Preface

This book argues in its first part against a commitment to metaphysical necessity, semantic modalities are enough. The best approaches to elucidate the semantic modalities are (still) versions of linguistic *ersatzism* and fictionalism, even if only developed in parts. Within these necessary properties and the difference between natural and semantic laws can be accounted for. The proper background theory for this is an updated version of Logical Empiricism, which is congenial to recent trends in Structural Realism. The anti-metaphysical attitude of Logical Empiricism deserves revitalization. Another target besides metaphysical necessity are substantial forms of iterated modalities, as used, for instance, in the philosophy of religion.

The second part takes up a methodological observation from the first part: elucidating a concept (in the spirit of Logical Empiricism) can proceed by computational modelling. As an example, the second part of the book concerns modelling belief dynamics not just in the sense of a formalization, but rather in the sense of building a computational model. The purpose of such a project is to illustrate some ideas about belief changes in a web of beliefs to explore and deepen one's understanding of belief changes by trying to implement or improve corresponding algorithms. As a part of the model accepting conditionals and counterfactuals can be understood by versions of *Ramsey Tests*, i.e. again without modal commitments.

Part I

Against Metaphysical Necessity

§1 *Structures*

Science concerns itself with developing theories to explain and predict *patterns* encountered in experienced reality. Regular patterns supporting counterfactual dependencies are captured in laws expressing dependencies between parameters.

Underlying these patterns are *structures*. They are as real as the patterns are, thus: Structural Realism. Structures are identified functionally, i.e. because of their functional role in patterns. Scientific progress consists in finding more (more detailed) patterns and structures, and finding out more with respect to the already known structures.

The Theory of Relativity and Quantum Mechanics originated at a time when Logical Empiricism and some version of its verificationism and/or operationalism were the accepted view of treating scientific theories. Some theorists themselves expressed their approach in this fashion. Taking some of their claims – especially those couched in terms of expressions borrowed from ordinary language – at face value in a realist spirit they sound strange or outrageous. In the light of a logical empiricist re-construction (like Reichenbach's *Die Philosophie der Raum-Zeit-Lehre*) these claims are the result of respective *conventions* of coordinate definitions or operationalizations of re-defined concepts (say, of 'time' or 'distinct

object'). From a Logical Empiricist perspective, we have here axiomatic theories with postulates and definitions which in total account for the observations and are successful in predictions. In their success they have captured some structures and laws of reality. Their general statements about *these* (say, about uncertainty or the existence of entanglement) can be taken literally, the detailed statements involved in calculating predictions and giving explanations might be taken with a pinch of salt as there might be empirically equivalent theories with different calculating devices. These devices (like detailed mathematical theories and models) share their empirical content. We might prefer some theory on meta-theoretical principles (like simplicity or connectedness to other theories), but there seems little benefit in committing oneself to such a *fine-grained* ontology in a realist spirit.

By observational regularities we can fix reference to the structures underlying these regularities. Theory succession substitutes formerly assumed laws about these structures with reformulated laws with respect to the same structures, preserving referential continuity, and thus expressing advancements in theoretical understanding. This may involve changing the detailed ontology (and mathematics) involved in the theoretical apparatus and its explanations and predictions. Referential continuity in *structures* may come with discontinuity of detailed *object* ontology (i.e., of the sort of posited items *realizing* the structures).

Structural Realism allows for Ontological Relativity in objects and other ontological categories, not allowing, however, for Structural Relativity in the sense of a general instrumentalism or constructivism with respect to scientific

theories. Structural Realism still endorses the argument of Scientific Realism that the best explanation of the success of science rests in its approximate truth with respect to the structures of reality. Structural Realism contracts the realist stance to structures. This fits better to the *functionalist* understanding of theory development and the *plurality* of fine-grained theoretical modelling.

In *Der Logische Aufbau der Welt* (§§11-12) Carnap explicitly states that science is concerned only with structural descriptions and not with claims about the carriers of these structures.

§2 *Objects*

Objects are *derivatively* modelled as the relata of these structures. One can still talk about the same structure – and patterns – although the modelling of the objects has changed. Structures inasmuch as identified functionally have a hidden nature only insofar as more can be learned about them. Objects as introduced as the items related in a structure are not introduced as substances with a hidden nature.[1]

As reality and the models of it come in scales objects of one level may be the structures of a more fundamental level. As reality and theories come in scales ontologies of these theories and levels of reality come relative to theories and levels. As much as these theories are successful and our best theories there is no need for a unified grand ontology of science beyond (i) the occasional reduction between theories, and (ii)

[1] Cf. Ladyman and Ross, *Every Thing Must Go.*

the coherence/consilience between our best theories. All cover reality and its structures and (experiential) patterns. Their ontologies are devices to discern certain relevant aspect of these structures in light of the scale or scientific discipline in question.

A *theory* comes with an ontology. Ontologies are relative to theories and kinds of sciences (like sociology or biology). The *language* a theory is expressed in also comes with an ontology: a formal ontology resting in the *types* of syntactic phrases and variables. The most general ontology of this sort in First Order Logic with no further specified variables. First Order Logic can express any ontology as *predicates* can be introduced for *types* of entities (ranging from general types like 'proposition' to specific ones like 'unicorn').[2] A theory accepts a type of these entities if it existentially quantifies over variables in parameter places of corresponding predicates. So far Quine's famous slogan (most conspicuously developed in *Set Theory and Its Logic*) is quite appropriate. Whether to quantify in such a way is a theoretical and empirical question of respective theories. A linguistic framework (like Second Order Logic or a language of typed/sorted quantifiers or a Free Logic with different types of quantifiers with different ontological impact) can also already come with further ontological commitments beyond the mere presence of variables to be bound. Accepting such a linguistic frame-

[2] By a theorem of Alan Turing standard First Order Logic is as universal as Turing Machines [cf. §18], in the sense of being able to express any explicit/computable semantics or ontology, thus we can make use of the *Church Turing Thesis* or *Hilbert's Thesis* (in mathematics) to express any ontology in First Order Logic.

work then is a *theoretical* question itself, one of a background fundamental theoretical outlook above the more specific theories expressed within that language – against the pragmatist conventionalism Carnap proposes on many occasions (most famously in "Empiricism, Semantics, and Ontology"). That linguistic frameworks are in most parts conventional is part of Logical Empiricism, but that conventions are beyond theoretical arguments for their adoption need not be.

The most congenial abstract metaphysics fitting Structural Realism is *Neutral Monism*: the basic items/events of the world are neither physical or mental or whatnot in themselves, but can be described as realizing structures described in terms of physics or psychology.[3] Neutral Monism need not commit itself to a metaphysics of item/event *constitution* for the basic type of neutral items/events. Neutral Monism identifies properties as dispositions and generally states that they are founded (somehow) in the nature of the ultimate items/events, the constitution of which in detail is beyond our ken – thus every claim thereof beyond some *general* idea of 'tropes' or 'universals *ante rem*' is metaphysics. This comes close to a nominalist understanding of predicate application, an understanding congenial to the constructive approach to building linguistic frameworks. This property theory is structurally realist inasmuch as it refers to the founding nature of the ultimate items/events, and talks not just about predicate application but (real) properties themselves. This property theory is

[3] This was championed by some Logical Empiricists sometimes (say, Russell in his *An Outline of Philosophy*) and rejected by others (say, the physicalism of the Vienna Circle, cf. Carnap, "Die physikalischc Sprache als Universalsprache der Wissenschaft").

anti-realistic inasmuch as it does not engage in property metaphysics. Neutral Monism is non-reductive with respect to psychology and avoids dualism at the same time. Types of behaviour should not be taken as introducing types of substances, which will for Structural Realists and Neutral Monist forever beyond our ken.[4] As Neutral Monism does *not* state that physical items/events are basic – neither are mental items/events – it need not concern itself with physical-psychological laws to explain the mere presence of the psychological. There may well be discoverable physical-psychological laws as established *correlations* of behaviour, but they are not in themselves reductive or explanatory. For Neutral Monism to speak of 'physical' objects or events is short for 'carriers of structures described according to the laws of physics'. The same holds for psychological events. The same events might realize physical and psychological structures, whether they are *the same* we have difficulty to say because (i) we cannot further access their constitution (i.e. beyond their behaviour), (ii) we may lack a reduction of (some) psychological properties.[5]

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[4] In this way Neutral Monism accompanied by Structural Realism regains or preserves the idea of (metaphysical) pseudo-problems in philosophy, although not the letter of Carnap's *Scheinprobleme in der Philosophie*.

[5] Thus, Neutral Monism disagrees in part with Davidson's Anomalous Monism (cf. Davidson "Mental Events") in rejecting the claim that the ultimate constituents or reality are all and firstly physical. It also disagrees with Nagel's present day Neutral Monism (in his *Mind and Cosmos*) as it (i) comes close to panpsychism, which is constitutional metaphysics, (ii) stresses the urgency of physical-psychological laws, and (iii) confuses the epistemological irreducibility

§3 *Ontological Relativity*

With respect to one and the same structure different models of this structure (including a carving up into related items) may be developed. Thus, there can be *Ontological Relativity* with respect to these models. Some models may be discarded because of meta-structural reasons like simplicity and consilience with other models of other structures. Some ontologies fare – *prima facie* – equally well with respect to these criteria. If that happens, we have a case of scientifically acceptable ontological relativity. For a realist with respect to structures this relativity is not as dramatic or anti-realistic as for a realism with a foundation in objects.

The general possibility of ontological relativity does not deliver interesting cases by itself. In mathematics, say number theory, Zermelo's conception of the ordinals and von Neumann's differ set theoretically, but are isomorphic, thus spelling out the same structure. For such a logicist or at least set theoretical foundation of mathematics the question "What are numbers really?" seems otiose. There might be more interesting empirically equivalent ontologically distinguishable theories in the empirical sciences. Also in empirical sciences, however, piped up syntactical variants that just add something to an accepted theory (as often invoked by Quine as arguments for ontological relativity) can be rejected for reasons of simplicity or by requiring that the traditional trajectory of theory successors should not be left without good reason, which in these cases seems obviously missing.

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of the 1st person perspective with a semantic shortcoming of a 3rd person world description.

The actual scope of ontological relativity in the sciences can be made out only by detailed analyses of supposed examples and the history of science.[6]

§4 *Logical Empiricism∓*

One may characterize a viable position in the analytic tradition as 'Logical Empiricism∓'. [7] Logical Empiricism has

[6] Cf. Laudan's explorations in "Demystifying Underdetermination" and "A Confutation of Convergent Realism".

[7] All labels are problematic because of their historical associations, but taking up an approach and label might be more helpful than inventing ever more idiosyncratic labels. 'Logical Empiricism∓' is the specialization to theoretical philosophy of a broader general attitude of 'scientism' with respect to knowing factual truths – where 'the sciences' are not just the natural sciences, but include methodologically explicit approaches in the social sciences and humanities. This orientation on the sciences, further on, can and should acknowledge the irreducible role of practical philosophy, taken broadly, and the arts. The ideological heritage of (early) Logical Empiricism and some current 'scientism' should be abandoned – as 'unscientific' after all. There is some truth in Curtis White, *The Science Delusion*. Just talking of the 'Analytic Tradition' or 'Analytic Philosophy' would be more misleading (i) because of the differences between Logical Empiricism and Ordinary Language Philosophy (in the Oxford or Wittgensteinian tradition), (ii) because the 'Analytic Tradition' has developed into branches championing metaphysics – contrary to the foundational ideas of Logical Empiricism – and branches which offer theories which should be offered and tested by the sciences. Logical Empiricism defines an understanding of philosophy as meta-science. This conception of philosophy should allow for other conceptions of philosophy besides it. They may care for themselves, Logical Empiricists set forth their conception and its proper updates and revisions. Neo-Kantians took excep-

developed over time. It *can* and *has* embraced holism of justification, against early foundationalist verificationism. It *can* and *has* embraced – at least in some philosophers in that tradition – scientific realism in the form of Structural Realism, therefore the "+" in "Logical Empiricism∓".[8] Empiricism as a theory of scientific knowledge can be separated from theories of meaning inspired by empiricism (like verificationism or operationalism). As theories of meaning verificationism and operationalism have failed both for epistemological reasons (in the failure of ultimate verification in some undeniable 'given') as for semantic reasons (in the failure of complete definitional reductions and verification rules not being compositional). They should not be tied to empiricism, therefore the "–" in "Logical Empiricism∓". Empiricism is compatible with externalist or atomistic semantics, expressed, say, in some form of a Davidsonian disquotational theory of truth for some language. Rules of justifying or verifying a (scientific) statement are linked to its semantics, but need not be its meaning. Verificationism *in the broad sense* can be understood as

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tion to most of the detailed claims of Kant's philosophy, but considered themselves Kantians in the spirit of their conception of Kant's methodological self-understanding. In the same vein philosophers today can understand themselves as Logical Empiricists∓ without subscribing to most of the detailed claims of early Logical Empiricism (say, in the Vienna Circle). Speaking positively about Logical Empiricism one runs the risk of being 'guilty by association'. As philosophers like to pontificate on which directions philosophy should better take, I would like to establish the invisible church of The Latter Day Saints of Logical Syntax and Computability.

[8] Even the differences between Structural Realism in Logical Empiricism∓ and van Fraassen's 'Constructive Empiricism' in *The Scientific Image* and *The Empirical Stance* seem to be minor.