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# The Architecture of Meaning: Wittgenstein's *Tractatus* and formal semantics

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## I Introduction

With a few notable exceptions formal semantics, as it originated from the seminal work of Richard Montague, Donald Davidson, Max Cresswell, David Lewis and others, in the late sixties and early seventies of the previous century, does not consider Wittgenstein as one of its ancestors. That honour is bestowed on Frege, Tarski, Carnap. And so it has been in later developments. Most introductions to the subject will refer to Frege and Tarski (Carnap less frequently) —in addition to the pioneers just mentioned, of course—, and discuss the main elements of their work that helped shape formal semantics in some detail. But Wittgenstein is conspicuously absent whenever the history of the subject is mentioned (usually briefly, if at all).

Of course, if one thinks of Wittgenstein's later work, this is obvious: nothing, it seems, could be more antithetic to what formal semantics aims for and to how it pursues those aims than the views on meaning and language that Wittgenstein expounds in, e.g., *Philosophical Investigations*, with its insistence on particularity and diversity, and its rejection of explanation and formal modelling. But what about his earlier work, the *Tractatus* (henceforth TLP)? At first sight, that seems much more congenial, as it develops a conception of language and meaning that is both general and uniform, explanatory and formal. In view of that, the general lack of reference to TLP is curious.

The central claim of the present paper is that, actually, this is an oversight. Perhaps Wittgenstein was no conscious influence on the minds of Montague c.s. at the time, but he did play a major role in establishing the fundamental principles and philosophical assumptions that helped shape formal semantics and make it such a successful enterprise, in linguistics and in philosophy. The actual channels through which this transmission of concepts and ideas has taken place is not what we will be focusing on here. That is another story, and a complicated one, which requires more historical knowledge and skills than we can muster. Rather, we will be content with discussing some systematic

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analogies (and differences, for there are those as well, of course) between Wittgenstein's conception of language and meaning in TLP, and the one that was prevalent in formal semantics at its inception and that continues to exert a major influence in the field until the present day.

The reasons for being interested in these connections are twofold. First of all, it appears that formal semanticists do not always appreciate what philosophical assumptions are behind their enterprise. This is deplorable since an awareness of that part of its legacy could help formal semantics answer questions regarding its proper status as a scientific discipline. The diversity that is characteristic of the state in which formal semantics finds itself today, raises the question how this came about, and how it can be justified. And part of the answer may well have to do with diverging ways of dealing with the problems caused by these philosophical assumptions. The second reason why tracing some systematic connections between Wittgenstein's early work and the origins of formal semantics is of interest stays 'closer to home', i.e., closer to Wittgenstein. At many points in his later works Wittgenstein formulated penetrating criticisms of his earlier ideas. In as much as formal semantics incorporates some of the latter the former might apply to it as well. These are related but distinct considerations, that each in their own way put formal semantics to the test: Is it really an empirical discipline? Or does it remain rooted in its philosophical ancestry?

The approach taken in what follows is by and large systematic. In section 2 we will review the main characteristics of TLP's 'architecture of meaning' —what meaning is, how it is structured, how it relates to language and to the world—, isolating three aspects that are particularly relevant for a comparison with formal semantics. Section 3 contains brief sketch of the way in which some ideas from TLP were transmitted through the work of Rudolf Carnap. Then, in section 4 we turn to a detailed analysis of the conceptions that are prominent in the work of the pioneers of formal semantics. The focus will be on the work of Richard Montague and Donald Davidson, but where relevant we also refer to the writings of other authors such as David Lewis and Max Cresswell. After this exposition we turn to an exploration of resemblances and differences between TLP and formal semantics in section 5. Finally, in section 6, we will address the two issues identified above: the consequences for the nature of formal semantics as a scientific discipline, and the potential relevance of Wittgenstein's own criticisms on the TLP-framework for formal semantics.

## 2 Wittgenstein's Architecture of Meaning

Although the nature of the main work of Wittgenstein's youth remains controversial, as it does seem, at least at first sight, that TLP contains a substantial theory of meaning. It outlines the nature of meaning, its structure, it analyses the way in which meaning relates to linguistic expressions, it details the role of the world in all this, and so on. The aim of this section is to sketch the place this theory of meaning has in the overall conception of TLP, and to derive from that some of its general and central characteristics.

It is not our intention here to enter into the debate surrounding the 'resolute

interpretation' of TLP that has been proposed in recent years by the so-called 'New Wittgensteinians'.<sup>1</sup> Nevertheless it should be pointed that the idea of extracting a general theory of meaning from TLP does take a stand in such a debate, since it presupposes an interpretation of the book as a whole that allows for this, and such an interpretation will at certain points be at odds with the 'resolute' one. As a matter of fact, there are a number of ways of reading TLP other than the resolute one, that make this possible. Fortunately, for our present purposes it will not be necessary to discuss the various options and decide between them on the basis of exegetical or systematic argumentation. Rather, as long as the resulting picture of Wittgenstein's ideas about meaning remains indifferent to these variations, we can pick one that serves our needs. And this is what we will do in this section. In a few words our reading is as follows.<sup>2</sup>

A central concern of Wittgenstein's during his entire life was ethics. The fundamental question, the basic moral challenge, of how to live, was one which occupied Wittgenstein always. The time of his work on TLP was no exception. Reports by contemporaries, from philosophy and from other walks of life, the surviving notebooks that he kept in that period, as well as some of the things he said about TLP after it was completed, leave no doubt that at that time, as always, ethics was of fundamental importance to Wittgenstein. And the concern for ethics was all-pervading, not just one of a number of interests that Wittgenstein explored, but a need and an attitude that were present in everything he did. To argue this in detail would take us too far afield, but a telling testimony is the famous letter Wittgenstein wrote to Ludwig von Ficker, in which he states the following:<sup>3</sup>

[. . .] the point of the book is an ethical one. I once wanted to include in the preface a sentence that is now actually not there, but that I will write to you now since it might be key for you: I wanted to write that my work consists of two parts: of the one that is present here and of everything that I have *not* written. Precisely this second part is the important one. For the ethical is delimited as it were from the inside by my book; and I am convinced that *strictly* speaking it can *ONLY* be delimited in this way. In short I think: everything of which *many* nowadays are blethering, I have defined in my book by being silent about it [. . .]

This suggests that the Tractarian system serves a purpose that goes beyond itself. What Wittgenstein wants to do is to safeguard ethics from all kinds of theorising, from logical analysis, metaphysical speculation, and theological dogma. Ethics is about action, about what to do (or what to refrain from doing), and it should be dealt with in that sphere. Ethics does not belong in the cognitive realm of thought and reasoning, proof and disproof, ethical views can not be discussed, argued, they can not even be expressed in meaningful language. To show this, rather than merely state it, Wittgenstein needs a theory of meaning and thought from which it follows that ethics falls outside their

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1. This radically therapeutic interpretation started with Cora Diamond's work and was further developed by, among others, James Conant, Thomas Ricketts, and Rupert Read. Cf., Crary & Read (2000) for a collection of papers that gives a representative overview of views and arguments.

2. Cf., Stokhof (2002, chapters 1 and 2) for a detailed exposition along these lines.

3. Cf., Wittgenstein (1969), my translation. The letter is from October or November 1919.

domain. That is why in the preface Wittgenstein describes the aim of TLP as ‘to draw a limit to thought, or rather—not to thought, but to the expression of thoughts.’ The totality of expressions of thoughts is the totality of everything that can meaningfully be expressed, i.e., the realm of the meaningful. The idea is that once the limits of that are drawn, we can characterise the realm of ethics ‘ex negativo’ as being that with which the meaningful can not be concerned (TLP 6.42).

So the theory of meaning (and language and the world) that TLP offers is there for a specific purpose. This observation is not just relevant for an understanding of the Tractarian project as a whole, it also informs some of the more conspicuous features of the theory itself. Three of these will be discussed in some detail in what follows, viz., universalism, intensional referentialism, and compositionality, all central characteristics of Wittgenstein’s architecture of meaning. ‘Universalism’ here refers to the task that TLP sets itself, viz., to give an account of how language operates in general, i.e., not the way any specific language works, but what underlies the possibility of any language to express meaning. ‘Intensional referentialism’ refers to the combination of an intensional ontology (consisting of possible situations built from a substance of objects) and a truth-functional, extensional semantics. Finally, compositionality (in various domains) plays a key role of the entire TLP-framework.

But let us first look briefly at the global structure of the theory. The central role is played by the picture theory of meaning, according to which the meaning of a sentence is the situation it pictures. This picturing relation has two basic ingredients. The first is the existence of a ‘depicting’ relation between simple expressions, ‘names’, and simple entities, ‘objects’.<sup>4</sup> The second is identity of the logical forms of the picturing sentence and the pictured situation. The idea of logical form as the most fundamental structure of both the world and language is central to Wittgenstein’s thinking here: every contingent feature of what makes an actual language meaningful, every contingent characteristic of some situation that is captured in language has to be abstracted away from, if we are to uncover the most fundamental principles that make meaning possible in the first place. At its most general level it is the logical form that world and language share that allows the two to enter into the picturing relation. Likewise, the depicting relation that puts names and objects in a one-to-one relationship is devoid of any descriptive content, simple because such content would be contingent and hence would make the meaningfulness itself a contingent matter as well. The combined result of such a purely referential relation and identity of abstract, logical form is a concept of meaning that is as general as can be.

Contingency, then, plays a crucial, Janus-faced role in Wittgenstein’s conception of meaning. On the one hand, as we just saw, he strives for an account that is as general

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4. The quotes indicate that these terms have a special meaning in TLP, and it is in that sense that we use them here. One of the more important properties of objects and names in the Tractarian system is that they display variation in ‘form’, another term used in a technical sense, viz., to indicate the possible configurations in which they may enter (TLP 2.0122, 3.21). Both names and objects may differ among themselves in the combinations with other names and objects they may engage in. Although Wittgenstein does not say much about what the various forms of objects and names might be, it seems that something akin to function application is included.

as possible, and hence abstracts away from any contingent features of the various elements that enter into the meaning relationship. On the other hand, contingency is the most fundamental characteristic of the meaningful. For, if the realm of the meaningful coincides with the totality of the contingent, then, a fortiori, ethics is excluded, since whatever ethical value is, it is necessary (TLP 6.41). Of course, with ethics a number of other domains of the necessary, such as logic, mathematics, and certain aspects of science, fall outside the realm of the meaningful as well. These Wittgenstein deals with successively in the last part of TLP, explaining in each case why what looks necessary and meaningful in fact is not. Logic, being the transcendental scaffolding of world and language that makes the meaningful possible, is 'ineffable' in that it can not be meaningfully described, but is shown by meaningful description of contingent situations. Mathematics does the same. Ethics is also dubbed 'transcendental' (TLP 6.421) and is also ineffable, but it is shown, not through language, but through action. It is in the action itself (and not in the consequences that follow it or in the intentions that precede it, for such connections are temporal and causal, and hence logically contingent) that ethical value resides. And what distinguishes the ethically just from the ethically unjust is not reflected in some contingent change in what happens in the world, but is revealed in the way in which the world as a whole, and not just some specific part of it, appears to the subject.

Such a necessary and a priori distinction between the meaningful and the meaningless requires a theory of meaning that is itself necessary and a priori. This means that it has to hold not just for some particular language (say, English), or some group of languages (say, Altaic languages). Nor is it sufficient to characterise the meaningful for all natural languages. No, the very purpose that the theory serves, the goal it aims to achieve, requires that it be completely general, that it hold for any conceivable form of language, any possible form of symbolic expression. In other words, TLP's conception of meaning is *universalistic* through and through. When TLP mentions 'language' it means all logically possible forms of symbolic expression; when it refers to 'world' it indicates any logically possible configuration of situations; and when it mentions 'meaning' it abstracts away from any contingent features that make particular expressions mean particular things.

TLP's theory of meaning is thus transcendental in the broad sense of dealing with 'conditions of possibility'. Constructing meaning in terms of the picturing relation, it comprises an ontology, a theory of linguistic (symbolic) structure, and an account of the relation between the two. These three elements consist of a reconstruction of the fundamental properties of the world, of language and of their interconnection, that are needed for any concrete language to mean any concrete situation. Those fundamental properties Wittgenstein finds in logic, which (in TLP at least) provides an unquestioned and unique foundation. Thus the transcendental task that Wittgenstein sets himself in the preface of TLP, viz., that of determining the limits of what can be meaningfully expressed, turns out to be to uncover the fundamental logical form that characterises both language and the world and that make meaningful expression possible. Recall that this 'critical' task itself derives from another one, that of securing the ineffability of ethics. Thus, it appears that the ontological and linguistic theories that TLP offers are derived from this fundamental starting point, and hence, give us an account, not of the

world or of language directly, but of what they have to be like for meaningful expression to be possible (in such a way that ethics remains outside its reach).

One consequence of the universalism of TLP is that many of the things it states about meaning, language, and the world, are extremely abstract and often quite difficult to connect with what we understand by these notions in everyday contexts. For example, the concept of an object, being ‘simple’ in TLP’s sense, i.e., devoid of any contingent features, defies attempts to provide concrete instantiations precisely because of the abstract logical nature of simplicity that is characteristic for it. Yet, this feature is needed in order for the theory to be universal.<sup>5</sup> The same holds for the linguistic category of names, which, appearances notwithstanding, have no counterpart in a natural language, but are a purely logical kind of entity.<sup>6</sup>

Another consequence of the universalism of TLP is that Wittgenstein can not avail himself of something akin to the distinction between object language and metalanguage that modern readers are thoroughly familiar with from Tarski’s work. The point is not that Wittgenstein did not have the distinction, or something analogous such as the distinction between use and mention, available as an analytic tool. Rather such a tool is useless because it constantly shifts the fundamental question to the next level. Using a suitable metalanguage we may well be able to give a complete specification of the semantics of some object language, but that works only if such a semantics for the metalanguage is already in place.<sup>7</sup> That in its turn can be specified in terms of yet another metalanguage, but the question what meaning *tout court* is, remains unanswered. For example, if we are to give a description of the fundamental way in which names and objects are related, then the language in which we formulate this description presupposes what it describes.

For Wittgenstein this is not a viable way to go, his universalistic goal forces him to determine the nature of the meaningful, both its scope and its structure, in one fell swoop and in a definitive way: it may not rest on assumptions about meaning or meaningfulness.<sup>8</sup> This means he has to accept that any ‘description’ of the fundamental

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5. Cf., Stokhof (2002, chapter 3) for a detailed discussion of the role of simplicity in the Tractarian system.

6. In Kamp & Stokhof (to appear) the development of semantics is described as going through two phases: that of ‘uncovering structure’ and that of ‘reinstating content’. In the first phase the driving force is to lay bare the formal principles, to discover the necessary features, and the way that is done is classic: by abstracting away from what is material and contingent. TLP is typical of that phase, as is the work that was done in formal semantics in the pioneering days as we shall see later. In formal semantics the ‘uncovering structure’ phase was followed by one in which the content that was abstracted away is put back in to place, but, by and large, within the framework that resulted from the first phase. In Wittgenstein’s case things did not go like that. His failure to ‘apply’ the TLP-principles to the (relatively) concrete problem of colour exclusion, made Wittgenstein change his ways in a much more radical fashion. He turned the entire enterprise upside down, and we can read his later work as an ongoing attempt to let what is necessary and a priori appear on its own terms from amidst the contingent.

7. Which is an innocent enough assumption if we are engaged in linguistic description, but one that directly flies in the face of universalism.

8. Cf., in this connection also Wittgenstein’s rejection of the axiomatic method in logic (TLP 6.127–6.1271). The idea that ‘self-evidence’ might be used as a criterion for determining the set of axioms of logic was already rejected by Wittgenstein early on, cf., [...] “self-evidence” is wholly deceptive and

principles of meaning is itself meaningless (TLP 6.54). In order to pull this off Wittgenstein make heavy use of two conceptual tools: the saying–showing distinction, and the principle of compositionality. The latter will be dealt with later, the former stands out as one of the most characteristic features of the Tractarian system. At the root of the distinction between saying and showing is an absolute distinction between the necessary and the contingent. That distinction is not parametrised or contextualised, it holds without any qualification. The realm of the contingent being identified with that of the meaningful, anything necessary *ipso facto* can not be expressed in meaningful language: ‘What *can* be shown, *cannot* be said’ (TLP 4.1212). This applies also to the fundamental structure of the realm of meaningful itself: given that this structure does not change, the principles determining it are necessary, hence can not be captured in a theory. ‘Logic must take care of itself’ is the first entry in the 1914–1916 Notebooks,<sup>9</sup> and the claim is repeated in TLP 5.473. There can be no theory of logic, because logic is the most fundamental structure of all, and is presupposed by any theory.<sup>10</sup> So nothing can take care of logic. Then how does logic take care of itself? Here the notion of ‘showing’ enters the stage. For Wittgenstein the fundamental, logical principles that characterise the meaningful, can not be described but, being the very principles in virtue of which language is meaningful, i.e., the principles that are operative in each and every meaningful expressions, they are displayed, ‘shown’ in TLP sense of the term, by these expressions and the use we make of them (TLP 4.121). Thus, the logic of language, which is also the logic of the world in virtue of the identity of logical form that is a necessary requirement for picturing, is accessible in this sense that analysis of meaningful language in the end will show this logic, laid out in completely analysed expressions (TLP 3.24–3.25).

This reads the larger part of TLP as some kind of transcendental deduction that starts from the given of meaningful language and then derives the fundamental conditions of its possibility, basically by abstracting away from anything contingent that enters into actual meaningful language.<sup>11</sup> As alluded to at the beginning of this section, this is a specific way of reading TLP, one that is not universally shared. But it is a reading which not only provides a substantial account of meaning, one which Wittgenstein arguably contested at many points later on in his life, it also fits in with Wittgenstein’s professed aim in writing TLP, viz., that of making a specific point about ethics. It would seem that the connection with ethics is not strictly necessary to defend this reading of its sections on language and meaning, logic and ontology. There are also reasons internal to what

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always has been’ (Wittgenstein, 1979a, 8/9/14). He insists on the surveyability of of logical form: all its logical properties and relations must be surveyable from the form of an expression (TLP 6.113 ff.). This, according to Wittgenstein, is not guaranteed by the axiomatic method, but it is a property of the truth table method he outlines in TLP. The requirement of surveyability must not be confused with that of decidability in the modern sense of the word, although there is a kinship between the two.

9. Cf., Wittgenstein (1979a, 22/8/14).

10. This is also the basis for Wittgenstein’s rejection of Russell’s theory of types; cf., TLP 3.331–3.334. Another point at which the ineffability of logic manifests itself is in Wittgenstein’s claim that logical constants do not refer (TLP 4.0312, 5.4), also an insight that Wittgenstein developed quite early on; it already occurs in the ‘Notes on Logic’ from 1913 (Wittgenstein, 1979b).

11. An illustrative example of the kind of abstraction that Wittgenstein uses is in his derivation of the notion of a ‘symbol’ in TLP 3.32 ff.

Wittgenstein says about these subjects that support it, such as the fundamental idea that ‘logical constants do not represent’ (4.0312). The fundamentals of logic, being at the same time the fundamentals of meaning, are not entities in the world, but conditions thereof. They show the structure of any world (6.124), hence ‘logic is transcendental’ (6.13). However, as argued elsewhere,<sup>12</sup> the connection with ethics is essential for a coherent interpretation of TLP as a whole.

Let us now turn to the second feature identified above, that of ‘intensional referentialism’. If one approaches the TLP-conception of meaning primarily from the point of view of language and investigates what kind of semantic theory it proposes, then what one finds looks like basically a referential theory of meaning. All sentences of a language are composed of elementary ones, which, in their turn, are composed solely of names. This depends on names (and objects) displaying ‘type variety’, i.e., possessing different combinatory possibilities that allow, e.g., for function–argument structure (cf. footnote 4). Names have meaning in virtue of ‘going proxy’ for objects (TLP 3.22): their meaning *is* what they refer to (TLP 3.203). Elementary sentences then depict elementary situations in virtue of this direct referential relation and identity of their logical form, which is determined by the logical forms of their constituents, i.e., the names and the objects respectively.<sup>13</sup> All other sentences are built from elementary ones by means of truth functional operations (TLP 6, 6.001). This preserves the referential character of elementary sentences in a strong way: there is no room for any intensional expressions or constructions, such as modal or tense operators, intensional verbs, and the like. Every aspect of meaning is exhausted by the referential relation between names and objects, and the truth functional operations.

But if one approaches things from the other angle, that of the world, a different picture emerges. The TLP ontology is a very rich one, in which we find not just actual entities and actual situations (facts, ‘Tatsachen’), but also all kinds of possibilities. The notion of an object as such transcends questions of existence, rather, the totality of objects functions as ‘the substance of the world’ (TLP 2.021), by which Wittgenstein means that every possible world is somehow ‘made up’ from this totality (TLP 2.014). Consequently, the notion of a situation (‘Sachlage’), including that of a state of affairs (‘Sachverhalt’) being an elementary situation, covers not just the factual, but everything that is logically possible. So the ontology of TLP is made up from intensional entities. Possible situations are pictured by sentences, they are their meanings. So the semantics of language includes intensional entities as meanings, yet does not exploit this intensionality in the sense of allowing expressions in the language to refer to it (as modal or temporal expressions or intensional verbs would do). Only in its definition of truth does the TLP conception of meaning make use of the intensional character of meanings. Depicted situations being always possible, truth can be defined simply as the property a sentence has when it depicts a situation that is not just possible, but also actual (TLP 2.221,

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12. Cf., Stokhof (2002, pp. 241 ff.)

13. In TLP 4.0311 Wittgenstein draws the apt comparison with a tableau vivant: ‘One name stands for one thing, another for another thing, and they are combined with one another. In this way the whole group—like a tableau vivant—presents a state of affairs.’

2.222). For the rest, Wittgenstein has no use.<sup>14</sup>

It is not completely clear why Wittgenstein chose to go this way. The reason he uses intensional entities in the ontology is clear: the required ‘once-and-for-all’ characterisation of the realm of the meaningful necessitates the inclusion of all possible situations as possible meanings. So on the ontological side the ingredients for an intensional semantics are available. Presumably, Wittgenstein was of the opinion that an intensional (modal, temporal) logic would not really be a logic in the required sense, i.e., that what underlies all that is possibly meaningful. For it introduces conceptual relations, which within that logic are necessary, but which are not purely logical according to Wittgenstein’s standards (if only because there are alternatives). Some evidence is perhaps forthcoming from the way in which Wittgenstein treats a particular instance of conceptual necessity, viz., that of colour exclusion. In TLP 6.3751 he claims that the necessity of the truth of the sentences ‘*a* is red’ excluding that of, say, ‘*a* is blue’, must be a logical one, and that hence these sentences cannot be elementary. This implies that they are not completely analysed, and that further analysis is needed. Obviously, an intensional semantics would deal with the exclusion in another way, e.g., by restricting the allowed interpretations by means of a postulate. One reason why this would not appeal to Wittgenstein is the conception of logic: it is not just that for him logic is extensional, it is also ‘syntactic’ in not quite the sense we attach to that phrase nowadays. The distinction between semantic, i.e., model-theoretic accounts of logical validity and syntactic, i.e., proof theoretic ones, at the time was not yet conceptualised in the way it is today. For Wittgenstein the logic of an expression ultimately is displayed in its form: it is by inspecting the form, and only the form, of a completely analysed expression that all its logical relations with other expressions should be surveyable. No additional rules or postulates may enter into that. And that rules out an intensional semantics in the modern sense of the term. Such a mixture of syntactic and semantic aspects, confusing as it is from a modern perspective, also characterises Wittgenstein’s use of truth functions. They are not the purely semantic entities (functions from (*n*-tuples of) truth values to truth values) that we associate with the term. Truth functions are defined in terms of operations on sentences (TLP 5.5), which would make them syntactic in our conception, yet they also have what we would regard as a semantic effect in that they determine the truth conditions of complex sentences in terms of the truth conditions of the sentences from which these sentences are constructed. It is in these terms that Wittgenstein specifies the structure of the meaningful, i.e., the meaningfulness of sentences, and not, as one would expect if one is familiar with modern intensional semantics, in terms of operations on meanings, i.e., situations, directly.

Finally compositionality. As was indicated above, for Wittgenstein to be able to achieve his aim, viz., that of determining the realm of ethics ‘ex negativo’ by determining the realm of the meaningful, he needs, not only a conception of meaning that excludes anything necessary, including ethics, but also an account of the structure of the

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14. In fact Wittgenstein goes to great lengths to ‘explain away’ what looks like intensionality in language, a case in point being his extensional reconstruction of such intensional constructions as ‘*A* believes that *p*’ in TLP 5.542 ff.

meaningful. Given how elementary sentences have contingent meanings by picturing contingent states of affairs, what then needs to be shown is how complex sentences have meaning in such a way that the feature of contingency is preserved. Here compositionality comes in. One of Wittgenstein's strongly held convictions is that the logic of the meaningful needs no 'middle men', there is nothing that serves to form meaningful combinations of signs that is not a meaningful sign itself. Hence, it is names that by themselves form configurations, the elementary sentences (TLP 4.22).<sup>15</sup> Which means that the elementary sentence is a purely compositional combination of signs. It is solely in virtue of their logical form that names determine, in a necessary, a priori way, all their possible combinations, i.e., the totality of all elementary sentences.<sup>16</sup> For complex sentences the task of determining the totality of possible meaningful combinations is fulfilled by truth functional logic, which secures compositionality. The fact that Wittgenstein does not rely on logical constants (connectives, quantifiers) as separate categories of expressions, with appropriate separate semantic interpretations, should not disturb us.<sup>17</sup> Wittgenstein's treatment of the logic of complex expressions is actually technically quite complicated, and it would take us too far afield to go into the details, in as much as these can be ascertained in the first place. Suffice it to say that by all intentions, Wittgenstein's treatment is compositional in this sense that besides elementary sentences and the transcendental, i.e., basic and independent logical structure of language and the world nothing plays a role in determining the realm of the meaningful. Meaning is determinate, non-contextual, and has a self-sufficient logic.

Does Wittgenstein's appeal to truth functional combination as the only machinery to derive complex sentences indeed preserve contingency? Well, almost, but not quite: tautologies and contradictions are the obvious exceptions. But given that they are the only ones, that is not a problem for Wittgenstein: for tautologies and contradictions do serve a function, since they show the logic of the meaningful in a very special way, viz., by being the limits of meaningful combinations of signs (TLP 4.466). Thus the structure of the realm of the meaningful is shown in three ways: in the way in which sentences have meaning by picturing situations; in truth-functional combinations that determine ever new complex meaningful sentences; and in the 'dissolving' of meaningful combination in tautologies and contradictions. And in each case compositionality is

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15. And the same holds, of course, for their ontological counterparts, the objects; cf. TLP 2.0272, 2.03. Note that this presupposes that names and objects display type variety, which allows function-argument structure and other kinds of combinations. It is because they are a priori (objects as substance) that the totality of states of affairs (and elementary sentences, in the case of names) is indeed determined, i.e., not contingent. The notion of the form of objects (and names) lends this determination a quasi-algorithmic flavour.

16. This is reminiscent of a purely combinatory categorial syntax as was developed later by people like Lesniewski and Ajduiewicz. Note that the lambda-calculus, though similar in some respects, is not a perfect model, since there one needs to define the properties of function-application (in terms of conversion and reduction).

17. In modern logic and in formal semantics, too, some form of syncategorematic treatment of certain classes of expressions is quite common, which departs from strict compositionality, but not in any principled way. Often the strictly compositional formulations is more cumbersome, and hence some slack in the formulation is accepted, for pragmatic reasons. As long as a strictly compositional formulation is possible, there is obviously no harm in this.

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Time to take stock. Disregarding many details, we can characterise Wittgenstein's architecture of meaning as an attempt to give a purely transcendental, non-contextual and formal account of the possibility of all meaningful expression. It characterises the realm of the meaningful by tying language (and thought) and the world together as isomorphic copies based on a purely logical structure common to both. That structure is extensional and compositional, and hence devoid of any material content or links with context or situation. It is like the grand design of a cathedral that rises above its worldly surroundings striving upwards towards eternity. Lofty, overwhelming, and an almost irresistible invitation to transcendence. But actual cathedrals took decennia, often centuries to build, their plans were constantly changed and adjusted, and very often they were only partially executed.

### 3 Quasi-historical Interlude: the Road from Vienna to Los Angeles

In the next section we will sketch how formal semantics arose at the end of the sixties, beginning of the seventies of the last century, partly as a reaction to prevalent opinions about natural language in philosophy, partly inspired by contemporary developments in linguistics. But it was made possible also by the availability of new logical techniques, and if one looks for historically traceable links between Wittgenstein's ideas from TLP and formal semantics, that is one area to look for one. A real historical investigation of the various often indirect ways in which Wittgenstein's ideas trickled down and influenced, mostly unconsciously, the work of the pioneers of formal semantics is beyond the scope of this paper. A few sketchy indications must suffice, and these are, moreover, only made for their systematic importance.

That Wittgenstein and TLP had great prestige among the members of the Vienna Circle is well-known. Moritz Schlick critically admired Wittgenstein's work, and Wittgenstein held Schlick in high regard, though also not uncritically. Waismann spent many years taking part in and recording conversations with Wittgenstein, Schlick and other members of the Circle. Some of these acknowledged at some point the influence of Wittgenstein's work. For our present purposes the most important one among these is Rudolf Carnap. That Carnap's work, in particular the *Logische Aufbau der Welt* from 1928 (Carnap, 1928), was inspired by some of Wittgenstein's ideas from TLP is well-known.<sup>18</sup> And in his later work, e.g., *Meaning and Necessity* (Carnap, 1956), Carnap also refers to TLP as a source of inspiration.

For the theme of the present paper it is not so much Wittgenstein's presumed or real influence on Carnap with regard to such issues as physicalism,<sup>19</sup> philosophy, or scientific method, including the issue of verification and meaning, that are relevant, but rather the ontological backdrop of meaning and reference. In *Meaning and Necessity* Carnap develops what he calls 'the method of state descriptions and ranges', as a means to give explicit definition of various concepts, such as truth and equivalence, intension and

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18. Cf., e.g., Friedman (1987).

19. Cf., Stern (2007).

extension. When he introduces the method he states that ‘some ideas of Wittgenstein were the starting point for the development of [it]’ (p. 9). Carnap likens his notion of state description to Wittgenstein’s concept of state of affairs (and to Leibniz’ concept of possible world). And as another example of Wittgenstein’s influence he mentions the idea that ‘to know the meaning of a sentence is to know in which of the possible cases it would be true and in which not’ (p. 10).

The state description and range method was used by Carnap to give, among other things, a semantics for various modal notions, and to give a formal construction of the concepts of intension and extension that avoided some difficulties that Carnap saw with Frege’s notions of sense and reference. The details of the difference of opinion between Frege and Carnap need not concern us here. What is important to note is the way in which Carnap ‘linguistifies’ what in Frege’s and in Wittgenstein’s theories was on ontological concept, that of a possibility. As we saw in section 2, Wittgenstein introduced in TLP an ontology that consists of possible states of affairs (which are the ‘atoms’) that make up possible situations that together fill logical space. The world is identified with ‘the totality of existing states of affairs’ (TLP 2.04), suggesting that any combination of states of affairs forms a possible world. Note that this concept thus is inherently partial in nature.

Carnap re-analyses this ontological perspective in linguistic terms. A state description is defined in terms of what Carnap calls ‘a semantical system’, which is basically a formal language (e.g., that of first order predicate logic with iota- and lambda-operators) along with an interpretation specified in some meta-language (e.g., English, suitably enriched). A state description in a semantical system is any set containing for all the atomic sentences of the system either that sentence itself, or its negation. The concept of a sentence ‘holding in a state description’ is defined recursively on the basis of atomic sentences belonging to it or not. Then the range of a sentence is defined as the set of all state descriptions in which it holds, and in terms of these concepts Carnap then continues to define various logical and intensional notions.

The consequence of this linguistic re-analysis is that many ontological issues become linguistic ones, something that of course fits in well with the main lines of thought characteristic for logical empiricism. And in view of the isomorphic relation that TLP constructs between language and world, such a redefinition might even be considered to be in the spirit of that work as well. But there is one crucial difference. For Wittgenstein in TLP the ‘language’ that is isomorphic to the world is a concept that is both singular and universal: it is a language, not languages, but this singular language is universal, it is language-as-such, the essence of any form of symbolic representation. In Carnap’s case languages are plural and particular: there is a wide variety of semantical systems and for each of them the notion of a state description is extensionally different. In such a set up reducing ontological concepts to linguistic ones implies a form of relativism, that is emphatically not present in the TLP framework. To be sure, Carnap welcomed this consequence and continued to make use of it, e.g. by analysing questions concerning abstract entities in terms of what he came to call ‘linguistic frameworks’.<sup>20</sup>

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20. Cf., Carnap (1950).

But from the perspective of what Wittgenstein wanted to achieve with TLP, such a relativism is not helpful or interesting at all.

Interestingly, although Carnap's analyses have proved to be very important and influential, especially in contemporary American analytic philosophy and logic, it was precisely this linguistic re-analysis of the ontological notion of a possible world that in the end proved to be an obstacle for obtaining a satisfactory, uniform semantics for the large variety of systems that by that time were characterised syntactically by means of various (additional) axioms. With state descriptions representing possible worlds, Carnap's semantics for the modal operators effectively comes down to quantification of the total set of worlds, which yields an adequate semantics for the strong system  $S_5$ .<sup>21</sup> In order to obtain satisfactory characterisations of the semantics of weaker systems ( $S_4$ , B, K, etc.) one needs a weaker notion, of quantification over some subset of worlds properly related. This relational semantics, a.k.a. 'possible world semantics', turned out to require a 're-ontologisation' of state descriptions. Textbook wisdom associates the first satisfactory formulation of possible worlds semantics for modal logic with the name of Saul Kripke, but a number of people have been responsible: Carew Meredith, Arthur Prior, David Kaplan, Stig Kanger, Richard Montague, and Jaakko Hintikka, to name a few.

But by the time possible world semantics became a standard the link with Wittgenstein and TLP was by and large broken,<sup>22</sup> and when possible worlds semantics was given a significant role in formal semantics this was done with hardly any awareness of the role TLP had played. It was Frege and Carnap that people referred to in this connection, not Wittgenstein.

#### 4 Pioneering Natural Language Semantics

In the late sixties, early seventies several people, from philosophy and from logic, started to develop systematic and formally explicit theories that attempted to deal with the semantics of natural languages along lines that were familiar from logic. In doing so, they felt they were going against prevalent opinion, which held that natural languages, being as complex, ambiguous and vague as they are, do not lend themselves to rigorously formal treatment. And a conclusion that some, though not all, people who held this conviction connected with it was that, for that very reason, natural languages were not suitable instruments for philosophical analysis. The pioneers of formal semantics all rejected the first point, and most of them also the second one, though here opinions sometimes vacillated somewhat.

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21. A semantics like this is already hinted at in TLP's analysis of tautologies and contradictions as being true and false respectively for all truth possibilities of elementary propositions (TLP 4.46), given that truth possibilities are defined in terms of the existence and non-existence of states of affairs.). Cf., Copeland (2002, p. 100-101). Copeland's paper gives an excellent overview of the very complicated and sometimes obscure history of the development of possible worlds semantics. For an historical survey that focuses on formal results, cf., Goldblatt (2005).

22. Copeland (Copeland, 2002, p. 117) does mention that Meredith was influenced by TLP.

A clear statement of the goal of the enterprise, that reflects these motivations, comes from a 1970 paper by Richard Montague, aptly titled ‘Universal Grammar’:<sup>23</sup>

There is in my opinion no important theoretical difference between natural languages and the artificial languages of logicians; indeed, I consider it possible to comprehend the syntax and semantics of both kinds of languages within a single natural and mathematically precise theory. On this point I differ from a number of philosophers, but agree, I believe, with Chomsky and his associates.

The message conveyed here is clear: other than ‘a number of philosophers’, Montague thinks that the tools and techniques used to deal with the languages of logic can be applied to natural languages because in the end, when it comes down to fundamental properties, there is no difference between the two. Both can be captured with the same means. Notice that Montague appeals to Chomsky as a supporter of this cause, the idea being that Chomsky had provided evidence that the syntax of natural languages can be dealt with with formal precision, which was regarded as an obvious requirement for a formally precise semantics.<sup>24</sup> In its turn this assumption depends on another one, regarding compositionality, about which more below.

Similarly Davidson, in his seminal 1967 paper ‘Truth and Meaning’ claims that Tarski’s worries, expounded in, e.g., Tarski (1944), that ‘we would have to reform a natural language out of all recognition before we could apply formal semantic methods’<sup>25</sup> are ill-founded and he, too, appeals to Chomsky, and on a more positive note than Montague, when he says that ‘recent work by Chomsky and others is doing much to bring the complexities of natural languages within the scope of serious theory.’<sup>26</sup>

For Davidson the differences between formal languages and natural languages are outweighed by the similarities inasmuch as we can get a proper semantic theory for a natural language, such as English, starting from interpreted formal languages as follows:<sup>27</sup>

[P]ick one as much like English as possible. Since this new language has been explained in English and contains much English we not only may, but I think must, view it as part of English for those who understand it. For this fragment of English we have, *ex hypothesi*, a theory of the required sort. Not only that, but in interpreting this adjunct of English in old English we necessarily gave hints connecting old and new. Wherever there are sentences of old English with the same truth conditions as sentences in the adjunct we may extend the theory to cover them. Much of what is called for is to mechanise as far as possible what we now do by art when we put ordinary English into one or other canonical notation. The point

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23. Cf., Montague (1970c, p. 221); page references are to the version in Montague (1974).

24. Not that Montague held the actual work of Chomsky in very high regard: ‘It appears to me that the syntactical analyses of particular fragmentary languages that have been suggested by transformational grammarians [...] will prove to lack semantic relevance’ (Montague, 1970c, footnote 2, page 223).

25. Cf., Davidson (1967, p. 29); page references are to the version in Davidson (1984).

26. Cf., Davidson (1967, p. 30).

27. Cf., Davidson (1967, p. 29).

is not that canonical notation is better than the rough original idiom, but rather that of we know what idiom the canonical notation is canonical *for*, we have as good a theory for the idiom as for its kept companion.

The passage deserves to be quoted in full since it illustrates, not just the idea that formal languages can be used to provide the semantics of a natural language, but also a view on the process of formalisation in semantics that is quite characteristic.<sup>28</sup> The idea is that a proper semantic theory for a natural language can be obtained by defining a ‘mechanised’ mapping of the sentences of that language into formulae of some suitable, interpreted formal language. Such a procedure has to meet requirements of completeness and explicitness that make it ‘mechanical’ in the sense of not dependent on any particular knowledge and skills one might need in order to apply it. In these respects it then mimics what are assumed to be characteristic features of semantic competence.

A couple of things should be noticed at this point. First of all, the pioneers clearly shared with generative linguistics the conception of a natural language as an infinite object, i.e., as an infinite set of structured expressions. This is already evident from their use of formal languages, which are *defined* to be that way, as models for natural languages. And some authors are even more explicit in that they agree that the goal of a semantic theory is to account in a finite way for the learnability of an infinite language and for the language users’ competence in dealing with a potentially infinite number of new sentences and new meanings. In Davidson’s early papers, for example, this is a recurrent theme.<sup>29</sup>

A second thing to be noticed is that compositionality plays a key role. If the infinite number of meanings of an infinite number of natural language expressions is to be defined in a finite manner, so as to account for both learnability and usability, then compositionality seems, if not necessary, at least sufficient.<sup>30</sup> The idea is that by defining compositional semantic analogues of syntactic rules one can account for these features of natural languages, since by making use of the syntactic structure one is able to define the meaning of a complex expression in terms of the meanings of its components, in the end all the way down to those of its lexical elements.

The link between compositionality and competence brought formal semantics close to Chomskyan linguistics, but not all the way. The pioneers coming from philosophy and logic consciously or unconsciously subscribed to the Fregean idea of logic, and, by extension of logic as applied to natural language, as a ‘normative’ discipline, to be distinguished sharply from psychology. Frege held that logic does not describe how we

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28. Cf., Cresswell (1973, p. 1) for another statement of this view: ‘I shall introduce a series of formal languages, modelled on the languages of symbolic logic, which gradually increase in complexity until they reach a point at which they can profitably be thought of as models for natural languages.’ As in Davidson’s case, the formal languages are interpreted languages.

29. Cf., in particular, Davidson (1965, 1967, 1970). Although widely accepted, the idea of language as an infinite object is by no means a conceptual necessity. Cf., Groenendijk & Stokhof (2005) for an alternative view. In linguistics, too, other voices are being heard, e.g., those of people working on so-called ‘construction grammars’; cf., e.g., Tomasello (2003); cf., also Pullum & Scholz (2005) for some discussion of the history of the idea in a generative framework.

30. Traditionally, the link between usability and compositionality is traced back to Frege, e.g., to Frege (1918–1919). The attribution is controversial, however. Cf., Janssen (2001) for discussion.

actually think, but prescribes how we ought to think. Analogously, many formal semanticists held that their theories exhibited the ‘ideal’ structure of natural language meaning, and that what they were aiming at was a complete and transparent representation of the logical relationships between sentences, not a description of how these sentences are actually produced and understood. So for them formal semantics was empirical (and in that sense different from logic) only to a certain extent, i.e., only in so far as it deals with an empirically given language. For formal semanticists coming from Chomskyan linguistics, on the other hand, the idea of semantics being an account of underlying psychological processes was not that strange.<sup>31</sup>

Finally, note that there is an assumption at work when one claims that formal languages can model natural languages, viz., that by abstracting away from the surface differences between formal languages and natural languages nothing of significance is lost. More in particular, the meanings of the natural language expressions remain essentially intact. One difference that is particularly relevant in the context of the present discussion is that whereas natural language expressions are geared towards use in context, and ‘actively’ employ contextual resources to convey meaning, the expressions of formal languages are context-independent, and deliberately so. It will be clear that abstracting away from this difference favours a highly ‘de-contextualised’ concept of meaning. It also makes the relation between form and meaning in a natural language very indirect, up to a point where the same meaning can be expressed by any arbitrary form, provided some constraints regarding category and type are met. This clearly points towards a notion of meaning that is not only not contextual, but universal and absolute.

In the picture that emerges the central goal of formal semantics is to deal with objective meanings of natural languages, conceived of as infinite structures, in a precise, ‘mechanical’ and finite way. What should be noted is that the equation ‘precise = formal’ is applied without much further ado. It is assumed, rather than argued that precision needs formalisation, or at least the use of a formal language as a counterpart to the natural language that is being studied. The assumptions on which the concept of formalisation rests, are complex and diverse, and it is not too often that one finds a more elaborate defence than a quick pointer to ambiguity and vagueness as properties of natural language expressions that necessitate it. The use of a distinction between grammatical form and logical form is more often a sleight of hand than a well-argued application of

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31. So there is an obvious tension between the Fregean and the Chomskyan roots of formal semantics. For a while people tried to argue that Fregean anti-psychologism could somehow be connected to the Chomskyan competence – performance distinction. But that turns out to construct competence in such a way that it is not related to human psychological and/or biological structure at all, and that is certainly at odds with Chomsky’s insistence that linguistics is a branch of psychology (or biology). If competence is a psychologically and/or biologically real the Chomskyan position can not be any other than that (the larger part of) semantics does not belong to linguistics (in the ‘narrow’ sense). But that was hardly an attractive position for formal semanticists.

Wittgenstein’s position in TLP is complicated. On the one hand he clearly intends his analysis of ‘thoughts’, which are characterised as ‘logical pictures’ (3), as completely general, and hence dismisses psychological considerations as irrelevant (4.1121). On the other hand, from correspondence with Russell in 1919 (Wittgenstein, 1979a, appendix III) it is clear that he did think that actual thoughts do conform to his general principles.

a clearly conceived distinction.<sup>32</sup> However, an investigation of them would be beyond the scope of this paper. But it is worth noting in the present context, since sometimes one gets the impression that formal semanticists are as adverse to language reform and hence as ambivalent as Wittgenstein was when he claimed that natural language is ‘al-right’ (5.5563) yet also propagated the idea of ‘analysis’ by means of reformulation in a language that obeys ‘logical syntax’ (3.325) into a completely perspicuous representation, of which the logical properties could simply be read off. And of course this is a point where Wittgenstein’s later criticisms of TLP straightforwardly apply also to formal semantics.

Another equation that formal semantics applies is ‘formal = logical’. Again, not much argumentation can be found in the original writings of the pioneers, which in this case probably is understandable. At the time logic pretty much had the field to itself.<sup>33</sup> The semantics of procedural programming languages still had to be invented, and other formal modelling techniques were also still in their infancy. The application of concepts and tools from fields other than logic, then, had to wait another decade.

And then there is a third equation that is applied, one that might appear more puzzling. It reads ‘logical = model-theoretic’. Again, if one looks at the seminal papers of Montague, Davidson and others, not much argumentation for this equation can be found. The idea of a proof-theoretic approach is never raised, discussed and rejected, and it would only be much later that the first attempts to do semantics of natural languages by some more syntactic methods would appear.<sup>34</sup> There may be various reasons for this, such as a shared rejection of the various forms of verificationism that had characterised logical empiricism; the fact that possible worlds semantics had constituted such a breakthrough in modal logic; or perhaps even Gödel’s incompleteness results. That the expressive power of natural languages equals at least that of second order predicate logic seems universally accepted at the time of the pioneers. It was only much later, when work on computational applications started to get serious momentum, that questions concerning complexity and effectiveness gained equal footing with considerations concerning expressive power.

This general scheme, that aims to realise a shared ambition, viz., that of a formally rigorous, model-theoretic semantics for natural languages, still allows for a variety of ways in which it can be made concrete and applied. One major dimension along which one may find differences between implementations is the kind of semantics that is considered needed, or allowed, in particular with regard to the use of intensional entities, such as possible world, properties, propositions, and the like. Interestingly, argumentation here is not just empirical, but also, and in some cases predominantly, philosophical.

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32. Cf., Stokhof (to appear) for some more discussion.

33. Perhaps with exception of algebraic methods, which were already heavily used in the study of modal logic, cf., Goldblatt (2005). But the idea that they could be fruitfully applied in natural language semantics came only much later, with the work of Keenan and Faltz on Boolean constructions.

34. One development that spurred such attempts was the concept of ‘formulae as types’ proposed by Martin-Löf, cf., e.g., Ranta (1991); the earlier work of Prawitz on natural deduction and constructive semantics remained largely unknown.

For some, such as Montague the full range of intensional entities is in principle available to be used in modelling natural language meanings, as is testified by his ample use of intensional type theory.<sup>35</sup> Similarly, Cresswell uses set-theory to construct a rich ontology, which includes a variety of intensional objects, including events.<sup>36</sup> Davidson, on the other hand, rejects a wholesale appeal to intensional objects and uses an extensional ontology to define his truth conditional semantics.<sup>37</sup> And then there is also what looks like an ‘agnostic’ attitude expressed by David Lewis: ‘In order to say what a meaning *is*, we may first ask what a meaning *does* and then find something that does that.’<sup>38</sup> This may look like a completely pragmatic approach, but appearances may be deceiving here, since Lewis says at the beginning of his paper that his intention is ‘to propose a convenient format for semantics general enough to work for a great variety of logically possible languages’ and that answering such questions as ‘What sort of thing is a meaning?’ is part of that.<sup>39</sup> This suggests that for Lewis, too, the choice of a framework for semantics really is a philosophical issue, a suggestion that is reinforced by his staunch realism with regard to modal concepts, which is in part defended by means of detailed analyses of natural language constructions.<sup>40</sup>

That the way in which the pioneers go about developing their respective frameworks for formal semantics of natural language is rife with philosophical considerations, is also apparent from the fact they are not just concerned with the notion of meaning in a strict sense, but treat issues concerning semantics as closely linked to broader philosophical ones. For example, Davidson’s choice of semantic framework is in part based on ontological considerations, and he uses that very same framework also to tackle philosophical questions, such as the ontology of individuals, time, and events, causation, and so on.<sup>41</sup> Perhaps less well-known are Montague’s view on this matter:<sup>42</sup>

[. . .] I have reason to hope that the ambiguities I have pointed out will confirm two points sometimes mistakenly supposed incompatible: there is philosophic interest in attempting to analyse ordinary English; and ordinary English is an inadequate vehicle for philosophy.

Obviously Montague, like Davidson, is of the opinion that semantic and philosophical issues are intimately related. True to ‘the linguistic turn’ he claims that the analysis of language is key in dealing with philosophical problems. The passage just quoted appears at the very end of the paper, but in the opening paragraphs, too, we can witness the same seamless going back and forth between analysis of language and ontological and epistemological questions: ‘It has been maintained that we need not tolerate such entities as pains, events, tasks, and obligations’ is the opening statement,<sup>43</sup> which introduces

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35. Cf., e.g., Montague (1973, 1970a).

36. Cf., Cresswell (1973, chapter 7). It is no accident that both Montague and Cresswell, before turning to natural language, had worked on modal logic.

37. Cf., Davidson (1965, 1967, 1973).

38. Cf., Lewis (1970, p. 173). Page references are to the version in Davidson & Harman (1972).

39. Lewis (1970, p. 169).

40. Cf., e.g., Lewis (1973).

41. Cf., Davidson (1977a) for discussion.

42. From Montague (1970b, p. 186).

43. Montague (1970b, p. 148).

the ontological problem of certain abstract entities. That problem is immediately tied to language, e.g., through the observation that we may not need such entities as pains for sentences like ‘Jones has a pain’ (which can be analysed as a simple subject – predicate judgement), but that we do need them for sentences like ‘Jones just had a pain similar to the one he had yesterday’ (since the referential function of the indefinite noun in this case can not be ‘explained away’ in terms of a predicate, without loss of meaning). Hence the analysis of such sentences enforces an ontology containing such abstract entities as pains, obligations, events, and the like. Thus semantic analysis has ontological consequences. And vice versa, the proper way to go about, according to Montague, is ‘to investigate the nature of the entities in question, construct an exact and convenient language in which to speak of them, and analyse the pertinent notion of logical consequence’.<sup>44</sup>

Time to take stock again. Although formal semantics of natural language aimed right from the start to be applied in the study of empirical phenomena, and soon after its inception was so applied, broadly and successfully, its origins are remarkably strung with strands of philosophical conviction. Its architecture of meaning, like that of Wittgenstein’s in TLP, is built, primarily, it seems, on philosophical, conceptual considerations regarding meaning in general, many of which are derived from other branches than those dealing with natural language meaning as an empirical phenomenon. And the requirements imposed, too, are by and large motivated by considerations of explicitness and elegance that bespeak their origins in logic. Unlike in TLP, which is after all a single man’s work, formal semantics displays a certain variety, e.g. with regard to ontology, but again it is remarkable that the arguments adduced on such issues are mainly of a philosophical bend, even where they explicitly address facts from a given natural language.

## 5 Resemblances and Differences

In this section we will confront the characteristic features of TLP, discussed in section 2, with the main assumptions of formal semantics outlined in the previous section, and see to what extent they line up, in particular with regard to the philosophical assumptions underlying them. Again we will be concerned primarily with formal semantics in its initial stage, when the enterprise was taking shape. As we already pointed out, the ideas of the original pioneers quickly caught on and drew more and more people to this emerging field, not just from philosophy or logic but increasingly also from linguistics. To a certain extent that changed the discipline, at least in the sense that discussion of principles soon gave way to description and explanation of empirical semantic phenomena in concrete natural languages.<sup>45</sup> However, that principles are not actively discussed does not imply that they are not operative. In section 6 we will have the opportunity to

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44. Montague (1970b, 148–9).

45. Cf., Kamp & Stokhof (to appear), already referred to above in footnote 6, for a detailed description and analysis of this development.

briefly mention some instances of their continuing influence. But for now we restrict our attention to the pioneering stage.

Before we turn to that discussion, however, it might be useful to state once again that our considerations here are systematical, not historical. In fact, there is very little or no awareness among formal semanticists that the Wittgenstein of TLP could count as a predecessor of their trade. The pioneers all refer to Frege, to Carnap, to Tarski, they acknowledge the influence of these thinkers and often discuss their ideas in detail. But Wittgenstein? Montague does not mention him, Cresswell only refers to him in connection with the truth conditional view of sentence meaning. References to his work in Davidson are sparse and never address issues concerning semantic theory proper. The same holds for many other authors. And it does not get better over time. References in the textbook introductions that start to appear from the eighties onwards all display the same pattern. The early Dowty et al. (1981) does not discuss the history of the discipline at all; Gamut (1991) discusses Frege (in some detail), Tarski, and Carnap, but mentions Wittgenstein only in connection with the truth conditional view; de Swart (1998) mentions Frege and Tarski, Chierchia & McConnell-Ginet (2000) adds a reference to Carnap, but in both Wittgenstein is conspicuously absent. And this is curious, indeed. Frege never proposed a formalisation of natural language, Tarski explicitly entertained serious doubts about the applicability of his truth theory to natural language, and Carnap used the ‘wrong’ conceptual apparatus. Yet the one figure that is not mentioned actually is the closest predecessor of formal semantics.

But let us leave the riddle of how a discipline constructs its history, and turn to our systematic issues. The case of two of the three characteristics of Wittgenstein’s architecture of meaning that we introduced in section 2, viz., those of compositionality and intensional referentialism, is relatively clear. It is mainly the third feature, that of universalism, that may not be that obviously represented in formal semantics.

Let us start with compositionality. Both in TLP and in formal semantics compositionality was a key feature, one that was so characteristic for the entire undertaking that it is hardly conceivable what it would be without. As was pointed out above, formal semantics ‘imports’ compositionality from the formal languages of logic, which simply come with a semantics that is defined in that way. The most common route is to model natural language meanings indirectly, via translation of natural language expressions into those of a logical language which has a compositional semantics. If the translation relation itself is compositional (which it is if it is a homomorphic mapping), then the compositional semantics of the formal language translations induces a compositional semantics of the natural language source expressions. A good example of this ‘indirect interpretation strategy’ is what was for a long time the standard model of formal semantics, viz., Montague’s ‘PTQ-model’.<sup>46</sup> What is important to note, since it brings the TLP-system and formal semantics closer together, is that indirect compositional interpretation can also be transformed into direct compositional interpretation, which is then one crucial feature that TLP and formal semantics share.<sup>47</sup>

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46. Cf., Montague (1973).

47. For a framework in which natural language expressions are interpreted directly, cf., Montague (1970a). Montague defined a general, algebraic framework in Montague (1970c). There both syntax and seman-

But, as we have also seen, there are differences as well. For Wittgenstein compositionality is first and foremost a fundamental characteristic of the realm of the meaningful, one that allows a determination of that realm ‘from within’, i.e., by specifying the base case, of elementary sentences, and the production rules, i.e., the compositional, truth functional combinations. In formal semantics compositionality is imported from logic and then used to explain features of competence, in particular ‘creativity’, i.e., the ability to produce and understand novel expressions. For Wittgenstein this is not a real concern. Although he does mention the aspect of creativity (though not by that name) in TLP 4.025 ff., the concept of individual competence has no role to play in the TLP scheme of things, because of the general nature of the latter: it is not individual languages, let alone individual users of those languages, that Wittgenstein is concerned with, but language as such. Conversely, no requirement to characterise meaning from within arises when we consider the semantics of a particular language. In fact, using the object language – metalanguage distinction we can describe the semantics of any particular language ‘from the outside’. Hence Wittgenstein’s specific reason for doing things compositionally does not apply. And indeed what we see are different reasons being given, mainly centring around creativity and learnability.

What is important to note is that although at this point there is a clear difference between Wittgenstein and formal semanticists, it plays out against the same backdrop, viz., a view of language as an infinite object, an entity in its own right, that Wittgenstein and the formal semanticists share. That concept of language is typically dissociated from actual use, actual users, actual competence. It leads to a non-contextual notions of meaning, which then need to be ‘supplemented’ with contextual elements, such as speaker’s meaning, implicatures, and the like, and it strongly favours ‘individuality’, i.e., a conception of competence as the property of an individual: it is individuals as such that are competent, and hence it is individuals that ‘have’ (grasp, produce) meanings.

Language being conceived as an infinite object and competence being considered as an individual property, a problem arises: How can one give an finite characterisation of such an object? How can one learn it? How can one use it to its fullness (at least potentially)? That is not three different problems but three variants of one and the same problem, and compositionality is called to the rescue in each case.<sup>48</sup>

As regards intensional referentialism, we first of all have to take into account the difference of opinion among formal semanticists with regard to the use of intensional entities as meanings. As we saw, for Davidson such entities have no role to play, which means that he disagrees at this point with the TLP-framework, in which the meaning of a sentence, being the situation it depicts, is such an entity. Those who work in the possible worlds framework, however, couldn’t agree more.<sup>49</sup> There is definitely a sense in which Davidson is more akin in spirit to TLP, since, as we saw above, Wittgenstein does forgo

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tics are defined as algebras, with translation (between languages) and interpretation (of languages) being characterised in terms of homomorphic mappings.

48. Cf., Groenendijk & Stokhof (2005) for a more detailed discussion of the various assumptions that go into making up such a view.

49. We can safely disregard the difference between the ‘total’ nature of possible worlds and the partial nature of TLP’s situations.

the use of intensional meanings in defining the semantics of complex sentences. There he uses extensional truth functions, not the intensional situations the ontology supplies. And it is probably because of that when TLP is referenced at all, it is Wittgenstein's equation of knowledge of meaning with knowledge of truth conditions (TLP 4.024) that is cited.

Another question with regard to intensional referentialism concerns reference as such. As we saw the existence of a referential relation between names and objects is one of the central elements in how elementary sentences depicts states of affairs, i.e., in how they have meaning. Likewise, a determination of the references of basic expressions as a preliminary to the determination of the meanings of complex expressions is an integral part of the various possible worlds type approaches in formal semantics.<sup>50</sup>

Some approaches in formal semantics, notably Davidson's, exemplify a holistic approach to the role of reference with regard to meaning. There reference is not a relation that can be determined independent of the meanings (truth conditions) of sentences. Thus Davidson insists that we can not explain reference within a semantic theory, but that we can only employ it.<sup>51</sup> That seems congenial to the contextuality principle with regard to reference of names that Wittgenstein formulates in TLP 3.3, where he states that 'Only sentences have meaning; only in the connection of a sentence does a name have reference'. For Wittgenstein, too, it holds that the references of names can not be explained independently from the meanings of the sentences in which they occur, which serve to 'elucidate' them. Does this imply that the reference relation is not fixed, but can be re-interpreted in any way that is consistent with the meanings assigned to sentences? This is a question that makes sense in the modern model-theoretic perspective, where interpretation is defined relative to a model, and where different models may share some properties (say, assign the same truth conditions, or sets of possible world, to a certain class of sentences) yet differ in other respects (for example, in what reference is assigned to what basic expressions). In TLP that distinction is not available. In modern terminology: Wittgenstein is interested in absolute interpretation, not in relative interpretation. But then 'reference' takes on a different meaning, and

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50. An interesting formulation, that actually makes a connection with TLP, can be found in Thomason's introduction (Thomason, 1974, p. 41) to Montague's collected papers:

One of the chief developments that made it possible to put physics on a rigorous mathematical basis was agreement on the form a system of units should take. [...] Many philosophers seem to have regarded the establishment of a theory of meaning as requiring an analogous foundation in terms of a system of units. Wittgenstein's *Tractatus* is, among other things, an attempt to regard meanings as dependent on just two basic notions: *entity* and *truth value*. [...] Montague's framework (adopted not only by him but by many other practitioners of 'possible-worlds semantics') is a generalisation of the *Tractatus* framework. The type of entities and the type of truth values are retained as basic semantic units, but another type is added, that of possible worlds.

The passage is interesting because Thomason completely ignores the intrinsically intensional nature of the TLP-system. As we suggested above, apparently, that aspect is eclipsed by the truth conditional characterisation of meaning in the text. Also note that what Thomason ascribes to Wittgenstein here is in fact Frege's position: the latter did acknowledge truth values as entities, the former rejects this explicitly (TLP 4.431, 4.441, 5.4).

51. Cf., Davidson (1977b).

needs to be thought of more as an indication of a semantic role than as denoting a semantic value.<sup>52</sup>

The distinction between absolute and relative interpretation connects the discussion of intensional referentialism with that of the third characteristic of TLP's theory of meaning, universalism. We venture the hypothesis that formal semantics is committed to universalism in a way that is quite comparable to TLP. For what formal semantics shares with TLP is a concern with laying bare the underlying logical structure of language as such. There is a difference, of course. In TLP the universalism is directly visible, since it is the only thing that matters. In formal semantics, which aims to provide semantic descriptions and explanation of concrete languages, the universalism is present in an indirect way, viz., the tools that are being developed and principles that are being adopted to realise that descriptive and explanatory aim. Wittgenstein has no such aims, his interest is in a transcendental deduction of the basic principles underlying any form of symbolic representation. As we indicated above, 'ineffability' is a necessary consequence. Whether that applies to formal semantics as well depends on the extent to which it is committed to universalism. So let us take a closer look at that. First we try to substantiate the claim that formal semantics is committed to universalism, in some form or other. And second we will investigate whether the availability of modern conceptual tools, such as the object language – metalanguage distinction, makes a difference for the consequences of that universalism.

As said, in formal semantics the universalistic claims are not in the actual descriptions and explanations that applications of the frameworks are supposed to produce. By and large these are language specific, and even when they generalise over certain language families, or even aim to identify universal properties of natural language semantics, they do so from essentially an empirical point of view. And as such their goals and hence the requirements they should meet are categorically different from what applies in the case of TLP. So where are the universalistic assumptions located? It is in the framework as such. The definition of a framework for doing semantics, such as Montague's Universal Grammar, or Davidson's truth conditional semantics, embodies the claim that it is by the use of this particular formal apparatus, and hence by means of these assumptions and principle about meaning that apparatus embodies, that all meaning can be described. Typically, the canonical frameworks for formal semantics that were developed in the pioneering days start out with a completely general definition of what meaning is, what its structure is like, and so on, only subsequently to apply it in the description and explanation of concrete semantic phenomena.<sup>53</sup> And that this is not all that different from what Wittgenstein does in TLP. The difference is that in TLP the emphasis is exclusively on the framework (and then only its most general aspects) and that actual applications

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52. Consequently, the notion of an 'object' becomes more like that of an 'arbitrary object' on the sense of Kit Fine. Much more needs to be said on this issue, also in connection with TLP's treatment of identity. Cf., Stokhof (2002, pp. 162 ff.) for more discussion.

53. Cresswell's approach in Cresswell (1973) might appear to be an exception, since he advocates going from basic logical language to one that 'models' a concrete natural one. However, note that this process is mainly one of adding content (and some additional structure) to a basic frame that is the same for all such models.

simply do not figure in the text as such. But the relationship between framework and possible application in TLP and in formal semantics appears to be quite comparable.

And the pioneers themselves would seem to agree to an ascription of universalism in some form. Recall the first sentence of the opening paragraph of Montague's 'Universal Grammar', which we quoted at the beginning of section 4: 'There is in my opinion no important theoretical difference between natural languages and the artificial languages of logicians', clearly a statement that conveys universalistic aims.<sup>54</sup> Davidson, too, is quite explicit about the universal nature of his framework. This is already evident from the completely general way in which he argues that a Tarskian theory of truth gives us the basic structure of semantic theory: in that derivation no contingent features of particular languages or formalisms play a role (other than illustrative).<sup>55</sup> And the way in which he uses that framework in settling other issues, such as conceptual relativism, or ontological issues, also bespeaks a universalistic approach.<sup>56</sup>

But what about the distinction between absolute and relative interpretation? Actually, there seem to be three positions one might take here. First of all, one may aim to give 'the' interpretation of a language, i.e., to give a complete description of the actual meanings of all the expressions of a specific language.<sup>57</sup> Second, one may be intent to specify suitable interpretations of a language, i.e., to give a partial description, which fully specifies some of its meanings, but leaves others unspecified (i.e., determine their type but not their content). Third, one may drop the language parameter, and look for general features that characterise meaning in general. Note that these three options can not be simply ordered in terms of generality, since the presence or absence of the language parameter also changes the character of the undertaking, making it empirical or conceptual, respectively.

It is clear that TLP's goal is the third one, and a framework like Montague's aims for something like the second option. One of the main differences between the first and the second is that semantic specification is total or partial, respectively. Note further that in a standard, referential setting the first option does not make much sense (as an aim for semantic description, that is), since it would involve determining the actual references of all the expressions which implies the actual truth values (not just truth conditions) of all the sentences. So the only way to stick to the idea of semantics aiming for absolute interpretation in the first sense is to 'loosen up' on reference. And this

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54. Actually, Richmond Thomason notices that what he calls the 'generality' of Montague's approach is likely to be misunderstood (Thomason, 1974, p. 47):

Philosophers and linguists are apt to object to the form taken by Montague's semantic theories, on the ground that content has been sacrificed to generality. [...] this feature of his work is not merely a defect of style. To a considerable extent the rarefied character of his semantic writings is a consequence of his fundamental approach.

Apparently, Thomason, too, reads an universalistic aim in Montague's framework, and recognises that there is a discrepancy with the particularistic nature of the applications of the framework. This gap he then attempts to bridge by making use of conceptual distinction such as that between lexical semantics and structural semantics.

55. Cf., Davidson (1967).

56. Cf., Davidson (1974, 1977a).

57. The parametrisation could also involve some specific subclass of languages, but we will ignore that in what follows.

is what Davidson does. He insists that semantics should be what he calls an ‘absolute theory’, in which no relativisation to a model (interpretation, domain, world) occurs.<sup>58</sup> In TLP, too, the semantic theory is an ‘absolute’ one, i.e., it is the one true theory. And here, too, reference plays a different role than it does in theories that take the second position. This shift in the role of reference that the first and third options bring about is not without conceptual complications, as we have seen. For one thing, a semantics that does not account for reference seems strangely ‘incomplete’. So presumably, that is one reason why the second option is still very much in favour.

Another reason concerns the distinction between ‘lexical semantics and ‘structural semantics’. Intuitively, it seems clear that we should aim for an absolute theory: if the semantics of, say, English is what we are after, then it is a complete description that we want. Everything else would be ‘substandard’. However, most theories will in fact take the second position, and usually this is motivated by making a distinction between an account of the content of lexical expressions, lexical semantics, and a specification of operations that build complex meanings from simpler ones, structural semantics. The difference between the two seems intuitive and clear enough, and almost ‘innocent’, but it remains to be seen whether it really is a distinction that can be made in a theory-neutral way. The difference between ‘word’ and ‘sentence’, for example, might have some intuitive, theory-independent ground, yet any explication of it would be theory-laden, and as an intuitive distinction it would not support full blown compositionality as a ‘real’ phenomenon, but at best only as a theoretical device.

For one thing, it is quite obvious that in formal semantics the distinction is in fact inherited from the way in which formal languages operate. It is because the semantics of natural languages is modelled after that of formal languages (among others through the very use of those formal languages in their description) that we end up with this way out. For formal languages the distinction makes sense: it is the function of a formal language to enable us to abstract away from what we are not interested in, and to just focus on what we do want to treat. After all, that is how formal languages are *designed* to operate. But a semantics for a natural language that is true to its calling can not follow suit, at least not ultimately. Of course, here too, we can do only so much at a time, so in that sense the use of a formal language can function in the same way. But do note that this is not at all the same as modelling a natural language after a formal one. So it seems that what is more or less the standard way of doing formal semantics of natural language is heavily influenced by unconscious borrowings from formal language. Certain properties of the latter are projected on the former by being built into the the general framework.<sup>59</sup> And precisely in that lies the (implicit) universalism.

Let us now turn to the second issue raised above, ineffability. What formal semantics shares with TLP is a concern with laying bare the underlying logical structure of language. Of course, the various frameworks that have been proposed differ on what that structure looks like, but that is a material difference, and hence immaterial. For

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58. Cf., Davidson (1977b, 216).

59. Does this apply to TLP as well? There the abstraction to just truth functional operations seems motivated by different concerns. But on the other hand, Wittgenstein’s only model of a language that transparently shows its logical form was that of a logical language.

Wittgenstein universalism implies ineffability: logical structure can not be described, it can only be shown. Formal semantics could rely on Tarski's distinction between object language and meta-language to get around this, but that works only (or, more carefully, might work only) if we distinguish between formal languages, to be employed as meta-languages, and natural languages, being the object languages that we want to describe. Two remarks are in order. First of all, such a use of the object language – metalanguage distinction flies in the face of universalism, that, as we just saw, also characterises formal semantics. After all, Montague claimed that there was in his opinion no difference between formal and natural languages to begin with. Secondly, if we grant the distinction, another deep and serious problem arises, the threat of circularity. If we use a formal language to specify the semantics of natural language (all of them), then we can do so only if somehow the semantics of the formal language is given independently. But what is the semantics of a formal language other than its description given in, ultimately, a natural language?

Of course this problem does not diminish the usefulness of the object language – metalanguage distinction for giving concrete descriptions of particular languages or classes of languages. But it is a serious problem for a framework that wants to be universal, i.e., one that wants to talk about meaning as such. The problem is completely obvious if the universalism encompasses all languages, formal and natural. But it is arguably also a problem in case we limit our universalistic aims to just natural languages, because in that case we would need to have access to the semantics of the formal language(s) that we use, via some other route than a natural language. But what could that be?

Here, it seems, formal semanticists and Wittgenstein (of TLP-days) are in the same boat, the difference being that the latter is aware of the consequences of his universalism and embraces ineffability wholeheartedly, whereas the former in general seem oblivious to the conundrum that is the result of their universalistic aspirations. In general, for in Davidson's case one could argue that his distinction between a semantic theory, being a Tarskian theory of truth that functions as a specification of the semantics of natural language expressions, and a theory of interpretation, being a theory that accounts for how we can arrive at such a semantic theory, indicates an awareness of the problem. Whether it also solves it, is another question, one that would lead us too far afield to answer here.

## 6 Consequences

This final section is concerned with a very brief discussion of two questions concerning the status of modern day formal semantics. From the pioneering days that have been the main subject in the foregoing sections, formal semantics has developed into a thriving branch of linguistics. As was indicated earlier, the initial phase was very much concerned with laying down the principles of the enterprise, concentrating on conceptual and formal issues, but in the next stage the emphasis shifted to description and explanation of concrete empirical phenomena. During that development the theoretical frameworks

changed as well, of course. Was the initial phase one of ‘uncovering structure’, and defining the tools needed to deal with that, what came after that was very much one of ‘reinstating content’, and modifying and adapting the formal machinery inherited from the pioneers to do so. Gradually, uniformity gave way to diversity, and radical changes were proposed and implemented. That has led to the present day situation in which the term ‘formal semantics’ denotes a single, coherent field only in name. A wealth of different frameworks and approaches are pursued almost in parallel: dynamic semantics, discourse representation theory, optimality theoretic semantics, game theoretic semantics, to mention just a few.

The first question is whether the philosophical elements of formal semantics in its early days, that we have discussed above, have survived the development of formal semantics into its present state. For example, we have seen that universalism is connected with an a prioristic, transcendental point of view. Can that simply be dropped, or would that have further consequences? Alternatively, if it is intrinsic to universalism, what does that imply for the status of semantics?

The second question is whether there are any lessons still to be learnt by semantics from Wittgenstein’s work after TLP. Wittgenstein formulated some penetrating criticisms of TLP, e.g., in *Philosophical Investigations*, some of which are directly aimed at the by now familiar aspects of universalism, compositionality, and intensional referentialism. The core question here is whether Wittgenstein’s objections have consequences for the theoretical frameworks of formal semantics. Obviously, one’s answer to the second question depends in part on what the answer to the first question is taken to be.

As for that first question, one thing that should be noted is that universalism has had an influence on the methodology of formal semantics. Characteristic for the way in which semantic description and explanation is carried out is a specific way of obtaining and assessing the relevant data, viz., via introspection. It is by consulting one’s own judgements on what sentences mean, how they are related (by implication, equivalence, exclusion), whether they are ambiguous, and so, that one proceeds in one’s semantic research. Of course consultation of other speakers is not excluded, but in principle it is not needed either. This methodology is in part due to the individualistic nature of competence, which in its turn is partly the result of the central role played by compositionality. But arguably the a priori nature of semantic theory plays a role here as well. The adoption of introspective methodology has had far-reaching consequences, for one thing it has made the introduction of formal semantics as part of overall linguistic theory easier, since the very same methodology was characteristic for linguistics in the Chomskyan tradition. But it also perpetuated a particular view of language, the structuralist conception of language as an entity in its own right, that may be the result of historical developments and social structures but that can be studied profitably in isolation. Recently this has changed somewhat, also in formal semantics, and statistical methods and corpus-based studies are now part of the methodological toolkit of the formal semanticist as well.

Another effect of the individualism spurred by compositionality and strengthened by universalism is an increasingly close association of semantics with cognitive neuroscience. If what semantics studies is competence, and competence is individual,

then there has to be a relation between the descriptions that the semanticist gives of meaning and the investigations that the cognitive neuroscientist conducts of what happens in the brain. The nature of the match (identity, some transformation, etc.) may be debatable, but the existence of a link seems given. That is to say, it is a given once semantic competence is conceptualised the way it is. And that conceptualisation is derived in part from the semantic framework as such. The issue of reductionism looms large over all of this, but not as an option, or even a possibility, but rather as something that will inevitably happen. Note that it can only be turned into something that we can debate if we can step back and ask anew what meaning is, and why it would it be the case that meaning is best modelled as some kind of object that ‘fits in a user’s head’? And there may not be a real answer to that question either.

It seems that the question we really should be asking is what we want semantics to do. The interesting (and perhaps confusing or upsetting) thing about that question (especially the last one: what do we want semantics to do?), is that it really allows for quite different answers in different contexts: what semantics could or should do in a computational setting (e.g., a translation system that is geared towards a dedicated domain, or a man–machine interface that uses natural language) will not be the same thing as what it could or should do when we study certain aspects of language processing. And within that broad domain it will probably be different according to whether we talk about the higher order level of cognitive psychology, or about what goes on at the basic neuronal level). And if we are interested in linguistic aspects, e.g., in a typological study, or in variation from a sociological perspective, or when we are trying to find out what the syntax–semantics interface is all about, we get other sets of answers every time.

This is disconcerting because it seems to rob semantics of its object: meaning appears to be not a natural kind. But as our discussion of formal semantics has illustrated, the idea that it *is* a natural kind, i.e., a natural phenomenon that has an intrinsic unity, is philosophically ‘loaded’. We can assume it, we can even think it is obvious, but from a philosophical perspective it is not a neutral assumption, it comes with implicit claims that need to be defended. At least, we should be able to decide what proper identity conditions for ‘being a meaning’, or application conditions for ‘being semantic’, might look like. Such specifications have been given, although not necessarily in these terms, but we can observe that the best and most explicit theories around are quite specific philosophical theories. But of course philosophically there is an alternative. A use–based theory actually provides a framework for thinking about meaning that is much less restrictive.

This observation brings us to the second question, whether the criticisms Wittgenstein adduces in his later work on his own ideas in TLP, should have had an impact on formal semantics. Of course we cannot survey these criticisms here, we will confine ourselves therefore to the general question of the influence they may have had, or should have had.

With regard to the pioneering days, it should be noted that Wittgenstein’s later work, which at the time consisted mainly of *Philosophical Investigations*, was not as widely known in the late sixties, early seventies as it is today. Also, the reception of Wittgenstein’s later work in mainstream philosophy, certainly in logic and related disciplines was

initially rather hostile and dismissive. In retrospect there are affinities between Wittgenstein's later work and ideas that Quine and Sellars were developing. But Wittgenstein's general philosophical attitude for a long time remained strange to most philosophers. In particular, the philosophers who were actively engaged with formal semantics in the pioneering days, and who also deeply influenced the linguists that were taking part, were all very much formal-minded, logic-oriented, 'problem solving' types of philosophers. Hence the influence of Wittgenstein's later work was virtually non-existent.

So, if Wittgenstein's criticisms of TLP did not in fact change formal semantics at the time, should it have? In our discussion above a couple of issues were hinted at that provide connections. If we look at the main elements in Wittgenstein's rejection of his earlier ideas, we can pick out the following as particularly relevant for formal semantics: the rejection of reference as the (only) ultimate semantic relation; the rejection of a viable distinction between systematic, context independent meaning ('semantics proper') and situational aspects of meaning ('pragmatics'); the rejection of individualism; the rejection of universalism. Each of these negatives is mirrored by a positive, of course: the acknowledgement of a multitude of ways in which language can be meaningful; the acknowledgement that meaning is fundamentally situational, tied to context, purpose, practice; the acknowledgement that the self-sufficient subject is a myth and that our subjectivity is at least partly socially constituted; and finally, the acknowledgement that language is varied, changing, developing and adapting and that no a priori determination of its purported 'essence' is possible, or needed.

We can not discuss each of these points here, but then neither do we need to. It will be clear that they touch upon fundamental features of the framework of formal semantics, and hence one way or the other must be taken seriously (as some of them already have been). In some cases an appeal to 'theoretical abstraction' might be defensible, but others seem to call for serious changes if we are ever to develop an approach to natural language meaning that really can deal with its variety, its complexity, and its ubiquity. For language is 'everywhere': in each of us individually, in our social and cultural surroundings, in our interactions with our physical environment; language is interwoven with thought, with action, with emotion. There is in a fundamental sense no escape from it, and that is the sense in which universalism is inescapable and has to be confronted. Of course, the bottom line question then is: Does a formal approach to natural language meaning still makes sense? Is it still possible?

That depends. On the terms on which it started, presumably not. But as one form of a Wittgensteinian 'perspicuous presentation', why not?

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