

# Theoretical Concepts in Flux

## Conceptual Knowledge and Theory Change

Hans Rott

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### 1. Introduction

Take gold, for instance. Is gold a yellow metal? For Kant this was an analytic truth<sup>1</sup>, while Locke and Leibniz agreed that gold in itself had no colour at all — as can be seen, for instance, from the fact that gold changes its colour in contact with mercury.<sup>2</sup> Putnam said that chemically pure gold was nearly white and that its yellow appearance was only due to the presence of copper in the samples of gold we typically see in jewellery.<sup>3</sup> But if gold is yellow, what is the source of our knowledge of this? Is gold a heavy substance which is not consumed by fire, fusible, ductible, malleable, and soluble in *Aqua Regia*? If so, how do we know? What in fact *is* gold?

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<sup>1</sup> Kant, *Prolegomena*, §2b (transl. Paul Carus, ed. Beryl Logan, 1996):

For the predicate of an affirmative analytic judgment is already contained in the concept of the subject, of which it cannot be denied without contradiction. ... For this very reason all analytic judgments are a priori even when the concepts are empirical, as, for example, gold is a yellow metal; for to know this I require no experience beyond my concept of gold as a yellow metal: it is, in fact, the very concept, and I need only analyse it, without looking beyond it elsewhere.

<sup>2</sup> In his *Essay Concerning Human Understanding* (Book 4, Chapter 6, Section 11; ed. P.H. Niddich, Clarendon Press, Oxford 1975:585-586), Locke writes: "Put a piece of *gold* ..., separate from the reach and influence of all other bodies, it will immediately lose all its Colour and Weight, and perhaps Malleableness too. ..." Also see Book 2, Chapter 31, Section 6, p.379 where Locke observes that gold even changes its colour "upon a slight touch of Mercury".

Leibniz on this subject (*New Essay on Human Understanding*, Book 4, Chapter 6, §11, transl. Peter Remnant and Jonathan Bennett, Cambridge UP 1996):

*Philalethes [for Locke]*. 'A piece of gold ..., separate from the reach and influence of all other bodies, [would] immediately lose all its [yellow] colour and weight, and perhaps malleableness too', becoming friable. We know how much the vegetables and animals depend on earth, air and sun; and who knows but that even the most remote fixed stars have some influence on us?

*Theophilus [for Leibniz]*. This is a very good point ...

It looks as if Locke and Leibniz took as a real possibility what in Kripke's blue gold example (1980:118-119) is only conceived as a thought experiment.

<sup>3</sup> Putnam (1975:250). This is repeated by Stegmüller (1979:67).

In this essay, I will consider *theoretical terms*, terms that "come from"<sup>4</sup> the theory in the sense that their correct application or determination of their values is not possible independently of the theory they are part of. In the following, I will use the term "theory" also, but not exclusively, to refer to theories as produced by an established science; my considerations are also meant to apply to belief systems that might be termed *naive* or *folk theories*.

Theoretical terms are the linguistic correlates of theoretical concepts. Theoretical concepts are distinguished from those concepts that are (a) innate, (b) fixed by the subject's *Lebenswelt*, or determined on the basis (c) of direct perception, or (d) theories that occupy a lower position in a logico-methodological hierarchy of theories. It has been claimed by proponents of various radically holistic positions that there aren't any non-theoretical terms in the sense of (a)–(d). Since we are interested in *theoretical* terms, however, we need not take a stand on this question here.

Theoretical concepts are characterized by the role they play in their respective theories. We can gain a (possibly restricted) understanding of this role by considering what the theory says about these concepts, or more precisely, by considering the *sentences* of the theory in which the relevant term occurs. I assume in the following that there is a one-to-one correspondence between theoretical concepts (mental entities) and the terms (linguistic entities) that are used in the formulation of the theory.

Furthermore I assume that every theory is formulated in a certain *language*. That is, theories are first of all given as linguistic entities (for instance, as a collection of axioms and theorems, or as ordinary pieces or fragments of text in a textbook). That means, we are primarily confronted with a given concrete formulation of a theory, and the language appertaining to it remains yet to be determined. This seems to be a trivial task, as theorists are always at the same time speakers of some natural language like German, French, Dutch, Portuguese, Japanese, Chinese and – most importantly these days – English. This appearance is deceptive, however, since theorists are also at the same time – though less evidently – speakers of a certain expert language, the language of physics, of chemistry, of sociology, of linguistics etc. If we may trust the most famous German

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<sup>4</sup> This formulation is due to Putnam (1962b:219) and made widely known as "Putnam's challenge" by Stegmüller (1973:30-34); both authors argued rightly, I think, that theoretical terms cannot simply be identified with "non-observational" terms.

dramatist and poet, then expert language and colloquial language may be as far apart as any two vernaculars can be:

Mathematicians are like Frenchmen; whatever you say to them they translate into their own language and forthwith it is something entirely different.<sup>5</sup>

Leaving the national language fixed for the moment, we are thus faced with at least *one* kind of poorly documented affiliation to a specific language community, one that will moreover be complemented by dialectal and ideolectal variation, as well as more specialized subcommunities of experts and their idioms. The complications posed by the latter variations should not be underestimated, as philosophers will know by personal experience: It may be doubtful whether a Leibniz scholar and a devoted Hegelian will ever really understand each other, and nowadays communication between followers of, say, Wittgenstein and Chomsky proceeds on equally shaky grounds — even though they may be concerned with "the same subjects".

Let us take it that theories (as concrete linguistic products) are our primary givens, and that languages (as abstract systems of rules) are assigned to theories only in a second step. We cannot tell the language in which a theory is couched by simply looking at the latter; I will, however, assume one more thing: that competent participants in linguistic communication (who are always multilingual, as argued above) are capable of deciding on intuitive grounds whether two given theories are formulated in the same or in different languages. I am going to make use of this assumption in the formulation of my main proposal below; an alternative proposal will be offered that can do without the assumption, but is instead based on the equally problematic notion of "genuinely" or "essentially" different theories.

We have noted above that theoretical concepts are (at least partially) determined by what the theory says about them. Usually, this will comprise much more than only *one* definition or only *one* relevant proposition of the theory, it will be a *collection* of definitions and propositions. Nevertheless, not *everything* in a theory which uses the terms in question will be relevant for the assessment of their role in the theory. Intuitively speaking, we would like to say that only those propositions of the theory that

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<sup>5</sup> Goethe (1972:662), maxim 1279.

encode "knowledge of meanings" or "conceptual knowledge" help determining the meaning of the theoretical terms. Meaning is only partially determined in this way of course, because such sentences will not tell us anything about the terms' reference to objects in the world.

Which are the propositions that express conceptual knowledge? *Analytic sentences* or *judgements*, well known from the history of philosophy, seem to be prime candidates. Following Gergonne (1818/19) and Schlick (1918:30-37), one can also call sentences that partially determine the meanings of (some of) the terms occurring in them "implicit definitions". This term is connected with one of the more widely discussed approaches to analyticity. Boghossian (1996:368, 375-387) attributes it to Carnap and the middle Wittgenstein and identifies Conceptual Role Semantics as one of its successor theories. Bealer (1998) closes with a section saying that whatever is interesting or valuable about analyticity is "really about the nature of definitions", of implicit definitions in particular. We will go on using the label "analytic judgements" in the following.

## **2. Analytic judgements**

Whatever one has to say about analytic judgements, the starting point is clear – clearer than for virtually any other philosophical subject. It is Kant.

The present essay proceeds in a historical order, but it does so with a systematic aim in mind. We will touch upon three central figures: Kant (1781-90; 1800), Frege (1884) and Quine (1951, 1974, with further developments by Putnam 1962-1979). We begin with Kant, who took synthetic judgements a priori, judgements claimed to be non-existent by the empiricists, as the pivot of his epistemology and metaphysics; we move on to Frege's logicist programme; and we end with Quine, a dominating figure in analytic philosophy up to the present date, who denied any sensible distinction between analytic and synthetic judgements and thus removed the basis for both the empiricists' and Kant's position. It will strike the eye that the philosophy of mathematics takes an important part in our guided tour.

### **2.1. Kant**

Kant's critical philosophy lives crucially on two contrasting dichotomies: the one between the a priori and the a posteriori, and the one between the analytic and the synthetic. While the former is an epistemological dichotomy (and consequently, the predicates "a priori" and "a posteriori" apply to bits of knowledge), the latter distinction pertains to the philosophy of language or to semantics (and, correspondingly, "analytic" and "synthetic" are predicates that apply to judgements formulated in some language).<sup>6</sup> As the two dichotomies do not coincide, the synthetic a priori is conceivable; Kant's metaphysics explores the ways the synthetic a priori is real.

Let us briefly recapitulate the terminology. Knowledge a priori is knowledge which is independent of (and in some way "precedes") empirical experience. This can in turn be spelled out in at least three different ways. First of all along the specifically Kantian lines, according to which this independence can be demonstrated by transcendental arguments (concerning the conditions of the possibility of experience). We will not be concerned with this idea, however, nor with Kant's criteria according to which knowledge a priori is both necessary and strictly universal. The dependency of knowledge on empirical experience can be spelt out in two different ways: as the capability of being verified, confirmed or supported ("positively affected") by empirical evidence, or as the capability of being falsified, weakened or undermined by empirical evidence ("negatively affected"). I refer to these respectively as the *positive* and the *negative* interpretation of dependence on empirical evidence. Correspondingly, knowledge a priori will be knowledge that — the positive interpretation — cannot be supported by any kind of empirical evidence, or that — the negative interpretation — cannot be undermined by any kind of empirical evidence. These two latter interpretations of knowledge a priori are not to be found in the writings of Kant,<sup>7</sup> but we

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<sup>6</sup> In Kant, the metaphysical term "necessary" is still linked to epistemology, and it was only much later (Kripke) that this link was called in question.

<sup>7</sup> Actually a few times Kant speaks of the confirmation of knowledge a priori, for instance in the *Prolegomena*, §16: "we are here ... concerned ... only with cognition of nature, the actuality of which can be confirmed by experience, though it (the cognition of nature) is possible a priori and precedes all experience." or §42: "All pure cognitions of the understanding have this feature, that their concepts present themselves in experience, and their principles can be confirmed by it." See also the Preface to the second edition of the *Critique of Pure Reason*, footnote to BXVIII (transl. Paul Guyer and Allen W. Wood, Cambridge UP 1997): "This method, imitated from the method of those who study nature, thus consists in this: to seek the elements of pure reason in that *which admits of being confirmed or refuted through an experiment*." All this is surprising at first sight; my interpretation is that confirmation of the Kantian a priori lies in the possibility of experience at large, rather than in the local confirmation of particular principles by particular pieces of evidence.

will come across them again in the explication of the analytic (not of the a priori!) in Frege and Quine. Knowledge a posteriori (also known as empirical knowledge) is knowledge that is not a priori.

Now consider the second of the two basic Kantian dichotomies. Kant calls a judgement *analytic* if the predicate term is "contained in" the subject term. Due to this containment, analytic judgements don't give us any new information; according to Kant they are only elucidating or analyzing concepts (*zergliedernd*), they are not ampliative (*erweiternd*) with respect to our knowledge.<sup>8</sup> The metaphorical phrase "contained in" is in need of further interpretation. As we shall presently see, Kant intends it to express that the predicate concept is "actually thought" in thinking the subject concept. As a criterion for recognizing analytic judgements, Kant tells us that they are valid according to the *law of identity* or *contradiction* (which Kant takes to be one and the same law<sup>9</sup>).

As Kant made explicit in the *Prolegomena* (more so than in the *Critique of Pure Reason*) the starting point of his metaphysics and its core question "How are synthetic judgements a priori possible?" is the claim that mathematical propositions are perfect examples of synthetic judgements a priori. Therefore, so Kant, such judgements do exist. But then, how do we know that mathematics, i.e., arithmetic and geometry, are synthetic? Consider the following passage which, to my mind, lays down Kant's clearest idea of how to define the notions of analyticity and syntheticity.

What usually makes us believe [in mathematics<sup>10</sup>, HR] that the predicate of such apodeictic judgments is already contained in our concept, and that the judgment is therefore analytical, is the duplicity of the expression, *requesting us* to think a certain predicate as of necessity implied in the thought of a given concept, which necessity attaches to the concept. But the question is not what we are *requested to join in thought* to the given concept, but what we *actually think* together with

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<sup>8</sup> Kant's remarks about the informational content of analytic judgements are not without ambiguities. On the one hand he fervently denies that such judgements can ever convey any new information, on the other hand there are passages where he admits that "*analyses* of the concepts" (i.e. analytic judgements) may well "afford us a multitude of cognitions" or "yield a real a priori cognition, which makes secure and useful progress" (*Critique of Pure Reason*, B9-10).

<sup>9</sup> See *Critique of Pure Reason* B193f, B622, *Prolegomena*, §3, and *Logik Jäsche*, A XV, A75.

<sup>10</sup> Paul Hoyningen-Huene (1998) argues that this passage does not refer to mathematics in general but only to arithmetic, and that it should accordingly be shifted in the text of the *Prolegomena* (and in the second edition of the first *Critique*). According to Hoyningen-Huene's interpretation of Kant (personal communication), no-one would ever be tempted to think that geometry is analytic.

and in it, though obscurely; and so it appears that the predicate belongs to these concepts necessarily indeed, yet not directly but indirectly by an added visualisation (*Anschauung*).<sup>11</sup>

The phrases in italics seem to suggest that Kant wants to draw a distinction between "what one should think" in a normative sense and "what one actually thinks" in an empirical, psychological sense. If this is true — and the literal reading says it is<sup>12</sup> — then this reference to "actual thinking" links up analyticity to subjective or psychological processes.

If we furthermore recall that all thinking is expressed and perhaps also guided by judgements formulated in the language of some language community, then we might feel tempted to say that Kant's notion of analyticity is even in part rooted in social processes. This, however, clearly exceeds what can be found in Kant's own writings.<sup>13</sup>

## 2.2. Frege

In Frege's understanding of the analytic and the a priori, the philosophy of mathematics plays an even more crucial role than in Kant. Frege's position, however, differs significantly from Kant's in that he takes both dichotomies as purely epistemological distinctions. In the *Foundations of Arithmetic*, Frege offers definitions that refer solely to types of proof and premises (primitive truths, *Urwahrheiten*). An *analytic truth*, according to Frege, is a proposition the derivation of which requires only "general

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<sup>11</sup>*Prolegomena* (1783; §2c), emphasis in the German original but not in Logan's 1996 edition of the Carus translation. This passage is almost literally repeated in the second edition of the *Critique of Pure Reason*, B17, with the following differences: "directly" is replaced by "as thought in the concept itself" (and "added" is replaced by "added to the concept").

<sup>12</sup>Similarly in *Critique*, B205, B746, B749 and *Prolegomena* §2a. These repeated passages show that Kant places the link between *wirklich denken* and analyticity in all consciousness. Our background knowledge about Kant's idea of logic and philosophy suggests that he could not have thought of anything psychological. It remains an open question, however, what *wirklich denken* is supposed to mean, if it is not meant in a psychological sense (and if *denken sollen* is not meant in a normative sense). The contrast between the descriptive and the normative anyway does not fit Kant's alternative explanation according to which the specific difference between mathematical and analytic judgements is that the former, but not the latter need a mediating contribution of intuition (*Anschauung*). Ayer (1946:78) holds that Kant did use a psychological criterion to establish the syntheticity of " $7 + 5 = 12$ ".

<sup>13</sup> This hint at language-dependency also suggests that we consider not particular, real speakers but an "ideal" speaker of some language. We would then be concerned with linguistic competence, not just with performance. Yet the question is: Competence with respect to what language? And furthermore: Which

logical laws" and "definitions"; the derivation of a *synthetic truth* in contrast requires propositions that are "not of a general logical nature but belong to the sphere of some special science". The derivation of an *a priori truth* only requires "general laws which themselves neither need nor admit of proof"; to obtain an *a posteriori truth* one needs "facts", i.e., "truths which cannot be proved and are not general, since they contain assertions about particular objects". (Frege 1884, §3, all transl. from Frege 1959, 4°)

Note the similarity between Frege's definition of the analytic/synthetic dichotomy and the "positive interpretation" of the Kantian a priori/a posteriori dichotomy that I proposed above. But in Frege's eyes, at least one of Kant's characteristics of analytic judgements is completely off the point: The logical consequences of analytic truths "extend our knowledge and ought therefore, on Kant's view, to be regarded as synthetic; and yet they can be proved by purely logical means, and are thus analytic" (Frege 1884, §88, transl. Frege 1959, 104°). Here Frege has evidently more in mind than merely a terminological shift. In the light of the interpretation of Kant I sketched above, we can take Frege's deviation as signalling that he denied (with good reason I think) the Kantian claim that analytic consequences are always *actually thought* together with the concepts in question.

Frege's terminology is in the first instance restricted to mathematical judgements, and it is not clear whether or how it might be transferred to non-mathematical judgements. But tensions arise even within mathematics proper. Why, one might ask, does Frege follow Kant in assuming that geometry is synthetic<sup>14</sup> but refuses adherence when it comes to arithmetic? Why does Frege hold arithmetic to be analytic? Here is an important argument:

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competences must or *may* competent speakers possess without *at the same time* being proponents of a certain theory about the world?

<sup>14</sup> Frege agrees with Kant that geometry is not rooted in conceptual reasoning but in intuition — at least he does so in *The Foundations of Arithmetic*. In the posthumous manuscript "Logic in Mathematics", however, written 30 years after the publication of *Foundations*, Frege says that in his (personal!) opinion the axiom of parallels is valid due to the meanings of the words "straight line", "parallel" and "intersect":

Can the axiom of parallels be acknowledged as an axiom in this [the traditional, HR] sense? When a straight line intersects one of two parallel lines, does it always intersect the other? This question, strictly speaking, is one that each person can only answer for himself. I can only say: so long as I understand the words 'straight line', 'parallel' and 'intersect' as I do, I cannot but accept the parallels axiom. If someone else does not accept it, I can only assume that he understands these words differently. Their sense is indissolubly bound up with the axiom of parallels. (Frege 1914, transl. Frege 1979, p. 247)



"For purposes of conceptual thought we can always assume the contrary of some one or other of the geometrical axioms, without involving ourselves in any self-contradictions when we proceed to our deductions, despite the conflict between our assumptions and our intuition. The fact that this is possible shows that the axioms of geometry are independent of one another and of the primitive laws of logic, and consequently are synthetic. Can the same be said of the fundamental propositions of the science of number? Here, we have only to try denying any one of them, and complete confusion ensues. Even to think at all seems no longer possible. The basis of arithmetic lies deeper, it seems, than that of any of the empirical sciences, and even than that of geometry. The truths of arithmetic govern all that is numerable. This is the widest domain of all; for to it belongs not only the actual, not only the intuitable, but everything thinkable. Should not the laws of number, then, be connected very intimately with the laws of thought?" (Frege 1884, end of §14, transl. Frege 1959, p. 20<sup>e</sup>)

Hence, propositions are analytic if one cannot deny them without violating the very foundations of thinking, or to put it less emphatically, if their negation would lead to logical contradictions (this is quite precisely Kant's criterion). Conceptual thinking — to which logic and arithmetic belong — is more fundamental for Frege than (even the pure forms of) intuition. Logical theorems, as well as the definitions with the help of which Frege intended to build up arithmetic from logic, enjoy this fundamental status.

Of course, the question arises how we can delimit conceptual thinking in general, and thus, how we can designate a particular logic and particular definitions of arithmetical terms as "the right ones". The above quotation suggests that we attack the task by saying that the distinguished parts cannot be abandoned without undermining the very possibility of thinking. But haven't even fundamental terms like "not" or "number" in fact been subject to change? Aren't there in fact alternative, deviant axiom systems for logic and arithmetic on the basis of which thinking can still advance? Consider, for instance, the development of intuitionistic logic where the inference from  $\neg\neg A$  to  $A$  is

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For an assessment of this passage in the context of Frege's philosophy see Rott (2000a).

forbidden, or the glorious career of "imaginary" numbers that, multiplied by themselves, yield a negative number.<sup>15</sup>

One might continue Frege's line of thought by arguing that what is accepted as a reasonable system of logic, arithmetic or geometry is determined by individual decisions or practices of everyday and scientific language use. There actually are communities who prefer intuitionistic to classical logic, and it has by now become a matter of course to use techniques involving imaginary and complex numbers — which by themselves are very strange creatures indeed. Developments in mathematical physics, such as relativity theory, quite evidently have an effect on which geometries we are ready to accept or reject.<sup>16</sup> The history of science offers a wealth of examples illustrating that things which had earlier been considered as intuitively or conceptually impossible may well turn out to be conceivable, amenable to investigation and even useful. We must not close our eyes to the dependency on the current state of individually or socially attained knowledge, a dependency that precludes an everlasting, "objective" fixation of the extension of the analytic.

### 2.3 Quine

Quine's background is Carnap, a student of Frege's. Carnap (1950) "external questions" concern the choice of a language or conceptual framework; here it is appropriate to exercise a lot of tolerance.<sup>17</sup> Only afterwards, in a second step, follow "internal" empirical questions that deal with the factual truth or falsity of sentences within the chosen conceptual framework; no pragmatic freedom of choice is admitted here. For Carnap, the conceptual framework determines clearly which judgements are analytic: the judgements that can be derived from meaning postulates of the conceptual

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<sup>15</sup> Such numbers were conceived of as early as in the 16th century (G. Cardano 1545, R. Bombelli 1572), the term "imaginary" was coined by Descartes (*La Géométrie*, 1637, Book III). See Nahin (1998).

<sup>16</sup> This is not to say that mathematics and physics share the same subject. Recall that Einstein (1921) distinguished purely axiomatic from practical geometry, Carnap (1922) formal from physical space and Reichenbach (1928) mathematical from physical geometry.

<sup>17</sup> Compare Carnap's (1937:51) *Principle of Tolerance*: "It is not our business to set up prohibitions, but to arrive at conventions." The concept of a *framework* is central in Carnap (1950), where "framework" is used without any adjective; later (in the reprint in the second edition of *Meaning and Necessity*), Carnap also uses the term "linguistic framework". Alternative terms of Carnap's are "linguistic form", "form of language", or "system". The use of the term "conceptual framework" in this context is mine. According to Quine, choosing a framework is choosing an ontology, but Carnap disapproved of this way of expressing things.

framework. Thus there is a definite demarcation between language (step 1) and theory (step 2), a demarcation that got particularly clear by the lights of Carnap's formalization program.

Quine, for whom the philosophy of science is inseparable from the philosophy of language, objects to Carnap's position on at least two points. Firstly, he denies that folk or scientific theories are ever set up in the described two-stage process, and secondly — a point frequently overlooked — he denies that Carnap's formalization program was fruitful or only relevant for the project of isolating knowledge of meanings from knowledge of facts.

Let us have a look at Quine's classical 1951 paper "Two Dogmas of Empiricism". In the first part of the paper, Quine discusses several definitions of analyticity that are based on notions like "definition", "interchangeability", "synonymy", "semantical rule" or "postulate". We find for instance a characterization coming very close to Frege's notion, according to which an analytic judgement is one that can be turned into a logical truth by replacing some words by synonymous words. Quine argues that this attempt does not explain anything because the notion of "synonymy" is just as loaded with problems as the notion of "analyticity". The same, he claims, is true for all of the above-mentioned terms. After these rather destructive arguments, however, Quine in the second half of "Two Dogmas" offers a constructive proposal of how to make sense of the term "analytic". According to this proposal, *analytic judgements* are judgements with an empty "factual component", i.e., ones which "vacuously confirmed, *ipso facto*, come what may", and are thus confirmed in precisely the same way as logical truths. This "positive reading" requires too much, because black ravens, say, should not count as confirming that all bachelors are unmarried. We should be content with the "negative reading" that analytic judgements do not get undermined "come what may".<sup>18</sup>

Thus the concept of analyticity finds a well-defined interpretation even for Quine, but he considers it as a pointless concept that can never actually be applied in (scientific or folk-theoretical) practice:

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<sup>18</sup> Observe the similarity between Quine's definition of *analyticity* and the "negative interpretation" of the *a priori* that was proposed above.

... it becomes folly to seek a boundary between synthetic statements, which hold contingently on experience, and analytic statements, which hold come what may. Any statements can be held true come what may, if we make drastic enough adjustments elsewhere in the system. ... Conversely, by the same token, no statement is immune to revision. ... (Quine 1951, p. 37)

This passage makes clear that Quine does not deny that there is a coherent concept of analyticity, he only insists that – given the explication proposed – there are no sentences qualifying as analytic.

In the final section of "Two Dogmas", Quine outlines a unified process of language and theory formation which simply does not exhibit the two different stages postulated by Carnap.<sup>19</sup> There are rather voluntary aspects all the way down to the determination of which theory elements to adopt, which to maintain, and which to jettison in face of recalcitrant experience. Hence, decisions about revisions *would* define which judgements to class as analytic and which as synthetic, *if* there were principled criteria determining which revision strategies are transsubjectively valid and binding within a given language community. But this is not the case, according to Quine's picture.<sup>20</sup>

Why does Quine refuse to consent to a solution along the lines of his teacher and friend Carnap? Like Carnap, Quine excelled in giving formal-logical, "rational" reconstructions and reductions of philosophical problems. It is important to see – and has in my opinion received much too little attention – that Quine resolutely rejected this kind of solution as early as when he wrote "Two Dogmas":

Appeal to hypothetical languages of an artificially simple kind could conceivably be useful in clarifying analyticity, if the mental or behavioral or cultural factors relevant to analyticity — whatever they may be — were somehow sketched into the simplified model. But a model which takes

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<sup>19</sup> In the year in which "Two Dogmas" appeared, shortly before his death, Wittgenstein (1969, §§ 318–319) noted that there is "no sharp boundary between methodological propositions within a method" (between "rules" including the "propositions of logic" and "empirical propositions"). Obviously, this is similar to Quine.

<sup>20</sup> At this point an interesting question arises. If we understand by a *theory community* a subgroup of a linguistic community with a common theory about the world, might there be binding revision strategies at least for a given *theory* community? My suggestion below assumes that there is a positive answer to this question (which saves it from Quinean pointlessness).

analyticity merely as an irreducible character is unlikely to throw light in the problem of explicating analyticity. (Quine 1951, p. 34)

Attempts at formalization thus are irrelevant for the elucidation of analyticity, and this is due to the fact that some essential factors of language use are just filtered out in formalizations. Formal, artificially constructed languages work in a way different from natural, living languages. The former may serve to model the latter, but they will at best approximate natural languages in certain aspects. Quine seems to suggest in the above passage that development and use of artificial languages are actually of a *completely* different kind than natural languages. Insofar as the analytic/synthetic distinction depends on an essential similarity with natural languages, the modelling provided by formal languages is *completely* inadequate. This view was of course advanced against the background of the state of philosophy in the middle of the 20th century. It an empirical question, and the possibility cannot be excluded on a priori grounds, that some day we find the proper means for the formal representation of "the mental or behavioral or cultural factors" and that Carnap's program can be carried out after all. Yet I guess that the situation has not much changed since 1950.<sup>21</sup>

It seems to me that Quine's picture is by and large correct. I will not follow him, however, in his sceptical conclusion that in view of his diagnosis, we had better give up the fruitless notion of analyticity altogether.

Hilary Putnam has made many important contributions to the extension, but also to the criticism, of Quine's position. I can only discuss one of these here.<sup>22</sup> Putnam (1976) says

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<sup>21</sup> The last quotation may also help furnishing an answer to the Kantian issues as to whether the competent speakers of a natural language *really think* the predicate when thinking the subject concept of an analytic judgement, and whether denying such a judgement would lead to logical *contradictions*. Both questions could perhaps be answered in the affirmative if indeed the respective concepts or terms of English, say, were somehow, somewhere officially and bindingly related to each other (as through the axioms or definitions of a formal system). As this is not the case in ordinary language, I think that the Kantian criteria are not applicable.

<sup>22</sup> Putnam's most influential contribution to the discussion of analyticity can perhaps be found in "Meaning of Meaning" and/or "Holism" (with the well-known *dictum* "Meanings must be invariant under belief fixation"). According to Putnam, the synonymy of two terms does not guarantee analytic truth, and not even truth *simpliciter*. To give you more samples of Putnam's creative thinking: In "The Analytic and the Synthetic" (1962) Putnam makes a distinction between planned revisions and spontaneous *ad hoc* revisions, defines analyticity relative to the set of alternative theories available (an adaptation of Kuhnian ideas: revisions are never occasioned by experience alone, but are also influenced by the theoretical situation), and finally introduces the notion of a "law cluster concept". In "Analyticity and Apriority: Beyond Wittgenstein and Quine" (1979), he offers arguments (against Wittgenstein) to the effect that no part of one's beliefs can ever be completely immunized against revision by one's communal practices.

— like others before him — that Quine's critique was really directed against apriority rather than analyticity. Is that true? At the present stage of discussion, we can say that a judgement is *a priori* if it cannot be revised, which is what we called the negative notion of "independent of experience" above. A judgement is called *analytic* if it cannot be revised — except by a local or global change of the language, i.e., a change of the meaning of single terms or the language system as a whole. Analyticity is always relative to a given language. A judgement, on the other hand, can only be a priori if the *terms themselves* that occur in it and are thus applied to experiences are in some objective way "valid a priori", or at least absolutely cognitively privileged – whatever this may mean.<sup>23</sup> Without any such presupposition, doubtful as it seems to me, a notion of apriority that is not relativized to a given language is idle.

At this point we have severely reversed the relations between the core concepts as originally given by Kant. In the sense just explained, every judgement a priori is analytic (this is even true, according to the rules of reasoning in classical predicate logic, if there are no a priori judgements at all). Conversely, not every (*L*-)analytic judgement is a priori, because there is always the possibility of a tacit or explicit change of language (to *L*).<sup>24</sup>

## 2.4 Conclusions from the historical review

From the discussion of three classical accounts of analytic judgements supports, I draw the following conclusions which are largely, but not entirely in agreement with Quine.

- (1) The revisability of a sentence (*qua* sentence of a certain theory) offers the best — "negative" — criterion for its analyticity (and also apriority).
- (2) The distinction between the two dichotomies analytic/synthetic and a priori/a posteriori has been blurred in much of the contemporary discussion within analytic

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<sup>23</sup> If they are, for instance, part of Fodor's "language of thought" or express "elite properties" in the sense of D. Lewis.

<sup>24</sup> This result is consonant with Carnap's (1937:318) statement about the revisability of logical "L-rules" ("Not every analytic judgement is unrevisable.") and with Kitcher's (1981:223-226) conclusion on the basis of his distinction between "weak" and "strong" revisions ("Not every analytic judgement is apriori.").

philosophy. This tendency was recognizable, at the latest, in Frege's epistemological reinterpretation of the notion of analyticity, and it was continued in Quine's discussions who, although concerned with epistemological issues, never dwells on the notion of the a priori. Presumably, the blurring of the distinctions is not (only) the result of a somewhat lax way of dealing with our philosophical heritage but, as I will presently argue, it is in part motivated by internal reasons. What will happen to Kant's cross classification, what to his basic metaphysical question: "How are synthetic judgements a priori possible?". If the reasons I mentioned are convincing, the Kantian project loses its foundation.

In the following, I want to accept Quine's diagnosis about the problems of demarcating the analytic and the synthetic, as well as the pragmatic solution that he sketched.<sup>25</sup>

(3) We found reason to interpret the writings of all three protagonists in a way that discloses references to psychological processes or to social practices, even though the authors did not always explicitly mention them.

As we have seen, Kant was ultimately after the "actual thinking" of the person who endorses a judgement. This at least admits of a psychological interpretation. But a thinking and judging person is part of a socially defined language community. So we may, *qua* members of a community of speakers, researchers, or communicators, reasonably ask ourselves in which case we would think of a person as an incompetent speaker (lack of terms); in which case we would think of her power of imagination as too poor (lack of intuitions); and in which case we would think of her as being simply ignorant (lack of world knowledge).

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<sup>25</sup> Quine was not at all the first to argue that the *analytic/synthetic* distinction is pointless. Eisler (1904) reports in his entry *Urteil, analytisches*: "According to J. G. Fichte, there is 'no judgement that is purely analytic in its contents.' (*Grundlage der gesamten Wissenschaftslehre*, second edition, 1802:33). ... G. E. Schulze emphasizes: 'For one person is an analytic judgement what for another one constitutes a synthetic judgement' (*Über die menschliche Erkenntnis*, 1832:196). According to Schleiermacher, too, the difference between analytic and synthetic judgements is vague (*Dialektik*, ed. Jonas, 1839:264, 563). ... According to Trendelenburg, every judgement is at the same time analytic and synthetic (*Logische Untersuchungen*, 2 Vols., 1862, II2:241 ff), an opinion shared by Jodl (*Lehrbuch der Psychologie*, 1896:616)." The original contribution of Quine thus consists only in his specific way of arguing, not in the claim itself. — While the analytic/synthetic distinction seems dubious, there is no need to challenge the value of analytic judgements themselves. No need thus to object to Frege's view (1884, §§17, 88, 91) that analytic judgements need not necessarily be uninformative; or to Ayer's (1946:79-80) remark that analytic judgements may "reveal unsuspected implications in our assertions and beliefs", as well as of linguistic usage in general.

Frege discusses languages and theories in a mathematical context. Here, questions like the following will arise: When do we, *qua* members of such communities of speakers and theorists, accept a given system of arithmetic or geometry as one that correctly represents our "natural" numbers or our "natural" space? To what extent are such issues dependent on the decisions of individuals, to what extent are they settled by social agreements or conventions?

Quine, finally, makes explicit mention of cultural factors when rejecting purely formal reconstructions à la Carnap. What enters into the "definition" of a term's meaning in a natural language cannot be fixed through philosophical analysis, but is determined only by the concrete social practices of speakers (and always remains preliminary, open to revisions). According to Quine, Carnap's voluntarism with respect to the choice of a conceptual framework should be extended to all stages of language acquisition and theory formation. The question that dislodges the traditional problem of analyticity is this: Which parts of a network of theories do we choose to sacrifice when we face "recalcitrant experiences." Quine elaborates on Duhemian confirmation holism here.

The core question that I want to address now with my own proposal, is the following: When do we — *qua* competent participants of a linguistic or theoretical practice — speak of a different theory in "a new language", when do we speak of a "really new" theory formulated in the old language and when do we only speak of a new version of an old theory that has essentially remained the same? To put it more generally: What is the difference between a change in language and a change in beliefs, what the difference between a change in the dictionary and a change in the encyclopaedia? And, finally, are all these issues material questions, or might they simply address a matter of terminology?

### **3. A new proposal**

We start by giving some definitions.

- (1) A revision of a theory  $T$  in a given language  $L$  is called *small* (or *evolutionary* or *conservative*) if the resulting theory  $T'$  is still understood as a theory in the



language  $L$ . The revision is called *big* (or perhaps *revolutionary*) if  $T'$  is not understood as a theory in language  $L$  any longer.

The main idea is that in the case of a big revision — and only in such a case — theory change will lead to a meaning change.

(2) *Analytic sentences of a theory  $T$  in the language  $L$*  are those sentences that are retained across all potential evolutionary revisions of  $T$ .

Conversely, but equivalently:

(2') He who — for whatever reason — gives up an *analytic* sentence (of theory  $T$  in language  $L$ ), steps out of the evolution of theory  $T$  in favour of a theory  $T'$  in a new language  $L'$ .

An *alternative* proposal is this:

(3) He who — for whatever reason — gives up an *analytic* sentence (of theory  $T$  in language  $L$ ), steps out of the evolution of theory  $T$  in favour of a theory  $T'$  that is a theory *really* or *essentially* different from  $T$  (i.e.,  $T'$  can no longer be regarded as a revised version of theory  $T$ , but constitutes a genuine break or fresh start).

The variant in (3) avoids the problematic task (discussed at the beginning of the paper) of assigning a language to a theory. It does so, though, at the expense of the equally problematic task of telling "real" or "essential" differences between the old and the new theory. I am not sure which variant is to be preferred. The aim in any case is to systematize correctly the intuitive judgements of competent speakers and theorists. There is an obvious discrepancy between the two proposals that looks unacceptable at first glance — shouldn't there be a big difference between language change and theory change? — but I want to postpone this point and address it only in the next section.

Both variants are motivated by the common idea that theory change leads to meaning change in exactly those cases where very central (Quine's metaphor) or high-level

(another metaphor) principles of the original theory are sacrificed, principles that were in some sense *meaning constitutive* for the terms that occur in them.

Let us recapitulate the course we have taken with this proposal. We said that conceptual knowledge or, more precisely, knowledge of the meanings of theoretical terms, is dependent on a certain class of propositions of the theory within which the terms in question are used. These propositions are the analytic judgements of the theory. They in turn are characterized by the fact that abandoning them leads to a theory in a new language (or alternatively, to an essentially different theory). The question whether such a difference in language (or such an essential difference in theory) is indeed present is to be determined on the basis of intuitions of the participants of the relevant linguistic (or theoretical) practice, intuitions that relate to large units – whole languages or whole theories – rather than to individual propositions.

If this analysis is right, what do we need to flesh it out?

1. We need a fully specified, powerful model of how to revise theories — for whatever reason. A rich spectrum of such accounts is already available and can be taken from the fields of philosophical logic and knowledge representation. In particular, the models used there offer various ways of making sense of the "centrality" or "high rank" of sentences in a given theory. This concerns a technical issue that we need not be concerned with at present.<sup>26</sup>
2. We need an account of what it means "to speak a different language" or "to hold an essentially different theory". This certainly is anything but a technical issue, and indeed I think that this issue cannot and should not be reduced to anything else. Answers can in my opinion only be provided by competent speakers, writers or theoreticians themselves.

Let me finally point out some features that are characteristic for the definition of analyticity that I proposed above:

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<sup>26</sup> For the theory of theory change and belief revision, see Alchourrón, Gärdenfors and Makinson (1985), Gärdenfors (1988), Gärdenfors and Rott (1995) and Hansson (1999). For a criticism of the philosophical self-understanding of belief-revision theories, and for their relation to Quine (1951), see Rott (2000b). In order to model the change of scientific theories, one moreover needs to account for "meta revisions", i.e., revisions of strategies for theory revision, or revisions of priorities, of degrees of theoretical importance, of epistemic entrenchments, or the like.

- (a) Since language change or an essential theory revision is always possible, there are no sentences that are analytic *simpliciter* (and that we have termed "a priori" above). There aren't even any sentences that are *L*-analytic *simpliciter*, because analyticity is always relative to the currently accepted theory *T*.
- (b) According to the above explication, meaning is holistic insofar as the ascription of meaning proceeds from the theory or the language in which the theory is phrased to the terms. Here, "theory" may well denote our all-encompassing theory about the world, especially if *L* is a natural language.
- (c) Speakers' decisions as to when two languages or theories are identical are subject to vagueness and perspectivity and dependence on speakers' interests. All this will carry over to the notion "analytic in theory *T* in language *L*". I do not consider this a disadvantage of the explication but take it simply to reflect facts that will have to be taken care of by any attempt at explicating analyticity.
- (d) The problems of vagueness, perspectivity and interest-dependence become less severe if we move from a *categorical* to a *comparative* notion of analyticity. In order to make this idea precise, we can make use of so-called "entrenchments" or "priorities" commonly used in belief revision theories which were originally meant to reflect comparative "degrees of retractability" but can be reinterpreted as "degrees of meaning constitutivity".<sup>27</sup>
- (e) In judgements about the (essential) identity of languages and theories, more emphasis will be given to either individual, personal aspects, or to social, conventionalized aspects, depending on whether we are interested in the momentary idiolect of a single individual at a particular point of time, or rather in the stable language spoken by a community. A judicious choice of factors will get us identity judgements of the desired granularity.
- (f) All definitions have to be taken with a grain of salt, as they all presuppose that the terms in question are of sufficient importance for the identity of the whole language or theory. The well-known bachelor sentences can certainly be classed as analytic or constitutive for the meaning of the term "bachelor", yet they do not seem to be essential

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<sup>27</sup> We must, however, not assume that a statement's retractability and its power to determine meanings always go hand in hand. Observation sentences, for instance, are generally taken to be fairly immune to revision and yet they do not determine meanings — at least not the meanings of theoretical terms with which we are concerned in this paper.

for the identities of either the languages or the all-including folk theories of the speakers of English. The term "bachelor" is simply too marginal.

(g) According to the present proposal, meaning change does *not* imply reference change. As was already noted by Locke for the case of gold, theories with differing conceptual structures may well speak about the same objects, substances or natural kinds.<sup>28</sup>

(h) The above proposal is not sensitive to the choice of the philosophical modelling of scientific change: Models that assume that revisions can be forced by experience alone fit the proposal, as do models assuming that revisions can only be accepted if a superior alternative theory is available.

(i) Scientific revolutions in which an old theory is given up altogether in favour of an entirely new theory  $T'$  in an entirely different language  $L'$  can be seen as the extreme case of a "big" revision in the sense of definitions (2) or (3) above. Kuhnian ideas about the development of scientific disciplines can thus be integrated, and perhaps even nicely reconstructed within the approach.<sup>29</sup>

#### **4. Theory Change vs. Meaning Change**

Semantic holism says that the meaning of words (as well as the truth of propositions) is determined by the environment in which they occur, especially by the linguistic environment. That is, one and the same word or sentence might, or must, mean different things in different linguistic contexts. If the theory changes, then the meaning of its terms change as well. This position has often been criticised, since intuitively it is easily possible to change a theory (or simply, one's opinions or beliefs) without any variations of meanings. It is even *necessary* in a certain sense that meanings can remain constant when theories or beliefs change. For if linguistic expressions continually changed their meanings, how could we ever come to know whether the content of a theory (a belief) has changed? Phrases looking exactly alike would mean different things, and

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<sup>28</sup> In this respect there are no differences between my proposal and externalist theories of meaning in the spirit of Kripke and Putnam. Compare especially Putnam's (1975:250-257) remarks about stereotypes which are (in his view) empirically wrong, like the stereotype that gold is yellow.

<sup>29</sup> Rott (1994) is an attempt at a reconstruction of Lakatos' (1970) model of scientific theory change which can be considered as a rationalization of ideas of both Popper and Kuhn. This reconstruction in terms of belief change theory (see footnote 26) is, however, restricted to evolutionary theory developments and neglects the problem of meaning change altogether.

contradictions on the linguistic surface could be explained away by appropriately reinterpreting the words used.<sup>30</sup>

So a modicum of constancy in meanings is a prerequisite for an understanding and communication. This is a very general argument against a holism that has overshot the mark. The generality of the argument ensures its broad range, but is also its weakness. Let us therefore, in order to arm us against philosophical sophistries, discuss two everyday cases to illustrate the intuitive differences between theory change and meaning change.

Example 1: If a leading politician today calls Perugona an unreliable trade partner while she claimed the opposite some days ago, then we will normally assume that she, on the basis of whatever evidence, has changed her beliefs. It is however conceivable that her current statement can be explained by the fact that the standards for economic reliability have been changed, tacitly or officially.

Example 2: If today I find that my computer at home is slow, but I considered it a fast computer some months ago, then this will probably be due to the fact that what was considered fast when the computer was purchased is perceived as slow today. It is not impossible, however, that my computer does in fact work at a slower pace, due to some software problems, say.

What these examples illustrate is that presented with an utterance that is in conflict with preceding utterances of the same speaker, we cannot read off whether it results from a change of beliefs (change of opinions, change of theory) or from a change of meanings. On an intuitive level, however, we can clearly distinguish two cases. *Either* the beliefs about the world have changed; perhaps — as in the case of our computer — because the world itself has changed, or perhaps — as in the Perugona case — because our information about the world has changed (while the world itself has remained the same in all relevant respects). *Or else*, the denial of a previously asserted sentence is due to a

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<sup>30</sup> In reaction to Kuhn's *Structures of Scientific Revolutions* it was critically observed that after a revolution, the new theory cannot simultaneously be inconsistent and incommensurable with the old theory (Achinstein 1964, Shapere 1966). Both at the same time are impossible indeed: Inconsistency requires *constant* meanings, while incommensurability involves *changes* of meanings.

difference in the rules that govern the usage of words, as in the examples where the meanings of the words "reliable" and "fast" have changed.<sup>31</sup>

How can we determine whether the change from a given statement to its negation constitutes a substantial change of theory, or rather a change of the *façon de parler*? I think that we can give two answers to this question, an objective one and a subjective one.

The *objective answer* reminds us of the fact that theories, after all, are not merely something enshrined in our heads but will usually have certain empirical parts or consequences — often called observation sentences — that are amenable to a more or less immediate perceptual verification or falsification. If the two different theories or belief systems in question make different predictions about (or admit different ranges of) observations, then we can at least potentially reach a decision between the two theories on empirical grounds. In so far as the two sentences in question contribute individually to the diverging empirical claims, they cannot simply be translation variants of one another.

There are epistemologists and philosophers of science who doubt the very possibility of such *experimenta crucis*, or generally any direct confirmation or weakening of theories by empirical findings. They view theories in a more coherentist way, as networks of propositions where even allegedly "basic" observation sentences are dependent on theoretical assumptions (like, e.g., assumptions about the presence or absence of imperceptible disturbing factors that would help to reconcile the data with incompatible predictions or explanations). On such an account, there is no way of deciding in favour or against a given theory on empirical grounds alone. We might then try using a *subjective* method to determine whether we are facing theory change or meaning change, by inquiring if the speaker is inclined to say that he *simply was wrong* with his previous beliefs, and that things are *really different* from what he had thought before. If this is the case, then we have a case of genuine belief change; otherwise we can hope to

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<sup>31</sup> Semanticists have pointed out to me that in the second example the meaning of "fast" does not really change, it is only the parameter that fixes the relevant threshold value that changes. Against this, one might argue that *intuitive meaning* is the formal semanticist's meaning plus a certain value of the parameter. I don't want to do this, since the point of the two little examples in the text is just that there is an undeniable intuitive difference between belief change and meaning change. No further claims are made at this point.

find a suitable non-homophonic translation procedure to explain away the apparent difference between the two theories.

A remark in closing: *Differences* in theory or meaning can, of course, also be conceived as differences prevailing between persons or cultures, not only as differences along the time axis of a single person or community. Note, however, that the temporal variant has two major advantages: (a) We may assume that the linguistic and epistemic systems at time  $t$  and  $t+1$  largely coincide, to a larger extent at least than what we may reasonably expect when we compare languages or belief systems of varying persons or cultures. (b) The subject has privileged access to both linguistic and epistemic systems at different stages of her own identity. Hence, she is the prime expert in making a comparison of these two stages, and we can talk to her. Any comparison of two persons or cultures will naturally be a much more delicate task. The *subjective method* of deciding between meaning change and theory change in the interpersonal or intercultural case may perhaps proceed by investigating whether it is necessary to quarrel about "who is right" or by looking for an interpreter *well-acquainted* with both persons or cultures, who is able to judge and resolve all apparent conflicts.

## 5. Summary and Related Work

I have put forward for discussion a way of making philosophical sense of the meaning of theoretical terms and of the changes thereof. The proposal is based on an explication of analytic judgements that is in turn inspired by Quinean ideas without, however, subscribing to his scepticism about meaning. Inspiration from Quine is drawn in three respects: the use of the revisability of sentences as a vehicle for the explication of *analyticity*; the acknowledgement of substantial difficulties to draw a line between knowledge of facts (beliefs, theories) and knowledge of language (meaning); and the recommendation of a pragmatic solution to these difficulties that refers to speakers and communities of speakers.

My position differs from Quine's mainly in that I consider the investigation of the meaning of theoretical terms and analytic sentences a meaningful task — assuming that we can get reasonable intuitive judgements about identities of languages or theories in

general, as well as a precise model for theory revision. The explications given in section 3, were an attempt to provide a basis for fruitful further research.

Later in his life, Quine partially rehabilitated the concept of analyticity; see, e.g., *The Roots of Reference* (1974, §21): "Here then we may at least have a line on a concept of analyticity: a sentence is analytic if *everybody* learns that it is true by learning its words. Analyticity, like observability, hinges on social uniformity." According to this passage, someone who thinks that an analytic truth is false has not learnt his words properly. Quine seems to find this an unproblematic explication, it is however not related to the many other explications that can be found in "Two Dogmas". It is, on the other hand, fairly close to Locke's explication of "maxims" which are truths that are "*generally assented to, as soon as proposed, and the Terms they are propos'd in, understood.*" (*Essay*, Book I, Chapter 2, §17, original emphasis). Similarly, the "epistemological conception of analyticity" in Boghossian (1996:363) says that "a statement is 'true by virtue of its meaning' provided that grasp of its meaning alone suffices for justified belief in its truth." That means that someone who is not ready to embrace an analytic statement has not grasped its meaning. The present approach is more charitable in interpreting the speaker. If a bona fide analytic statement does not get accepted, the diagnosis is not that the speaker does *not* understand the words that he is using. Rather the point is that he understands the words *differently* (as compared with the common use in the relevant speaker community). And a different understanding is here taken to mean that a change in language – or alternatively, an essential change in theory – has taken place.

In a recent paper, Pagin (2001) advances an approach that is on the face of it quite similar to the one presented in this paper. He, too, uses the revisability of propositions as the central concept for the explication of synonymy and analyticity.<sup>32</sup> His basic idea is that two expressions are *synonymous* if and only if substitution of the one for the other in any statement preserves the revisability of the statement (likelihood of re-evaluation in terms of truth-value in the event of recalcitrant experience). When Pagin

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<sup>32</sup> Pagin distinguishes between what he calls *analyticity-s* (which is just what Boghossian terms 'Frege-analyticity': transformability into a logical truth by substitution of synonyms) and *analyticity-f/analyticity-e* (corresponding to Boghossian's 'metaphysical/'epistemic' analyticity: truth/acceptance in virtue of meanings, independently of matters of fact). Pagin argues that the latter has been demolished by Quine while the former is defensible and may indeed be identified with *analyticity simpliciter*. In my



(2001:23) says that 'analytic' is a vague predicate admitting borderline cases, he seems to point to the comparative notion of analyticity that I suggested above. There are, however, important differences with my view. According to Pagin (2001:14), analytic statements are just as hard to revise as logical truths and nothing is harder to revise than a logical truth. In contrast to Pagin (2001:18–22), however, I do think that

(1) Eye doctors are eye doctors

is harder to revise than

(2) Ophthalmologists are eye doctors

It is indeed hard to imagine that any experience could make one abandon statement (2), but further specialization of ophthalmology might well lead to a new distinction of nomenclature.<sup>33</sup> So even though (2) is analytic, (1) is harder to revise than (2). Unlike Pagin who suggests that minimal revisability is a necessary condition for analyticity, the account presented in this paper suggests that low revisability – revisability on pain of dropping out of the language and theory games other people play – is a necessary and sufficient condition for analyticity (with the qualifications mentioned).

Finally, I do not think that it is illuminating to distinguish 'theoretical revision' from 'linguistic revision' by simply saying that the former is motivated "by the need to avoid untenable theoretical or observational consequences" while the latter is motivated "by terminological needs" (Pagin 2001:24). This seems far too casual to me. I have tried to argue in this paper that the recourse to identity judgements about language and theories is a more promising route. But in any case, making sense of the difference between substantial changes of theories and mere changes of ways of speaking is crucial if we want to understand how theoretical concepts can be in flux.

## Acknowledgements

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opinion, however, the analysis based on comparative revisability shows how the concept of analyticity can be thought of as a single one after all.

<sup>33</sup> Compare Harman's (1996:399–400) point that "stipulative definitions" are assumptions that may be abandoned just as any other theoretical principle.

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