

# Alethic Modalities in Updated Logical Empiricism

## §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: Structural Realism. They 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 *The Philosophy of Space and Time*) 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.

## §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.<sup>1</sup>

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 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) 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

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<sup>1</sup> Cf. Ladyman and Ross, *Every Thing Must Go*.

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’).<sup>2</sup> 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 framework 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 “Empirism, 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.

### §3 *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 realist 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

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<sup>2</sup> By a theorem of Turing First Order Logic is as universal as Turing Machines, 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.

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.

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.<sup>3</sup>

#### §4 *Logical Empiricism* $\mp$

One may characterize a viable position in the analytic tradition as ‘Logical Empiricism  $\mp$ ’.<sup>4</sup> Logical Empiricism has 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  $\mp$ ”.<sup>5</sup> 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. They should not be tied to empiricism, therefore the “–” in “Logical Empiricism  $\mp$ ”. Empiricism is compatible with externalistic or atomistic semantics, expressed, say, in some form of a Davidsonian disquotational theory of truth for some language. Verificationism *in the broad sense* can be understood as the methodological commitment to have one’s theories tied to

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<sup>3</sup> Cf. Laudan’s explorations in “Demystifying Underdetermination” and “A Confutation of Convergent Realism”.

<sup>4</sup> 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  $\mp$ ’ 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.

<sup>5</sup> Even the differences between Structural Realism in Logical Empiricism  $\mp$  and van Fraassen’s ‘Constructive Empiricism’ in *The Scientific Image* and *The Empirical Stance* seem to be minor.

testable predictions and observation requirements. Operationalism possesses some residual adequacy in that theoretical terms of a theory occur in sentences with observational terms ('observational' relative to that theory) which fulfil the function of 'bridge principles', which tie the theoretical core of a theory to testability. This allows to take some claims of, say, fundamental physics with less ontological commitment than in disquotational scientific realism.

Logical Empiricism – starting already with Carnap in *Logical Syntax* and “Testability and Meaning” – embraced both a holism of justification and a theory of meaning which reject epistemic foundationalism and meaning constitutive verification rules; even Quine in his late work (like *The Pursuit of Truth* and *From Stimulus to Science*) can be classified as Logical Empiricist in this sense.

Logical Empiricism distinguished between the (linguistic) framework of theories and their empirical content. The framework set up (axioms and definitions) is pre-given to empirical exploration and thus *a priori*. This *a priori* is in most parts language relative and, as language can be changed, revisable, seen from a meta-perspective. The role of language building is to come up with a most feasible and comprehensive framework which does not get into conflict with theories empirically developed.

This much is already present in early Logical Empiricism, say, Carnap's *Logical Syntax*; Carnap in the *Logical Syntax* – and later in his semantic work, starting with *Introduction to Semantics* – also admitted the universal perspective of constructing languages. From this perspective there may be features present in all frameworks, such that these, despite the revisability of individual frameworks, are *a priori* and will not be revised, apart from our coming to a better understanding of these features. [Carnap himself did not develop an explicit meta-theory which recognizes this.]

With the distinction between framework and theories early Logical Empiricism (say, in Carnap and Reichenbach) takes up Kantian themes. Kant's Transcendental Philosophy distinguishes between the framework (the topic of 'Transcendental Logic') and empirical knowledge. Framework principles and concepts are *a priori*, although we know about them only as we gather experience. Thus, Transcendental Logic is compatible with Logical Empiricism, as Logical Empiricism – even if not always clearly stated – does not subscribe to a simple empiricism which claims that *all* knowledge is gained by experience (inner and

outer senses) *only*. The contrast between epistemological analysis in transcendental philosophy and empiricism is overrated.<sup>6</sup>

Assuming innate components of knowledge – once again a conflict much overrated – is also compatible with empiricism in the sense that empirical theories establish knowledge about what has to be assumed as *a priori* or innate (e.g., in linguistics or in computational cognitive science).<sup>7</sup>

### §5 *Against Metaphysics, again*

Philosophical conceptual analysis can degenerate into so-called ‘intuition mongering’: a style of argumentation in which some states of affairs are propounded as ‘metaphysically’ or conceptual possible, whereas other truths or links between states are propounded a conceptual or *a priori*, on idiosyncratic assessments of intuitions. This way, it is not an argumentation with clear standards of quality or empirical (sociolinguistic) backup. What we have here – at best – are proposals for word use and definitions of word meanings or concepts. There are no truths about metaphysical modalities to be discovered, all depends on definitions one may endorse or reject. Such proposals of definitions are essential for science, but should be announced and methodologically reflected as being such proposals about linguistic frameworks. Their force derives from both the linguistic support of talking thus as well as from their fruitfulness in describing phenomena, putting them into an explanatory structure of a theory that employs the concepts as so defined.

Because of this connection to theories in the sciences conceptual analysis should be considered as part of the framework building in sciences. Isolated from this embedding it might be difficult to articulate clear quality standards apart from the logical coherence of the proposed definitions and usage. In some fields where we lack developed scientific theories one should at least aim at reflective equilibrium of prior intuitions (personal ones or taken up from tradition), statements of (uncontroversial) facts, and phenomenological descriptions (especially in the philosophy of mind). In these cases philosophy aims at a coherent framework of best capturing the area (semantic field) in question. In natural languages and folklore there are established forms of usage and definitions, but – at best – only with respect

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<sup>6</sup> Already Strawson in *The Bounds of Sense* classifies large parts of Kant’s ‘Transcendental Analytic’ as “a truly empiricist philosophy”.

<sup>7</sup> Cf. Chomsky, *New Horizons in the Study of Language and Mind*, esp. chapter 3.

to some few fundamental (i.e. *a priori* or innate) concepts might we find genuine conceptual discoveries apart from the empirical sciences.

Like sentences knowledge can be analytic or synthetic knowledge. Knowledge of analytic sentences can be gained *a priori*, nonetheless it might be subjectively surprising. Although our framework already contained the content of the analytic sentences, we can subjectively learn about it. Thus, analytic knowledge is no deficient mode of knowledge. Debates about frameworks are also debates about what should be considered analytic. Synthetic knowledge and synthetic belief stems from experience. Minimally empiricism claims that all synthetic belief and knowledge stems from experience.

The distinction between analytic – and thus unrevisable – and synthetic sentences is a *synchronic* distinction. Terms can be re-defined if a definition turned out to be useless or in conflict with empirical results. Definitions should track some fundamental constituent properties of the properties defined or put in analytic links to other properties. This spans a net of analytic sentences, a net of semantic necessity stronger than the lawlike connections discovered within empirical theories. Semantic necessity in this way follows natural necessity, and suspends some connections between properties from revision, for the time being of the success of this linguistic framework. For Logical Empiricism there is no further ‘metaphysical necessity’ beyond or besides this.

Whether some definitions are so fundamental that they can never be successfully re-defined constitutes a question of traditionally called ‘Transcendental Philosophy’, difficult to settle. Meta-linguistic and logical concepts may belong in this realm. In any case, defined concepts of a specific science can be discarded or re-defined in the light of better theories.

Diachronically what was synthetic can be made analytic, or vice versa – improperly speaking as by this the language itself has been changed. In this (limited) sense proper definitions are discovered, all this being compatible with the presence of conventions and a distinction between language and theory.

## §6 *A Reductive Analysis of Modality?*

Many accounts of the alethic modalities<sup>8</sup> like ‘possibility’ and ‘necessity’ try to be reductive. Modalities are supposedly explained by providing truth conditions for modal statements in a

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<sup>8</sup> In the following ‘modalities’ for short.

semantics that does not contain modalities itself, but refers to some *sui generis* entities like ‘propositions’ or ‘possible worlds. One may ask whether there could or should be any reductive account of the modalities at all. Modality may be an irreducible semantic concept, and all we can do is to elucidate it by some model (e.g. some type of ‘possible worlds’ talk). Modality may point to a fundamental feature of reality.

The reason for this scepticism concerning reduction rests in the hidden modal assumptions made with respect to the entities that are employed to explain modality. The very term “possible world” points to such presuppositions. These presuppositions may hide in some construction principle (like ‘independence’ of the building blocks of a combinatorial account of modality) or be given with assumptions of consistency. For example, ‘consistency’ explained as the non-derivability of a contradiction rests on ‘derivability’. ‘derivable’ is a (hidden) modal notion (as witnessed by the “-able” in the English term). One is not saying that the contradiction has been derived, but – sic! – that it could be derived, i.e. that it is *possible* to derive it.

There may be reductions of modality, however – *inter alia* versions of consistency accounts. Nonetheless even a non-reductive elucidation (e.g. in terms of consistency) may be illuminating. It may (a) establish meaningful modal talk; modal talk could be meta-semantic talk (with respect to consequence) being mirrored in the object-language (like in Provability Logics). It may (b) be part of a full-blown metaphysical picture (like Modal Realism).

## §7 *Linguistic Fictionalism (I)*

Linguistic ‘ersatzism’ as an account of the modalities provides a version of a *fictionalist account of possibilities*: the possibilities do not exist (neither in the space-time universe nor anywhere else in reality), there are no possible existants, there are only *stories*. Or stories about them *might be written*. If the stories just ‘might’ be written the account cannot be reductive. It can be *reflective*, however: ersatzism *is* a story about possibilities itself. It tells how and why such stories might be written.

Rudolf Carnap in *Meaning and Necessity* aims at an explication of modal terms in terms of his semantic construction of state *descriptions* and Meaning Postulates. He does not supply a formal system of modal logic, although his suggestions point to something close to S5. Modality is modelled by means of a theory of formal languages. The main idea is that all



complete re-combinations of basic terms (singular terms and general terms) which *do not* contradict the Meaning Postulates (including logical axioms) constitute a state description, the logical closures of which are the possible worlds.

This means that  $\alpha$  is possible iff there is a possible world  $w$ ,  $w \models \alpha$ . This in turn (by the definition of “possible world”) means:  $\not\models \neg \alpha$  iff  $\models \diamond \alpha$ . This is not S5 inasmuch as S5 is deductively complete with respect to some (standard) possible worlds semantics for it, and for this ( $\alpha$  should be *derivable* if valid (i.e. true with respect to all possible worlds). But to know whether  $\diamond \alpha$  is valid, one has to know  $\not\models \neg \alpha$ , i.e. a *negative* fact about derivability. This not just makes it dependent on a (hidden) modal concept like derivability, but is a fact which in the interesting cases is not decidable in general. It will be decidable in principle given finitistic restrictions on the number of basic singular terms (individuals) and general terms (properties).

That this conception is not deductively complete, however, does not make it useless. Statements of the type  $\diamond \alpha$  are epistemically difficult to assess, but such epistemological difficulties do mean neither that we do not understand what the statement says nor that we do not know how to argue for such a statement’s truth or falsity. Modal statements need not be epistemically simple. They are not on any of the main accounts of modal semantics.

( $\alpha$  is if true *not* a derivable truth in a sufficiently expressive First Order System, as for provable (“B”)  $\not\models \alpha \Rightarrow \vdash \neg B\alpha$  is not valid in the logic of provability (by Gödel’s *Incompleteness Theorems*). So, although  $\not\models \neg \alpha$  is a semantic/logical property of the system, ( $\alpha$  cannot be a derivable truth in such systems in all cases of  $\alpha$ . So, strictly speaking, Carnap’s supposed system is *not* deductively incomplete, as  $\diamond \alpha$  is not a consequence that can be *expressed* in general as a logical truth *in* the system.  $\diamond \alpha$  is true by the logical/semantic rules of the system, thus a logical/semantic truth, but a truth *about* the system, not a logical/semantic truth *in* the system.

$\diamond \alpha$  could be derivable in a paraconsistent system in which Gödel sentences are (just) further antinomies – in a system in which the meta-reasoning about derivability is done in the system itself. Thus – given semantic closure combined with an application of the *Church Turing Thesis* (CTT) of capturing our (meta-)reasoning within a sufficiently extended (paraconsistent) formal system – one may argue:

- i. Suppose:  $\not\models \neg\alpha$  is true given a system of inference.
- ii. Then:  $\models \neg B\neg\alpha$  as the argument for (i) is existing *within* the system of inference.
- iii. Thus:  $\models B\neg B\neg\alpha$  again as the argument for (ii) is existing *within* the system of inference.
- iv. Thus, by definition:  $\models B\Diamond\alpha$
- v. Thus:  $\models \Diamond\alpha$  by the plain correctness of “B” [ $\vdash B\alpha \supset \alpha$ ], as *Löb’s Theorem* [i.e.  $\vdash B(B\alpha \supset \alpha) \supset B\alpha$ ] does not apply in a paraconsistent context.

## §8 Modality as Meta-Semantic

Alternatively to such an approach one could proceed in a fashion of elucidating modality without logical/semantic closure by starting from the observations just made:

- i. there being a (often hidden) dependency on derivability
- ii. possibility being the *meta*-property of ‘possibly true’ with respect to sentences of a formal system.

and see them as a way to *forsake* a philosophically loaded primitive notion of possibility altogether. One could claim that  $\Diamond\alpha$  is just an object-language rendering of a meta-language statement, namely one of *satisfiability*:

$$\models \Diamond\alpha \text{ iff } M \models \alpha \text{ for some model } M \text{ (i.e. } \alpha \text{ being satisfiable)}$$

And the claims about satisfiability and the existence of models can – given the presumption of at least correctness if not completeness as well – be further traced back to statements about a story’s *consistency*:

$$\models \Diamond\alpha \text{ iff } (\exists s)(\alpha \in s) \text{ and } s \not\vdash \perp$$

i.e.  $\alpha$  is part of a (complete) consistent story (a negation-complete consistent set of sentences). A consistent story  $s$  has a model, thus:  $\alpha \in s, s \not\vdash \perp \Rightarrow \exists M(\forall \gamma \in s) \models_M \gamma$ , i.e.  $\exists M \models_M \alpha$ , i.e.  $\models \Diamond\alpha$ .

## §9 Linguistic Fictionalism (II)

Possibility is thus reduced to consistency, where consistency has a modal element in talking about the derivability of sentences.

A realist with respect to abstract entities who considers a formal system as an abstract object, which exists even without our successive epistemic access to it, can *eliminate* the *residual* model element in ‘derivable’ and simply state  $\nVdash \perp$  as a *fact* given the system as it is. This (“ $\vdash$ ” meaning “there *exists* a derivation”) would be a complete reduction of modality.

Thus, on the one hand “possible” as a term can be reduced ultimately to a syntactic concept, which thus elucidates it in a regimented form. An ‘explication’ in Carnap’s sense is achieved. On the other hand, we see that the basic syntactic notions contain an aspect of modality *if* we restrict ourselves to talk in terms of our limited (epistemic and deductive) abilities.

## §10 Metaphysical Modalities

An account of this sort would, it seems, take all modalities to be *de dicto*; there are no modal properties ascribed to entities independently of linguistically established modalities. The fact that a formal system might be able to express *de re* modalities is in itself no reason to consider the respective sentences (possibly) true. One might give their truth conditions in a way that leads back to *de dicto* modalities, e.g.  $\exists x \diamond F(x)$  may be seen as making a *de dicto* claim for all assignments to the variable (i.e. some sentence being true of that object).

But *de re* claims seem to make sense. *In* the object-language  $\diamond \alpha$  says not of a sentence but of a state of affairs that it is possible. Modal talk in the object-language applies to the world. We say what is possible or not *in* the world. Derivatively we ascribe modal properties to entities in the world. They have them themselves (in that sense *de re*).

These *de re* modalities, nevertheless, go back to the ways we in our theories and in the Meaning Postulates<sup>9</sup> of our language describe or conceive of the world. We have chosen these ways of talking and formulated our theories, on the other hand, *because* we want our

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<sup>9</sup> Meaning Postulates are just axioms including non-logical concepts without any presumption of providing conceptual analysis.

language and theories *to fit to* reality. By our *de dicto* modalities we try to trace any inevitable (i.e. exception forbidding) objective connection in reality. The strength we attach to some connection determines whether we see it as semantic or just empirical.

Considering just semantic axioms we can talk of a broader class of possibilities than if we are taking the empirical assumptions of our best theories into account as well. We see links (between properties) of different strength and we want to capture the differences in strength. Consistency with respect to some empirical theory elucidates empirical possibility (i.e. compatibility with the laws of nature). Consistency with respect to semantic axioms elucidates logical/semantic possibility.

The contrast between metaphysical and linguistic possibility should not be understood in a way that any linguistically *based* elucidation of modality rejects the distinction between the strength of some connections between properties. Our best theories and corresponding Meaning Postulates try to trace the structure of reality. If they are true, these connections are *there*. ‘Metaphysical possibility’ is then not to be contrasted to ‘semantic possibility’: in our best theories they should coincide.

#### §11 *Necessary Existents*

If modalities are elucidated by Meaning Postulates and the semantic and syntactic properties of a formal system, there are no exclusions with respect to sentence types that are considered possibly or necessarily true. So, existential claims can be possibly true (if the concept of the entity involved contains no contradiction) – or even be necessarily true. If there are Meaning Postulates/Axioms making *existence claims* these existence claims are – *prima facie* in the *shallow* sense of a Carnapian explication of ‘analytic’ (as ‘following from the Postulates’) – derivable as theorems, thus being necessarily true. In the non-shallow sense – the sense to be elucidated – they are synthetic (as they do not decompose by the form of an implication the meaning of a term, as most Meaning Postulates). So, in that sense postulating them renders them *synthetic a priori*.

These necessary existence claims – prototypically in mathematics – may be part of our best theories, thus we understand that necessary existents are part of reality. Controversial posits are entities like the ‘perfect being’, necessarily existent.

Our linguistic frameworks are not directly proven themselves (as they set out what counts as a proof). In that sense synthetic *a priori* sentences in them cannot provide a – non-shallow (i.e. not just axiom repeating) – *proof* of a necessary existant as postulated. They can be used in proving other necessary existants conditional on the ones postulated. Our frameworks are viable in the holistic pragmatic fashion that ultimately serves as our best available justification of proceeding with these frameworks and believing their theorems and assumptions.

## §12 *Linguistic Fictionalism (III)*

A linguistic ersatzism avoids the postulation of (new) kinds of *sui generis* entities: necessarily existing abstract propositions which do not contain their subject matter as constituents (which these do not to avoid possible existants and overlap between such propositions which take on the role of possible worlds, as abstract stories)<sup>10</sup>. If one has other reasons besides an account of modality for this type of entity, they come in handy: As they need not be constructed (like real sentences) a reduction of modality seems possible. The possible is the realm of these complete, conjunctive propositions (standing in for possible worlds). Supposedly inconsistent propositions just do not exist. In contrast one has to explain why supposedly inconsistent sets of sentences are not constructed (or are not constructible). This – as an ontological investment – solves a problem of analysis by fecund ontological postulation. Nonetheless we see a postulation here which inherits all the epistemological and metaphysical problems of postulating abstract entities.

A linguistic ersatzism also has advantages over a non-linguistic account in the tradition of Ludwig Wittgenstein's *Tractatus logico-philosophicus*, which deals in a combinatorial account of the modalities using a non-abstract ontology, the major ingredient of which are states of affairs.<sup>11</sup> The problem such an account faces is to talk about possibilities ('possible states of affairs') without either taking them as sentences or as abstract entities (like propositions). There seems to be no place left to place such entities. A 'possible states of affairs' cannot *be* a recombination of the constituents of actual states of affairs (i) because these are parts of the actual states of affairs *already* (and at least the individuals cannot be

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<sup>10</sup> An example is Alvin Plantinga's *The Nature of Necessity*.

<sup>11</sup> An example is D.M. Armstrong's *A Combinatorial Theory of Possibility*. The ontology of non-transcendent universals and states of affairs Armstrong sets out in *A World of States of Affairs*.

replicated), (ii) because *if* they were combined thus, they *are* combined, i.e. one would have actual states of affairs.<sup>12</sup> So where are the combinations? One seems to land on a general principle:

(\*)  $\Diamond\alpha$  iff the constituents of  $\alpha$  could be combined in that fashion.

This is, of course, no longer a reductive explanation of modality, but just a substitution of *possible combination* for *possible truth*. A reductive account might proceed on the general principle

(\*\*) All combinations of atomic individuals and atomic properties are possible.

This shows the alignment of such a theory to Logical Atomism. This explanation now rests on the assumption of independently existing atomic constituents. This might be an option, but it certainly faces the epistemological challenges (i) to identify such atomic constituents, and (ii) to analyse all complex individuals and properties in their terms. No one has delivered on these desiderata – presumably relegated to a completed science! The problem was – at least – involved in the downfall of Logical Atomism.

Linguistic ersatzism, therefore, remains the best option. So long as it relies on the idea of sets of sentences being ‘constructible’ and (semantic) consistent in adhering to previously given axioms or Meaning Postulates it cannot provide a reductive explanation of the modalities. It can, however, provide an elucidation of our modal talk and the role of modal talk in our linguistic frameworks. At the same time, it avoids more controversial ontological posits.

### §13 *Modal Instrumentalism*

A fictionalist account involves many intricacies and might be cumbersome to handle at least in its semantics expressed with *stories* (about entities) for modal talk and existing *entities* of various types for non-modal talk. Quantifying-in and counterfactual reasoning about existing objects raise then technical intricacies in formalising them within one (object) language. Higher order quantification aggravates the complexities.

The point of setting out the conception of fictionalism, however, is not to propose working with a formal system that mirrors fictionalism and its claims properly. The point is to have a

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<sup>12</sup> The problem resembles Bertrand Russell’s problem in his attempt of a *Theory of Knowledge* with having individual negative states of affairs which make negated sentences true.

theory that shows how modal analysis *could* be done without extravagant ontological commitments. This resembles a nominalist or fictionalist account of numbers – one sets out the account and then goes on to use the standard formal systems in the knowledge that their efficiency and seeming simplicity of expression is valuable, i.e. taking an *instrumentalist* stance on their ontology, especially set theory and model theory. The same can be done in modal logic: One may use higher order intensional/modal logic with a model theoretic framework (in the broad sense of including inaccessible cardinals or classes ...) including an ontology containing possible worlds and possible entities (of whatever type). The fictionalist just does not believe in these scaffolding structures (i.e. the ontological talk taken literally).

An argument for scientific realists to be modal instrumentalist may stress the difference between a commitment to unobservables of some kind and a commitment to non-existing entities (whatever “non-existing entity” means).

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