Updated Logical Empiricism

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> [T]he philosopher, as an analyst, is not directly concerned with physical properties of things. He is concerned only with the way in which we speak about them. In other words, the propositions of philosophy are not factual but linguistic in character. […] Accordingly, we may say that philosophy is a department of logic. […] It follows that philosophy does not in any way compete with science.
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> (Alfred Ayer)

Preliminary Remarks

One may characterize a viable position in the analytic tradition as 'Updated Logical Empiricism'. 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. 'Updated 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. 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 [but see §4], (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 may set forth their conception and its proper updates and revisions. Neo-Kantians took exception 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).

§1 Logical Empiricism as Early Structural Realism

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

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) 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

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

2 By a theorem of Alan Turing standard 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.

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 "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 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

[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 Einheitssprache der Wissenschaft").

[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*.

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.

§2 Updating Logical Empiricism

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.[5] 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. Empiricism is compatible with externalistic 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 the methodological commitment to have one's theories tied to testable predictions and observation requirements.[6] 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 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. Carnap refines in *Testability and Meaning* verifiability towards confirmability, and explicitly embraces holistic theory

[5] Also the differences between Updated Logical Empiricism and van Fraassen's 'Constructive Empiricism' in *The Scientific Image* and *The Empirical Stance* seem to be minor.

[6] Carnap in §27 of *Testability and Meaning* states the 'principle of empiricism' thus: "As empiricists, we require the language of science to be restricted in a certain way; we require that descriptive predicates and hence synthetic sentences are not to be admitted unless they have some connection with possible observation, a connection which has to be characterized in a suitable way."

confirmation and comparison in *Logical Syntax*.[7] 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 distinguishes 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. To be distinguished are truths coming with the language frame set up and true sentences contingent with respect to the frame. The latter are the empirical synthetic sentences. The former are frame truths and by their semantic constitutive role also determine the logical space of semantic modalities. Given a broad definition of "analytic" as 'following from the axioms and definitions' and the fact that the axioms and definitions follow from themselves the frame truth can be taken as 'analytic', which does not exclude that they contain information about the world.[8] Given a narrow definition of "analytic" as 'following from the axioms and definitions and not being an axiom or definition' the frame constitutive axioms and those definitions which are not just nominal definitions introducing a term to express what could be said otherwise are synthetic, even synthetic a priori. Partial Meaning Postulates should be considered synthetic a priori in this sense as they embed in the language framework conditional dependencies that are taken to be true, i.e. corresponding to facts (like foxes being animals). That axioms should rather be classified as 'synthetic' should not be surprising as many axioms (already in set theory) involve existence claims. Again, this does not exclude the revisability (i.e. change) of the language framework and axioms.[9]

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[7] Cf. *Logical Syntax*, §82. This was way before the appearance of Quine's "Two Dogmas of Empiricism"! Neurath in 1931 famously expounded coherentism against Schlick's foundationalism.

[8] "A fox is an animal" is about foxes, and not 'empty' in any useful sense: it is empty of new information, which means it is not synthetic and contingent, which means it is analytic or definitional, which we knew beforehand! Analytic consequences can extend our subjective understanding. In as much as they refer to the world definitions have to be chosen to stand in no conflict with known scientific truths, otherwise the frame has to be revised. One quality standard for a framework can be how it restricts the alethic possible by adopting corresponding definitions.

[9] The Axiom of Infinity in ZFC, say, is synthetic in the common and Kantian sense, as it postulates the existence of an object (in fact of infinitely many). The aversion of early Logical Empiricism against synthetic *a priori* principles rests on taken such principles to be unrevisable and as expressing the idea that reason can fix and determine basic structures of reality (paradigmatically taken thus and rejected in Reichenbach's *The Rise of Scientific Philosophy*). Giving up these problematic features of synthetic *a priori* principles and corresponding (Transcendental) Idealisms undercuts the opposition to an otherwise useful notion, which might be supplanted by other notions like 'synthetic and necessary' but signals, at least, the meta-linguistic spot where some such a distinction need to be placed.

One may use (with respect to a specific language) the distinctions 'synthetic/analytic' and 'necessary/contingent' and abandon the distinction 'a priori/aposteriori' altogether. Abandoning the distinction 'a priori/aposteriori' has the advantage of banning an epistemological distinction in favour of proper semantic distinctions. Empirical sentences are synthetic and contingent. Theorems are analytic and necessary. Axioms and those definitions which are not just nominal definitions are synthetic and necessary. To classify a sentence as 'analytic and contingent', on the other hand, might only be used as a shortform for the meta-language statement that a corresponding definition or axiom could have been otherwise in a modified language framework. If one wants to get rid of the epistemologically loaded distinction 'a priori/aposteriori' and deems the distinction between nominal definitions, partial definitions and axioms cumbersome, and finds re-categorization of sentences like "All foxes are mammals" as synthetic repugnant, then the fallback position is Carnap's broad use of 'analytic' for all sentences following from the axioms and definitions, including the axioms and (partial) definitions themselves. As this again involves categorizing some existence claims as 'analytic' instead of 'synthetic', and still uses the traditional term "analytic" the best and clearest option is to use Carnap's distinction 'L-determined/not L-determined (a.k.a. contingent)'. "L-determined" was introduced by Carnap in *Logical Syntax* as 'determined (solely) by logic', but it might better be broadened to 'determined (solely) by language' to include any definitions and axioms (existential or not) of the language framework. We then have the distinction between framework truth of the language framework adopted, such sentences being L-true, and sentences being rejected as false by the language framework adopted, such sentences being L-false, these two groups comprising the L-determined sentences, sentences determined by language set up alone. Empirical sentences, being contingently true or false, are the other group, again with two subgroups.[10] 'revisable' is another notion to be employed in meta-language statements – leaving open the possibility that a core of logical and meta-linguistic principles, at least, might be 'unrevisable' for any comprehensive language framework.[11] 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.

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[10] Although this classification is clearest and carries the least luggage from philosophical tradition, a regimented and explicit usage of the other distinctions might be employed and will most times be employed here, as, unfortunately, "L-determined" has not been widely adopted. Labels should not be multiplied.

[11] A 'comprehensive' framework is one in which all thoughts can be expressed (like in a natural language or 'regimented' natural language). Special languages/frameworks for some science or other human endeavour (like art) need not be comprehensive. The concept of framework does not exclude the framework coming with no inference rules but the single axiom "Pop goes the weasel".

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 comprehensive frameworks, such that these, despite the revisability of individual frameworks, are universally L-true and L-constitutive (or a priori in the traditional sense) and will not be revised, apart from our coming to a better understanding of these features. Such features provide the foundation for the broadest sense of alethic possibility. [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.[12]

Building language frameworks and comparing their merits requires a meta-framework able to express the meta-linguistic, meta-logic and meta-semantic concepts needed. Modalities are introduced and discussed in this meta-framework. Ideally the meta-framework should be applicable to all kinds of language frames. Elucidating natural languages, then, leads to the issue of a universal meta-framework able to express even its own features and meta-theory. This can be discussed as the question of a Transcendental or Universal Logic. It is possible to have a FOL (classical) meta-theory for any universal logic – but the aspiration of a truly universal logic, of course, must be to be able to express its own meta-theory. By Tarski's Theorem a FOL theory cannot (without trivialization) contain its own semantics, whereas some paraconsistent logics can formalize semantic closure. So, our universal meta-frame, being its own meta-frame and semantically closed, should be couched in some paraconsistent logic. This looks, prima facie, like a massive deviation from the logical work of the early Logical Empiricists. Again, there is no deviation from the spirit of Logical Empiricism, as the very point of this move to paraconsistency is to enlarge the logician's tool box and to extend formal treatment to areas of philosophy – namely universal meta-reasoning – that were opaque beforehand. Universal Logic structures the field of language framework building. Following an approach of this type Updated Logical

[12] Already Strawson in *The Bounds of Sense* classifies large parts of Kant's 'Transcendental Analytic' as "a truly empiricist philosophy". Reichenbach's praise and criticism of Kant neglects this because of his crusade against Rationalism and the Synthetic Apriori.

Empiricism captures its own meta-reasoning and bans appeals to needed intuitions, pragmatic decisions without argument – or whatnot.

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).[13] What is innate is ontogenetic a priori, but phylogenetic acquired (i.e. aposteriori), and thus revisable. It can also (e.g. concerning our beliefs formed by interaction with middle sized objects) be suspended by scientific theories. Nonetheless it often secures in the mind/brain and human bodies in general knowledge about the world which need not be acquired by experience.

The age of scientific philosophy started with the distinction between the empirical sciences, dealing with factual discoveries, and the reflection on the foundations of science (i.e. meta-science). The best way to understand and undertake this reflection is as a study of the linguistic frameworks of the sciences (their forms of arguments, ontologies, basic vocabularies, and axiomatics). Even after this step philosophy can use the discoveries of science in its arguments and expositions. It has to, as the choice of a (better) framework for a field of study will depend on what we already know about this field. An explication of foundational concepts has to consider their usage and proper and improper application conditions of related expressions and employment of methods. Philosophy involves scientific knowledge in reflective equilibrium of conceptual exposition. What philosophy should not put forth are empirical/factual claims. To discover the facts the sciences explore reality (with all the required training and equipment). Simple factual claims, apart from those about using a linguistic framework, will not follow from the linguistic framework and its development. If philosophers proclaim such contingent truth in the field of a science in question, they are almost certainly overstepping their resources of justification, and may have used a bad argument to derive such claims from meta-scientific considerations. Of course, they can report any claim established by the sciences, but to derive factual claims from the proverbial armchair, which then turn out to be just wrong or at least questionable, has given philosophy a bad name in some quarters.

A particular source of error can the formulation of a comprehensive philosophical system, which covers several or even all areas of inquiry. The architectonic of the system may invite the philosopher to transfer principles and structures from one realm to the other, postulating on this way elements and facts which owe their existence only to the image imposed by the

[13] Cf. Chomsky, *New Horizons in the Study of Language and Mind*, esp. chapter 3.

structures of the system.[14] The amount of effort to make such a system fit reality or the state of the sciences should be a warning sign of philosophical overreach.

Slightly later, but almost in parallel to Logical Empiricism the theory of computability developed. It immediately expanded the methods of meta-logic. Computational modelling also allows for a form of more fine-grained analysis. Programs and data structures can be employed for models that simulate or emulate, say, cognitive faculties. Given the equivalence of First Order Logic and Turing Machine Computability these analyses can be translated into each other.

Computational modelling, however, provides a further quality standard of analysis. With respect to a calculus (say, of epistemic modality) correctness and completeness proofs vindicate the axiomatic approach. With respect to a computational model one can further on test it on examples and in the light of the relation between predicted output and valid or analytically acceptable output. Elucidating a concept (in the spirit of Logical Empiricism) thus can proceed – often preferably should do so – by computational modelling. With the advancement of – nowadays called 'traditional' – Artificial Intelligence (AI) in the 1970s another slogan has been coined: "AI is philosophy."[15] Human thought consists in processing and transforming representations (they may be linguistic or pictorial, conscious or sub-conscious). Computation consists in processing and transforming representations. That makes human thought a target area for computational analysis. More precisely: computation consists in processing and algorithmically transforming representations. Human thought cannot be completely algorithmic.[16] Inasmuch, however, as human cognition is (intuitively) computable, cognitive faculties are open to computational modelling. This includes, for instance, deductive but also probabilistic inference – topics of explication by Reichenbach, Carnap and other Logical Empiricists. Logical Empiricism was close to the gestation of AI (with the work of von Neumann and Turing) and the Dartmouth and Macy Conferences.[17] The integration of AI into Cognitive Science integrated as well analysis of epistemologically relevant concepts at least in the

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[14] Which might be a more fitting criticism of many features of Kant's theoretical philosophy.

[15] Cf. for instance: Cummins & Pollock (Eds.) *Philosophy and AI*; Bynum & Moor (Eds.) *The Digital Phoenix. How Computers are Changing Philosophy*. What nowadays mainly is called "AI" is mostly 'Machine Learning', which has little to do with analysis or intelligence – or learning in any non-associative sense either.

[16] For a variety of philosophical reasons – not to be dealt with here – ranging from creative language use to judgement and choices.

[17] Cf. Dyson, *Turing's Cathedral*; Dupuy, *The Mechanization of the Mind.*

tradition – if not the letter – of Logical Empiricist conceptual elucidation.[18] The connection is obvious in the field of Logic Programming.[19]

§3 Limitations of Theory Building in Updated Logical Empiricism

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 as conceptual or a priori, on idiosyncratic assessments of intuitions. Done 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 to some few fundamental (i.e. a priori or innate) concepts might we find genuine conceptual discoveries apart from the empirical sciences.

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[18] One may see examples in early paradigmatic work like Winograd's Procedural Semantics (cf. Winograd, "Towards a procedural understanding of semantics") or Newell's General Problem Solver (cf. Newell, *Unified Theories of Cognition*), and more recent work like Thagard's *Computational Philosophy of Science* and Pollock's *Cognitive Carpentry*.

[19] Cf. the analytic claims of one of the founding fathers of Logic Programming: Kowalski, *Computational Logic and Human Thinking*; on foundations cf. Fitting, *Computability Theory, Semantics and Logic Programming*. A recent philosophical application with respect to belief revision is Tennant, *Changes of Mind*.

Like sentences knowledge can be analytic or synthetic knowledge. Knowledge of L-true sentences can be gained a priori, nonetheless it might be subjectively surprising. Although our framework already contained the content of the L-true 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 L-true – or analytic and synthetic a priori. Synthetic aposteriori knowledge and belief stems from experience. Minimally empiricism claims that all aposteriori belief and knowledge stems from perceptual experience, and that all a priori knowledge grounds in frame constitutive postulates.

The distinction between a priori – and thus in the framework used unrevisable – and aposteriori 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 property (term) defined or put in analytic links to other properties (property terms). 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.[20] 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 aposteriori can be made a priori, 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.

A methodology of building language frameworks presupposes – as a kind of 'first philosophy' – a core theory of the main concepts of a theory of language inasmuch as these as these are relevant for the methodology (involving, e.g., 'meaning' 'derivation', 'denote', 'wellformedness' etc.). This theory is the remainder of the philosophy of language. Most of the traditional topics of philosophy of language are now dealt with in linguistics. The general core theory of language deals both with formal/artificial and natural languages. Its claims with respect to natural language should be consilient with linguistics, which it does not compete with. It differs also

[20] This answers to the proper concern and partial truth of Quine's criticism in Quine, "Truth by Convention" and "Carnap and Logical Truth".

from the philosophy of linguistics, which is one of the branches of specialized philosophy of science on a par with the philosophy of biology and so on. The general theory sets up the methods of philosophy. As philosophy itself it has self-referential features.

The general philosophy of science deals with core concepts present in each specialized branch of philosophy of science (like 'theory' or 'confirmation'). It is meta-scientific and not history or sociology of science. Its most basic concepts and their clarification comprise a remainder of (traditional) epistemology (concepts like 'justification', 'evidence', 'coherence' etc.). Clarification of these concepts is continuous to general philosophy of science on the one hand and the core theory of language on the other hand. Most of traditional epistemology is today dealt with in the cognitive sciences.

The combination of a core general theory of language (remnant of the philosophy of language), a core theory of justification (remnant of philosophical epistemology), and the general philosophy of science constitute (what remains of) a 'first philosophy'. What they say should be consilient with the empirical sciences, which they do not compete with. Therefore – as metaphysics in the traditional sense is handed to the sciences completely – theoretical philosophy has very limited content with respect to the constitution of the world. This is an echo of the old claim of Logical Empiricism that philosophy does not put forth (factual, non meta-scientific) thesis in the way the empirical sciences do.

§4 Updated Logical Empiricism and Ordinary Language Philosophy Revisited

Ordinary Language Philosophy (OLP) has become unfashionable with the rise of 'naturalism' and the cognitive science approach to traditional philosophical issues. There are some hints (e.g. several recent books) that with meta-philosophical reflection some reconsideration of OLP takes place, to the advantage of Analytic Philosophy. Philosophical fashions are not more sustainable than other fashions, so that ideally the merits of supposedly 'superseded' approaches should be incorporated into their descendants. OLP with its focus on the central importance of language and the impact of established usage, admitting language authority in philosophical debates, contains valuable insights and methodology for Updated Logical Empiricism.

OLP appeals to the 'authority of language'. As we like to deal with *philosophical* issues we often want to supersede a more chronicle of usage. To do otherwise rests authority on (all) philosophical issues on a mere socio-historic record, it seems. Where should the philosophical qualification of that usage come from? Usage has become embedded over time in (useful) ways of acting, but may have had a limited scope of situations confronted. Thus, usage stays silent on many problematic scenarios. It just does not decide one way or the other on how to employ an

expression in these circumstances. It is not fixed in universally applicable criteria of sufficient and necessary features of something. Thought experiments, thus, cannot be decided, at least often, in favour of one of the supposed views based on them. Intuitions with respect to them are not completely grounded in language then, but contain minimal theories stemming from one's prior view on the issue in question or related affairs. Why should we expect ordinary language to have sufficient authority in cases of theoretical issues? The occasions of such questions being spoken about may be severely limited. Ordinary language seems to be the wrong place to look for (hidden) theories and well-defined concepts.

One may consider philosophical issues to be an exception to these worries. As many of them concern foundational issues in our conceptual scheme one may surmise that (even) ordinary language contains enough structure and rules concerning them. One may even insist that in case that ordinary usage does not reveal something about them then nothing (else) can be revealed about them. Anything important about foundational concepts has to have left its trace in ordinary language, otherwise these concepts just would not be foundational but optional. So, looking at, listening to ordinary usage on foundational concepts is a live option and may even delimit where we cross from conceptual knowledge to our additional intuitions stemming from other parts of our world view or our cherished theories. We may discover, to our dismay, that some of these foundational concepts are not sharp in the sense of laid tracks of sufficient and necessary conditions of applying a term. This in itself may be a discovery worthwhile. Not all conceptual links have to be drawn by (complete) definitions. We may see the proper role of a foundational concept despite its vague nature. The ordinary language philosopher participates in the conventions of her linguistic community. Aiming at her own (tacit) grasp of these patterns of usage she aims at the (tacit) grasp of them of any competent speaker

Reports of statements or assertions about language or use report events, i.e. are empirical sentences. A description of a pattern of usage in a linguistic community is an empirical sentence. Neither of these classifications implies that conceptual analysis is empirical. A description of a pattern of usage describing the rules or conventions of a linguistic community is true only if these rules or conventions are *in force*. Reporting rules or conventions does not transform them into reports. The reports are descriptions backed up in regularities of behaviour (i.e. events), described empirically. The regularities in question exist because the speakers of the linguistic community orient themselves (at least tacitly) on rules or conventions, which are norms and expressed by the use of deontic modal vocabulary. Assertions made by oneself or witnesses about language are events, but their content are judgements whether a linguistic rule has been applied correctly or not; rejecting, for example, a sentence as a category mistake contains the judgement that some semantic rule has been violated. The semantic rules in

question concern conceptual links (like 'numbers are not spatio-temporal'), which at least partially constitute the concepts involved; completely so only if a concept can be completely analysed into a definition involving informative necessary and sufficient conditions of applying the concept, which may be feasible only for a small minority of concepts. Even if most concepts, however, are atomistic in the sense of not having such a definition (as claimed by Conceptual Atomism) they are accompanied by conceptual links: knowing or possessing them within the framework of our concepts involves knowing of these conceptual links.[21] Sentences expressing conceptual links are analytic and thus in the traditional sense *a priori*. Such sentences may be embedded in deontic modalities so that rules result, which demand that the conceptual links have to be taken into account, that words are only employed assertively in a way that does not result in nonsense (i.e. that the constraints of the conceptual links are obeyed). The rules may be understood as more specific (e.g. 'In assertions never apply a predicate implying spatio-temporal existence to a singular term when the singular term, say a numeral, is used to designate a number') or there may be a few general rules (e.g. 'Assertoric use of a sentence should not contradict the analytic sentences'). The latter alternative has the advantage that we represent our linguistic knowledge more efficiently: we have the rules of reference and meaning postulates, and what follows only by them expresses conceptual links. We need these representations in inferring anyway. Rules demand in the general fashion indicated semantic correctness. Individual rules and verdicts on use follow from the combination of the two components. Because of the 'authority of language' sentences analytically true (true by conceptual links) nevertheless can safely be assumed to speak truly about the reference of the words employed: “Cats are animals” is analytically true: even if “cat” cannot be completely analysed into necessary and sufficient conditions of being a cat – apart from reference to an usually unobservable genetic code – a partial definition of “cat” consists in this postulate. Nevertheless, the sentence tells us that cats *are* animals. The sentence is *about* cats, not about concepts. *That* the sentence is analytic tells us something about the concepts involved, thus our conceptual framework and our language. Reporting that we *have* such and such a conceptual framework, which is an empirical anthropological claim, does not make philosophical re-constructions of the structure of that system empirical claims. Claiming that most mathematicians believe that Peano Arithmetic is true and thus use the system is an empirical report, that 0 has no predecessor is not.

Where does the authority of ordinary language come from? The question is misleading as one may read it as presupposing a trust in common sense, which often went wrong and cannot claim scientific authority. Of course, ordinary usage has neither authority in a verbatim reading

[21] Cf. Bremer, *Conceptual Atomism and Justificationist Semantics*.

of it in clashes with scientific discoveries (the sun just does not “rise”), nor does it exclude introducing more appropriate ways of speech for scientific purposes. There is no authority of a supposed general common way/context of talking over some specific context of language use. The authority resides, firstly, within contexts of usage. Established patterns of usage rest on a history of successfully employed language. Such patterns fit to reality and human endeavours in it. Therefore, they also are often descriptively adequate (enough). A usage following these patterns thus possesses a higher chance of being successfully embedded in our dealing with the world, including its description (starting from simple cases of following the usage of “tree” to identify trees). Very often the use of a sentence in a situation corresponds to the world because it corresponds to established usage. Such *correspondence of usage* (intersubjective *coherent* usage) precedes correspondence of language and world (e.g. in the sense of a robust correspondence theory in which true statements correspond to facts). This role of correspondence of usage founds the authority of ordinary usage. Truth-conditional semantics coupled with the meta-rule to assert sentences according to their truth conditions tries to capture this double correspondence. OLP should not be equated with anti-realism tout court.

The authority of ordinary usage must not be confused with a privileged role of folk theories or folk interpretations accompanying this usage. Such folk theories or interpretations may illicitly move from the contexts of ordinary usage to the context of (scientifically) theorizing about the world, and in that context scientific theories usually fare better. Philosophical theories may often be just such elaborated folk interpretations of ordinary usage that remove it out of its ordinary context or mix different contexts of usage (e.g. reading expressive utterances as referring to entities just as descriptions do, thus arriving at an extravagant ontology). One may dismiss such 'theories' out of hand by outlining their deviant usage. One may also criticize them. Criticizing such 'theories' may take two forms: (i) rejecting them by confronting them with better scientific theories, or, more interesting, (ii) rejecting the as theories, but, at least in some cases, maintaining or even elaborating them as an insight into our naïve conceptual framework, or into some common mistakes invited by our conceptual framework. OLP need not claim that in our conceptual framework all discoveries of future science are hidden. Our conceptual framework *may* contain constitutive errors or misleading constructions. Nevertheless, and even because of this OLP puts emphasis on revealing them as they are.

In analysis of ordinary usage we understand our concepts at a level even beneath folk theories. Still, what we analyse here are the basic *conceptions* of our concepts, of our conceptual framework. These conceptions need not be entirely accurate. That they are not could be seen either by relating them to other investigations about our conceptual framework (as of theories of cognition or linguistics) or because of incoherencies in ordinary usage. Only if ordinary usage

was acceptable as it is in its patterns, ordinary usage would carry *full authority* on our basic conceptions of our conceptual framework. Incoherence, however, clashes with the idea that even what is said about vague concepts need not be vague, that what is said about, seemingly, inconsistent employment of a concept need not be inconsistent itself. A supposedly incoherent usage at least invites further conceptual distinctions which then distribute the apparent clashes over at least two sub-concepts each of which with a coherent usage.

In case conceptual analysis tells us that some fashionable identification (say of mind and brain) cannot be stated save conceptual confusions this does not tell us that mind and brain are not identical, and it does not tell us that neurophilosophy has to stop. It tells us, however, that our concepts cannot be unified so easily. It may at least cast into doubt any attempt at such an identification as we have our concepts not by accident but as part of our more or the less successful cognitive equipment. It points at least to the need of a kind of conceptual revolution. And in case of a nonsensical claim of identification of mind and brain it may not be the mental vocabulary that has to give: chemistry and physics could only be united after a conceptual revolution in physics; in analogy a conceptual revolution in the neurosciences and physiology might be needed to support any aspirations of an identity theory. Further on, attesting some conflicts in our conceptual framework may *not* find an easy remedy. Any call for conceptual revolution should heed (i) to the at least presently given limits of human cognitive nature, and (ii) to the advice that you should not drop what works in most situations and what one cannot improve at will, so that what one ends up with might be some form of conceptual reform process in which extensions of usage or extensions of our conceptual equipment work around the diagnosed errors or limitations. Having abstractly outlined such vague possibilities does not mean that there ever will be pressing philosophical reasons to proceed in this this. (Even neuophilosophy may turn out a blind alley after all.)

As usage changes itself to adapt to new circumstances, we may *intervene* to foster its better adaptation or coherence. Introducing finer conceptual distinctions and excluding some ways of word use are ways to regularize usage anew. Analysis of usage so precedes new regulation. Philosophical analysis leads to a *normative* activity of tweaking rules of usage, of upgrading our conceptions of our concepts, or rebuilding a linguistic framework in the manner of Logical Empiricism. In analysis, in general, we can see the constitutive elements and so gain understanding, even if we leave them as they are, put things together again, in synthesis, as we found them before analysis. We can, however, as well synthesize them in an improved fashion so that synthesis is not just the reverse of analysis, but also an attempt at practical advancement. This applies to technical devices as well as to conceptual frameworks. Creative

synthesis achieves a re-construction of a concept. Carnap, at least sometimes, pursued this approach as 'conceptual explication'.

When Logical Empiricism distinguishes philosophy from the sciences by conceiving it as a *meta-science* not concerned with the world at large, but our conceptual/linguistic frameworks of it, that means that philosophy is interested in a better fit of our conceptions to the patterns of the world. Meta-science as an *activity* (which may occur outside of department boundaries) distinguishes itself by reflecting, analysing and re-regulating language and its conventions, exhibited in usage.

All motivation and evidence for improved usage has to come from criteria of improving coherence in present usage. Missing a clear account of such improved coherence, supposed incoherences have to be left in place and mapped as part of our conceptual landscape. OLP leaves then everything as it is (in usage) and endorses the authority of usage on an elucidation of our fundamental concepts. The benefit of even this strongly descriptive enterprise rests in increased understanding by analysis, even if synthesis is not creative, and in the therapeutic use of rejecting some (philosophical) theories as clashing with proper usage, which as part of our life carries more weight than those deviant views, a conception Wittgenstein at least sometimes pursues. Sometimes inventing technical jargon helps to make fine-grained distinctions, explications may aim at a proper updated definition of a term which is more perspicuous than the former one. Often, however, re-definitions are employed not to capture the full control of a term but to facilitate the development of one's cherished theory, disguised as dealing with the old subject matter. One might regard it as ironic that sometimes (even) Logical Empiricists (say, in Vienna) who insist on being concerned not with verbal disputes seem to believe that by stipulating a new definition of a term the old problems related to its subject matter are solved. These problems are rather shoved under the carpet by trying to make them inexpressible. Re-definition and a move to newly regimented (formal) languages have therefore to answer the suspicion that the gain in rigour is outweighed by the preceding flight from the complexities of ordinary language. Redefinition may be nothing more than confusion about the real issues. Many formal explications just seem to change the subject as the original issue was just too intricate to be dealt with in that fashion.

Explication in Carnap's sense and the activity of creative synthesis or re-construction of usage in the light of scientific purposes are meta-scientific activities, as such philosophical, nonetheless continuous with foundational reflection in individual sciences. OLP sets itself more apart from the sciences and guarantees philosophy its own field and status. Even if formal re-constructions are employed within analyses their purpose usually is *not* to alter usage or to stipulate new language forms. Therefore, the distinction between ordinary language philosophy and Logical

Empiricism should not be understood as excluding formal methods from OLP, but serves some purpose in stressing the conservative perspective that OLP has on language. There can be, however, an explicative, re-constructive approach *not* tied to empirical sciences, namely in case we recognize, supposedly with the help of OLP, that our conceptual framework contains misconceptions, and framework building then tries to see more clearly or to intervene into the future development of our conceptions. Thus, the *combination* of conceptual *re-construction* and *re-regulation* involves the construction of models and (partial) languages. It combines the traditions of OLP and the study and construction of formal systems and languages in Logical Empiricism.

§5 The Place of Updated Logical Empiricism within the Sciences

The tradition of Logical Empiricism going in its protagonist's training back to Kantianism started with the Fregean tradition in early Analytic Philosophy and transformed its conception of philosophy from a discipline contributing to theories of the world (i.e. science) to a meta-discipline which concerns itself with reflection and model-building (especially linguistic framework building) aiming at the general methodological foundations of science. 'Scientific Philosophy' became understood as theory of linguistic frameworks – elucidating some foundational concepts on the way – and as general philosophy of science.

Who needs philosophy of science? Scientists do not want to be taught about the form of their theories or even the appropriateness of them. They doubt that philosophical amateurs have the qualification to interfere with science. Students of science are trained in methodology, but only partially in the philosophy of science. Its topics had to be endorsed by mature scientists to be taught in foundational classes. Other topics and more practical methodology are always more pressing. Thus, the impact of philosophy of science on the working scientist can be doubted. Only in an ideal science will a foundational reflection be in contact with scientific research and the working scientist. Philosophy of science, more likely, is a reflection on science within philosophy (i.e. an interpretation of science for those looking for such interpretations).

Linguists are continuing on theories once in the philosophy of language. Most of philosophy of language dissolved into linguistics. The philosophy of linguistics is a branch of the philosophy of science. As linguists are concerned with language, one may surmise that they more self-consciously reflect on the status of their own theories, more so than other scientists. Especially syntax theory – and especially in Generative Grammar – is dealing with the issue of a universal framework of all languages (i.e. the question of framework truths) and the demarcation of linguistics from other natural sciences. Philosophy of linguistics constitutes a special meta-

science, but one that need not demand departmental special status for the philosophy of science. The philosopher of linguistics has to know current linguistic theory, but has a focus more on meta-theoretical problems than working on defense or articulation of linguistic theory himself.

The philosophy of mathematics and logic is continuous to foundational work in these fields. Constitutionally the status at least of the ontology of these fields is in question. Thus, at least an academic logician or mathematician should know and be partially concerned with philosophy of science questions. Questions of an appropriate linguistic framework are part of the development of formal tools. This does not apply to the 'working mathematician' outside academia, who does not concern herself with problems of a philosophy of mathematics. Reflecting on the epistemological aspects of the formal sciences as genuine topic is a topic of cognitive science, not a philosophy of science. In parts the philosophy of logic is a debate on self-understanding between logicians, i.e. those otherwise active in the field.

Formal philosophy in the tradition of Logical Empiricism can see itself as working in the intersection of the formal sciences and a science like linguistics (as in Montague's paradigmatic *Formal Philosophy*). Formal philosophy is not located in a department of these other fields, but the working (armchair, paper & pencil) methods practiced in formal philosophy are (mostly) identical to the (armchair, paper & pencil) methods of foundational studies in these fields. This way formal philosophy connects to the scientific endeavour as practiced in these departments. In publications in this intersection one can easily identify the departmental origin of work. In those cases where theories in linguistics are connected to empirical research or advanced special tools are employed in pure mathematics as practiced by mathematicians there the formal philosopher has to acknowledge these theories and treat them as given facts. The influence of formal philosophy, thus, is restricted to supplementary work. Especially general claims about language should be confirmable by linguistic theories of natural language, or at least not run against them.

Reflections on method and meta-cognition are the prototypical philosophy of science areas that can be dealt with as well by scientists, but are typically dealt with mostly and sometimes only by people specializing in them (i.e. in philosophy). Taken psychologically these topics are topics of (first order) cognitive science. Taken normatively and from an epistemological point of view they ideally are part of scientific theory construction, but typically may fail to find an audience in science. Working scientists take the methodological framework or at least their scientific heritage of (first order) theories for granted, and do not pursue these types of issues. They do not want to be lectured by a 'First Philosophy' about their science. Reflection on (meta-) epistemology (meta-science), therefore, should not present itself as or even be such a rulebook

development directed at the working scientist. It should see and present itself as supplementary branch of science that reflects on the scientists' work and theories from an epistemological (meta-scientific) point of view. An epistemological reading of general theories in linguistics and the formal sciences will be of interest in its own right as it can teach us insights about human cognition. The factual observations of such epistemological studies are, again, part of a universal cognitive science (inasmuch as it inherits the topics of traditional epistemology). Abstract epistemology (in the sense of the core *theory of* framework building) can claim to be part of cognitive science, insisting that some armchair methods and foundational reflections cannot be superseded by exclusively empirical research.

Epistemological readings of logical and meta-logical results can understand themselves to be an abstract part of cognitive science (of theories of human cognition). They are abstract by the abstract/formal character of their subject matter (namely formal theories, or theories of formal systems and general linguistic frameworks). They are also abstract in some of the methodological tools recruited (i.e. meta-logical proofs and model-building). That such work can be done by paper and pencil – and nowadays by some programming – poses no deficit of its scientific status, but should be expected when dealing with the most abstract issues of foundations of theory building. Any empirical science will both presuppose the formal capacities under investigation and be too narrow in its scope and reach (by the very definition of the methodology of specific empirical research methods).

Epistemological readings of results in the formal sciences and linguistics can also be seen as part of (Quine's) 'epistemology naturalized' inasmuch as any such reflection has to take notice of the empirical state of the art knowledge on human cognition and reasoning. The results of formal philosophy have to be consilient with science, but they can reach (by their formal tools and procedures) securely for insights that are not available by other methods (especially not by empirical methods). Formal philosophy and so in particular Updated Logical Empiricism, thus, constitute an independent branch of epistemology, whether taken traditionally or presently as cognitive science or epistemology naturalized. The approach taken by formal philosophy lets in contribute both to first order theories (of our formal abilities and faculties) as well as to second order theories (of our building of formal theories, and its limits).

Epistemological readings of meta-logical results or results in meta-linguistics take part in theory building in theories of cognition, which [cf. §3] was not to be the task of Logical Empiricism, it seems. The theory building, however, is limited: a Logical Empiricist approach to linguistic frameworks and modelling includes some *remnants* both of the general philosophy of language as well as of general epistemology. These parts are expanded when the epistemological readings of the meta-results are integrated in an account of framework building. They are

employed as justification, outline and measuring of the limits of such framework building, once again continuing on the Kantian theme of a 'critique' of pure reason. They elucidate the cognitive significance of such frameworks and the capacity of framework building. As this theory building has to be consilient with cognitive science and human feasible frameworks (e.g. relying rather on finite rules than infinitary ones). It can comment on, rely on, and integrate empirical results of cognitive science on meta-cognition and the limits of human cognition (say, in complexity of problems solvable given human resources in speed, time, or memory). Studies in Logical Empiricism consist not just of setting out the rules of some formal systems, then proceeding to prove theorems and meta-theorems. Being both meta-science and part of cognitive science (broadly taken) Logical Empiricism may on occasion partially overlap with theory building in science, but in a way more limited extent than traditional philosophy, and quite distinct from metaphysics as First Philosophy (be it traditional or present).