Thus if we say 'Humphrey might have won the election' (if only he had done such-and-such), we are not talking about something that might have happened to *Humphrey*, but to someone else, a "counterpart". Probably, however, Humphrey could not care less whether someone *else*, no matter how much resembling him, would have been victorious in another possible world. (Kripke 1980, 54n13)

Kripke is correct. The intuitively natural view is one according to which Humphrey might have won because of how things go with *Humphrey* at other worlds, and not because of how things go with other individuals who relevantly resemble

[26]Notice that Kripke's intuitive metaphysical hypothesis fits smoothly with the simple semantical representation of denotation noted above, and articulated in Chapter 2 at §2.3. Suppressing reference to a model, simple modal semantics represents 'possibly, Nixon loses' as true, relative to our actual world, just in case *Nixon* is among the losers at some other possible world. Thus underlying the simple treatment of the semantics of names in modal contexts is a presupposition that ordinary individuals may be meaningfully said to exist relative to more than one possible world, just as Kripke maintained.

Humphrey. It would be theoretically suprising indeed if a compelling solution to Chisholm's Paradox in fact required that we abandon such an arguably *default*, and highly plausible, metaphysical and semantical hypothesis concerning modality *de re*.[27] Shortly, we shall see that resolving Chisholm's Paradox does require anything so extreme as Lewisian counterpart theory.

4.2.3 Contingent Essentialism

Despite substantial metaphysical differences, a remarkable dialectical symmetry obtains between the thinking of Salmon and Lewis on the paradox of flexible essence. Each supposes that resolving the paradox requires committment to *contingentism* about true essentialist claims: though Woody is essentially composed of matter substantially like *m*, both Salmon and Lewis take reflection on the paradox to demonstrate that this need not have been so. While that idea is implemented by Salmon and Lewis in radically different ways, the discussion thus far has shown that in each case, such contingent essentialism invites a plausible, and structurally very similar, pattern of objection.

On the one hand, Salmon's implementation of contingent essentialism by way of metaphysically 'inaccessible' worlds brings with it Lewis's plausible charge of *obscurity*. The default assumption ought to be that *all* possible worlds without restriction relevantly enter into the domain of modal quantification when matters of essence, and consequently of metaphysical necessity, are under consideration. That is a compelling assumption that proponents of Salmon's strategy must relinquish, in favor of an implausibly primitive distinction between necessity 'tout

[27] To be sure, one reason that Lewis thinks we cannot say the simple and intuitive thing is that he conceives of other possible worlds as spatiotemporally maximal cosmoi that are of the same metaphysical type as our own actual world (Lewis 1986*c*, 69–81). Given that view, the idea that ordinary individuals exist relative to more than one possible world can indeed seem metaphysically intractable (though see McDaniel 2004). I assume here that concrete modal realism does not provide cogent reason to endorse a controversial and counterintuitive position in modal semantics, however.

court' (Salmon) and necessity 'no matter what' (the standard view).

On the other hand, Lewis's implementation of contingent essentialism by way of inaccessible 'individual possibilities', or counterparts, brings with it Kripke's plausible charge of explanatory irrelevance. Counterpart theory distorts the intuitive truth conditions of *de re* modal discourse, which on a sensible view ought to involve the subject-matter of that discourse, and the way that subject-matter *itself* is relative to other possible worlds. Plausibly, the obtaining of counterpart relations is metaphysically unconnected to whether a given individual could or must be a certain way.

This underlying dialectical symmetry suggests a broader error in the way that Chisholm's paradox of flexible essentialism has been standardly understood in the contemporary literature.

4.3 A Better Picture

That broader error involves a conception of the data generating Chisholm's puzzle entirely in terms of the *index relativity* of (compositional) possibility and necessity. A better picture represents flexible compositional essence as instead relativized to the possible world of the *context*. With compositional essence so construed, Chisholm's puzzle evaporates.

4.3.1 Formalities

In highly schematic terms, the better picture may be represented as follows; I shall return directly to apply the picture more concretely to the Woody data, in §4.3.2.

Following the convention of previous chapters, let us continue to represent the available *contexts* as a set $C \subseteq W \times T \times L \times D$, with W, T, L, and D retaining their earlier definitions. Thus a context $c \in C$ remains a structure, comprising a possible world w_c, together with temporal, locational, and agential parameters drawn 'from

within' w_c. Additional representational complexity enters into the better picture at the level of a *frame*. Given $c \in C$, let a *c-relativized frame* (or 'c-frame') $\mathcal{F}_c$ for moderate compositional essentialism be a 5-tuple $\langle W, J, Q_c, w_c, \mathsf{K}_c \rangle$, such that:

- W is a contextually 'absolute', non-empty set of possible worlds;
- J is a similarly absolute, non-empty set of particles;
- Q_c is a c-relative set of composite entities;
- $w_c \in W$ is the possible world of the context; and
- K_c:$W \times Q_c \rightarrow \mathcal{P}(J)$ is a c-relativized, partial 'composition' function, mapping a world and (contextually-dependent) composite individual $q \in Q_c$ onto the set of particles that compose q at w, as from the view of c.[28]

Notice that no *particle* is a composite entity: thus, $J \cap Q_c = \varnothing$. As a convenient notational convention, given $c \in C$ and $\mathcal{F}_c = \langle W, J, Q_c, w_c, \mathsf{K}_c \rangle$ for c we let $\langle w, q, \{j_1, ..., j_n\} \rangle \in \mathsf{K}_c$ represent the fact that composite $q \in Q_c$ is composed of $j_1, ..., j_n \in J$ relative to w, as from the view of c. We suppose further that for any $c \in C$, all composite entities 'available' from the view of c are composed relative to w_c; that is: for all $q \in Q_c$, for some $j_1, ..., j_n \in J$, $\langle w_c, q, \{j_1, ..., j_n\} \rangle \in \mathsf{K}_c$. This has the effect of requiring that, relative to any context, whatever composite entities exist as from the perspective of that context are *actually* composed from that perspective.

First and foremost, what this apparatus does is enable the representation of the thesis of moderate compositional essentialism as *relativized to a context*.

> *c-relative Compositional Essentialism*:
> Fix $c \in C$ and $\mathcal{F}_c = \langle W, J, Q_c, w_c, \mathsf{K}_c \rangle$ for c. Then for any $q \in Q_c$: if for some $S \subseteq J$, $\langle w_c, q, S \rangle \in \mathsf{K}_c$, then for all $w \in W$, if $\langle w, q, S' \rangle \in \mathsf{K}_c$, S' substantially overlaps S.

[28] Here $\mathcal{P}(J)$ represents the power set of J.

Less abstractly, the idea is that from the view of any context c, the 'range' of any object's flexible compositional essence is fixed by its *actual* material composition, as from the world w_c of that context. Naturally, that implies that matters of 'cross-world' material composition are similarly constrained by matters of material composition relative to w_c: whatever composes an object, relative to any (counterfactual) world, is 'most' of what composes that object relative to the world of the context.

Compositional essence on this picture emerges as *metaphysically necessary*, as from the view of any context, while similarly *non-rigid across contexts*. As I shall now demonstrate, the cross-contextual non-rigidity of compositional essence provides for a smooth explanation of the intuitive data supposed by Chisholm (1967) to generate paradox; similarly, however, the contextually relativized necessity of compositional essence blocks any paradoxical collapse into anti-essentialism.

4.3.2 Composition from a Context

Consider Chisholm's puzzle afresh. 'Off at' world w', is it so that Woody the table is possibly composed of m''? On the better picture, the correct answer here is: 'it depends' (compare Murray and Wilson 2012, 202). That is because consideration of what is the case 'off at' w' is *loose*, and ambiguous between a conception of w' as world of context or world of index.

Fixing our imaginative standpoint in w, w' represents a way things could have been, *given that* Woody is actually composed of m. With our imaginative standpoint fixed in w, we ought to say that 'off at' w' it is *impossible* that Woody be composed of m''. That is because, as from the view of w, *no world* represents Woody as being so composed: m'' is not 'most' of m, which on the better picture composes Woody from the view of w at any 'counterfactual' world (at which Woody is composed at all). Here lies in part the significance of our definition of K_c as a *partial* composition function: as from the view of a context $c \in C$, a

(contextually-available) composite individual $q \in Q_c$ might be composed relative to one world in W, but not another. That is how things go with Woody relative to worlds w' and w'', on the better picture, when $w_c = w$: Woody's being composed of m'' relative to w'' is modally precluded, from the view of $w = w_c$, *given* that in w Woody is actually composed of matter m.[29]

To be sure , Chisholm's Paradox invites us to suppose otherwise (§4.1.1). According to the reasoning of the paradox, 'off at' w', it *could be* that Woody is composed of m''. Chisholm's puzzle invites us to conclude, on that basis, that Woody is so composed relative to world w'', thus collapsing flexible essentialism into incoherence (assuming S5, as Chisholm does). On the better picture, the supposition is not incorrect; rather, it is *underspecified*, and fails to properly illuminate a crucial feature of the reasoning we employ as we 'follow' Woody along from w to w'.

That crucial feature involves the imaginative shifting of the world of context from w to w'. Untethering our imaginative standpoint from w and considering 'as actual' instead a world in which Woody is composed of m', what *could be* the case as far as Woody's composition is concerned similarly shifts: on the better picture, as from $w_c = w'$, Woody *could* be composed of either m or m'', and consequently is so composed relative to w and w''. That is because m and m'' each coincide with 'most' of m', and thus represent compositional possibilities for Woody, given the hypothetical supposition that Woody is originally composed of m'. That is similarly why, on the better picture, it seems so plausible to suppose, with Chisholm, that 'off at' w' it is possible that Woody be composed of matter substantially unlike m. It *is* possible that Woody be so composed, as from the hypothetical perspective we take up in imaginatively shifting w_c from w to w'. Here again lies the significance of our treatment of K_c as a partial function. In

[29]Notice that this is compatible with Woody nevertheless *existing* relative to w'', from the view of w, albeit as non-composed. Perhaps Woody the table *necessarily* exists, as from the view of $w = w_c$: that is a theoretical possibility considered in the chapter that follows.

broad relief: in shifting the context from c to c', it may be that for $q \in Q_c \cap Q_{c'}$, $\langle w_c, q, S \rangle \in \mathsf{K}_c$ but $\langle w_{c'}, q, S' \rangle \in \mathsf{K}_{c'}$, for $S \neq S' \subset J$. If so, it may similarly be that $\mathsf{K}_{c'}(w, q)$ but not $\mathsf{K}_c(w, q)$ is defined, if for some $S'' \subset J$ $S'' \cap S'$ is 'most' of S' while $S'' \cap S$ is mostly *not* S. That is how things go with Woody relative to w'', on the better picture: the table is composed, there, of m'' as from $w_c = w'$, but not as from $w_c = w$.

It can be instructive to contrast the better picture with Salmon's Priorean treatment of the data in the Woody case. Salmon, in effect, treats matters of world-relative material composition as absolute, or perspective-*invariant*. Specifically, on Salmon's approach, Woody is composed of m'' relative to w'' *absolutely*, and is similarly absolutely composed of m' relative to w'. Assuming S5, that absolutist conception of the cross-world compositional data collapses flexible essentialism into paradox; that is why Salmon abandons the transitivity principle of S5, and instead construes w'' as an impossibility relative to w but not w'. Schematically:

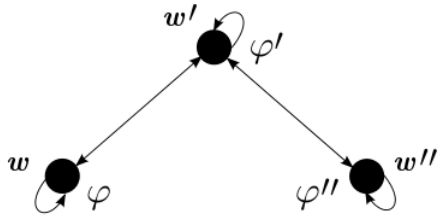

Figure 3. Salmon's intransitive conception of the Woody data. Woody is composed from m'' at w'', and from m' at w'; w'' is impossible relative to w, but not relative to w'.

The better picture instead represents matters of cross-world composition as perspectival in character, and as *dependent* upon what is essential to an artifact relative to the possible world of the context. Composition relative to a context fixes the (flexible) essences of physical objects, such as Woody, and thereby fixes what matter composes such objects 'off at' possibilities considered as counterfactual, as from the view of w_c. For example, letting $w_c = w$, on the better picture Woody is composed of m' relative to w', but is non-composed relative to w''. Schematically:

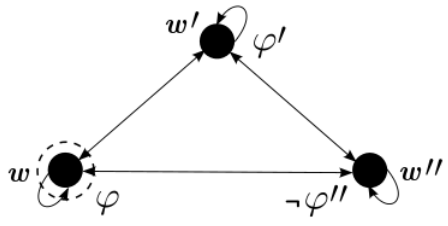

Figure 4. Cross-world composition from the view of $w_c = w$. As from w, Woody is actually composed of m' at w', but is non-composed of m'' at w''. Here and below a dashed-circle indicates the possible world of the context.

Consequently, on the better picture, as from w, it is *impossible* that Woody be composed of m''. But that is not because w'' is an 'inaccessible' world relative to which Woody is nevertheless so composed, in contrast with what Salmon wishes to maintain. Rather, as from w, it is impossible that Woody be composed of m'' for just the reason that Woody is not composed that way at *any* world whatsoever.

On the better picture, the temptation to conceive of m'' as a *possible compositional possibility* for Woody arises on the basis of our theoretical capacity to shift the world of context from w to w'. Fixing our imaginative standpoint now in w', the matter that *actually* composes Woody similarly shifts from m to m'. That is why, as from the view of $w_c = w'$, it could be that Woody is composed of either m or m'', given that each is 'most' of m':

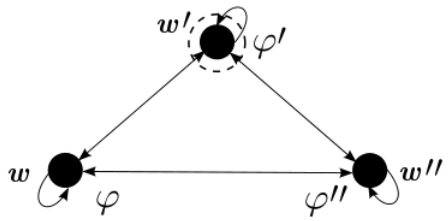

Figure 5. Cross-world composition from the view of $w_c = w'$. As from w', Woody is actually composed of m', and could be composed of either m or m'' instead.

There is no contingency of compositional essence on the better picture; rather, what we have is *non-rigidity* across contexts at the level of the essential compositional facts.[30] Construing world w for convenience as *our* world @—i.e., the '*actual* actual' world (Davies and Humberstone 1980)—the imaginative shifting of contextual perspective from w to w' involves the hypothetical supposition of what is in fact false: namely, that Woody the table is *actually* composed of m'. As from that hypothetical perspective, it is indeed possible that Woody be composed instead of m''. But that is merely hypothetical possibility: it does not translate into genuine contingency from the view of w.

4.3.3 Semantics for Compositional Essentialists

Relativizing flexible essence to the world of context keeps the semantics simple.

Consider a 'compositional' quantified modal language $\mathscr{L}^{\forall\Box\leq}$. Syntactically, $\mathscr{L}^{\forall\Box\leq}$ extends $\mathscr{L}^{\forall\Box}$ by way of the multigrade composition predicate $\leq$ introduced in §4.2.2, and its constant terms now bifurcate into a stock of *particle* and *composite* terms: $a_1, \ldots$; and $b_1, \ldots$; respectively. The intuitive idea is that the latter name composed objects of the represented ontology, while the former pick out the matter that (collectively) composes those objects. Where $\tau^1, \ldots, \tau^n$ are any (particle or composite) terms, β is any composite term, and x_k is any variable, we define the well-formed formulae φ of the language by way the following grammar:

$$\varphi ::= F^n_k(\tau^1, \ldots, \tau^n) | \tau^i = \tau^j | \beta \leq \tau^1, \ldots, \tau^n | \neg\xi | \xi \wedge \zeta | \xi \vee \zeta | \forall x_k \xi | \exists x_k \xi | \Diamond\xi | \Box\xi$$

(Here ξ and ζ are any formulae). A string of symbols of the compositional extension is a *sentence* just in case that string is a formula in which no variable term x_k occurs unbound.

[30] Compare Murray and Wilson 2012 on the illegitimacy of '*in-situ*' shifts at the level of what possible world is being treated as indicatively actual for the purposes of modal deliberation concerning the composition of ordinary physical artifacts.

Given $c \in C$, we define a c-relativized model $\mathfrak{M}_c$ for moderate compositional essentialism as a pair-sequence $\langle \mathcal{F}_c, V_c \rangle$, in which $\mathcal{F}_c = \langle W, J, L_c, w_c, \mathsf{K}_c \rangle$ is a c-frame (§4.3.1) and V_c is a contextually relativized, partial valuation function. V_c is defined such that:

- For each n-place predicate F^n_k, $V_c(F^n_k) : W \rightarrow (J \cup L_c)^n$; and
- For each term τ^k: if $V_c(\tau^k)$ is defined,

$$V_c(\tau^k) = \begin{cases} j_k \in J, \text{ whenever } \tau^k \text{ is a particle-constant;} \\ \\ b_k \in L_c, \text{ whenever } \tau^k \text{ is a composite-constant.} \end{cases}$$

Thus the context- and model-relative interpretation $V_c(F^n_k)$ of a predicate is a possible-worlds intension, while that of each individual constant term τ^k is represented as 'sensitive' to τ^k's semantic categorization as either a particle- or composite-naming device. We shall suppose that c-relative valuation functions V_c are *cross-contextually rigid*, in the following sense:

Cross-contextual Rigidity:

1. For all particle-constants τ^k, and for all $c, c' \in C$, $V_c(\tau^k) = V_{c'}(\tau^k)$.
2. For all composite-constants τ^k, and for all $c, c' \in C$, $V_c(\tau^k) = V_{c'}(\tau^k)$ if $V_c(\tau^k)$ and $V_{c'}(\tau^k)$ are each defined.

The idea is that in shifting our view from c to c', modal deliberation continues to concern the same *matter*, and the same *composite individuals*. That is, intuitively, how things go in consideration of the Woody data, for example. Shifting w_c from w to w', we continue to deliberate concerning *Woody*, and the materials m and m' that compose and could compose Woody from the view of w.[31]

[31]Contrast Lewis, whose approach requires that consideration of compositional possibility 'off at' w' involves the consideration of a qualitative counterpart of Woody's, composed there of a

Given a context c and c-relativized model $\mathfrak{M}_c$, the denotation of terms in $\mathfrak{M}_c$ is relativized to a simple index of evaluation $i{=}\langle w, g\rangle$, such that $w \in W$ and $g \in (J \cup L_c)^\omega$ is a variable assignment (here we construe $J \cup L_c$ as our quantificational domain). As follows:

$$\delta^i_{\mathfrak{M}_c}(\tau^k) = \begin{cases} V_c(\tau^k), \text{ if } \tau^k \text{ is a constant;} \\ \\ g_i(k), \text{ if } \tau^k = x_k. \end{cases}$$

The satisfaction of formulae is similarly relativized. Given $c \in C$ and model $\mathfrak{M}_c$ for c, the conditions for atomic formulae of the compositional extension are that $\Vdash^i_{\mathfrak{M}_c} F^n_k(\tau^1, \ldots \tau^n)$ just if $\langle \delta^i_{\mathfrak{M}_c}(\tau^1), \ldots, \delta^i_{\mathfrak{M}_c}(\tau^k)\rangle \subseteq V_c(F^n_k)(w_i)$; $\Vdash^i_{\mathfrak{M}_c} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}_c}(\tau^j) = \delta^i_{\mathfrak{M}_c}(\tau^k)$; and $\Vdash^i_{\mathfrak{M}_c} \beta \leq \tau^1, \ldots, \tau^n$ just if $\langle w_i, \delta^i_{\mathfrak{M}_c}(\beta), \{\delta^i_{\mathfrak{M}_c}(\tau^1), \ldots \delta^i_{\mathfrak{M}_c}(\tau^n)\}\rangle \in \mathsf{K}_c$. Thus, in particular, composition-attributing sentences of form $\beta \leq \tau^1, \ldots \tau^n$ are represented as satisfied, relative to $i = \langle w, g\rangle$, just if, relative to w_i, $\delta^i_{\mathfrak{M}_c}(\beta)$ is composed of whatever matter each of the τ 'pick out' relative to i. For Boolean and quantified formulae, the conditions are as one would expect.[32] Modals $\Box$ and $\Diamond$ are represented as unrestricted quantifiers over the space of possible worlds in a model:

- $\Vdash^i_{\mathfrak{M}_c} \Box\xi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$
- $\Vdash^i_{\mathfrak{M}_c} \Diamond\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$

Truth and entailment are defined as in §3.4.1. Consequently, the underlying semantics validates each of the (T), (B), and (4) principles of S5 modal logic.

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qualitative counterpart of m'. On the better picture, Woody the table is both a cross-world and *cross-contextual* continuant; relative to any context from which 'Woody' is defined, consideration of how things could go for Woody is consideration of hypothetical possibility for the Woody of our world @ (continuing here to construe $w = @$).

[32]Thus: $\Vdash^i_{\mathfrak{M}_c} \neg\xi$ just if $\nVdash^i_{\mathfrak{M}_c} \xi$; $\Vdash^i_{\mathfrak{M}_c} \xi \wedge \zeta$ just if $\Vdash^i_{\mathfrak{M}_c} \xi$ and $\Vdash^i_{\mathfrak{M}_c} \zeta$; $\Vdash^i_{\mathfrak{M}_c} \xi \vee \zeta$ just if $\Vdash^i_{\mathfrak{M}_c} \xi$ or $\Vdash^i_{\mathfrak{M}_c} \zeta$; $\Vdash^i_{\mathfrak{M}_c} \forall x_k\xi$ just if, for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$; and $\Vdash^i_{\mathfrak{M}_c} \exists x_k\xi$ just if, for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$.

Crucially, the S5-structure of the semantics has the pleasing result that matters of context-relative compositional essence are represented as *non-contingent*, in contrast with what Salmon and Lewis each suppose. To see this, fix $c \in C$, and $\mathfrak{M}_c = \langle \mathcal{F}_c, V_c \rangle$ for c. Notice that:

- $\Vdash^{i/w_c}_{\mathfrak{M}_c} \beta \leq \tau^1, \ldots, \tau^n$ just if $\langle w_c, \delta^{i/w_c}_{\mathfrak{M}_c}(\beta), \{\delta^{i/w_c}_{\mathfrak{M}_c}(\tau^1), \ldots, \delta^{i/w_c}_{\mathfrak{M}_c}(\tau^n)\}\rangle \in \mathsf{K}_c$;
    - hence just if: for all $i' \approx_w i/w_c$, if $\Vdash^{i'}_{\mathfrak{M}_c} \beta \leq \tau^{1*}, \ldots, \tau^{n*}$ then $\{\delta^{i'}_{\mathfrak{M}_c}(\tau^{1*}), \ldots, \delta^{i'}_{\mathfrak{M}_c}(\tau^{n*})\} \cap \{\delta^{i/w_c}_{\mathfrak{M}_c}(\tau^1), \ldots, \delta^{i/w_c}_{\mathfrak{M}_c}(\tau^n)\}$ is 'most' of $\{\delta^{i/w_c}_{\mathfrak{M}_c}(\tau^1), \ldots \delta^{i/w_c}_{\mathfrak{M}_c}(\tau^k)\}$ (by *c-relative Compositional Essentialism*);
    - hence just if, for some S^* containing 'most' of $\{\delta^{i/w_c}_{\mathfrak{M}_c}(\tau^1), \ldots, \delta^{i/w_c}_{\mathfrak{M}_c}(\tau^n)\}$, $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Box\beta \leq S^*$.
- Notice, moreover, that for such S^* and for all $i' \approx_w i/w_c$, $\Vdash^{i'}_{\mathfrak{M}_c} \beta \leq S^*$ just if, for all $i'' \approx_w i'$, $\Vdash^{i''}_{\mathfrak{M}_c} \Box\beta \leq S^*$.
- Consequently, for some S^* containing 'most' of $\{\delta^{i/w_c}_{\mathfrak{M}_c}(\tau^1), \ldots, \delta^{i/w_c}_{\mathfrak{M}_c}(\tau^n)\}$, $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Box\beta \leq S^*$ just if $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Box\Box\beta \leq S^*$.

Thus matters of flexible compositional essence, as from a context, are represented as non-contingent. For example, as from $w_c = w$, it is both necessary, and *necessarily…necessary*, that Woody the table be composed of matter substantially similar to *m*.

4.4 Chisholm's Paradox in Context

Considered through the lens of the context–index framework, the common error underlying standard solutions to Chisholm's paradox involves the conflation of genuine contingency with context dependence.

Such conflation explains why it can seem superficially plausible to suppose, as Salmon and Lewis each do, that it is *possibly possible* for an ordinary physical

artifact to be some way it essentially is not. For in imaginatively shifting around our contextual point of view, certain states of affairs that are modally precluded, in view of how things actually are here in @, may in certain cases emerge as possibilities. That is how things go with Woody the table and its possible composition from m'', in view of matters of 'actual' material composition from the contextual standpoint of w'. But possibility as from the view of other contexts is not automatically *possible possibility* as from the view of our actual context: when w_c = @, possibility as from the view of other contexts is *imaginary* possibility, in view of the hypothetical supposition that things are actually some way they are not.

In some ways, it is unsurprising that standard solutions to the paradox fail to reflect this simple fact. Chisholm 1967 discovered his puzzle of flexible essentialism during a period in which the philosophical significance of context was relatively under-appreciated, and originally formulated the puzzle against the backdrop of a modal framework that lacks the resources to draw the context–index distinction (simple-indexical S5 semantics of the sort pioneered by Carnap, and articulated in §2.3). Consequently, each world as it figures in the reasoning of the puzzle has traditionally been viewed as a world of evaluation, or *index*; given that uniformity, loose talk of possibility 'off at', or 'relative to', other possible worlds cannot be properly disambiguated into precise talk of possibility *as from* a context, or *relative to* an index.

This chapter has documented various further ways in which philosophers have proposed to complicate our modal metaphysics, and modal semantics, in light of seemingly recalcitrant data that cannot be accomodated against the backdrop of such inadequate theoretical foundations. Distinguishing context from index makes for a smooth interpretation of that data, and similarly allows us to keep our modal metaphysics and modal semantics simple.

Chapter 5

Ontology

5.1 Quantification, Modality, and Metaphysics

Simple quantified modal semantics, as pioneered by Carnap (1946, 1947), represents ontology as non-contingent. If correct, such a representation has surprising implications, not the least of which is that each of us is represented as a necessary being.

A *prima facie* opposing picture can seem more intuitively correct. According to the (seemingly) opposing picture, matters of existence and nonexistence are such as to vary from one possible world to another, and thus could be otherwise than they actually are. This chapter shows that the intuitive opposition, properly conceived through the lens of the context–index distinction, is merely apparent.

5.1.1 Puzzles of Modal Ontology

Just as simple possible-worlds semantics represents modality (§3.1), and denotation (§4.2), as having a 'constant' structure across the space of possible worlds, the straightforward Carnapean approach to modal semantics articulated at §2.3 represents the *domain of quantification* as invariant from one possible world to

another.

Recall that on the straightforward approach, sentences of a quantified modal language are evaluated relative to a model $\mathfrak{M}$, comprising a frame $\mathcal{F} = \langle W, D, @\rangle$ and valuation function V, and index $i = \langle w, g\rangle$ for $\mathfrak{M}$ such that $w_i \in W$ and $g_i \in D^\omega$. In particular, on the straightforward approach a universally quantified sentence $\forall x_k \xi$ is satisfied (in a model) relative to $i = \langle w, g\rangle$ just in case ξ is satisfied relative to all indices $i' \sim_k i$ for that model, while an existentially quantified sentence $\exists x_k \xi$ is satisfied relative to $i = \langle w, g\rangle$ just if ξ is satisfied relative to some $i' \sim_k i$; $i' \sim_k i$, recall, just if i' differs from i at most in containing an x_k-*variant* $g_{i'}$ of g_i. Schematically:

- $\Vdash^i_{\mathfrak{M}} \forall x_k \xi$ just if, for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
- $\Vdash^i_{\mathfrak{M}} \exists x_k \xi$ just if, for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$

Notice that where $i' \approx_w i$, on the simple view the ranges of g_i and $g_{i'}$ *coincide*: each is a mapping from natural numbers to values in a 'common' ontology D, mutually available from the view of each possible world. Thus on the straightforward approach, what individuals are available for quantificational purposes is represented as a matter that is invariant from the view of one possible world to the next.

Prima facie, that construal of the quantificational domain as world invariant conflicts with the intuitive thought that, in some sense, there *could be* more or less than there actually is. Consider, first, matters of *actual nonexistence.* Plausibly, that certain individuals, and kinds of individuals, fail to exist is a matter that is grounded in how things happen go here in actuality. Given that things could go otherwise than they actually do, it would thus similarly appear that there could be objects that do not exist from the view of @. To fix ideas: consider human gametes s_0 and e_0 such that, actually, s_0 and e_0 never 'fuse' in the sort of way that leads to the existence of a person (in normal circumstances, in the normal course of time, etc.; I suppress these complications in what follows). Then, actually,

nothing is the individual f_0 that would result from the fusion of s_0 with e_0 (contra Salmon 1987 and Meinong 1904: the claim is not that such 'merely possible' individuals have some shadowy variety of being short of actual existence; rather, the view is that such individuals are *unreal*, full-stop). And yet, presumably, in some sense s_0 and e_0 could fuse in the relevant sort of way: that is just to say that there could be a human person distinct from all actual persons (and everything else there actually is). For example, and more concretely, consider the fact that while actually childless, it *could be* the case Wittgenstein has a child (Williamson 1998).

A construal of the sense of 'could' at issue as involving genuine *possibility* generates a familiar puzzle against the backdrop of Carnapean modal semantics. That is because the Carnapean picture validates what has come to be known as the *Barcan Formula*, after Barcan (1946).[1]

(BF) $\quad \Diamond\exists x_k\xi \supset \exists x_k\Diamond\xi$

Here and in what follows, ξ is any formula in which variable x_k occurs free.[2] Informally, BF says that if it is possible for there to be something satisfying some condition, then there *is* something that possibly satisfies that condition. Accordingly, BF says that possibility *de dicto* implies possibility *de re*. That implication can seem superficially innocuous. But now consider: it is *possible* that s_0 and e_0 fuse into something (f_0), and hence it is possible that something be the individual resultant of that fusion; schematically, $\Diamond\exists xFx$. Given BF, the latter implies

[1]Later Ruth Barcan Marcus. Marcus would come to revisit the logical status of the Barcan Formula, and its *converse* introduced below, once certain of the more controversial modal-ontological implications of these principles became apparent. See, e.g., Marcus 1975, 1985.

[2]Carnap's own discussion of the Barcan Formula occurs at Carnap 1946, 37. To see that BF is valid in Carnap's framework, consider the principle in its contrapositive form, $\forall x_k\Box\xi \supset \Box\forall x_k\xi$. Fix a model $\mathfrak{M} = \langle \mathcal{F}, V\rangle$ with $\mathcal{F} = \langle W, D, @\rangle$ and V defined as in §2.3 (we here assume $\mathscr{L}^{\forall\Box}$ as our background quantified modal language). The proof is then straightforward given the definitions of model- and index-relative satisfaction set out in earlier chapters. In particular: $\Vdash^{i/@}_{\mathfrak{M}} \forall x_k\Box\xi$ just if, for all $i' \sim_k i/@$, $\Vdash^{i'}_{\mathfrak{M}} \Box\xi$; hence just if, for all $i'' \approx_w i'$, $\Vdash^{i''}_{\mathfrak{M}} \xi$; hence just if, for all $i'' \approx_w i'/@$, $\Vdash^{i''}_{\mathfrak{M}} \forall x_k\xi$; hence just if $\Vdash^{i/@}_{\mathfrak{M}} \Box\forall x_k\xi$. Thus $\vDash_{\mathfrak{M}} \forall x_k\Box\xi \supset \Box\forall x_k\xi$.

that something actual is such that, possibly, *it* is the resultant individual ($\exists x \Diamond Fx$). That implication is deeply metaphysically suspicious.

Recall our concrete example: it could be that Wittgenstein had a child. Given BF, and with 'could' construed as *possibility*, something actual might have been a child of Wittgenstein's. And yet what actual individual is there such that, possibly, it is such a child? Could Wittgenstein have fathered any of *us*? Not plausibly, at least given intuitive essentialist presuppositions that are widely endorsed (Kripke 1980, 110-15; Bennett 2006): given those presuppositions, anything that is not already a child of Wittgenstein's is *necessarily* not a child of Wittgenstein's. Consequently, and given such presuppositions, nothing which exists from the view of actuality could be fathered by Wittgenstein.[3] *Upshot*: intuitive data concerning what there could be, framed in terms of *possibility*, have metaphysically unacceptable consequences given a simple Carnapean approach to first-order modal semantics.[4]

These results are in some ways unsurprising. The Barcan Formula represents the modal $\Diamond$ and quantifier $\exists$ as 'scopally' independent, and consequently represents $\Diamond$ as freely commuting with $\exists$ (Linsky and Zalta, 1994; Sider 2010, Ch. 5). That commutativity of modal and quantifier is a natural formal counterpart of a model-theoretic representation of the domain of quantification as invariant across the space of possible worlds. Thus if, from the view of @, it is *possible* that s_0

[3]As we shall see down the line, Williamson (1998, 2013*b*) rejects the implication. On Williamson's 'necessitist' view, there *is* something actual that is possibly Wittgenstein's child, but that object is one we pass over in an inventory of our world's *spatiotemporal* ontology. I return to Williamson's modal metaphysics in due course.

[4]As Williamson (2013*b*, 64–72) notes, Prior (1953) appears to have been the first to notice the philosophical problems raised by BF. Prior considers a reading of BF on which $\Diamond$ is interpreted as representing the temporal sentential operator 'it either is or has been or will be the case that'; he then presents as a counterexample to BF under that reading the sentence 'if it either is or has been or will be the case that someone is flying to the moon, then there is someone who either is flying or has flown or will fly to the moon', which Prior rejects on the grounds that while its antecedent may well be true, its consequent may be false if no one currently alive is a moon-traveller at any past, present, or future time.

and e_0 fuse into something ($\Diamond\exists xFx$), then out at some counterfactual world w, something is the individual resultant of the fusion of s_0 and e_0. Consequently, on the straightforward semantical picture, that something belongs to the common domain D, and accordingly exists from the view of @. That implies, naturally, that from the view of @ something could be that individual resultant ($\exists x\Diamond Fx$), just as the Barcan Formula requires.

Consider, next, *actual existence*. Plausibly, as with nonexistence, that certain individuals exist is a matter that is grounded in how things happen to go in actuality. Given that things could go otherwise, and do go otherwise in other worlds, it is reasonable to think that certain individuals could fail to exist. To fix ideas: consider human gametes s_1 and e_1 such that, actually, s_1 and e_1 fuse in the sort of way that leads to the existence of a human person (f_1). Intuitively, in some sense it could be that s_1 and e_1 never fuse in that way; consequently, it could be that the individual resultant of their fusion never comes into being. For example, and more concretely: consider the fact that Socrates's parents could have failed to meet, in which case certain events that *essentially* lead to the existence of Socrates would not occur.

And yet, construing the sense of 'could' at issue as involving *possibility* leads to incoherence against the backdrop of simple Carnapean modal semantics. To see the problem, notice to begin that the Carnapean picture validates the *converse* Barcan Formula (again, after Barcan 1946):[5]

(CBF) $\quad \exists x_k\Diamond\xi \supset \Diamond\exists x_k\xi$

Informally, CBF says that if there is something that possibly satisfies some condition, then it is possible for there to be something that satisfies that condition; accordingly, CBF says that possibility *de re* implies possibility *de dicto*. Again, that

[5]Carnap's discussion of the converse Barcan Formula occurs at Carnap 1946, 54. To see that CBF is valid on Carnap's approach, consider the principle in its contrapositive form, $\Box\forall x_k\xi \supset \forall x_k\Box\xi$. With $\mathfrak{M} = \langle\mathcal{F}, V\rangle$ fixed as above, the proof is similarly straightforward. For $\Vdash^{i/@}_{\mathfrak{M}} \Box\forall x_k\xi$ just if, for all $i' \approx_w i/@$, $\Vdash^{i'}_{\mathfrak{M}} \forall x_k\xi$; hence just if, for all $i'' \sim_k i'$, $\Vdash^{i''}_{\mathfrak{M}} \xi$; hence hence just if, for all $i'' \sim_k i/@$, $\Vdash^{i''}_{\mathfrak{M}} \Box\xi$; hence just if $\Vdash^{i/@}_{\mathfrak{M}} \forall x_k\Box\xi$. Thus $\vDash_{\mathfrak{M}} \Box\forall x_k\xi \supset \forall x_k\Box\xi$.

implication is superficially innocuous. But now consider: there is something—the individual resultant f_1 of the relevant fusion of s_1 and e_1—such that, *possibly*, nothing is that thing ($\exists x \Diamond \neg \exists y(y = x)$). Given CBF, the latter implies that it is possible for there to *be* something such that nothing is that thing. An incoherent result: it is *impossible* that there be something, x, such that absolutely everything is distinct from x. *Upshot*: intuitive claims about what could fail to be, framed in terms of *possibility*, collapse into incoherence against the backdrop of simple quantified modal semantics.

Again, ultimately unsurprising. The simple Carnapean picture represents each possible world as 'accessing' a single, common domain of possible individuals D. Given that Socrates, say, exists from the view of @, Socrates belongs to D, and consequently exists relative to all worlds. Consequently, the Carnapian picture is one according to which Socrates's existence is strictly necessary, just as CBF implies. (Naturally, these considerations do not turn upon any special feature of Socrates's: assuming the converse Barcan Formula is a valid principle of metaphysical modal logic, *everything* necessarily exists: $\forall x \Box \exists y(y = x)$). That result, too, is necessary on the simple semantical view, with the result that the necessity of being is itself non-contingent: $\Box \forall x \Box \exists y(y = x)$.

5.1.2 Possibility and Perspective

Thus, an apparent tension exists between intuitive data and theory. According to intuitive data, there could be more or less than there is, actually. And yet, according to theory, ontology is strictly non-contingent. Theory validates the Barcan formulae, which jointly represent the ontology of actuality as comprising both an upper and lower limit on what it is possible for there to be.

Contemporary discussion of the apparent tension bifurcates into two distinctive strategies.

On the one hand, we have proposals to complicate our semantical *theory*, thus

invalidating the Barcan formulae and enabling the coherent model-theoretic representation of ontology as contingent (Kripke 1963; Plantinga 1976). In broad relief, such proposals replace Carnap's single, common domain of quantification D with a plurality of 'variable' domains, each uniquely relativized to a possible world of evaluation. The key move is that such variable domains need not be coincident, thus allowing for representation of the intuitive thought that what exists relative to one world need not exist relative to all worlds. Focusing primarily on Kripke's foundational implementation of the idea, variable-domains semantics is critically evaluated at the top of §5.2.

A contrasting strategy retains the simple semantics, instead complicating our *modal metaphysics* as a means of reconciling intuitive data with theory (Linsky and Zalta 1994, 1996; Nelson and Zalta 2009; Williamson 1998, 2000, 2013*b*, Ch. 1). Strictly speaking, Socrates exists non-contingently, as does any child Wittgenstein could have. What is not strictly necessary is that such individuals be 'metaphysically concrete', or located in space and time. Thus relative to possible worlds in which Socrates's parents never meet, or the Big Bang never occurs, Socrates exists but fails to be metaphysically concrete; analogously, here in actuality something is a possible child of Wittgenstein's, but unlike each of us that individual is non-concrete (though similarly non-abstract!). It is because ordinary intuition *conflates* (logical) existence with metaphysical concreteness that the apparent tension between theory and data arises (Williamson 1998; compare Bennett 2006). Once such conflation is seen for what it is, the apparent tension evaporates (or so it is argued: I return to critically discuss Williamsonian modal metaphysics in §5.4).

As we shall see, such semantics- and metaphysics-complicating strategies are highly contentious. My aim in this chapter is to explore a third strategy for dealing with the apparent tension that has been largely neglected, owing in large part to the contemporary methodological preoccupation with index relativity (and index *complication*) documented at various points in the discussion thus far (§5.3). *To*

prefigure. Plausibly, the notion that matters of existence and nonexistence are such as to vary from one possible world to the next may be understood in two different senses. One involves the differentiation of ontology under shifting of the world of *index*: that sense presupposes that matters of ontology are genuinely contingent, and hence such as to vary from one 'counterfactual' world to the next. Another sense involves the differentiation of ontology under shifting of the possible world of *context*: that is not genuine ontological contingency, but is instead reflective of the *dependence* of matters of ('actual') existence and nonexistence upon a contextual point of view. The contrast affords a concomitant distinction between two ways in which it might reasonably be supposed that ontology could be otherwise. One—*possibility*—reflects genuine contingency, or index relativity, at the level of ontology. The other—*dependence*—reflects the sensitivity of matters of existence and nonexistence to a contextual standpoint.

As we shall see: disambiguated in that second way, intuition and theory are not in tension; nor does their reconciliation require substantial complication to simple modal semantics or modal metaphysics.

5.2 Index Relative Ontology

Kripke (1963) famously articulated one way in which possible-worlds semantics might be complicated in order to allow for a representation of ontology as contingent.

5.2.1 Local Domains

Kripke's central insight was that different possible worlds may be represented as 'disagreeing' on matters of existence and nonexistence by being associated in a model with distinct (and variable) 'local' domains of quantification, where w's local domain D_w is understood as representing the collection of possible individuals

that exists relative to w. Specifically, Kripke allows that where $w \neq w'$, it may be that D_w and $D_{w'}$ fail to coincide, thus reflecting the intuitive supposition that (as he would put it) "in worlds other than the real one, some actually existing individuals may be absent, while new individuals, like Pegasus, may appear" (Kripke 1963, 65). In this way, Kripke introduced a highly influential technique for representing the idea that matters of existence and nonexistence are an internal affair relative to each world w, in being grounded upon how things go in w alone.

At the formal level, Kripke implements this insight by relativizing the domain of unrestricted quantification to the world w_i of the *index*. He takes as his background, first-order modal language a restriction of $\mathscr{L}^{\forall\Box}$ containing no individual constant terms, and constructs a semantics for that language as follows.[6] Let a *Kripke-frame* $\mathcal{F}$ be a four-tuple $\langle W, @, D, \mathsf{Q}\rangle$, in which W, $@$, and D retain their earlier definitions, and $\mathsf{Q} : W \rightarrow D^n$ is understood as 'domain' function, assigning to each $w \in W$ a subset of possible individuals from D (w's *local domain* D_w).[7] A model $\mathfrak{M}$ for Kripke's semantics may then be defined as a pair-sequence $\langle \mathcal{F}, V\rangle$ comprising such a frame and a valuation function V. The latter maps each n-place predicate F^n_k of the language to a possible-worlds intension $V(F^n_k) : W \rightarrow D^n$; for our purposes, these intensions shall be understood such that the extension of a predicate at a world w is a subset of n-tuples of individuals in w's local domain D_w (thus, for all $w \in W$, $V(F^n_k)(w) \subseteq (D_w)^n$).[8]

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[6]The absence of individual constant terms from Kripke's background language is significant, and below I shall consider the implications this omission has for the overall viability of Kripke's project (§5.2.2).

[7]I depart from Kripke on matters of notation, in order to preserve continuity with earlier discussion.

[8]Here I depart from Kripke (1963, 65–6), who allows instead that the world-relative extension of a predicate may include individuals that fall outside of that world's domain; given Kripke's treatment of quantification, to be discussed momentarily, that implies on his view that a world w may represent individuals that are non-existent from w's standpoint as falling in the extension of certain predicates relative to w. Kripke construes this treatment of predicate intensions as a 'matter of convention', though see Williamson 2013*b*, 122-23 for discussion of technical problems that arise given that conventional decision, and which motivate the contrasting 'domain inclusion'

Kripke (in effect) relativizes the denotation of terms and satisfaction of formulae in such a model to an index of evaluation $i = \langle w, g\rangle$ for that model, where w is a possible world and $g \in D^{\omega}_{w_i}$ is a variable-assignment function, now understood as assigning to each variable x_k of the language a temporary referent in D_{w_i} (compare §2.3). Specifically, relative to an index $i = \langle w, g\rangle$, the denotation of each variable term x_k is identified with the value of $g_i(k) \in D_{w_i}$. This treatment allows Kripke to represent the index-relative satisfaction of quantified formulae of form $\forall x_k\xi$ and $\exists x_k\xi$ as a matter that is 'internal' to the world of the index, as follows:

- $\Vdash^{i}_{\mathfrak{M}} \forall x_k\xi$ just if, for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$
- $\Vdash^{i}_{\mathfrak{M}} \exists x_k\xi$ just if, for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$

Kripke thus represents quantified formulae of form $\forall x_k\xi$ and $\exists x_k\xi$ as satisfied, relative to a model and index $i = \langle w, g\rangle$ for that model, just if the formula ξ is satisfied at w_i under an assignment of its free occurrences of x_k to (all or some) elements of the local domain D_{w_i} of w_i. The remaining, non-quantified fragment of the language receives the standard treatment considered in earlier chapters.[9] Kripke's treatment of modality mirrors that of Carnap (1946); consequently, his semantics validates the principles of S5 modal logic (§3.1.2).

Kripke's relativization of the domain of quantification to the local domain D_{w_i} of the world of index enables for metaphysically coherent representation of ontology as contingent. Consider, first, *possible existence*. It could be that s_0 and e_0 fuse: with 'could' construed as *possibility*, Kripke's semantics allows for a world w in which s_0 and e_0 fuse into *something* ($\exists xFx$). But here $\exists$ ranges over D_w, not $D_@$: consequently, assuming $D_@ \subsetneq D_w$, relative to @ the truth of '$\Diamond\exists xFx$'

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treatment of predicate interpretations given here.

[9]Thus, for atomic formulae, the conditions are that $\Vdash^{i}_{\mathfrak{M}} F^n_k(\tau^1, \ldots, \tau^n)$ just if $\langle \delta^i_{\mathfrak{M}}(\tau^1), \ldots, \delta^i_{\mathfrak{M}}(\tau^n)\rangle \subseteq V(F^n_k)(w_i)$ and $\Vdash^{i}_{\mathfrak{M}} \tau^j = \tau^k$ just if $\delta^i_{\mathfrak{M}}(\tau^j) = \delta^i_{\mathfrak{M}}(\tau^k)$; for the remaining Boolean and modal fragment, the conditions are that $\Vdash^{i}_{\mathfrak{M}} \neg\xi$ just if $\nVdash^{i}_{\mathfrak{M}} \xi$; $\Vdash^{i}_{\mathfrak{M}} \xi \wedge \zeta$ just if $\Vdash^{i}_{\mathfrak{M}} \xi$ and $\Vdash^{i}_{\mathfrak{M}} \zeta$; $\Vdash^{i}_{\mathfrak{M}} \xi \vee \zeta$ just if $\Vdash^{i}_{\mathfrak{M}} \xi$ or $\Vdash^{i}_{\mathfrak{M}} \zeta$; $\Vdash^{i}_{\mathfrak{M}} \Box\xi$ just if, for all $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$; and $\Vdash^{i}_{\mathfrak{M}} \Diamond\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}} \xi$.

does not imply the metaphysically problematic truth of '$\exists x \Diamond Fx$' (Kripke 1963, 67). More generally, the Barcan Formula is invalidated on Kripke's semantics by models in which the domain of some non-actual world 'extends' that of actuality, by containing individuals not included in $D_@$ (see deRosset 2016 for discussion of this technical fact).[10] That idea meshes smoothly with standard philosophical objections to the Barcan Formula, of the sort earlier noted in §5.1.1. *Prima facie*, that Wittgenstein could have a child does not imply that something (actual) could be Wittgenstein's child; rather, it requires only that the local domain of some *other* world be such as to contain a child of Wittgenstein's.

Consider, second, *possible nonexistence*. Actually, s_1 and e_1 fuse, but could fail to do so: assuming CBF, and with 'could' construed as *possibility*, there is actually something (f_1) such that, possibly, nothing is it ($\exists x \Diamond \neg \exists y(y = x)$). Kripke's semantics allows for a coherent representation of that possibility by allowing that the local domain D_w of some world w *contracts* that of actuality, in the sense that $D_w \subsetneq D_@$, and consequently fails to contain some actual individual (f_1) (Kripke 1963, 67-8). That technical fact meshes smoothly with standard philosophical objections to the converse Barcan Formula, of the sort earlier considered. Kripke's truth-conditions for $\exists x \Diamond \neg \exists y(y = x)$ do not require, nonsensically, that something 'in' some other possible world w fails to be identical with itself: on Kripke's semantics, 'something' is interpreted, relative to w_i, under an assignment $g_i \in D^{\omega}_{w_i}$ assigning to each variable a temporary referent in the local domain of the world

[10]Here is a more exact proof of BF-invalidity in Kripke's semantics. Fix an 'increasing-domains' Kripke-model $\mathfrak{M} = \langle \mathcal{F}, V \rangle$ with $\mathcal{F} = \langle W, @, D, \mathsf{Q} \rangle$ and $d^* \in D$ such that for some $w^* \in W$, $d^* \in D_w$ but $d^* \notin D_@$. Notice that $\Vdash^{i/@}_{\mathfrak{M}} \forall x_k \Box \xi$ just if, for all $i' \sim_k i/@$, $\Vdash^{i'}_{\mathfrak{M}} \Box \xi$; hence just if for all $d \in D_@$ $\Vdash^{i'/d}_{\mathfrak{M}} \Box \xi$, where i'/d is that index differing from i' at most in that $g_{i'}(k) = d$. Given that $\Vdash^{i'/d}_{\mathfrak{M}} \Box \xi$, for all $i'' \approx_w i'$ $\Vdash^{i''/d}_{\mathfrak{M}} \xi$. However, $\Vdash^{i/@}_{\mathfrak{M}} \Box \forall x_k \xi$ just if, for all $i' \approx_w i/@$, $\Vdash^{i'}_{\mathfrak{M}} \forall x_k \xi$; hence just if for all $i'' \sim_k i'$, $\Vdash^{i''}_{\mathfrak{M}} \xi$. Let us suppose that $\nVdash^{i''/d^*}_{\mathfrak{M}} \xi$, given that $d^* \in D_w$ but $d^* \notin D_@$; then $\nVdash^{i'}_{\mathfrak{M}} \forall x_k \xi$, and hence $\nVdash^{i/@}_{\mathfrak{M}} \Box \forall x_k \xi$. Combining the results, $\nVdash^{i/@}_{\mathfrak{M}} \forall x_k \Box \xi \supset \Box \forall x_k \xi$, contra BF. It is worth noting that Kripke operates with a 'general' conception of validity, as involving truth relative to every world in every model. The present reconstruction of Kripke's proof transposes that notion into our operative 'real world' conception of validity, involving truth relative to the actual world coordinate of any model.

of index D_{w_i}, which by assumption contracts $D_@$. Thus Socrates, for example, is not a possible value for any variable relative to a world in which his parents never meet, and consequently fails to fall under the quantifier $\exists$ relative to such a possibility.[11]

5.2.2 Problems for Kripke-semantics

Despite its technical ingenuity, Kripke's contribution has failed to result in an increase in conceptual clarity when it comes to philosophical thinking about the Barcan formulae, and cognate issues in first-order modal metaphysics. In fact, certain additional problems emerge with the introduction of Kripke's variable-domains approach; *prima facie*, these problems have all the markings of being at least as substantial as those which Kripke's contribution was originally introduced to resolve.[12]

One issue arises in connection with the conspicuous absence of individual constant terms, or *proper names*, from the background modal language that Kripke considers. Once these are added to the modal language modeled by Kripke's semantics, it is far from clear that Kripke has shown how to coherently represent the idea that ordinary existence is a contingent matter. Notice, to begin, that Kripke's semantics is sound and complete with respect to a simple axiomatic system, combining the rules and a routine axiomatization of first-order predicate logic (with

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[11] Here is a more exact proof of CBF-invalidity on Kripke's framework. Fix a 'decreasing-domains' Kripke-model $\mathfrak{M} = \langle \mathcal{F}, V \rangle$, with $\mathcal{F} = \langle W, @, D, \mathsf{Q} \rangle$ and $d^* \in D_@$ such that for some $w \in W$, $d^* \notin D_w$. Notice that $\Vdash^{i/@}_{\mathfrak{M}} \Box\forall x_k\xi$ just if for all $i' \approx_w i/@$, $\Vdash^{i'}_{\mathfrak{M}} \forall x_k\xi$; hence just if, for all $i'' \sim_k i'$, $\Vdash^{i''}_{\mathfrak{M}} \xi$. Similarly, $\Vdash^{i/@}_{\mathfrak{M}} \forall x_k\Box\xi$ just if, for all $i' \sim_k i/@$, $\Vdash^{i'}_{\mathfrak{M}} \Box\xi$; hence in particular just if $\Vdash^{i'/d^*}_{\mathfrak{M}} \Box\xi$, and hence only if for all $i'' \approx_w i'$, $\Vdash^{i''/\delta^*}_{\mathfrak{M}} \xi$. But given the stipulation of decreasing domains, for some $i'' \approx_w i'$ $\nVdash^{i''\delta^*}_{\mathfrak{M}} \xi$, given that $d^* \notin D_{w_{i''}}$; consequently, $\nVdash^{i'}_{\mathfrak{M}} \Box\xi$ and hence $\nVdash^{i/@}_{\mathfrak{M}} \forall x_k\Box\xi$. Combining the results, $\nVdash^{i/@}_{\mathfrak{M}} \Box\forall x_k\xi \supset \forall x_k\Box\xi$, contra CBF.

[12] I shall focus here on two familiar problems with Kripke's strategy. For additional discussion of the current state of the debate over the general theoretical viability of Kripke-semantics, see chapters 2–4 of Williamson 2013*b*, and additionally deRosset 2016, Fine 2016, and Stalnaker 2016.

identity) with the axiomatic basis of the modal propositional system S5. Notably, Kripke takes the class of theorems of the resulting logic to be closed under the rules of *modus ponens* and *necessitation*; according to the latter, all theorems of the logic are necessary truths:

(NEC) $\vdash \varphi \rightarrow \Box\varphi$

However, it is a familiar fact that where a_k is any individual constant term, the (closed) sentence $\exists y(y = a_k)$ is a theorem of classical quantification theory with identity (Linsky and Zalta 1994; Sider 2010, Ch. 5). Consequently, if Kripke's background language were to include constant terms, his logic would require that for any constant a_k, $\vdash \Box\exists y(y = a_k)$, given the stipulation that theoremhood is non-contingent (*necessitation*). Thus for any *named* individual in the ontology, the existence of that individual is represented as necessary in the proof theory for Kripke's semantics, given a natural extension of the background modal language under consideration to one that includes constant terms. More broadly, given that theoremhood is similarly preserved under universal generalization (a rule of classical predicate logic), were Kripke's language to include constant terms his axiomatic system would similarly require that $\vdash \forall x\Box\exists(y = x)$, and hence that $\vdash \Box\forall x\Box\exists y(y = x)$ (by *necessitation*). Of course, that result is precisely what Kripke's introduction of variable domains is intended to avoid.[13] Kripke circumvents these issues only by omitting constant terms entirely from the quantified modal language he considers. And yet that omission is plainly philosophically unsatisfying, insofar as our aim lies in an adequate model-theoretic representation of truth and entailment for natural languages, such as English. The latter enable the expression not only of quantification and modality, but moreover of singular

[13] Kripke (1963, 68-9) bypasses the analogous problem resulting from the fact that the *open* sentence $\exists y(y = x)$ is similarly a theorem of classical quantification theory by restricting theoremhood in his logic to closed sentences. Naturally, were Kripke to extend theoremhood to open sentences, the problems just noted would be even more immediate, and would be orthogonal to the problem discussed in the main text arising in connection with individual constant terms.

reference to particular individuals, such as Socrates.[14]

A second dimension along which Kripke's variable-domains semantics is philosophically unsatisfying involves its treatment of quantification. Kripke's relativization of the quantificational domain to the possible world of the index is intended to allow for coherent representation of the idea that certain individuals that do not actually exist are nevertheless existent 'relative to' other worlds. But now consider a claim in the metalanguage used to state the (world-relative) satisfaction conditions of quantified formulae in Kripke's semantics, to the effect that *something*—Pegasus, say—that is absent from $D_@$ belongs to the local domain D_w of some world w. As Williamson (1998, 263) points out, that metalinguistic statement employs an English quantifier ('something') that cannot be construed as relativized to the domain of the actual world, at least if it is to convey its intended information. Instead, 'something' in that metalinguistic statement must be construed as ranging over the 'über-domain' D of the model theory, which on Kripke's approach may coherently be supposed to contain such alien possible individuals as Pegasus. As Williamson (1998, 263) puts it, the metalanguage for Kripke's "relativized domains approach [...] quantifies in a way its own theory of quantification cannot account for".

That semantical mismatch between object- and meta-linguistic quantification manifests itself in a general philosophical tension that arises between Kripke's framework and the 'picture' of modal reality the framework is intended to represent. Intuitively speaking, the picture is one according to which matters of (unrestricted) existence and nonexistence are such as to vary from one possible world to the next: Pegasus is *nothing* from the view of actuality, and is something only

[14]Potential solutions to this difficulty involve considerable departure from Kripke's original picture. Such solutions include: (*a*): the abandonment of the rule of *necessitation*, in order to allow that certain logical truths are merely contingent (see Nelson and Zalta 2012, further discussed in Nelson 2016); (*b*): the endorsement of a free logic, and consequent rejection of theoremhood even for closed sentences of form $\exists y(y = a_k)$ (compare Adams 1981). Naturally, either strategy requires substantial complication to the proof theory of Kripke's framework; philosophical problems that arise given such complications are discussed in detail by Williamson (2013*b*, Ch. 3).

relative to other possible worlds. Kripke's semantics comes close to representing this intuitive picture by restricting the range of the quantifiers at each world to that world's local domain. But it does so only by presupposing that we may nevertheless meaningfully and correctly speak in English of a modal reality common to all possible worlds—the über-domain D of possible individuals—relative to which Pegasus has some mode of being. That is not the intuitive picture of modal reality with which we began: according to that picture, from the view of actuality such modally 'alien' individuals as Pegasus lack being *absolutely*.[15]

5.2.3 Perspective-dependence

These technical difficulties should not be seen as detracting from the considerable philosophical significance of Kripke's core insight, according to which ontological 'disagreement' between worlds is to be modeled in terms of the *world-relativity* of quantificational domains (contrast Williamson 1998 and Bennett 2006).

Naturally, given the period in which his article was written, Kripke chooses to implement that insight by relativizing the quantificational domain to the possible world of the index; that is, similarly, the predominant way in which the theoretical significance of Kripke's insight would come to be understood in subsequent developments of the basic Kripkean model-theoretic picture (Plantinga 1970, 1976; Menzel 1990; Bennett 2005; Hayaki 2005).[16] And yet, perhaps what the various

[15]The basic problem here is sometimes put in terms of objectionably 'possibilist' quantification (Bennett 2005), given that Kripke's semantics appears to allow for metalinguistic quantification over individuals that are 'non-actual'. Nevertheless, as Bennett (2005) and Williamson (2002, 2013*b*, Ch. 1) each note, the precise contours of the actualism/possibilism distinction are theoretically unclear; and at any rate the problem with Kripke's approach may be articulated, as above, in a way that does not presuppose any specific interpretation of the actualist thesis. Kripke's semantics is intended to allow for coherent representation of the idea that (unrestricted) existence and non-existence are each a matter that varies from one possible to another; the problem is that the metalanguage required to articulate that semantics is one in which the quantifiers range over a single, world-invariant, 'über-domain' of possible individuals.

[16]Plantinga (1976), for example, famously replaces the domain D of possible individuals in Kripke models with a domain D^e of *individual essences*, and construes the quantifiers at each world w_i as

difficulties noted above in connection with Kripke's approach to variable-domains semantics ultimately reveal is in fact a problem with that index-relative *implementation*, and not a general defect of Kripke's core insight *per se*. Perhaps, *pace* Kripke (1963), ontology from the view of actuality is, after all, a necessary matter, and consequently such as to remain invariant across each counterfactual world (or world of index). As we shall now see, that theoretical possibility is nevertheless compatible with an alternative implementation of Kripke's core insight as instead involving the *dependence* of ontology upon a contextual perspective, and a concomitant construal of ontological 'disagreement' between possible worlds in terms of the *cross-contextual* variability of matters of existence and nonexistence.

5.3 Ontology Relative to a Context

More concretely, that alternative implementation of Kripke's core insight may be specified as follows.

5.3.1 Contextual Domains

Recall, from §3.4.1, the notion of a *c-relativized* frame $\mathcal{F}_c$. Given $c \in C \subseteq W \times T \times L \times D$, that is a structure $\langle W_c, D_c, w_c \rangle$, in which W_c and D_c represent, respectively, the possible worlds and possible individuals 'available' for quantificational purposes from the view of w_c. Notice that where $c \neq c'$, it may be that $D_c \neq D_{c'}$: the contextually available *ontology*, as from w_c, may fail to coincide with the con-

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ranging over a set $D^{\epsilon}_{w_i} \subseteq D^{\epsilon}$ of individual essences that would be exemplified were w_i to 'obtain' or 'be actualized'. That treatment is intended primarily to circumvent worries of the sort noted above for Kripke's original proposal, in connection with meta-linguistic quantification over an über-domain of possible *individuals*: Plantinga maintains that whereas committment to such a domain is problematic from an 'actualist' ontological perspective, analogous problems do not arise given a construal of the über-domain of a model as containing (unexemplified) individual essences. It is unlikely that Plantinga succeeds here, however: for criticism, see for example Adams 1981, Fine 1985, and more recently Bennett 2006.

textually available ontology as from $w_{c'}$.

Such ontological non-rigidity across contexts enables the representation of the basic Kripkean idea that matters of existence and nonexistence, 'relative to' a world w, are ultimately grounded upon matters that are internal to w. Kripke implements that idea by relativizing ontology to the world of index, as we have seen; by contrast, the alternative under development does so by relativizing ontology to the world of *context*. Intuitively speaking, given $c \in C$, the *contextual local domain* D_c represents the collection of individuals that 'show up' as existent given how things go in w_c. Shifting our contextual perspective from w_c to $w_{c'}$ ($c \neq c'$), perhaps from the view of $w_{c'}$ things 'actually' go differently than they do in w_c, with the result that, as from $w_{c'}$, individuals that are existent as from w_c are absent, while new individuals absent from the view of w_c 'appear'.

Notice, moreover, that unlike Kripke's index-relative implementation of the idea, the contextual relativity of ontology is similarly compatible with the necessity of existence and non-existence, as from a given context $c \in C$. That is just to say that relative to w_c, the c-relative ontology D_c may be represented as fully 'characterizing' what shows up as existent relative to each target world w_i, as considered from w_c. Schematically, that is the case just when the ontology of w, as from c, $D_{c,w}$, is represented as coincident with D_c; that is, just when $D_{c,w} = D_c$. On that picture, the contextual local domain of c, D_c, is represented as comprising a collection of possible individuals that exist non-contingently, from the view of w_c.

Notice that this is just the picture we get under a broadly 'Carnapean' semantical construal of the quantifiers $\forall$ and $\exists$ as ranging unrestrictedly over the *contextual local domain* D_c relative to the world w_i of the index. Here are the formalities. Given $c \in C$, let a *c-relativized* model $\mathfrak{M}_c$ consist in a pair sequence $\langle \mathcal{F}_c, V_c \rangle$, such that $\mathcal{F}_c = \langle W_c, D_c, w_c \rangle$ is a c-relativized frame and V_c is a similarly relativized, partial, valuation function.[17] Define the latter as follows:

[17]The restriction of V_c to a partial function is intended to reflect the fact that the interpretation

- For each individual constant τ^k of $\mathscr{L}^{\forall\Box}$, $V_c(\tau^k) \in D_c$ (if $V_c(\tau^k)$ is defined);
- For each n-place predicate F^n_k of $\mathscr{L}^{\forall\Box}$, $V_c(F^n_k) : W_c \rightarrow (D_c)^n$.

We relativize the denotation of terms and satisfaction of formulae in a c-relativized model $\mathfrak{M}_c$ to a simple index of evaluation $i = \langle w, g\rangle$ for that model, such that $w_i \in W_c$ and $g_i \in D_c^\omega$ (contrast Kripke 1963). Thus where τ^k is any term (variable or constant) of $\mathscr{L}^{\forall\Box}$:

$$\delta^i_{\mathfrak{M}_c}(\tau^k) = \begin{cases} V_c(\tau^k), \text{ when } \tau^k \text{ is a constant;} \\ \\ g_i(k), \text{ when } \tau^k = x_k. \end{cases}$$

Quantified formulae of form $\forall x_k\xi$ and $\exists x_k\xi$ in particular may be represented as satisfied, in a model $\mathfrak{M}_c = \langle \mathcal{F}_c, V_c\rangle$ and relative to $i = \langle w, g\rangle$ for $\mathfrak{M}_c$, just when the embedded formula ξ is satisfied relative to w_i under (some or all) $i' \sim_k i$. Thus:

- $\Vdash^i_{\mathfrak{M}_c} \forall x_k\xi$ just if, for all $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$
- $\Vdash^i_{\mathfrak{M}_c} \exists x_k\xi$ just if, for some $i' \sim_k i$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$

As with Carnap's treatment (§5.1.1), notice that whenever $i' \approx_w i$, the ranges of g_i and $g_{i'}$ *coincide*: each is an assignment of values to variables relative to the *local contextual* domain D_c that is mutually available from the view of each $w \in W_c$. Consequently, this approach preserves the scopal non-interaction of modals and quantifiers characteristic of Carnap's simple quantified modal semantics, as reflected in the validity of the *Barcan Equivalence* (BE):

(BE) $\quad \Diamond\exists x_k\xi \equiv \exists x_k\Diamond\xi$

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of individual constant terms is, intuitively, a matter that is sensitive to our theoretical capacity to imaginatively shift the world of context. Letting $w_c = @$, 'Socrates' is defined, picking out an individual that exists from our own contextual perspective. But (as below) we may shift around our imaginative standpoint to contexts from which Socrates is *nothing*: relative to such contexts, 'Socrates' goes undefined (just as 'Pegasus' is intuitively undefined for us). I return to these issues momentarily.

Left-to-right, the equivalence yields the *Barcan Formula*; right-to-left, its *converse* (§5.1.1). Fix $c \in C$ and $\mathfrak{M}_c = \langle \mathcal{F}_c, V_c \rangle$ for c. And notice that:

- $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Diamond\exists x_k\xi$ just if, for some $i' \approx_w i$, $\Vdash^{i'}_{\mathfrak{M}_c} \exists x_k\xi$;
  - Hence, just if, for some $i'' \sim_k i'$, $\Vdash^{i''}_{\mathfrak{M}_c} \xi$;
  - Hence, just if, for all $i''' \approx_w i''$, $\Vdash^{i'''}_{\mathfrak{M}_c} \Diamond\xi$;
  - Hence, in particular, only if $\Vdash^{i/w_c}_{\mathfrak{M}_c} \exists x_k\Diamond\xi$.
- Thus $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Diamond\exists x_k\xi$ only if $\Vdash^{i/w_c}_{\mathfrak{M}_c} \exists x_k\Diamond\xi$; hence—and continuing to construe *entailment-relations* in terms of truth-preservation relative to all c-models (§3.4.1)—$\Diamond\exists x_k\xi \vdash \exists x_k\Diamond\xi$.

BF is valid. Notice, similarly, that:

- $\Vdash^{i/w_c}_{\mathfrak{M}_c} \exists x_k\Diamond\xi$ just if, for some $i' \sim_k i/w_c$, $\Vdash^{i'}_{\mathfrak{M}_c} \Diamond\xi$;
  - Hence, just if, for some $i'' \approx_w i'$, $\Vdash^{i'}_{\mathfrak{M}_c} \xi$;
  - Hence, just if, for some $i'' \approx_w i/w_c$, $\Vdash^{i''}_{\mathfrak{M}_c} \exists x_k\xi$;
  - Hence, just if $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Diamond\exists x_k\xi$.
- Thus $\Vdash^{i/w_c}_{\mathfrak{M}_c} \exists x_k\Diamond\xi$ just if $\Vdash^{i/w_c}_{\mathfrak{M}_c} \Diamond\exists x_k\xi$; thus $\exists x_k\Diamond\xi \vdash \Diamond\exists x_k\xi$.

CBF is valid. More broadly: the ontology of the *context* c, on this treatment, is represented as comprising both 'ceiling' and 'floor' when it comes to what it is possible for there to be, as from the view of w_c (compare §5.1.1). Whatever possibly exists, as from the view of w_c, is 'witnessed' by something already present in D_c (BF); similarly, whatever belongs to the contextual local domain, D_c, exists necessarily as from w_c (CBF).

5.3.2 Existence

Returning to the main thread: the foregoing apparatus enables the *reconciliation* of intuitive data with theory. As represented, actual ontology is, strictly speaking, non-contingent (theory). But such ontological non-contingency is nevertheless, as represented, compatible with data to the effect that there *could be* more or less than there actually is. That is because such data is plausibly in some ways underspecified (§4.3.2), owing to the fact that other worlds may be viewed as playing two distinctive roles in a theoretical representation of modal-ontological deliberation.

Consider, first, such deliberation as it concerns actual *existence*. Perhaps there are certain objects, such as numbers or pure sets, that are by their very nature such as to exist necessarily.[18] Nevertheless, that is intuitively not how it goes with such 'ordinary', spatiotemporal, objects as Socrates, or you and me. That is just because, perhaps unlike the case of mathematical abstracta, whether or not such individuals as these exist is plausibly a matter that is in some sense metaphysically dependent upon how things go relative to each possible world (§5.1.2). For example, a world w' in which Socrates's parents do not meet, or the Big Bang does not occur, is intuitively a world in which certain conditions necessary for the existence of Socrates do not obtain.

The notion that ontology is metaphysically dependent upon how things go 'relative to' each possible world w is *loose*, however; the context–index framework offers precisification. On the one hand, considered as from the view of a world w—that is, when $w = w_c$—what exists relative to w may indeed be a matter that is metaphysically dependent entirely upon how things go 'within' w. To consider things that way is to construe w as the possible world of the *context*, and to think of the ontology of w as a matter that may be characterized entirely in terms of

[18] Though see Rosen 2002 and Miller 2009, 2010 for a defense of contingentism in connection with the ontology of mathematics.

the ontological, and corresponding semantical, resources that show up from the perspective of an agent whose 'actual' world is w (compare Stalnaker 2011, Ch. 2, and Einheuser 2012).

To be sure, the notion of 'showing up' at issue is admittedly imprecise. It can be sharpened by reflection upon the fact that *our* actual context is in some ways relevantly similar to that of an agent whose actual world is w' (that is, for whom $w_c = w'$). In each case, certain conditions that are intuitively metaphysically *constitutive* of the existence of a certain possible individual—*Pegasus*, say, for us, and *Socrates* for an agent whose actual context is such that $w_c = w'$—do not obtain (in the case of w', we may suppose for simplicity that such conditions involve the essential biological origins of Socrates). Just as we here in @ plausibly lack the requisite ontological and semantical resources to single out, and quantify over, Pegasus, similarly it is plausible to suppose that an agent whose context c is such that $w_c = w'$ lacks the requisite ontological and semantical resources to quantify over Socrates. Consequently, supposing ourselves into such a context—by imaginatively shifting w_c from @ to w'—it is similarly not unreasonable to think that, from that contextual point of view, Socrates is nothing at all. To imaginatively shift the world of context from @ to w' is to hypothetically suppose ourselves into a perspective upon reality from which certain conditions that are metaphysically constitutive of Socrates's existence do not obtain.

Contrast such 'internal' characterization of the ontology of w' with its *external* characterization, as from our perspective here in @. Construed, as above, as relativized to the possible world of the context, what simple 'Carnapean' possible-worlds semantics requires is merely that the *externally-characterized* ontology of w' contain Socrates. In some ways, that too is not implausible. After all, fixing our imaginative standpoint here in our world as it actually is, Socrates 'shows up' as existent *for us*. What simple quantified modal semantics requires is that with our imaginative standpoint so fixed, Socrates similarly shows up in a full characterization of what there is even 'off at' possible worlds, such as w', in which his

parents never meet. That is just to say, more broadly, that in the course of the counterfactual consideration of the ontology $D_{@,w}$ of another world w, the manifest ontology $D_{@}$ of our actual world @ 'carries over' into a correct description of what there is at w.

The internal and external disambiguations are not incompatible: whether the ontology of a world is to be characterized internally or externally is a matter that *depends* upon what contextual standpoint is imaginatively supposed. Externally characterized as from the view of @, the ontology of w' is $D_{@,w'}$, that is, $D_{@}$, that is, the ontology of the *context* (§5.3.1). Internally characterized as from the view of w', the ontology of w' is $D_{w',w'}$, that is, $D_{w'}$, that is, the ontology of the context c when $w_c = w'$. Thus in imaginatively shifting our contextual perspective from @ to w', certain individuals that are existent from our original view in @ are no longer so. That is not genuine ontological contingency, of course, but is instead reflective of the *dependence* of ontology upon a contextual standpoint. Consequently, construing intuitive (though underspecified) data to the effect that certain actual individuals could fail to exist in terms of our theoretical capacity to imaginatively shift the context, one half of the *prima facie* tension between data and theory evaporates (we shall shortly return to the other half, involving actual *nonexistence*).

The disambiguation between internal and external ontological characterization further illuminates certain additional data which can seem otherwise puzzling in a 'necessitist' ontological setting. Consider the fact that, though Socrates necessarily exists, it is nevertheless metaphysically possible that certain conditions that are metaphysically constitutive of his existence fail to obtain. (For example, it is possible that Socrates's parents never meet, or the Big Bang never occurs). Jointly, those facts imply that it is possible that Socrates exist and such conditions fail to obtain (compare Fine 2005*a*). Schematically:

1. Necessarily, Socrates exists.
2. Possibly, conditions metaphysically constitutive of Socrates's existence do not obtain.
3. Possibly, Socrates exists and conditions metaphysically constitutive of Socrates's existence do not obtain. (1, 2)

That simple argument is valid in any normal modal logic. Its conclusion, (3), invites us to consider a world w' relative to which Socrates both exists and certain conditions that are metaphysically constitutive of Socrates, such as his biological origins, for example, do not obtain. *Prima facie*, it can seem that there could be no such world w'. And in one sense, that is correct. There is no *context c* such that, when $w_c = w'$, at w' Socrates exists despite the non-obtaining of conditions that are metaphysically constitutive of his existence. Put in terms of the above framework, that is just to say that at the level of *internal* characterization, the ontology D_w of no world w is such as to both *include* Socrates and *exclude* conditions that are 'metaphysically required' in order for Socrates to be something.

What this suggests is that theoretical attention, in the course of modal deliberation, to such a world as w' makes that world 'salient' to us primarily in its role as the world of a *context*, as opposed to index (compare Lewis 1996 on the epistemic relevance of 'attending' to a possibility). Considering w', by attending to it in the course of evaluating (3) in the above argument, we in some sense *automatically* untether our imaginative standpoint from @ and shift our contextual perspective from @ to w', treating w' as the world of context and not as that of index of evaluation. Such pragmatic pressure to imaginatively shift the world of context explains why it can seem implausible to suppose that for some world w, 'relative to' w it is both the case that Socrates exists and, for example, the Big Bang never occurs. Consideration of such a scenario forces its default consideration as *contextual*, rather than *indexical*, requiring (at the default level) that we consider w as from the view of an agent whose actual world is that way. And,

as above, it is plausible that Socrates fails to exist from the view of all such contexts: internally characterized, the ontology D_w of any world in which Socrates's intuitive 'existence conditions' do not obtain is one that does not contain Socrates.

And yet a uniform reading of (1)–(3)—the reading under which the argument is *valid*—requires that we hold our imaginative perspective fixed here in our world as it actually is (the argument is about *possibility*, and *necessity*). Consequently, and resisting the above pragmatic pressure to imaginatively shift the context, the conclusion (3) of the argument should be read as true in virtue of how a world such as w' is to be *externally* ontologically characterized from our contextual perspective here in @. So considered, (3) is not implausible: the fact that Socrates exists at w' is a matter that depends not upon how thing go 'within w'' at all, but rather upon the fact Socrates exists here in our actual world @ (the world of the context from which w' is considered). Conditions metaphysically constitutive of Socrates's existence, such as his biological origins, are manifested *here*, in the actual world: it is irrelevant whether, at the level of external ontological characterization, such conditions are similarly manifested 'off at' w'.

5.3.3 Nonexistence

Let us turn now to modal-ontological deliberation as it concerns actual *nonexistence*.

Given how things go here in actuality, human gametes s_0 and e_0 do not fuse; consequently, there is actually nothing that is the individual resultant of their fusion ($\neg\exists xFx$). But, plausibly, it *could be* that s_0 and e_0 fuse in the sort of way that normally leads to the existence of a human individual; consequently, it could be that something is the individual resultant f_0 of that fusion. *The lesson of the Barcan Formula*: a construal of the sense of 'could' at issue as involving *possibility* from the view of actuality has deeply puzzling implications, given plausible metaphysical presuppositions (the essentiality of origin). Concretely: given BF, if

it is *possible* that s_0 and e_0 fuse ($\Diamond\exists xFx$), then something actual is such that, possibly, *it* is the individual resultant of their fusion ($\exists x\Diamond Fx$). And yet, given origin essentialism, everything actual is such that, necessarily, it does not so originate ($\forall x\Box\neg Fx$).

Perhaps, therefore, an additional lesson of the Barcan Formula is that it is indeed non-contingent that nothing is the individual resultant of the fusion of s_0 and e_0. Given the theoretical resources of the context-index framework, that does not imply that intuitive data to the effect that there *could be* such an individual is incorrect (compare Simchen 2013). For considered through the lens of that framework, such data as it concerns what there could be is again underspecified, owing to the fact that we may consider two different ways in which the ontology of some world w might 'outstrip' that of actuality. What BF, and simple Carnapean possible-worlds semantics, require is merely that the *externally* characterized ontology $D_{@,w}$ of no world w outstrips the local-contextual ontology $D_{@}$ of actuality. Nevertheless, just as other worlds may, at the level of *internal* ontological characterization, fail to contain some of what there actually is (Socrates), so too may we reasonably suppose that the local-contextual ontologies of some worlds 'extend' that of our actual context, by representing as existent certain individuals that do not 'show up' from the ontological perspective of our actual world. Shifting the possible world of the context w_c from @ to w'', perhaps s_0 and e_0 fuse, so fuse into *something* (f_0). If so, then $D_{@} \subsetneq D_{w''}$; hence from the contextual perspective of w'', something exists that does not exist as from the contextual perspective of @. That is to represent intuitive data to the effect that there could be individuals that are non-actual in terms of our theoretical capacity to suppose ourselves into perspectives *from which* certain individuals are 'available', for quantificational purposes, that do not exist here in the real world.

As in the case of our earlier discussion of actual existence, here it can seem as though there is a certain structural tension underlying this way of thinking. Consider: it is *possible* that s_0 and e_0 fuse, and yet (actually) necessary that nothing

is the individual resultant f_0 of their fusion. Consequently, there is a world w'' in which s_0 and e_0 fuse without fusing *into* f_0. *Prima facie*, it can seem reasonable to think that there could be no such world. For what more could there be to the existence of f_0 than the relevant fusion of s_0 with e_0? The latter condition, it would seem, is plausibly metaphysically constitutive of the existence of f_0 (compare Salmon 1987).

In one sense, it is entirely correct that there could be no such world as w''. There is no *context* c such that, when $w_c = w''$, relative to w_c s_0 and e_0 fuse and do not fuse into f_0. This suggests, again, that *attending*, in the course of modal deliberation, to a particular possibility can create pragmatic pressure to imaginatively shift the world of context to one verifying that possibility (compare Lewis 1996). Attending to the possibility w'' that s_0 and e_0 fuse, we in some sense automatically suppose ourselves into the hypothetical perspective of an agent whose actual world is one in which s_0 and e_0 *have fused*, and hence suppose ourselves into a perspective on reality from which conditions metaphysically constitutive of the existence of f_0 'actually' obtain. And from that imaginative perspective on reality, f_0 is indeed real.

A further upshot, again mirroring our earlier discussion of actual existence, is that the ontological characterization of a world is sensitive to a contextual perspective. Externally characterized, as from @, w'' 'contains' s_0 and e_0 but not f_0; that is just to say (and ignoring irrelevant entities) that $\{s_0, e_0\} \in D_{@,w} = D_@$ but that $f_0 \notin D_{@,w}$. Shifting w_c from @ to w'', the internally characterized ontology $D_{w'',w''} = D_{w''}$ of w'' outstrips its external characterization as from @: in particular, $\{s_0, e_0, f_0\} \in D_{w''}$.

I shall close this section by noting a further application of the present apparatus to a familiar puzzle concerning the modal truth-conditions of iterated modality *de re*. Consider: though actually childless, it could be that Wittgenstein have a child who himself has certain *de re* modal features. For example, Wittgenstein could have a child that is a philosopher, but who could have been a politician

instead. Construing 'could' as involving *possibility* from the view of actuality requires both that, from our actual point of view, for some possible world w, a child of Wittgenstein's is a philosopher in w, and similarly that, for some other world w^*, *the very individual* who is a philosopher in w is now a politician. But no such *particular* child of Wittgenstein's is actually real; consequently, there are no facts of the sort that might serve to metaphysically ground the requisite representational 'coordination' of w and w^* upon some *particular* possible child of Wittgenstein's. Thus the so-called *McMichael Problem* of iterated modality *de re* (after McMichael 1983).

The context–index apparatus nicely solves the problem. Imaginatively shifting our contextual view to a world w in which Wittgenstein has a (philosophizing) heir, it is open to us to reason counterfactually, within the scope of the supposition that $w_c = w$, about how that particular individual heir is relative to worlds that are counterfactual from the view of w. To do so is to consider the representational coordination of worlds w and $w^* \in W_c$, when $w_c = w$. Such representational coordination is imaginary of course: it is a way we may coherently hypothetically suppose possibility space to be, on the basis of our theoretical capacity to imaginatively shift the possible world of the context from @ to w.

5.4 Concreteness and Reality

5.4.1 Absolute Ontic Necessitism

In a series of papers[19] and a book (Williamson 2013*b*), Timothy Williamson has recently defended the thesis that ontology is metaphysically non-contingent.[20]

[19] Williamson 1998, 2000, 2002, 2016 are representative.

[20] See, in addition, Linsky and Zalta 1994, 1996 and Nelson and Zalta 2009 for further defense. I focus here on Williamson's *first-order* necessitist modal metaphysics. The second-half of Williamson 2013*b* is largely devoted to analogous defense of *higher-order* necessitism: the thesis that all propositions and properties exist non-contingently. I examine the implications of

The central argument Williamson advances for ontic necessitism is premised upon the methodological assumption that (modal) logic is distinctively well-suited to inform our philosophical conception of metaphysical reality ('*anti-neutrality*'; compare deRosset 2016). In broad relief: it is, as we have seen, a theorem of the simplest and most philosophically well-understood systems of first-order modal logic that existence is (necessarily) non-contingent: that is, it is a logical truth in such systems that necessarily, everything necessarily exists ($\Box\forall x\Box\exists y(y = x)$). Given that such systems of modal logic exhibit the various theoretical virtues, such as simplicity and explanatory strength, that are seen as justifying theory choice in the natural sciences, Williamson maintains that we have defeasible reason to accept such systems of modal logic as correct. And, since it is a theorem of such systems that existence is absolutely non-contingent, Williamson contends that we should similarly endorse ontological necessitism when it comes to our metaphysics of modal reality (see in particular Williamson 2013*b*, Ch. 3).[21]

Williamson's ontological necessitism is *absolutist* in character: he does not distinguish, as I have here, between world of context and world of index, and correspondingly draws no relevant distinction between (non-contingent) existence from the view of a possibility, and *dependence* of ontology upon contextual perspective. Instead, matters of existence and nonexistence are construed as absolutely invariant from one possible world to the next. Naturally, that absolutist conception of non-contingent ontology leaves the intuitive tension between theory and logical data first considered in §5.1 untouched. Williamson proposes to resolve that intuitive tension by complicating our *metaphysics* of ordinary objects,

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context-relativity for such higher-order necessitist theses in Murray forthcoming.

[21] Other arguments Williamson has advanced for the view turn on substantive presuppositions of metaphysics, particularly the idea that 'singular' propositions are ontologically dependent upon their subject-matter, and consequently could not exist in the absence of the individuals they are directly about (Williamson 2002; compare Plantinga 1983 and more recently Spencer 2014). I critically evaluate the propects for such alternative metaphysical (as opposed to purely logical) routes to ontic necessitism in Murray forthcoming.

by way of a theoretically primitive distinction between *existence* and *metaphysical concreteness* (Williamson 2000, 2002, 2013*b*, Ch. 1).

In broad relief, the idea is that ordinary intuition to the effect that there could be more or less than there actually is systematically confuses the *existence* of an object with its 'locatability' in space and time. That we are led to suppose that Socrates could fail to exist, for example, on the basis of consideration of a world in which Socrates's parents never meet, is to confuse Socrates's existence at that world with his location in space and time there. On Williamson's view, such a world is not, in fact, a world in which Socrates does not exist (there are none of those). Rather, it is a world in which Socrates is non-spatiotemporal in nature ('non-concrete') though only contingently so. Similarly when it comes to intuitive data concerning what there could be. On Williamson's absolute necessitist conception, anything that could be a child of Wittgenstein's exists, actually: indeed, there are presumably a very large number of such possible children of Wittgenstein's here in the actual world with us (compare Fritz and Goodman 2016 on compossibility in necessitist ontological frameworks). However, Williamson proposes that the actual existence of such individuals does not require anything that is actually spatiotemporal to be a possible child of Wittgenstein's. Possible children of Wittgenstein's are *additional* individuals, over and above those we are pretheoretically disposed to recognize, and here in our world each fails to be located in space and time (though again, contingently so).[22]

Williamson maintains that ordinary (and philosophical!) intuition to the effect that there could be more or less goes wrong in its naturally, though *mistakenly*, eliding existence at a world with metaphysical concreteness at that world: *contra* the core insight of Kripke 1963, we are to suppose that such elision ultimately explains why it can seem reasonable to think that one world's ontology may outstrip

[22]What is possibly a child of Wittgenstein's is not a *child* of Wittgenstein's here in actuality, but is rather something non-concrete that *would be* Wittgenstein's child, were it to be concrete. On these matters, see the discussion of *predicative* vs. *attributive* possible *Fness* in Williamson 2000, expanded upon at Williamson 2013*b*, 10–14.

that of another. Williamson's proposal is that once existence and metaphysical concreteness are properly distinguished, the apparent tension between theory and data is defused.

Williamson's metaphysics of ordinary objects as dividing into both the (contingently) concrete and non-concrete is obscure. Plausibly, insofar as we have some theoretical handle on what it is for something actual to be non-spatiotemporal in character, that theoretical handle presupposes that such objects be *essentially* non-spatiotemporal in character: as Quine (1948, 23) pointed out long ago, we have some sense of what it would be for a mathematical object, say, such as the cube root of 27, to exist because we understand such objects to be incapable of location in space and time (as Quine put it, such denoting expressions as '$\sqrt[3]{27}$' "lack spatiotemporal connotation"). But Williamson's metaphysics requires that we see certain actual objects, such as a possible child of Wittgenstein's, as being akin to $\sqrt[3]{27}$ here in our world but not essentially so. One naturally wonders what intrinsic, categorical, features of the one but not the other could explain such modal differentiation (compare Bennett 2006). Williamson provides no substantial answers to such questions.

In place of direct explanation, Williamson instead proposes to explicate the putative contrast between the contingently concrete and non-concrete primarily by 'way of negation' (compare Lewis 1986*c*, 83), employing the more philosophically-familiar distinction between concrete and *abstract* existence as a foil. Williamson (2013*b*, 7) writes:

> [. . .] on plausible auxiliary assumptions, necessitism requires the barrier between the concrete and non-concrete to be modally (and temporally) permeated in both directions. It is tempting to paraphrase that conclusion thus: given necessitism, something concrete could have been abstract and something abstract could have been concrete. However, that is to treat 'non-concrete' and 'abstract' as synonyms. They are not. [. . .] In particular, the counterfactual supposition about this coin that it is something non-concrete in no way entails that it is abstract. Abstract objects such as numbers and directions play specif-

> ically defined theoretical roles. The counterfactual supposition about this coin does not entail that it plays any similar role. Had this coin not been concrete, it would still not have been abstract.

Evidently, we are to suppose that a contingently non-concrete individual is akin to an abstract object in certain respects (e.g., it is nowhere), but unlike an abstract object in being only contingently non-located in space and time. Such negative elucidation is helpful, however, only to the extent that we have some antecedent and well-established grasp of the nature of the distinction between concrete and abstract entities, and it is a familiar fact that there is no philosophical consensus here (Lewis 1986*c*, 81–6; compare Cowling 2014 and Davies 2016, Ch. 1 for recent proposals). Consequently, Williamson's complicated metaphysical framework requires that we draw finely-grained categorical distinctions against a theoretical backdrop that is often invoked, but in poor shape philosophically-speaking.

A final concern is more intuitively based: it can seem, quite simply, *incredible* to suppose that our world's ontology is chock-full of infinitely many, distinct, possible mountains taller than Everest that might have been located precisely where Toronto actually is. If that were indeed the case, it would be an exceedingly surprising metaphysical consequence of the endorsement of simple possible-worlds modal semantics (Stalnaker 2010, 2011, Ch. 5; compare the 'incredulous stare' discussed by Lewis 1986*c*, 133–36).

5.4.2 Perspective-shifting

Williamson may be led to endorse this complicated conception of the metaphysics of ordinary objects on the basis of a pattern of modal reasoning we have noted at several points in the discussion thus far. Discussing the Inn River, which on his view exists necessarily but is not necessarily metaphysically concrete, Williamson writes that it is the Inn's actual concreteness which

> [. . .] allows us to establish reference to it in the usual way; we use that referential link to discuss the object with respect to situations in

> which it is not in space and time. We can then reflect that people in those situations might be unable to establish reference to the object, if no uniquely identifying description were available to them, but could still express general propositions (e.g., 'There is a merely possible river') made true by facts about the object. We can further reflect that we may be in the same predicament with respect to other possible members of the same kind, such as merely possible rivers, to which we cannot establish reference but facts about which nevertheless make true general propositions that we can express (such as BF). (Williamson 1998, 267)

We are to suppose that our situation here in actuality, when it comes to the question of what objects there are, is structurally analogous to those of individuals in 'situations' (worlds) that *we* may correctly describe as worlds in which the Inn exists, albeit 'non-concretely'. Relative to such worlds, something that is real *for us* is not located in space and time; consequently, relative to such worlds something (the Inn) is non-concrete but only contingently so. We are similarly to suppose, by parity of reasoning, that things might be just so for us here in @, when it comes to objects that are pre-theoretically nonexistent from our actual point of view. For example, the inhabitants of other worlds may directly reason counterfactually about some non-actual river, and say of *it* that it exists in our world @ despite being non-located in space and time here. That should give us reason, Williamson surmises, to think that from the view of actuality some of what exists is contingently metaphysically non-concrete.

The dialectical pattern should seem familiar. In broad relief, according to the pattern, certain basic, structural features of metaphysical modal reality are to be understood as *invariant* from one possible world to the next. That is the pattern, recall, exhibited in standard formulations of Chisholm's paradox of flexible essentialism, discussed in Chapter 4. 'Off at' w', it is possible that artifact α be composed of m''; thus α is so composed relative to w''. And yet, assuming S5, modal reality relative to w' is just modal reality relative to actuality (or world w); consequently, as from the view of actuality, α is composed of m'' at w'', and

consequently is possibly some way it essentially is not.

That is similarly the pattern, recall, embodied by modal reasoning that might reasonably be seen as militating in favor of a 'Priorean' conception of nomological and metaphysical modality as structurally heterogeneous (*quasi-determinism*; §3.2.2). Relative to w, it is possible (nomologically) that matters be slightly otherwise (within quasi-deterministic limits); 'off at' w', which obeys the laws of w, it is *impossible* (nomologically) that matters be otherwise than they are. But (metaphysical) modal reality relative to w' is just the same reality relative to w; consequently, as from the view of w, it is *metaphysically* possible that the laws of nature be violated.

That is similarly the pattern, finally, embodied by *prima facie* intuitive reasoning concerning the modal profile of *actuality* (Chapter 1). Here in @, actually, a Democrat lost; 'off at' w, a Democrat wins, and so actually wins relative to w. But modal reality relative to w is just modal reality relative to @; consequently, as from the view of @, it is contingent that matters be as they *actually* are.

I have suggested over the course of this dissertation that, in each case, the pattern is succeptible of a more theoretically attractive interpretation, one that involves our capacity to imaginatively consider certain aspects of modal reality—such as lawhood, composition and compositional essence, and modality itself—as they appear from the view of *contexts* other than our own. Williamson overlooks that theoretical possibility, in the passage cited above, when it comes to matters of existence and nonexistence 'relative to' a given possible world. Construed in terms of the context–index framework, to correctly describe the ontology of some possible world w as containing the Inn River is to characterize w's ontology *externally*, as from the view of our own actual context (that is, in terms of inclusion in $D_{@,w}$; §5.3.2). It does not follow that, in imaginatively shifting our contextual perspective from @ to w (by shifting w_c to w), the Inn belongs to the *internally* characterized ontology D_w of w. That makes an important difference when it comes to Williamson's reasoning by analogy concerning our actual 'predicament', when

it comes to objects pre-theoretically nonexistent from our contextual perspective. Perhaps there is a sense in which the inhabitants of *w* may truly say, of *us*, that relative to our world something is existent but contingently non-concrete: that sense involves the *external* characterization of the ontology of @ from the view of *w*, and is accordingly a matter of the inclusion, in $D_{w,@}$ of something that is modally 'alien' from the view of our actual context. It does not follow, however, that at the level of internal characterization, $D_{@}$ contains something that is both existent and contingently unlocated in space and time.

To suppose otherwise is to conflate, in the course of modal-ontological deliberation, two distinct contextual perspectives on what the facts of ontology are actually like (compare Murray and Wilson 2012, 202): it is to reason, from consideration of what belongs to $D_{w,@}$, to conclusions about what belongs to $D_{@}$. And yet if, as I have proposed, the contextual standpoints corresponding to D_w and $D_{@}$ are themselves irreducibly relative, such '*in-situ*' shifting of contextual point of view is inferentially problematic, and patterns of modal reasoning based upon such shifts are fallacious.

Chapter 6

Conclusion

The preceding discussion has documented a trend towards increasing technical and philosophical complexity in modal semantics, and modal metaphysics, that begins to emerge following the publication of Carnap's *Meaning and Necessity*.

Simple Carnapean modal semantics supports a conception of possibility and necessity as *structurally simple*. That structural simplicity manifests itself in a representation of valid modal inference as characterized by intuitive principles of S5 modal logic, and in a concomitant model-theoretic representation of modality as *invariant* from one possible world to the next. The picture would come to be abandoned by many over the decades following Carnap's work in the model-theoretic tradition, to be replaced by a conception of modality as structurally *complex*. Patterns of modal inference involving certain varieties of possibility and necessity are now to be viewed as characterized by logics weaker than S5; that requires, at the semantical level, that the modal operators themselves be viewed as involving *restricted* quantification over subspaces of 'relatively accessible' possible worlds (Prior 1962*a*,*b*).

Simple possible-worlds semantics similarly underwrites a highly plausible and arguably 'default' conception of the possible-worlds truth conditions of *de re* modal discourse as metaphysically *transparent* (Kripke 1980). On the plausible

view, ordinary physical individuals (such as Nixon) may be viewed as transworld 'continuants', and consequently figuring *directly*, at other worlds, in the truth-conditions of our *de re* modal discourse here in actuality. That plausible conception would similarly come to be abandoned by some, in favor of an analysis of modality *de re* as involving relations of overall qualitative similarity between distinct, and typically 'world-bound', individuals (*modal counterpart theory*; Lewis 1968). That view requires not only a substantial departure from intuitive modal metaphysics, but additionally the considerable technical complication of our possible-worlds model theory, as we have seen.

Finally, simple *quantified* modal semantics supports a conception of the modals and quantifiers as scopally independent; that independence manifests itself in the validity of the *Barcan formulae*, and a concomitant representation of actual ontology as non-contingent. Here again, the simple view would come to be complicated in the years following Carnap's work, in favor of a conception of quantification as *relativized* to the possible world of evaluation (Kripke 1963).

What I have done in this dissertation is show that neither our modal semantics, nor our modal metaphysics, need be as complicated as many contemporary philosophers have supposed. Foundational work in modal metaphysics throughout the second half of the 20$^{\text{th}}$ Century proceeded largely in the absence of sufficient attention to the crucial phenomenon of *context*, as opposed to *index*, relativity. It is the methodological preoccupation with index relativity that explains the widespread assumption that modal semantics must be complexified, if it is to be capable of adequately representing a range of *prima facie* intuitive modal-metaphysical data. Relativizing the theoretical apparatus of modal metaphysics to the possible world of the context, I have shown, allows us to keep both our modal semantics and modal metaphysics simple, while at the same time making available a range of theoretically attractive interpretations of that data which have largely overlooked in the contemporary literature.

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