Logic and Formal Ontology[1]

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Introduction

Logic, for Husserl as for his predecessor Bolzano, is a *theory of science*. Where Bolzano, however, conceives scientific theories very much in Platonistic terms, as collections of propositions existing outside space and time, Husserl defends a theory of science which takes seriously the project of understanding how scientific theories are related to specific sorts of activities of cognitive subjects. His *Logical Investigations* thus represents the first sustained attempt to come to grips with the problems of logic from a cognitive point of view.

The present essay begins with an exposition of Husserl's conception of what a science is, and it goes on to consider against this background his account of the role of linguistic meanings, of the ontology of scientific objects, and of evidence and truth. The essay concentrates almost exclusively on the *Logical Investigations*. This is not only because this work, which is surely Husserl's single most important masterpiece, has been overshadowed first of all by his *Ideas* I and then later by the *Crisis*,[2] but also because the *Investigations* contain, in a peculiarly clear and pregnant form, a whole panoply of ideas on logic and cognitive theory which are not readily apparent in Husserl's own later writings or became obfuscated by an admixture of that great mystery which is 'transcendental phenomenology'.

Logic as Theory of Science

One might, as a first approximation, regard a scientific theory as a multiplicity of acts of knowing, of verifyings and falsifyings, validatings and calculatings, on the part of successive generations of cognitive subjects. Of course not every collection of acts of knowing constitutes a science. Such acts must manifest, for example, a certain intrinsic organization, they must be set apart in determinate ways from cognitive acts of other sorts (for example acts of mere, unstructured curiosity) and they must be capable of being communicated from one group of

2. Evaluations of the latter works in some respects complementary to the ideas put forward here can be found in Schuhmann and Smith 1985, Smith 1987, and in Smith 1995. The latter, in particular, contains a sympathetic interpretation of the theory of scientific and pre-scientific cognition propounded by Husserl in the *Crisis* and in Book II of the *Ideas*, but shows that Husserl was not able to formulate this theory in a coherent fashion within the framework of his later idealism.

scientists to another. Husserl's logic is a theory which seeks to determine the conditions which must be satisfied by a collection of acts if it is to count as a science. It is in this sense that logic is a 'theory of science' and of all that is necessarily connected therewith.

Theory realizes itself in certain mental acts, but it is clear that the more or less randomly delineated collections of knowings and judgings concretely performed by cognitive subjects on given occasions will have ephemeral and accidental properties that are of little relevance to logic. Husserl however saw that we can put ourselves in a position where we are able to understand the intrinsic organization of collections of scientific acts if we consider such collections from a certain idealizing standpoint.

In fact, there are three distinct sorts of idealization which are involved in the properly logical reflection on scientific acts:

I. The members of a collection of acts must be idealized, first of all, in that they are considered not as individual events or processes of judging, inferring, verifying, but as *universals*, as *species* or *kinds* of such events, capable of being instantiated in principle at any time or place: 'the theoretical content of a science is nothing other than the meaning-content of its theoretical statements independent of all contingency of judgers and occasions of judgment' (II A92/332).[3]

II. These species or kinds must themselves be idealized by being considered not as classes or extensions, but rather as 'ideal singulars'. We are interested in species of acts not as collections of individual instances, but as *proxies* or *representatives* of such instances in the sphere of idealities, related together in representative structures of certain sorts.

III. The total collection of ideal singulars corresponding to each given empirical realm of individual instances must then in turn be idealized by being seen as enjoying a certain sort of *ideal completeness*: thus a scientific theory in the strict sense that is relevant to logic must enjoy the property of deductive closure.[4]

A science, then, is a certain idealized structure made up of parts which are the species or types of simple and complex cognitive acts of various sorts. The most important nodes in such ideal structures are occupied by species of acts of judgment, and these can be divided in turn into two sorts, corresponding to the two different roles which individual judging acts may play on the

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3. References in this form are to the 1st (A-) edition of the *Logische Untersuchungen* (1900/01) and to the Findlay translation of the second (B-) edition, respectively. I have not adhered to the Findlay translation, and nor have I always reproduced entirely Husserl's somewhat heavy-handed emphases.

4. One way to conceive the ideal structure thereby obtained is to conceive it as a structure of propositions as these would be represented in an ideal textbook of the science in question. Structures of propositions are laid out in scientific works, and these works – in the ideal case – inherit the structure of the judgments they are designed to express, something which led Bolzano to define logic as the science of constructing perfect scientific textbooks. It is a version of this Bolzanian view which survives in the modern logical conception of sciences as sets of propositions abstractly conceived.

level of underlying instances or tokens. On the one hand are those judgment-species whose truth is self-evident (or is taken as such), for example *red is a colour*. We can call these axioms; they are judgment-species which are the primitives or starting points in the order of justification. On the other hand are those judgment-species which 'are grasped by us as true only when they are validated'—validated by means of some appropriate method, i.e. precisely by the method of logic (I A16/63). These are the *theorems*, or derived judgment-species.

It is in reflection on the ways in which the latter are justified that we reach the heart of logic as Husserl conceives it. Some judgments are and must be *derived by laws from others*. We are thereby enabled to move beyond what is trivially or immediately evident to what is enlightening, to what is able to bring clarification. (I A234/229) It is this fact which 'not only makes the sciences possible and necessary, but with these also a *theory of science*, a *logic*.' (I A16/63).

It is a matter of some note that such a science of science exists at all, that it is possible to deal within a single theory with what all sciences have in common in their modes of validation, irrespective of the specific material of their constituent acts and objects. For it is not evident that there should be, as Husserl puts it, necessary and universal laws relating to truth as such, to deduction as such, and to theory as such, laws founded 'purely in the concept of theory, of truth, of proposition, of object, of property, of relation, etc., i.e., in the concepts which as a matter of essence make up the concept of theoretical unity.' (I A111/136)

On immersing ourselves in the practice of theory, however, we very soon discover that the modes of interconnection which bind together the judging acts which ideally constitute a scientific theory do indeed belong to a fixed and intelligible repertoire, being distinguished by the fact that:

1. they have 'the character of fixed structures in relation to their content. In order to reach a given piece of knowledge (e.g. Pythagoras' theorem), we cannot choose our starting points at random among the knowledge immediately given to us, nor can we thereafter add or subtract any thought-items at will' (I A17/64),

2. they are not arbitrary: 'A blind caprice has not bundled together any old heap of truths P_1, P_2, … S, and then so instituted the human mind that it must inevitably (or in "normal" circumstances) connect the knowledge of S to the knowledge of P_1, P_2, … . In no single case is this so. Connections of validation are not governed by caprice or contingency, but by reason and order, and that means: regulative laws' (I A18/64),

3. they are formal, i.e. they are not bound up with particular territories of knowledge: all types of logical sequences 'may be so generalized, so purely conceived, as to be free of all essential relation to some concretely limited field of knowledge.' (I A19/65)

This means that, the form of a given validation having once been established, it is possible for us to justify all other validations of this same form – all validations that conform to a given law – *in one go*, just as in mathematics it is possible for us simultaneously to determine the properties of a whole family of structures conforming to any given set of axioms.

Meanings as Species
There is no science without language. This is not merely because scientific judgments must be communicable and it is language which, as a matter of anthropological fact, is uniquely qualified

to serve this purpose. It is also because scientific judgments are typically of such an order of complexity that they could not arise without verbal expression. It is therefore incumbent upon us to examine the ways in which grammatical clothing is related to the other parts and moments of a scientific theory.

Husserl's conception of language, too, is both Aristotelian and cognitively based. Linguistic expressions are seen as having meaning only to the extent that they are *given* meaning through cognitive acts of certain determinate sorts. The acts which, in becoming bound up with uses of language, may carry out this meaning-giving function are in every case acts in which objects are given to the language-using subject either in perception or in thought: 'To use an expression significantly, and to refer expressively to an object', Husserl tells us, 'are one and the same.' (II A54/293) An act of meaning is, we might therefore say, 'the determinate manner in which we refer to our object of the moment' (II A49/289).[5]

Husserl's theory of linguistic meaning, like his theory of logic, is therefore non-Platonistic in the sense that it is free of any conception of meanings as ideal or abstract objects hanging in the void in a way which would leave them cut apart from concrete acts of language use. Husserl does however accept that it is inadequate to conceive the meanings bestowed on given expressions on given occasions as being exhausted in the particular acts involved. For meanings can be communicated. They can be realized by different subjects at different places and times. Hence they cannot be accounted for theoretically in merely psychological terms, as real parts or moments of concrete experiences. What, then, are meanings? Husserl's solution to this problem is both elegant and bold: it is to develop a conception of the meanings of linguistic expressions simply as the *species* of the associated meaning acts.

To see what this means we must note first of all that meaning acts are divided by Husserl into two kinds: those associated with *uses of names*, which are acts of presentation,[6] and those associated with *uses of sentences*, which are acts of judgment. The former are directed towards *objects*, the latter towards *states of affairs*.[7] A meaning act of the first kind may occur either in isolation or (undergoing a certain sort of transformation) in the context of a meaning act of the second kind: 'Each meaning is on this doctrine either a nominal meaning or a propositional meaning, or, still more precisely, either the meaning of a complete sentence or a possible part of such a meaning.' (II A482/676) The meanings of names, now, which Husserl calls concepts, are just *species of presentations*; the meanings of sentences, which Husserl calls propositions, are just *species of acts of judgment*. And the relation between meaning and associated act of meaning is in every case the relation of species to instance, exactly as between, say, the species *red* and some red object.

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5. On Husserl's doctrine of 'objectifying acts' see Smith 1990. On the wider implications of Husserl's cognitive or intellectualistic theory of meaning see Smith 1987a and Schuhmann and Smith 1987.

6. The term 'presentation' is a translation of Husserl's '*Vorstellung*'. It refers to all object-directed acts, be they acts of perception, imagination, memory or acts of merely 'signitive' directedness for example involving names or descriptions.

7. The contrast drawn by Husserl between '*Sachverhalt*' and '*Sachlage*' will not be of relevance to us here. See for example Mohanty 1977.

More precisely, we should say that, just as it is only a certain part of the red object – its individual accident of redness – which instances the species *red*, so it is only a certain part or moment of the meaning act which instances any given meaning-species, namely that part or moment which is responsible for the act's intentionality, for its being directed to an object in just this way.[8] The meaning is just this moment of directedness considered *in specie*:

> There correspond to meanings, as to all ideal unities, real possibilities and perhaps actualities; to meanings *in specie* there correspond acts of meaning, and the former are nothing other than the ideally apprehended act-moments of the latter. (II A322/533)[9]

The identity of meaning from act to act and from subject to subject is then simply the *identity of the species* in the traditional Aristotelian sense. (The *species* is a part or moment of that which *instantiates* it.[10])

> In the concrete act of meaning a certain moment corresponds to the meaning and makes up the essential character of this act, i.e. necessarily belongs to each concrete act in which this same meaning is "realized". (II A302/B312/506)

We can talk of 'the same' meaning from speaker to speaker and from occasion to occasion simply in virtue of the fact that numerically different individual moments of meaning on the side of the relevant acts serve to instantiate identical species. Indeed to assert that given individual objects or events instantiate one and the same species is simply to assert that the objects or events in question manifest among themselves a certain qualitative identity of parts or moments – that they are, *in this or that respect*, identical, are one and the same.[11] One might indeed, though the detailed justification of this proposal would lead us too far from our main concerns, see Husserl's talk of species here as consisting effectively in a shorthand for more common or garden talk about certain exact similarities among individual instances.[12]

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8. See I A100f./130, A106/337, Willard 1984, p. 183f. and the references there given.

9. 'Act-moments' substituted in B for 'act-characters'. The nature of the moments in question will be discussed in more detail below.

10. For an elaboration of this constituent theory of species and instance, and of the solution to the Third Man problem which follows in its wake, see my 1997. For a careful discussion of traces of Platonic thinking in the *Logical Investigations* see Hill 2000.

11. Cf. II A112/342f.

12. This Aristotelian reading is supported by the text of the first edition of the *Logical Investigations*, for example in Husserl's use of the terminology of 'lowest specific difference'. Such Aristotelian terminology is however to a large degree eliminated from the second edition. As we shall see below, the Aristotelian reading is required also to make sense of Husserl's account of our apprehension of species in categorial acts.

It is important to stress that meanings so conceived are not the *objects* of normal acts of language use.[13] We do not mean the meaning of an expression by having this meaning as the object of any associated act, but by being directed to an appropriate ordinary object or state of affairs in such a way that, willy nilly, the meaning is instantiated. Meanings can however become our objects in special types of reflective act, and it is acts of this sort which make up (*inter alia*) the science of logic. Logic arises when we treat those species which are meanings as special sorts of *proxy objects* (as 'ideal singulars'), and investigate the properties of these objects in much the same way that the mathematician investigates the properties of numbers or geometrical figures.[14]

Thus consider for example the number five. This is not my own or anyone else's number five: 'it is the ideal species of a form which has its concrete individual instances on the side of what becomes objective in certain acts of counting' (I B171/180). Two different sorts of objects are then involved: empirical objects which get counted, thereby yielding empirical groupings (as for example when we talk of there being 'a number of objects on the table'); and ideal objects, which are what result when such empirical groupings are treated *in specie*, disembarrassed of all contingent association with particular empirical material and particular context. And now the same applies to all the concepts of logic: just as terms like 'line', 'triangle', 'hemisphere' are equivocal, signifying both classes of factually existing instantiations and ideal singulars in the geometrical sphere, so terms like 'concept', 'proposition', 'inference', 'proof', etc., are equivocal: they signify both classes of mental acts belonging to the subject-matter of psychology and ideal singulars in the sphere of meanings.

Of course when, in our logical investigations, we speak about meanings *in specie*, then the meaning of what we say is itself a species. 'But it is not so, that the meaning in which a species is thought, and its object, the species itself, are one and the same.' The species we think about is a general object, but 'the generality *that* we think of does not resolve itself into the generality of the meanings *in which* we think of it.' (II A103/331) Those general objects which are meanings (concepts, propositions, higher-order meaning-structures including entire theories) differ in this respect not at all from general objects of other sorts, be they numbers, geometrical structures, or species of qualities given in sensation. The fact that objects may be either individual (empirical) or general (ideal), and that the presentations in which we mean them may be such that their objects are meant either as singulars or *in general*, then gives rise to four different kinds of judgment:

– singular judgments about what is individual: *Socrates is a man*,

– singular judgments about what is general: *Round square is a nonsensical concept*,

– general judgments about what is individual: *All men are mortal*,

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13. Nor, *a fortiori* are they the pseudo-objects of such acts, as on the peculiar 'noema' theory of meaning propounded by Husserl in *Ideen* I. For a criticism of this theory from the standpoint of Husserl's earlier views see Smith 1987.

14. 'If all given theoretic unity is in essence a unity of meaning, and if logic is the science of theoretic unity in general, then it is at the same time evident that logic must be the science of meanings as such, of their essential species and differences, as also of the laws which are grounded purely in the latter and which are therefore ideal.' (II A93/323)

– general judgments about what is general: *All analytic functions can be differentiated* (cf. II A110f./341).

Species Talk and Implicational Universals

We can now begin to see how the necessity of logic can enter into the flux of real mental acts. The latter, in so far as they carry identical meanings, instantiate species which satisfy necessary laws, laws which are no different, in principle, from the laws of geometry. The laws associated with given species are such that they continue to obtain even where, as a matter of empirical fact, the species in question are not instantiated. This will enable us to do justice to the status of a science as an *ideally complete structure* of meanings that is always only partially instantiated by given empirically existing collections of meaning acts.

Species laws are in fact always in a certain sense hypothetical, taking forms such as:

if instances of species *S* exist, then as a matter of necessity there exist also instances of the species *S′, S″*, etc.,

if instances of species *S, S′*, etc., exist in association with each other, then it is possible that there exist also associated instances of species *T, T′*, etc.

if instances of species *S, S′*, etc., exist in association with each other, then it is necessarily excluded that they should be associated also with instances of the species *U, U′*, etc.

Consider, for example, the geometrical law to the effect that the angle obtained by joining the two end-points of the diameter of a circle to some other point on the circumference is always a right angle. Here we have a law relating together a number of structures and part-structures (lines, angles, points, circles) purely *in specie*, and clearly there is a sense in which this law has validity even if, as a matter of empirical fact, the structures in question are not instantiated. For even then it remains the case that *if* a structure of the given sort *were* realized, then these and those other structures would be realized also. Or consider the assertion that an action of promising gives rise as a matter of necessity to a mutually correlated claim and obligation. Here, too, we have a law, pertaining to certain structures in the quasi-legal sphere, which retains its validity even if, as a matter of empirical fact, actions of the relevant sort should not occur.

'Implicational universals' of the given sort have been investigated in detail by linguists, anthropologists and others in recent years, and it seems that it is precisely universals of this kind that Husserl has in mind when he talks about species and about 'spheres of necessary law'. As he himself writes:

If all gravitating masses were destroyed, the law of gravitation would not thereby be suspended: it would merely remain without the possibility of factual application. For it tells us nothing regarding the existence of gravitating masses, but only about that which pertains to gravitating masses as such. (I A149f./164)

Similarly, even in a world without intelligent beings it would remain *possible* that meanings of certain sorts should be instantiated, and it would remain the case that, if instantiated, such meanings would be subject to certain necessary laws. Thus again, it is not as if meanings would 'hang somewhere in the void'; meanings are rather a matter of possibilities of being realized in

actual meaning acts. And *what* I mean by a given expression 'is the same thing, whether I think and exist or not, and whether or not there are any thinking persons and acts.' (II A100/329)

The relations among meanings with which logic is concerned can thus be considered apart from all relation to any thinking subject. The laws expressing these relations refer, not to knowing, judging, inferring, but rather to concept, proposition, inference. These laws may however 'undergo evident transformations through which they acquire an express relation to knowledge and to the knowing subject, and now themselves pronounce on real possibilities of knowing.' (I A239/233) It is in virtue of the possibility of transformations of this sort that the propositions of logic may once again have application to real, cognitive achievements of thinking subjects.

One particularly interesting and important set of such evident transformations consists of those derived laws which enable us to go from *truth*, an objective matter, to *evidence*, a property of the mental acts of some subject. 'Each truth represents an ideal unity in relation to what is possibly an infinite and unlimited manifold of correct statements of the same form and matter.' (I A187/192) Even if there are no intelligent beings and no correct statements then this ideal unity and its associated possibilities of instantiation remain, though without actually being realized. *It is the truth that p* and *There could have been thinking beings having evidence into judgments to the effect that p* are, Husserl tells us, equivalent.[15] This should not, however, be taken to imply that Husserl identifies the notions of truth and evidence (and much less does he confuse them):

> In itself the proposition *A is true* plainly does not state the same thing as its equivalent *It is possible for someone to judge [evidently] that A is*. The former says nothing about anyone's judgment … Things stand here just as with the propositions of pure mathematics. The assertion that a + b = b + a states that the numerical value of the sum of two numbers is independent of their position in the combination, but it says nothing about anyone's counting or summing. The latter first enters in through an evident, and equivalent transformation. *In concreto* there is after all (and this *a priori*) no number without counting, no sum without summing. (I A184f./190)

The logic of the ideal structures of inference and validation can have applicability to proofs and inferences empirically performed, since once we have established by logical means the laws stating how 'the being-true of propositions of certain forms determines that of propositions of correlated forms', then we can see that these laws 'admit of equivalent transformations in which the possible emergence of evidence is set into relation with the propositional forms of judgments' (I A184/190).

Validations and proofs relating propositional meanings as ideal singulars are therefore also structures guaranteeing the inheritability of evidence in the sphere of concrete judging acts. This they achieve by making it possible for us to grasp the fact that a given sequence of propositions, purely in virtue of its form, instantiates a certain law. For logical reflection is able to

> set forth abstractively the relevant underlying law itself and to bring the multiplicity of laws to be gained by this means, which are at first merely single cases of laws, back to the primitive basic laws; it thereby creates a scientific system which, in ordered sequence and

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15. On the Brentanian roots of Husserl's thinking on these matters see my 1990a.

purely deductively, permits the derivation of all possible purely logical laws, all possible "forms" of inferences, proofs, etc. (I A163/174)

The Theory of Meaning Categories

Science as cognitive activity is constituted out of collections of acts of judging, validating, verifying. Science as theory is constituted out of the homogeneous fabric of meanings taken *in specie*. There are different levels of complexity, different varieties of combination of the elements making up this fabric, and only some possible combinations will yield complex meanings possessing that sort of unity which is required if the meanings in question are to be qualified to form part of the subject-matter of logic. It was in relation to this problem that Husserl, in his 4th Investigation, put forward those ideas on meaning categories which were to prove so influential through the work of Les,'niewski and Ajdukiewicz and in subsequent experiments in the field of 'categorial grammar'.

The theory of meaning categories as Husserl conceives it is part and parcel of his theory of meanings as species. For Husserl's use of the term 'species' (and of the associated terminology of 'genera', 'instantiation', 'lowest difference', etc.) is no mere historical accident. It was designed to draw attention to the fact – familiar to Aristotle and Porphyry, as also to Brentano and W. E. Johnson – that *species form trees*: if *A* is similar to *B* in some given respect, i.e. if both instantiate some species *S*, then *A* is similar to *B* in all superordinate respects, i.e. both *A* and *B* instantiate all *S*-including species higher up the relevant tree.[16] Each tree of species is crowned by a certain highest species or 'category' including all the species lower down the tree. Such highest species are 'primitive' or 'indefinable' in the strict Aristotelian sense that they do not arise through composition of any specific differences. Husserl's *meaning categories*, now, are just the highest species in the realm of meanings, and therefore they, too, are 'primitive' in this sense.[17]

Higher and lower level meaning species, as we have already had occasion to note, can be taken either as many or as one, as species or as ideal singulars standing proxy for the relevant instantiating acts. But now each meaning species *S*, when taken as an ideal singular, bears to its respective category a similar relation to that which the relevant instances of *S* bear to *S* itself, taken as species.[18] To investigate the connections and combinations of highest species is therefore also to investigate the range of possible connections and combinations of the relevant lower level meaning species themselves, and therefore also of the underlying acts which correspond thereto.

Categorial grammar is thus for Husserl not a matter of building up a grammatical theory on the basis of a more or less arbitrary selection of convenient and conventional combinatoric units.

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16. The relation to this tree-structure is lost if we attempt to translate Husserl's talk of species and instance into the more popular vocabulary of 'types' and 'tokens'.

17. The concept of number also lacks the requisite type of complexity to admit of definition, and therefore it, too, is a categorial concept, a fact which formed the basis of Husserl's criticisms of Frege's theory of number in the *Philosophie der Arithmetik*, for example on p. 119. See also Willard 1984, p. 66.

18. 'This or that meaning is itself of course a species, but, relative to a meaning category it counts as a contingent individual instance.' (II A308/511)

It is a descriptive theory, a science, taking as its subject-matter the ideal structures obtaining in the meaning sphere itself, and therefore also in the sphere of object-giving acts. The laws of this science, laws governing the objective and ideal possibilities and impossibilities of combination among meanings, are laws relating precisely to such highest species. They set forth 'the *a priori* patterns in which meanings belonging to the different meaning categories can unite together to form a single meaning' (II A287/493), as opposed to those merely possible combinations – 'and swam if never apple knock' – which yield only meaning heaps. It is not any merely empirical incapacity on our part which puts it beyond us to realize such a heap as a unity: 'the impossibility is rather objective, ideal, rooted in the pure essence of the meaning realm'. (II A308/511)

Husserl's science of meaning categories is the science which deals with combination-possibilities among meanings purely from the point of view of their intrinsic well-formedness and abstracting from any possible cognitive employment and from all questions relating to truth and reference. There is however a further level of possibility and impossibility among meanings which we encounter when we consider meanings in respect of their having or not having objects or in respect of their corresponding or not corresponding to states of affairs. The first level is the level of grammar, a matter of the presence or absence of sense or meaning as such in given meaning-combinations (and of correspondingly unified complexes of instantiating acts). The second level is the level of logic proper, a matter of the presence or absence of objectual correlates for meanings already established as unified. To the impossibilities on the first level belong cases such as 'a round or', 'a man and is'. To the impossibilities on the second level belong cases such as 'a round square' or 'this colour is a judgment'.

Impossibilities of the first sort are such that their constituent part-meanings cannot even come together to form a unity on the level of meaning alone. We cannot fit together corresponding presentations in such a way as to yield a unified directedness to any sort of object, whether existent or non-existent, possible or impossible. At most we can patch together 'an indirect presentation aiming at the synthesis of such part-meanings in a single meaning, and at the same time have insight into the fact that such a presentation can never correspond to an object' (II A312f./517). Impossibilities of the second sort, in contrast, clearly do in fact yield unified meanings, reflecting a corresponding unity on the level of objectifying acts, a unity of complexity within a single act, of 'part-presentations and dependent presentation-forms within an independently closed presentation-unity' (II A295/500f.). But it is no less evident that there could be no object which would correspond thereto: 'An object (e.g. a thing or state of affairs) in which there is unified all that the unified meaning on the strength of its "incompatible" meanings presents as unitarily pertaining to it does not and cannot exist' (II A312f./517).

There are, then, simple meanings and complex meanings. Both can be combined together in different ways, governed by necessary laws into which we can have insight of the kind that is enjoyed for example by the theorems of geometry. At the one extreme we have a unity of several meanings within a single complex whole. At the opposite extreme we have a mere meaning heap. Between these two extremes we have various ways in which the combination of meanings can be merely partial, ways in which instantiating acts are capable of being combined together but in such a way that they do not and cannot constitute a complete and self-contained unity of judgment or presentation: 'John is nearly', 'If John were', '+ 2 ='. Such combinations require, as a matter of categorial law, a larger surrounding context within which they can be brought to a completion of an appropriate sort. Simple meanings, too, above all the various connective forms: 'and', 'if', 'but', etc., may be partial in this sense, and there are also partial meanings which include as parts whole meanings which are in themselves capable of making up 'the full, entire

meaning of a concrete meaning act' (II A303/506): 'John is swimming but', 'Before she opened the door'.

In this way we obtain an opposition between *dependent meanings*, both simple and complex, which stand in need of a larger meaning context, and *independent meanings*, where the process of completion has been successfully brought to an end. Dependent and independent meanings, like all combinations of species are subject to necessary laws. The opposition between the two sorts of meanings 'has its objective ground in law in the nature of the [meanings] in question.' (II A302/506).

Expressions, correspondingly, are divided into *syncategorematic* and *categorematic*. The former are not meaningless. They carry a determinate though characteristically modified moment of meaning even when they occur in isolation. And when they occur normally, i.e. in the context of an independently complete expression, they have as their meaning a certain dependent part or moment of the total thought.[19]

Formal Ontology

Logic is not, however, concerned only with meanings and with associated instantiating acts. For even a deductively closed collection of meanings will constitute a science only where we have an appropriate unity and organization also on the side of the *objects* to which the relevant acts refer. The unity of scientific theory can in fact be understood to mean either (1) an *interconnection of truths* (or of propositional meanings in general), or (2) an *interconnection of the things* to which our cognitive acts are directed.

Since meanings are just ways of being directed towards objects, it follows that (1) and (2) 'are given together *a priori* and are mutually inseparable' (I A228f./225). And logic, accordingly, relates not only to meaning categories such as *truth* and *proposition*, *subject* and *predicate*, but also to object categories such as *object* and *property*, *relation* and *relatum*, *manifold*, *part*, *whole*, *state of affairs*, and so on.[20] Logic seeks therefore to delimit the concepts which belong to the idea of a unity of theory in relation to both meanings and objects, and the truths of logic are all the necessary truths relating to those categories of constituents, on the side of both meanings and objects, from out of which science as such is necessarily constituted.

Husserl's conception of the science of logic as relating also to formal-ontological categories such as *object*, *state of affairs*, *unity*, *plurality*, and so on, is not an arbitrary one. These concepts are, like the concepts of formal logic, able to form complex structures in non-arbitrary, law-governed ways, and they, too, are independent of the peculiarity of any material of knowledge. This means that in formal ontology, as in formal logic, we are able to grasp the properties of given structures in such a way as to establish *in one go* the properties of all formally similar structures.

As Husserl himself points out, certain branches of mathematics are partial realizations of the idea of a formal ontology.[21] The mathematical theory of manifolds as this was set forth by

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19. Cf. II A297/502.

20. Cf. for example I A244/237. Another list of formal ontological categories is added in B: '*something* or *one*, *object*, *property*, *relation*, *connection*, *plurality*, *cardinal number*, *order*, *ordinal number*, *whole*, *part*, *magnitude*, etc.' (II B252/455).

21. See Rosado Haddock 2000.

Riemann and developed by Grassmann, Hamilton, Lie and Cantor, was to be a science of the essential types of possible object-domains of scientific theories, so that all actual object-domains would be specializations or singularizations of certain manifold-forms. And then: 'If the relevant formal theory has actually been worked out in the theory of manifolds, then all deductive theoretical work in the building up of all actual theories of the same form has been done.' (I A249f./242) That is to say, once we have worked out the laws governing mathematical manifolds of a certain sort, our results can be applied – by a process of 'specialization' – to every individual manifold sharing this same form. Husserl's discovery of this essential community of logic and ontology is of the utmost importance for his philosophy of mathematics.[22] It can be shown to imply a non-trivial account of the applicability of mathematical theories – of a sort that is missing, for example, from a philosophy of mathematics of the kind defended by Frege – as a matter of the direct specialization of the relevant formal object-structures to particular material realizations in given spheres.

How, then, are we more precisely to understand Husserl's account of the relation between theory as structure of meanings and theory as structure of objects and objectual relations? A theory as a structure of meanings is a certain deductively closed combination of propositions (and higher order meaning structures) which are themselves determinate sorts of combinations of concepts and combination-forms. Just as the propositions are species of judgments, so the concepts which are their parts are species of linguistically expressible presentations. The concepts in question are in each case of determinate material: they are concepts of a dog, of an electron, of a colour (or of this dog, of dogs in general, of electrons in general) and so on. But we can move from this level of material concepts to the purely formal level of: *a something*, *this something*, *something in general* and so on, by allowing materially determinate concepts to become mere place-holders for any concepts whatsoever – a process of 'formalization'. The idea of a theory-form now arises when we regard all materially determinate concepts in a given body of theory as having been replaced in this fashion by mere variables, by materially empty concepts, so that only the formal structure of the theory is retained.[23]

What, now, is the objectual correlate of such a theory-form? It is the structure shared in common by all possible regions of knowledge to which a theory of this form can relate, a structure determined solely as one 'whose objects are such as to permit of these and these connections which fall under these and these basic laws of this or that determinate form.' (I A248/241) Here again, therefore, it is form alone that serves as determining feature. The objects in the given structure are quite indeterminate as regards their matter: they constitute, as it were, mere shells or frames into which various matters can, in principle, be fitted. And the structure as a whole is determined merely by the fact that its objects (nodes) stand in certain formally determined relations and permit of certain formal operations, for example the operation that is represented by '+', defined as commutative, associative, etc.

For a collection of scientific statements to constitute a theory, then, there must be on this purely formal level an 'ideal-lawful adequacy of its unity as unity of meaning to the objective

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22. See Hill 2000a.

23. Husserl's *Formal and Transcendental Logic* contains further elaboration of this point, in particular as concerns the important distinction between 'formal theory' and 'theory-form'. A useful discussion of the development of Husserl's logical ideas from the *Logical Investigations* to the *Formal and Transcendental Logic* is provided by G. E. Rosado Haddock in his 1973.

correlate meant by it' (II A92/323). The objects *meant* by the constituent propositions of the theory (and therefore also by corresponding judging acts) must *hang together* in a precisely appropriate way, must constitute the formal unity of a certain determinate formal manifold.

The Formal Ontology of Dependence
Husserl himself, particularly in his manuscripts on the foundations of arithmetic and analysis written at a time when he was collaborating with Cantor in Halle, was deeply involved with early developments in the theory of manifolds and with the offshoots of this theory in geometry and topology.[24] His most original contribution to formal ontology was however his work on theory of parts and moments, of dependence and independence, set forth in detail in the 3rd Logical Investigation. We have already seen the notions of dependence and independence at work in the theory of meaning combinations above, and Husserl's terminology of 'moment' has accompanied us throughout the present essay. These notions were employed also by Brentano and Stumpf in their work on the ontology of mental acts, and Stumpf, in particular, had used a fledgling theory of dependence as early as 1873 in his investigations of the structures of acts of spatial perception.[25] It was however Husserl who was the first to recognize that the given notions are capable of being applied, in principle, to all varieties of objects, that the proper place for the distinction between dependence and independence is in a 'pure (*a priori*) theory of objects as such' (II A222/435), 'in the framework of *a priori* formal ontology.' (II B219/428f.).

The notion of dependence can be set forth, very roughly, in terms of the definition:

A is dependent on *B* := *A* is as a matter of necessity such that it cannot exist unless *B* exists.[26]

It is not however individuals as such that are dependent or independent, but individuals *qua* instances of certain species. The notions of dependence and independence can therefore be carried over to the species themselves 'which can, in a corresponding and somewhat altered sense, be spoken of as "independent" and "dependent".' (A237/448)

On the basis of this simple notion of dependence or foundation a whole family of other, associated notions can be defined. Thus we can distinguish between one-sided and reciprocal dependence, between mediate and immediate dependence, and between the case where an individual is linked by dependence to one and to a multiplicity of founding objects in a range of different ways. The resulting theory has a number of interesting mathematical properties. As has been shown in recent unpublished work by Kit Fine, it can be compared with an extension of standard whole-part theory obtained by adding notions of connectedness derived from topology. The formal ideas on which it rests have been applied with some success not only in psychology

24. See, now, the manuscripts collected as *Studien zur Arithmetik und Geometrie*, as also Miller 1982, but compare the comments in Smith 1984a.

25. This theory was systematized and extended by Brentano in the lectures now published as the *Deskriptive Psychologie* (1982). For more details of the historical background see Smith and Mulligan 1982, Mulligan and Smith 1985, and Smith 1994.

26. Here *A* and *B* are presumed to be contingent existents. Further details of the formal theory of dependence are presented in the papers by Mulligan, Simons, Smith and aggregates thereof in the list of references below.

but also in linguistics.[27] Perhaps the most interesting employment of the theory however – if only in view of the almost total neglect of this fact by Husserl's myriad modern commentators[28] – was by Husserl himself within the discipline of phenomenology. For the detailed descriptions of the structures of acts which are provided by Husserl, as indeed the larger metaphysical claims that he makes on behalf of his new discipline, are remarkably often phrased in the terminology of the theory of dependence or foundation.

From our present point of view it is important to stress that the theory of dependence, because it relates always to species, or to individuals *qua* instances of species, is a matter of ideal and therefore necessary laws:

> It is not a peculiarity of certain sorts of parts that they should only be parts in general, while it would remain quite indifferent what conglomerates with them, and into what sorts of contexts they are fitted. Rather there obtain firmly determined relations of necessity, *contentually* determinate laws which vary with the species of dependent contents and accordingly prescribe one sort of completion to one of them another sort of completion to another. (II A244f./454)[29]

Unity and Compatibility

The theory of dependence is of importance for logic as theory of science first of all because it is in the terms of this theory that the idea of unity is to be clarified.[30] Every instance of unity, Husserl tells us, is based on a necessary law asserting, on the level of species, certain relations of foundation and compatibility between the unified parts. Compatibility, too, pertains not to individuals but always to instances of species. Thus the fact that individual instances of redness and roundness may be unified together in a single whole implies that there is a complex species, a form of combination, which can be seen to be capable of being re-instantiated also in other wholes. This complex species is the foundation of the compatibility, which obtains whether empirical union ever occurs or not; or rather, to say that compatibility obtains, is just to say that the corresponding complex species exists.[31]

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27. Both by Husserl himself and by Les'niewski and Ajdukiewicz, and – independently – by subsequent proponents of what has come to be called 'dependence grammar': for references and a brief discussion see Smith 1987. Husserl's theory was applied also within the theory of speech acts by his pupil Adolf Reinach: see his 1913 and also the papers collected in Mulligan, ed. 1987.Husserl's ideas on meaning-combinations were then extended by his followers in Munich, above all Daubert, Pfänder and Reinach, to yield a theory of the ontological structures manifested by the different sorts of speech acts.

28. See Sokolowski 1974, for a notable exception.

29. Husserl uses the term 'content', here, as a synonym for 'object'.

30. In one influential passage of the 3rd Investigation Husserl goes so far as to assert that 'The only true unifying factors...are relations of foundation' (II A272/478). This passage forms the motto to Jakobson 1940/42.

31. Cf. II A578/752.

The theory of meaning categories may now be conceived as the science of those complex species which are forms of combination among meanings. To say that a given complex meaning exists, i.e. that there is a certain determinate possibility of instantiation in individual meaning acts, is to say that there is a certain corresponding compatibility among the given acts and among their various parts and moments.[32]

Incompatibility or mutual exclusion, too, is in each case a certain complex species which puts determinate lower order species into a certain determinate relation within certain determinate contexts. Thus for example:

> Several moments of colour of varying specific difference are incompatible as regards overlays of one and the same bodily extension, while they are very well compatible in the manner of standing side by side within a uniform extension. And this holds generally. A content of the species q is never *simply* incompatible with a content of the species P: talk of their incompatibility always relates rather to a definite species of combination of contents, $W(A, B \ldots P)$, which includes P and *should* now take up into itself q as well. (II A580/753)

Quality, Matter and Representative Content

The theory of dependence is important to logic not merely in providing an account of notions such as unity and (in)compatibility, however, but also because it can be used as the basis of an account of the cognitively and logically relevant dimensions of variation in those mental acts of whose ideal structures logic ultimately treats. Husserl distinguishes between three such dimensions of variation: the *quality* of the act, its *matter*, and its *representative content*.

The quality of an act is that moment of the act which stamps it 'as merely presentative, as judgmental, as emotional, as desiderative, and so on' (II B411/586). The matter is 'that which stamps it as presenting *this*, as judging *that*, etc.', in the sense that those acts have the same matter whose intended object (and the way that it is intended) is the same. The matter is 'that in an act which first gives it directedness to an object, and directedness so wholly definite that it not merely fixes the object meant, but also the way in which it is meant.' (II A390/589)

Likeness of matter with differing act-quality 'has its visible grammatical expression':

> A man who imagines to himself that *there are intelligent beings on Mars*, presents the same as he who asserts *there are intelligent beings on Mars*, and the same as the man who asks *Are there intelligent beings on Mars?* or the man who wishes *If only there were intelligent beings on Mars!* etc. (II A387/586f.)

And indeed the dimensions of variation in the grammatical expression of the act can point the way for our analysis of variation in the act itself.[33]

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32. And similarly in relation to the compatibility between meaning and representative content with which we shall deal in more detail below. 'That the combination of expression and expressed (meaning and corresponding, i.e. objectively and completely adequate intuition) is itself again a combination of compatibles … is obvious.' (II A578/752)

33. One consequence of our earlier discussions is that linguistic meaning is just the 'manner of being directed to an object'. We cannot, however, define linguistic meaning as this very matter taken "in specie", because, as Husserl tells us, this 'would have the inconvenience that the

Act-quality and act-matter are two mutually dependent moments of the act: it is a matter of necessity that each cannot exist without the other. Just as the act-matter is unthinkable without some quality, so each act-quality is unthinkable 'as cut free from all matter'.

> Or should we perhaps hold as possible an experience which would be judgment-quality but not judgment of a determinate matter? The judgment would thereby after all lose the character of an intentional experience, which has been evidently ascribed as essential to it. (II A391/589)

Quality and matter are however also associated with a third dimension of variation, the dimension of what Husserl calls *representative content*. This we can think of as consisting in our act's being *more or less intuitively filled*, in its being *more or less in touch with the things themselves* towards which our acts are directed: it is a matter of that in the act which goes proxy for the object. Alternatively (and from the opposite perspective) we can regard it as consisting in our act's being *more or less linguistically articulated*, in its being *more or less a matter of mere signs*.

Acts which are least in touch with the things themselves and which are entirely a matter of linguistic or signitive directedness have as their content just that which is contributed by the signs themselves, the various *marks* which the signs leave behind within the acts. To the extent that an act's directedness is not merely linguistic, however, it will acquire a representative content that is in whole or in part derived from the objects grasped. Where we are dealing with acts of ordinary perception such representative content is of course ultimately just the *sensory* content of the relevant acts, a matter of those sensory qualities in the acts which more or less (according to circumstances) correspond to sensory qualities in the objects perceived (or to analogous qualities in internal perception).[34]

Clearly all (used) linguistic expressions yield representative 'marks' in the first sense. But only certain determinate parts of our expressions can have something corresponding to them in intuition in the second, 'fulfilling' sense.[35] Thus if we consider the various simple judgment forms: *A is P, An S is P, The S is P, All S are P*, etc., then 'it is easy to see that only at the places indicated by letter-symbols … can meanings stand that are fulfilled in perception itself.' (II A607/779) Even where the variables in question replace complex contents, we shall eventually

> come down to certain final elements of our terms – we may call them elements of stuff – which find direct fulfilment in intuition (perception, imagination, etc.), while the supplementary *forms*, which as forms of meaning likewise crave fulfilment, can find nothing that ever could fit them in perception or acts of like order. (II A607f./779)[36]

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moment of assertion in, e.g., a predicative statement, would fall outside of that statement's meaning.' (II A559/737)

34. For a discussion of Husserl's extraordinarily rich theory of perception in the *Logical Investigations* see Mulligan 1995.

35. Cf. II A607/778.

36. Husserl developed this doctrine of forms and stuffs in the remarkable "Appendix" on syntactic forms and stuffs in the "Formal and Transcendental Logic".

Or, as the title of § 43 of Husserl's Sixth Investigation expresses it: 'The objective correlates of categorial forms are not real moments.'

> The "a" and the "the", the "and" and the "or", the "if" and the "then", the "all" and the "none", the "something" and the "nothing", the forms of quantity and the determinations of number, etc. – all these are meaningful propositional elements, but we should look in vain for their objective correlates (if such may be ascribed to them at all) in the sphere of *real* objects, which is in fact no other than the sphere of *objects of possible sense-perception*. (II A610f./782)

Categorial Acts and Categorial Objects

Categorial forms include not only the *and* and the *not*, however, but also the *is*, and this element of the proposition, too, is incapable of being fulfilled in any mere perceptual act:

> I can see colour, but not *being*-coloured … Being is nothing *in* the object, no part of it, no moment inhering in it; no quality or intensity, no figure or internal form whatsoever, no constitutive feature however conceived. (II A609/780)

When Husserl talks of 'seeing' here he refers to both outer and inner perception, and indeed in the title of § 44 of the sixth Investigation he is concerned to stress – against Brentano – that 'The origin of the concept of being and of the remaining categories does not lie in the realm of inner perception'.[37] For unlike Brentano, Husserl is unwilling to accept that the categorial concepts of logic and formal ontology – concepts such as being and non-being, unity, plurality, totality, number, ground, consequence, and so on – should arise through reflection on certain mental acts. Of course some concepts do arise in this way: 'concepts like *perception*, *judgment*, *affirmation*, *denial*, *collecting* and *counting*, *presupposing* and *inferring*' (II A611/782), but these are not the categorial concepts which lie at the very heart of logic.

'Being is not a judgment nor a real constituent part of a judgment. Being is as little a real constituent of some inner object as it is of some outer object' (II A611/782). How, then, do we acquire the formal concept *being*, how do we achieve a fulfilled presentation of the corresponding formal-ontological category? How, indeed, do we achieve a more than merely empty or signitive grasp of any species or categorial form?

We shall henceforth use the term 'categorial object' and its derivatives in a wide sense, to encompass all objects existing on levels above that of empirical individuals. Thus categorial objects will include material species and states of affairs as well as the formal categories of logic and formal ontology, as well as all structures built up therefrom. Such an object can be given to us in a fulfilled way, Husserl insists, only on the basis of an individual presenting act which sets some individual instance before our eyes. But this 'analogue of common sensuous intuition' (II A613/784) for categorial objects is not by any means a straightforward matter. Categorial objects can be presented in a fulfilled manner only by appeal to a certain kind of complex cognitive processing.

Individual sensible objects are *immediately given*, 'not *constituted* in relational, connective, or in any other acts, acts founded on further acts which bring objects from elsewhere to

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37. It is therefore unfortunate that for 'inner perception' Findlay has substituted 'sense-perception' in the English translation of Husserl's work.

appearance. Sensuous objects are present in perception in a single act level' (II A618/787). Categorial objects, in contrast, need to be made present in a more complex process involving acts on several levels: 'An aggregate, e.g., is given, and can only be given, in an actual act of grasping together, an act which comes to expression in the form of the conjunctive connection *A and B and C and …* ' The concept *aggregate* does not, however, arise through reflection on this act, but through reflection 'on the aggregate it makes apparent *in concreto*' (II A613f./784).

This is clearest in the case of those categorial acts in which we move from some sensible, material object to the corresponding material species or universal. This is not, as is too often supposed in the more superficial commentaries on Husserl, a matter of some special kind of 'vision', directed towards extra-worldly Platonic objects in the same way that sensory perception is directed toward ordinary objects in the material world. The categorial act which enables our apprehension of the species is, like all other categorial acts, a *founded* act. And the lower order acts on which it is founded are in this case (1) acts of perception of certain specific moments in the things perceived, (2) acts of apprehension of these moments as standing in certain relations of exact similarity, of identity in this or that respect, and (3) a founded act of presenting the species that is rooted in this identity.[38]

How, now, do things stand in regard to the apprehension of states of affairs? Here we are normally only signitively directed to the object in question: the state of affairs is the direct objectual correlate not of a straightforward act of perception but of an act of judgment, an act linguistically clothed. We *can* be directed towards a state of affairs in a fulfilled way, not however by reflecting on judgments, but only 'through the fulfillments of judgments themselves' (II A613/784).

Consider, for example, our apprehension of the state of affairs *that a is part of A*. We have here first of all a straightforward act directed towards *A*, an act in which *A* 'stands simply before us: the parts which constitute it are indeed in it, but they do not become our explicit objects in straightforward acts'. The same object

> can however be grasped by us in explicating fashion: in acts of articulation we put its parts 'into relief', in relational acts we bring the relieved parts into relation, whether to one another or to the whole. And only through these new modes of conception do the connected and related members gain the character of 'parts' or of 'wholes'. (II A624f./792)

Thus we must consider now a pair of acts of perception, trained, respectively, upon *A* and upon its part or moment *A*, in such a way that the two acts

> are not merely performed simultaneously or one after the other in the manner of disconnected experiences; rather they are bound together in a single act and it is only in the synthesis of

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38. To grasp given parts or moments as qualitatively identical and to grasp the terms in question as instances of one and the same species are therefore two sides of a single coin. Note in passing how well this Husserlian view of species in terms of perfect identity works for species from the realm of categorial forms: when two aggregates, for example two separate collections of five items, are compared, then there is indeed something perfectly and straightforwardly identical in the two collections: their respective individual fivehoods are absolutely alike, and this regardless of all differences in their underlying matters.

this act that A appears as containing *A* within itself. Just so, *A* can, with a reversal of the direction of relational perception, appear as pertaining to A. (II A625/793)

This 'direction of relational perception' is a new species of act-moment having its own determinate 'phenomenological character' and making its own determinate contribution to the matter of the relating act. In the present case there are clearly two such 'directions', two possibilities 'in which the "same relation" can achieve actual givenness' but only 'in founded acts of the indicated sort' (II A626/794).

The same two-fold possibility is present also in the case of states of affairs involving *external* relations such as *A is to the right of B, A is larger, brighter, louder than B*. The formal (and material) ontology of these relations, too, can be most adequately understood within the context of a theory of part, whole and dependence of the Husserlian sort. The states of affairs in question may arise wherever independently perceivable objects

find themselves together – regardless of their mutually separate self-containedness – in association with each other, in more or less intimate unities, i.e. into what are at bottom more comprehensive objects. They all fall under the general type of the relation *part to parts within a whole*. And once more it is founded acts in which the primary appearance of the states of affairs in question … is achieved. (II A627/794f.)

Suppose, to take another example, we perceive in sensation the *contact* of two objects *A* and *B*, their sharing a common boundary within a more comprehensive whole:

we grasp the contact and perhaps express it in the synthetic forms '*A* is in contact with *B*', or '*B* is in contact with *A*'. With the constitution of the latter forms, however, new objects arise, belonging to the class of 'states of affairs', which includes only 'objects of higher order'. In the sensible whole, the parts *A* and *B* are made one by the sensuously connecting form of contact. But the setting into relief of these parts and moments, the formation of intuitions of *A*, *B*, and of the *contact*, will not yet yield the presentation *A is in contact with B*. This demands a novel act which, taking charge of such presentations, shapes and connects them in an appropriate way. (II A628/795)

As is well known, Brentano defended the view that all acts of judging presuppose, that is to say are founded on, acts of presentation. Brentano however insisted that the presentational acts which occur in the context of a judgment are in every case capable of existing in separation from this context, i.e. that the very same presentational act could in principle occur both alone and in the structure of a judgment. This view, as Husserl puts it, involves 'a confusion of two utterly different species of foundation' (II A462/651). On the one hand we have that sort of foundation which obtains between an act of joy provoked for example by the perception of some pretty girl, and this very perception itself, a foundation of one act upon another, separate act. On the other hand we have that sort of foundation which is involved within the locus of a single complex act, for example between the matter of a judgment and the matters of the constituent presentations or nominal acts.[39] Reflection on such cases reveals that, as already noted above, presenting acts

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39. See Smith 1987a for a discussion of the foundation relations that are involved in this latter case.

existing on their own and what might appear to be the same presenting acts serving as the terms of a judgmental whole *are not really the same acts*. Thus in the move from presentations of *A* and of *B* to a judgment such as *A is in contact with B*,

> it is not as if some intervening additional piece had been shoved in between the unchanged presentations, a bond, which would combine the presentations together in a merely external fashion. The function of synthetic thought (the intellective function) does something to them, shapes them anew, although, being a categorial function, it has done this in categorial fashion, so that the sensuous content … remains unaltered. (II A629/796)

Moreover, what applies to the acts applies also to the objects presented. Thus the object *A* or *B* on becoming inserted into the new relational complex

> does not appear before us with new real properties; it stands before us as this same object, but in a *new manner*. Its becoming fitted into the categorial context gives it a definite place and role, the role of a *relatum*, more particularly of a subject- or object-member; and these are differences that manifest themselves phenomenologically. (II A629/796)[40]

> In fact we have a quite general parallelism of the structures of meaning and object in relation to all categorial phenomena. Thus to the categories of meaning distinguishable within the simple proposition there correspond categories on the side of the object such as relatum, relation, subject, object, etc., distinguishable within the state of affairs. And to each of the higher order meaning categories there correspond new categorial object-forms relating to complex states of affairs and to combination-forms such as *and, or, both, either, because, if,* and so on.

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40. Husserl's criticism of Brentano here parallels in many respects criticisms of the production theory of the Graz school of Gestalt psychologists on the part of the (in this respect) more sophisticated psychologists of the Berlin school, who were indeed almost certainly influenced by Husserl's theory of dependence (see Smith, ed. 1988 and Smith 1994). Both Husserl and the Berlin Gestaltists recognized (in different ways) that there is a characteristic transformation which takes place

> wherever contents are on one occasion considered of themselves and on another occasion considered as connected, woven together, with other contents, as parts of a whole. Connection would connect nothing if it left connected contents entirely unaffected. Certain changes occur as a matter of necessity, and naturally those which, as properties of connections, make up the phenomenological correlates of relational properties on the side of the objects. (II A510/699)

Husserl is implicitly criticising the production theorists when he insists that 'we must guard against confusing the straightforward perceptions of sensuously unified groupings, series, swarms, etc., with the conjunctive properties in which alone the consciousness of plurality itself is properly constituted.' (II A633/799) There are still, however, certain important elements of the production theory remaining in Husserl's approach to perception and cognition, though an adequate treatment of these matters must await upon a detailed comparison of the views on Gestalt perception of Husserl, Ehrenfels and the Meinongians.

Categorial Perception, Evidence and Truth

Categorial perception is conceived by Husserl as a true analogue to ordinary sensory perception. As already stated, this is not because categorial acts have their own determinate objects of direct intention.[41] The analogy obtains, rather, because categorial acts share with ordinary judgments and presentations the three essential features of quality, matter and representative content, the latter being here also that moment which 'makes up the difference between "empty" signification and "full" intuition' (II A643/808).

But what *is* the representative content in the case of categorial acts? It is provided, Husserl argues, by the very *acts* of categorial shaping themselves, acts of collecting, identifying, connecting, setting into relief, and so on. That is, it is provided by the very operation of that cognitive processing on the basis of which the given categorial objects are set before us in the first place. The directedness to a categorial object is therefore a fulfilled directedness to the extent that the complex acts necessary for the setting forth of the given object are in fact carried out. A fulfilled directedness to a species, for example, occurs only if parts or moments of given objects standing in relations of exact similarity are in fact picked out and the objects grasped as identical in this or that respect, so that their (qualitative) identity can itself be made into an object in a process of what Husserl calls 'ideating abstraction'. A fulfilled directedness to an aggregate occurs only if given individual objects are in fact brought together in actually executed collecting acts. A fulfilled directedness to a state of affairs occurs only if given objects or determinations are not merely perceived together but grasped determinately in a judgment, and in such a way that we have an experience of agreement between the meaning of our judgment and the state of affairs which corresponds thereto.

But now, Husserl argues, when a state of affairs is given in this manner, then our acts correspondingly add up to what he calls an evident judgment, an experience which has the peculiar property that it instantiates that quite special sort of species which we call a truth. For each single truth *is* a species whose instances are fulfilled experiences of states of affairs, cases of correspondence between fulfilled meaning act and meant object.[42]

When a given state of affairs is given to us in a fulfilled manner, then a certain truth is instantiated. We can reflect on this instantiation and perform an act of grasping the species involved, so that the truth itself becomes our apprehended object. 'We hereby apprehend – through ideating abstraction – the truth as the ideal correlate of the transient subjective act of cognition, as one [ideal singular] over against the unlimited manifold of possible cognitive acts and of knowing individuals.' (I A230/227)

One could in principle apprehend in this way a whole theory, a whole deductively closed collection of truths, for here, too, there is an opposition between the ideally identical theory as a structure of truths on the one hand set over against an array of dispersed evident judgings on the

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41. 'The new higher order objects which are created by categorial forms are not objects in the primary and original sense' (II A658/820).

42. Husserl in fact distinguishes between four different meanings of the term 'truth' (II A651ff./765f.), but since the differences in question relate merely to different ways of delineating the single ontological structure described in the text they will not be of relevance to our discussions here. See also I A189f./194f.

other. The fulfilled apprehension of an entire theory, however, and therefore also of an entire domain of scientific objects, is ruled out by factual constraints on consciousness. Our properly scientific knowledge is always partial and incomplete, as contrasted with that direct knowledge of objects which is vouchsafed to us through inner and outer perception. Scientific knowledge is indeed a cognitive possession that survives even when the relevant objects are not themselves present to the cognizing subject. And as Dallas Willard points out in his remarkably sophisticated study of this aspect of Husserl's logic, the absence of the relevant objects is 'of necessity the normal case in scientifically organized research and knowledge' (Willard 1984, p. 12). This partiality, too, may be made the object of its own kind of theoretical investigation, an investigation of the various different ways in which our cognitive acts may fall short of the ideal of theory or of knowledge in the strict and proper sense. And indeed Husserl's framework provides us with the means not only for investigating the structures of a science as a deductively closed collection of fulfilled cognitions and validations *in specie*, but also for coming to an understanding of the nature and status of the various definitions, algorithms and other auxiliary devices which enable the scientist to economize on cognitive fulfillments in more or less justified ways. Willard's study, which sets new standards of scholarship in work on the early Husserl, is now the definitive treatment of this aspect of Husserl's theory of science.

Categorial Shaping

The world has a certain sensible, material stuff. Within this stuff we can, if we strain our mental eyes, pick out certain categorial objects. By means of suitable acts of relating or of setting into relief we can make out certain higher order formally determined structures and we can carve out for ourselves new objects by cleaving the relevant matters along formally determined contour lines.[43] The material stuff of the world thereby serves as immediate foundation for the categorially shaped objects which result.

This process can however be carried forward. The operations involved in categorial shaping can be iterated, so that the objects of categorial acts are themselves subjected to further categorial shaping of higher order:

> categorial unities may again and again become the objects of new connecting, relating or ideating acts. Thus for example universal objects can be collectively connected, the collections thereby formed then again connected with other collections of similar or different type, and so on *in infinitum*. (II A653/816)

The resulting higher order categorial acts can indeed be such that the sensory material with which we started is no longer present even in a subsidiary way in the contents of the acts in question. This is the sense of Husserl's designation of the categorial disciplines as 'pure':

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43. See Schuhmann and Smith 1987 for a complementary discussion of this process of categorial shaping in the work of the Munich phenomenologist Johannes Daubert. The issue of categorial shaping has been subjected more recently to investigations on the part of cognitive scientists and others engaged in a project of 'naturalizing' phenomenology. See, on this, the papers collected in Petitot, *et al.* (eds.), 2000. It serves as the basis for a new type of correspondence-theoretic understanding of truth (formulated in terms of the doctrine of truthmaking) in Smith 1999.

Like the whole of pure logic, so all pure arithmetic, the pure theory of manifolds, in short the pure mathesis in the all-embracing sense, are pure in the sense that they contain no sensuous concept in their entire theoretical fabric. (II A656/819)

Categorial shaping is a purely intellectual matter. But the objects it picks out are not denizens of any separate, purely intellectual realm. It is, rather, as if these objects sit on top of the perceptual world in such a way as to leave all the real, sensory structures and all the real unities which lie beneath them unaffected.[44] Categorial objects are, in the terminology of Smith 1995a, 'fiat objects', and their boundaries are 'fiat boundaries'.Thus categorial forms do not glue, tie or put real parts together so that new sensuously perceivable wholes would emerge. The relating and connecting, the setting into focus and the drawing of boundaries that is involved in categorial processing merely sets up a new *view* [*Fassung*] of what is intuited on the primary level of sensory acts, a view which 'can be given *only* in such a founded act, so that the [Platonistic] idea of a straightforward perception of that which has been formed or of a givenness through some other straightforward intuition, is absurd.' (II A658/820) From this it follows however that – as far as concerns the world of what happens and is the case – categorial shaping *leaves everything as it is*.

It is not, however, as if the categorially perceiving intellect enjoys complete freedom in his forming and shaping:

The very fact that the categorial forms constitute themselves in founded characters of acts, and in these alone, involves a certain necessity of connection. How, otherwise, could we speak of categorial *perception* and *intuition*, if any conceivable matter could be put into any conceivable form, i.e. if the founding straightforward intuitions permitted themselves to be arbitrarily connected together with categorial characters? (II A660/821)

The insistence on the possibility of fulfilment – in fact of a complex chain of fulfillments leading back, ultimately, to sensory intuitions – imposes quite determinate constraints on the shaping that is possible on the higher categorial levels. Indeed there are laws governing the possibility and impossibility of combination and iteration of categorial operations that are analogous to the laws governing the combination of meanings on the level of pure grammar, laws having their origins in what is possible and impossible in virtue of the compatibilities among acts of identification, collection, setting into relief, and so on, in relation to given foundations. We cannot convert a part-whole relationship into a relationship of discrete items and preserve the possibility of adequate fulfilment. Such examples point to a family of laws governing the transformation of meanings, for example from '*w is a part of W*' to '*W is a whole relative to w*', from '*a certain A is B*' to '*not all A's are not B's*', and so on, in such a way that the possibility of fulfilment is preserved.[45] Because the species of material foundations hereby involved 'are quite freely

44. It is above all in this respect that Husserl's views may be said to resemble those of the Graz production theory. In general we can say that Husserl's account of categorial perception rests on too sharp a distinction between sensation on the one hand and that which is catgorially formed on the other, where – as Gestalt psychologists such as Wertheimer, Michotte and Rubin showed – even our most basic experiences are characterised as being already categorially formed.

45. See II A666f./826f.

variable and are only subject to the obvious ideal condition of capacity to function as carriers of the relevant forms, the laws in question are of an entirely pure and analytic character' (II A661/822). They hold in abstraction from all sensuous stuff, 'and are accordingly not capable of being affected at all by limitless variation of such stuff' (II A672/831). Hence they do not need grounding in experience, and it is senseless to suppose that the world might somehow fail to satisfy them: 'Laws which refer to no fact cannot be confirmed or refuted by fact.'

> There is need of no metaphysical or other sorts of theories to explain the harmony of the course of nature and the 'inborn' laws of 'understanding': instead of an explanation one needs merely a phenomenological clarification of meaning, thinking and knowing and of the ideas and laws which spring from these. (II A671f./830)

In the theoretical domain of logic proper we are concerned exclusively with *authentic* thinking, with cognitive acts and processes capable of corresponding in the full sense to objects, i.e. of being bound up 'with an intuition which fulfils them totally and singly' (II A666/826). But there are of course free and easy categorial acts which are a matter of mere signitive directedness to categorial objects already constituted. Indeed we might entirely abandon the insistence on fulfilment, and rest content with an empty categorial forming and shaping, a forming and shaping which does not understand itself and which can take place fully *ad libitum*. We could then talk purely signitively about (even build entire axiom systems relating to) the square root of Napoleon's hat, or the part-whole relations between Wellington's boots and the mother of my umbrella. For in the sphere of inauthentic thinking, of mere signification, 'we are free of all constraint by categorial laws. Here anything and everything can be brought together in unity.' (II A666/826)

The Formal and the Analytic

One indication of the powerful economy of Husserl's theory is provided by his treatment of the traditional notions of the analytic and the synthetic in terms of the opposition between *formal* and *material* concepts and categories.[46] Analytic propositions are those propositions which express purely formal truths (truths which apply to all objects whatever their material make-up or qualitative determinations) and all the specializations thereof which arise through substitution of particular material concepts.[47] Synthetic propositions are propositions which cannot be converted to formal truths by any process of substituting variables for the simple or complex material concepts they contain. The basic laws of logic and formal ontology are in every case analytic and are in this sense 'trivial generalities'. Indeed, Husserl castigates 'the old rationalism' because it

> could not get clear about the fact that logical principles are no more than trivial generalities, with which an assertion may not clash on pain of being *absurd*, and that therefore also the harmony of thought with these norms guarantees no more than its formal consistency. (I A140/157)

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46. On this see also Soldati 1999.

47. As when we go, for example, from "every A which is B is A" to "every bachelor who is bald is a bachelor". Cf. II A247f./457f.

Logic and formal ontology themselves, however, are not entirely empty. They first of all enable us to tie together trivialities, which might otherwise seem random and unmotivated, into the framework of a *theory*.[48] But then also they have the utterly non-trivial task of helping us to get clear about the fundamental categories upon which their respective laws are based, the 'categories essential to all science as such', and this is a matter not of logical laws in the strict sense (and not even of analytic truths) but of a more global, structural description of the entire domain of knowledge and cognition.[49] This task of clarification has been all but forgotten by modern logicians, whose efforts have been directed almost exclusively to the working out of certain sorts of mathematical properties of more or less arbitrarily constructed formal systems of a merely conventional character. The status of these efforts and their relevance to logic as theory of science is never clarified, and is in practice nil.[50]

That the task of clarification is still not by any means completed will become clear if we consider the status of concepts such as *thinker*, *thinking act*, *expression*, *use of language*. Are these concepts formal or material? And how are they related to a concept such as *human being*? Husserl himself seems to suggest that it is a relatively incidental matter that the laws of authentic thinking apply also to human thinking, for he sees such laws as being rooted in the character of acts purely as instances of the relevant ideal species: they are laws which 'pertain to all possible organizations which could be built up out of acts of like species' (II A669/828). But what are these 'possible organizations'? Are they, as Husserl's doctrine of formal concepts would seem to imply, realizable in a range of structures other than those to be found within the organic realm? Are they, for example, realizable within the locus of a machine?

Logic as Husserl conceives it is a science of certain privileged species in the sphere of both meanings and objects and of the relations holding between these and between the ideal singulars which they comprehend. At the very centre of Husserl's account, therefore, is the notion of species, and it is clear that the account will work only to the extent that this notion is itself well-founded. Now there is species only where objects manifest total qualitative identity in this or that respect: this is what talk of 'species' means. Such identity is manifested, for example, between two patches of red of an exactly similar hue. On the level of empirical individuals, however, exact similarity of this sort is comparatively rare: we find it among the elementary data of sense, and in the sphere of phenomenology (of mental acts, their qualities, matters, and contents) in general, and for example in relation to certain phenomena in the realm of action.[51] Where we do *not* find it is in relation to a species such as *dog*. As already noted however, when we leave behind the sphere of empirical individuals and consider the higher order categorial objects in the region of the 'pure' or 'theoretical' sciences, then perfect similarity is no longer at a premium. Thus where, above all, we are dealing with the mathematical sciences, then Husserl's doctrine

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48. Cf. II A254/463.

49. See II A144/370. Husserl's actual practice in the "Logical Investigations" consists precisely in setting forth the synthetic relations, above all relations of dependence, of compatibility and of necessary exclusion, among a whole chequered family of different sorts of categorial objects.

50. Compare Willard 1980 for an elaboration of this point.

51. See Reinach 1913 for a detailed investigation of these phenomena which is entirely in the spirit of Husserl's *Logical Investigations*.

seems to be on firm ground. And the same applies to those sciences, both logic itself and various branches of theoretical linguistics, where we are dealing with structures of meanings in abstraction from particular occasions of use.

Husserl's logic thereby provides us with a means of abandoning conventionalism in logic and in surrounding spheres. It gives us an account of what the subject-matter of logic is, in terms of the actually existing patterns of identity and difference, of constancy and variation, within the realm of meanings. Moreover, it provides us with a means of providing, in a way which does not involve compromising the necessity of logic, an account of the relations between logical laws and empirical acts of thinking and inferring.

But what, now, is left of our first approximate account of the nature of a scientific theory as an organized collection of mental acts? We have reached the point where we can see that logic as full theory of science must be taken in a wider sense, as including not merely the theory of acts and of meanings – including the 'pure logical grammar of meaning categories' – but also the various branches of formal ontology. For there are of course more bits and pieces involved in the practice of a science than simply mental acts, and Husserl's *Logical Investigations* is surely still, after one hundred years, the most detailed and the most realistic study of the ways in which these various bits and pieces hang together.

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