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Philosophical Entities

An Introduction

1 Semantics and Ontology

Ontology yields answers to the question of what there is, and semantics provides answers to the question of how we refer to what there is. Not surprisingly, both fields often go hand in hand: Basic ontological categories are accepted along with basic linguistic types, and linguistic types are accepted as basic if and because they refer to acknowledged ontological categories. In that sense, both areas are concerned with structure – the structure of the world and the structure of our languages. Since Aristotle, the main view has been formed by the *Substance–Property–Distinction*: In the world, there are substances and properties, where substances are primary and the bearers of properties. Grammatically, such a view is reflected by noun phrases which are subjects of verb phrases. Together these two types of phrases form sentences, or to put it in another way, we construct sentences by assigning predicates to subjects. Semantically, verb phrases (verbs, adjectives, adverbial constructions, ...) are functions, mapping objects (elements of the universe) into **T**True or into **F**False.

Aristotle's version of the substance-property distinction had, in fact, a more intricate structure: Substances divide in primary and secondary ones, corresponding to singular and general terms, respectively. Primary substances have independent existence, and they are referred to by proper names and (successful) definite descriptions, while secondary substances are linguistically represented by common nouns, and terms denoting them often occur in verb phrases. Predication of common nouns requires a decision on whether *all* or *some* of the entities picked out by the general term have the property in question; hence, an account of quantification enters the picture. So far, language reflects ontology (or, if one prefers to put it in that way, ontology is built up from language). Several nontrivial problems are lurking behind this rather simplistic view, however.

1.1 That-clauses

The first and most paradigmatic examples that come to mind when thinking or speaking about objects are material things: persons, tables, planes. These entities are the undoubted bearers of natural properties; they carry weight, are red or green, and are harder than others of their kind. They are countable (sixteen persons at the party), located (in the middle of the room is the table which precludes there being a chair at this place), and sometimes they have proper names ("Air Force One"). Many things do not fit into this picture – drops of water may be neither coloured nor countable (in a glass, for example, although they are there). It is also unclear where precisely a mountain is located, and most things do not have proper names. Nevertheless, our concepts of natural properties and some other qualities form the basis of our understanding of the elements of the universe. And to obtain sentences that relate to them, we apply predicates standing for such attributes to subject phrases.

Now, such sentences are true, loosely speaking, if the elements of the universe have the properties that are expressed by the predicates ("do not have" in case of negative predication). Obviously, the truth of such predicative sentences presupposes the existence of the respective entities – and this enable us to turn the argument around: For if a predicative sentence is acknowledged to be true, then the subjects of predication must exist (at least as part of the accepted universe). This way of presenting the argument raises the issue of nominalizations (nouns derived from verbs) and that-clauses.

Consider the following sentences:

- (i) Last year there were three weddings in our family.
- (ii) The eruption was dreadful.
- (iii) Adam sees that Eve leaves now.

- (iv) Moving the head caused serious pain.
- (v) Adam still cannot accept that Eve hit him yesterday at his office with a pillow.

Let us suppose that all these sentences *are true*. Then, the reversed argument above leads to the conclusion that what was tripled, what was dreadful, what Adam sees, what caused the pain, and what Adam cannot accept *must* all exist – otherwise there is nothing to which the properties can be ascribed. Accordingly, our natural languages, which contain expressions such as those above, suggest the existence of weddings, eruptions, leaves, moves, and strokes. Moreover, such entities are not only existents but are in general countable; they have properties, are located in space (at the office) and time (last year, now), and some of them have names (the American Civil War, the French Revolution). In many ways, entities referred to by nominalizations and that-clauses behave like things. Just like other elements of the universe, some of them are not precisely located, are not easily counted, and most of them do not have proper names.

Of course, there are differences between material things and entities like weddings or beatings. For instance, a wedding and a beating can occupy the same place at the same time, something which is impossible for a table and a chair. Furthermore, although some philosophers believe that objects occur only in situations, Eve's hitting Adam yesterday with the pillow cannot occur without Eve, Adam and the pillow, whereas at least Adam could exist without the beating. This suggests that we may include the referents of nominalizations and that-clauses among the building blocks of the universe, so that names, definite descriptions and quantification can fulfill their purpose. But then we have to clarify the differences and, possibly, dependencies between these entities and other elements of the universe.

Thus, the obvious question concerns the entities themselves. *What* are these weddings, eruptions, movings, leaves, beatings, etc.? Their names figure in reports of perception (one can see them, even take part in them), in sentences about propositional attitudes (one can believe that they occur), in modal talk (some are possible, others inevitable), in claims about causal or teleological dependencies and other such relations. It would be rather surprising to discover that one and the same kind of entity figures in all these contexts. The philosophical vocabulary provides us with a wide range of objects, given through sentential descriptions, as if there are actions, events, facts, situations, states of affairs, and there is no commonly accepted opinion about how they should be explicated. Many philosophical theories deal not only with one, but with two or more the kinds of entities mentioned. It is therefore important not only to explicate and

define correctly what we are talking about, but also to elucidate which connections and dependencies exist between them. The common grammatical representation via nominalizations and that-clauses should not be allowed to obscure differences among actions, events, facts, situations and states of affairs.

1.2 Particulars and Universals

Following Richard Montague, we shall call entities which are denoted by or referred to by nominalizations and that-clauses ‘philosophical entities’ (cf. (Montague 1974)). Such a phrase is nothing but a convenient umbrella term. Philosophical entities, like things, take the form of particulars or universals. Consider a list of frightening disasters: floods, storms, volcano eruptions, and earth quakes. There are two ways of understanding the question ‘How many disasters are on the list?’ – One can count every single flood, storm, . . . , and obtain the number of 35, say. Alternatively, it might be said that there are four *kinds* of disasters: floods, storms, volcano eruptions, and earth quakes. Thus, the question of how many disasters there are on the list can be taken to concern *tokens* or *types*. Here we shall not enter the discussion about the relative merits of moderate or strong nominalism as against moderate or strong realism; we only want to remind the reader that problems related to the nominalism–realism debate occur in the area of philosophical entities, too.

Tokens of philosophical entities are spatio-temporally located. They may have material constituents (certain distinct volcanoes, for example) and cannot literally recur. Proper names and definite descriptions refer to tokens. Types of philosophical entities, by contrast, have no distinct localization in space and time. Terms for types of actions, events, and so on, are used to denote many things, or refer to kinds, or classes of the corresponding entities. There can be, and often are, many instances of the same type at different times and places. Without doubt we need terms for tokens as well as terms for types in our language.

Ontologically, the picture is more interesting. Particulars, *i.e.* token philosophical entities, can resemble each other in many respects and stand in various relations and yet still be different. Universals, *i.e.* type philosophical entities, reflect some of the relations between the particulars, and they stand in many relations to other universals. Some of these relations are logical or analytic (as the *buttering the bread with a knife* which is also a *buttering the bread*), while others are empirical (*reckless driving* provoked *that the number of accidents increased so fast*). Actually, the collection of interesting ontological relations including identity, similarity, parthood, instantiation, exclusion . . . of tokens and types, pro-

vides us with attractive topics for philosophical enquiry. The fundamental question, however, is whether tokens and types exist or don't exist at all.

Above, we accepted that language suggests the existence of philosophical entities. Once recognized, the question of whether these entities exist transforms into one about their modes of existence. Both tokens and types may exist independently of each other, and of other entities, or may be dependent on other entities. Philosophical conceptions of philosophical entities can be divided according as they enjoy dependent or independent existence. Types exist only if instantiating tokens exist, whereas types and tokens exist independently, being related by an appropriate relation (for instance, Tadeusz Kotarbiński's relation of *inherence* from (Kotarbiński 1913)). Types guarantee the existence of tokens by instantiation; the existence of tokens depends on the existence of their constituents (things, the fact is *about*, to which the event *happens*, and which *figure in* a situation ...), and so on. Every such conception is a decision about ontological primacy, ontological reductability or supervenience, and which stand one takes imposes certain consequences. Some of them, such as the notions of mental events, omissions or negative facts deserve a discussion of their own.

Another point concerning universals has to be made regarding properties and relations. Philosophical entities are referred to by nominalizations and that-clauses, that is, by nominalizations of *verbs and verb phrases* and by *sentences* introduced by 'that'. The central place in 'Eve's giving Adam a kiss' and in 'that Eve gives Adam a kiss' is occupied by the verb *to give*; hence, it is natural to raise the question of whether there exists a relation like 'give(..., ..., ...)', or a property like 'give(..., Adam, a kiss)' which can be truly ascribed to Eve and falsely to Jane. In other words: Does the existence of properties and relations (which are usually, although not always taken to be universals) follow from the existence of individual philosophical entities (particulars)? The answer rests, of course, on the underlying theories of properties and predication. This is why these theories play such an important role for conceptions of philosophical objects (cf. the essay of Scheffler's and Winkler's in this volume).

1.3 Descriptions

In language, actions, events and other philosophical entities are presented to us under *descriptions*. Even entities having a proper name ('the One Hundred Years War') can be provided with a description. If somebody doesn't know the term, one could identify it from the description 'the complex event that took place in ..., between ... and ..., and which consists of all the battles, fights, negotiations ..., and so on'. It means

that the that-clauses contain a description explicitly stated in the sentence that forms the clause and that nominalizations are nominalizations of the verb in a sentence. Let us refer to those sentences as *constituting* sentences.

Undoubtedly, expressions like ‘the event that Eve stroke Adam’, ‘the fact that Eve stroke Adam’, ‘the situation in which Eve stroke Adam’, and also nominalizations such as ‘Eve’s striking Adam’, act like functions, like term-forming operators: Literally one and the same sentence is mapped onto one and the same philosophical entity whenever the operator is applied. The claim holds notwithstanding the empirical phenomenon of ambiguity, error or conscious bewilderment. The problem becomes controversial if we ask how much the “literally one and the same” can be liberalized. Does a sentence remain one and the same after a logically equivalent transformation? Is it still the same after having changed an occurring subject term with one with *the same meaning* (whatever this may amount to in the given semantics)? Is it still the same after redundant information is added to it? What about philosophical entities constituted by sentences that aren’t logically equivalent, but which are *known to describe* the same material process (‘Adam bought the house from Eve’ and ‘Eve sold her house to Adam’, for instance)? Questions of this sort lie at the centre of discussions concerning the topics of the *individuation* and *identity* of philosophical entities. As we know, some philosophers prefer individuation criteria which are partially or completely beyond the realm of the constituting sentences. Nevertheless, even if the above questions do not arise as a part of the ontological problem, they must be answered as a part of the logical problem of substitution in contexts containing philosophical entities.

Individuation and substitution are closely related to a complex of puzzles concerning the topics of *by-phrases* and *adverbial constructions*. If philosophical entities are presented to us under descriptions, then the possibility arises of different descriptions concerning one and the same object. Consider again the example with Adam and Eve, and suppose the following sentences are true:

- (i) Eve was hitting Adam.
- (ii) Eve tore up the pillow.
- (iii) Eve tore up the pillow by hitting Adam.

A simple but powerful argument in favour of theories that see by-phrases as expressing identity is based on a view of how many things Eve did while she was hitting Adam and was tearing up the pillow, namely that it took no more than hitting Adam to tear up the pillow. In other words ‘Eve’s hitting Adam’ and ‘Eve’s tearing up the pillow’ refer to one and the same event. Much evidence supports the identification of the act of

hitting and of the tearing up: For instance, they occur at the same spatio-temporal region (as we know from above – yesterday, at Adam’s office), they are each both caused by Eve’s furiousness and effect the indignation of Adam’s secretary. But, if the hitting is nothing but the tearing up, then these acts should share all properties. The opponents of the identity view concerning by-phrases have produced many counterexamples, some of which are quite impressive. With respect to our example above, it could be objected that Eve *intentionally* struck Adam *with the pillow*, but she didn’t tear up the pillow intentionally and certainly not with the pillow. In other words, Eve tore up the pillow *by mistake*, but she didn’t hit Adam by mistake; on the contrary. Since the tearing up of the pillow cannot be with the pillow and be intentional, and the hitting cannot be by mistake (under the intended circumstances), they cannot be the same entity.

Besides the rather strong defense of the nonidentity account of by-phrases in terms of properties of philosophical entities, there are a lot of misunderstandings concerning the function of by-phrases. An argument to the effect that by-phrases cannot indicate identity because the ‘by’ is not symmetric (even if (3) is true, this does not mean that Eve hits Adam by tearing up the pillow) is such a mistake: Proponents of the identity account would claim that identity, of course, is necessary, but not sufficient to use the ‘by’. An obvious way out of the trouble, generated by examples like the one above, consists in denying the identity of *hittings* and *intentional hittings with a pillow*, and *tearings up* and *tearings up by mistake*. A distinction between these entities can only be drawn if based upon a very clear explication of tokens and types. Furthermore, such a distinction takes us to the theory of adverbial constructions and valency theory, where semantics and ontology go hand in hand with linguistics (theories of grammar). We should expect semantic differences between verb modifiers (like ‘intentionally’) and sentence modifiers (like ‘possibly’) to show up in different conceptions of philosophical entities.

As one can see, analysis of the constituting sentences gives us a considerable theoretical grasp of philosophical entities. We have, however, tacitly accepted the assumption that the constituting sentences are unproblematic. But what if they are not?

1.4 Shadowy Entities

If there aren’t any restrictions on the constituting sentences, the following examples should be able to provide us with philosophical entities by nominalizations or by applying a ‘that’:

- (i) Eve is looking for a nice blue dress.

- (ii) Eve is not leaving.
- (iii) Eve is not looking for a nice blue dress.
- (iv) Eve draws a card with hearts, or she draws a card with diamonds.

For the sake of unity and simplicity, one can recognize all kinds of philosophical entities expressed by (i)–(iv). In some cases this idea is harmless. That-clauses, for instance, include names of sentences, and ‘the sentence that (i)’, . . . , ‘the sentence that (iv)’ can be coherently treated as denoting objects, as the reader can see in the previous section. Matters change, however, when it comes to facts, events, and other inhabitants of the philosophical universe. Suspicions have been raised in the relevant literature about every item from (i)–(iv).

Suppose (i) is true, but suppose that Eve has so high demands and expectations that nothing she would regard as a nice blue dress exists at all. She will never buy one, because none exists. But this doesn’t prevent her from looking for one. That Eve is looking for a nice blue dress must, if it is a philosophical entity at all, be independent of the existence of (some of) its material constituents. One can try to introduce a category of possible objects, allowing their names to occupy the object places for verbs like ‘looks for’, ‘is afraid of’ and others. However, there could have been a nice blue dress, and if Eve saw it, she would have said ‘That’s the one I am looking for’. Unfortunately, the realm of objects that people are looking for, or are afraid of, is not bounded by what is possible. Any attempt to introduce patterns, images or pictures instead of objects fails, because one can be afraid of something completely amorphous and indefinite. This leads to the idea that ‘looks for’ and ‘is afraid of’ are not relations between a person and a object. Sentences like (i) have to be explicated as ascribing a property to a person; properties, for example, like ‘looks for a nice blue dress’ or ‘is afraid of Adam’s evil spirit’. According to such a position, we have to accept specific properties such as properties involving non-existent entities, or intensional properties related to mental states. But even worse, one can find examples where there seems to be no necessity for existents in any of the relation’s positions. In case one tries to deal with examples like the one expressed by (i), philosophical entities whose corresponding sentences contain (factually or logically) empty terms provoke serious difficulties. That Adam has no gun in his hand seems to require neither the existence of Adam nor that of a gun. This example, however, changes the issue under discussion to the item of sentence (ii).

That Eve does not leave the party at a certain moment at night may play an important role in her and Adam’s life. So, is there a *fact that Eve does not leave*, an *event that Eve does not leave*, or an *action where Eve is not leaving*? Those who answer ‘yes’ to this question must be able to

explain when and where such entities like negative facts, events, and actions occur. Once admitted into one's ontology, they would overpopulate the universe, and all of us would be very busy with not-doing something (we, the authors, are just performing the action of not saving the whales in the Baltic Sea – we did so this morning too and will be doing so again tonight).

A further strong argument against negative philosophical entities is the claim that they are parasitic upon usual, positive entities. According to such a view, not-being-the-case, not-doing-something, etc., indicate that something else is the case, something else is done, etc. In that sense, negative entities belong to a pragmatic mode of speaking, expressing a reference to some indefinite positive entities. It would be preposterous to allow every such negative entity into our ontology.

There may, however, still be something to be said for retaining some of them, as the following arguments suggest. First, as was mentioned at the beginning of our discussion, negative entities sometimes play an important role. It is widely admitted that omissions and negligence can be actions, and that one can be punished for performing or even omitting one. Moreover, such entities are sometimes given to us without a corresponding excluded positive counterpart. One can see that Eve's dress is not blue, but not which colour it is. A further argument belongs to the semantics of some predicates: Eve's staying would probably be acknowledged as a perfectly good entity – but then, so the argument runs, there is no reason not to admit her not-leaving. Since we use the words 'stay' and 'leave' as we do, 'Eve does not leave' and 'Eve stays' constitute the same action, event or fact. A derived problem arises if we allow for structured, non-atomic sentences. As a general rule, we may endorse the principle that logically equivalent sentences either both constitute or neither constitute philosophical entities (that is not yet to speak of the *same* philosophical entity), which immediately involves negative entities. If this is so, not only (ii), but also (iii) must be considered as constituting an entity when occurring inside a that-clause.

Negative entities are not the only uncertain candidates for admission into our philosophical zoo. Disjunctive sentences, as for example (iv) in the list above, generate similar problems. Russell excludes them from the constitution of facts (cf. section 3.1.1) for reasons like the following: It is not necessary to have something like 'the fact that Eve draws a card with hearts or she draws a card with diamonds', because the corresponding sentence (iv) is made true already by either the fact that Eve draws a card with hearts, or by the fact that Eve draws a card with diamond, and of course by both facts together. Moreover, *really* and *actually* there is only Eve's drawing a hearts card or her drawing a diamond – in fact, she

draws one card (or two) but not a disjunction of cards. The first part of the argument is simply true, but too short. The argument would have been successful if it were the case that disjunctive philosophical entities serve *only* as truth-makers. But this is not the case. Anybody holding this position should be able to show that all disjunctive entities can be reduced to non-disjunctive entities no matter what the purposes are for which we need them.

Again, as in case of the negative entities, one has to decide whether or not another philosophical position pays off. The second part of the consideration above indicates the weak point of disjunctive entities: If any exist at all, then so great many of them. Eve's drawing hearts would guarantee not only the existence of entities corresponding to (iv), but also of all disjunctive entities composed from her drawing a card with hearts. Just as in the case of the negative entities we are at the moment very busy performing many disjunctive actions. That is why we call those entities *shadowy*, and their existence is the price one has to pay. What you get for your money is unification: Just like the natural antonyms in the discussion above (stay – not leave), we have umbrella terms for disjunctive constructions. Instead of (iv), we could have used the statement 'Eve draws a red card', which factually means the same. Accordingly, it seems that at least the fact of, the event of, and the action of drawing a red card, and the fact of, the event of, and the action of drawing hearts or of drawing diamonds are the same fact, event, or action.

We shall not continue this ontological discussion any further. There is, however, no formal obstacle to including shadowy entities into the realm of philosophical beings; but there might be good philosophical reasons for not doing so. Formal arguments play a special role in contemporary ontological investigations. They are pursued on various levels of formal precision, or, so to say, with different degrees of logicity, and in addition to ontological reflections one finds very abstract theories almost mathematical in form. Under these circumstances it comes as no surprise that some of the same issues enter the realm of logical considerations.

1.5 Formal Ontology

Ontology involves the most general theorems of logic. Among them is the ontological principle of contradiction as well as the ontological version of the *tertium non datur*. Although they seem entirely self-evident at first glance, the validity of these principles has nonetheless raised puzzles and endless controversy. Similar ontological considerations are pursued on many other levels of formal precision. Ontological reflections take the form of abstract theories of purely logical or mathematical character.

Under such circumstances, some of these reflections are naturally treated as logical considerations. Investigations concerning the validity of the above principles were of great importance in the historical development of formal logic. 2000 years after the Aristotelian and Stoic logic, they have led to various classes of logical calculi.

From this perspective even some parts of pure mathematics may be understood as formal approaches expressing modes of existence of entities, since such mathematical theories state precisely what an individual object is, what properties and relations are, etc. Here one might first think of set theory; but other mathematical theories, such as topology and model theory, seem to be of relevance.

One hundred years ago, Edmund Husserl was perhaps the first philosopher to pay any interest to the formal treatment of some of the most fundamental questions of ontology. Powerful tools of logic were developed in those days, and this new development inspired in a natural way various attempts to use these techniques within this prestigious area of philosophical inquiry. Through Husserl's younger colleague, Roman Ingarden, and in the light of related ideas of Leśniewski and other members of Lwow–Warsaw School, these ideas spread rapidly, particularly in the Polish scientific community.

Philosophical inquiries into ontology in an advanced formal setting were put forward first by Stanisław Leśniewski. Inspired by the contemporary discussion on the foundations of mathematics, Leśniewski was interested in finding a formal framework appropriate for the ontological grounding of both mathematics and logic. The basic system was *Mereology*, i.e. the general theory of collective sets. Ontology itself arises from Protothetic. All his axiomatic systems came about in an elegant yet somewhat exotic notation. Leśniewski's mereology was intended to play the part of an alternative to set theory. Later – as an axiomatic “calculus of individuals” – it appears to be a proper extension of set theory rather than a competitive calculus.¹ Thomas Mormann's article “Topological Representations of Mereological Systems” can be seen as a recent example of that line of research. He shows that nothing is lost when a reasonable mereological system is substituted by its topological model. That brings mereology into contact with well developed mathematical theories and may help mereology, as Mormann concludes, “to leave its present state of theoretical immaturity”. In any case, mereology can be treated as a contribution to formal ontology only if it carries a meaningful theory of

¹Tadeusz Kotarbiński served as a faithful translator of Leśniewski's rather esoteric writings for the broader public. Most of Leśniewski's successors both within and outside the Lwow–Warsaw School set out their own considerations on formal ontology in the spirit of his systems. They often, however, use Kotarbiński's explication of these ideas.

(the construction of) universes. The same holds for (pure) set theory itself, which is sometimes taken to be the most usable and convenient base for any formal ontological system (cf. Quine's discussion of this topic in various places, and for several other approaches (Poli and Simons 1996), (Scheffler and Urchs 1995)).

Nowadays, a need for formal tools is strongly felt in the treatment of two special areas of ontological inquiry. One area is concerned with *intentional objects*, an area which seems to contain difficulties on the level of things, but also on the level of states of affairs, facts and other "propositional" entities. An intentional relation holds between either persons (more generally experiencing subjects) or acts of consciousness on the one hand, and the intentional objects on the other. The latter are what people see, fear, expect, look for; and the problem, naturally, consists in the fact that – contrary to usual predication – the predicates in question truly apply to intentional objects which do not exist in the same sense as my cat in "My cat is on the mat". In short: "We are thinking about Sherlock Holmes" may be true (and in fact *is* true while we are writing the sentence) in a real-world-context, but "Sherlock Holmes lives on Baker Street" can be true only inside the fictive context of the novels. Nevertheless, intuitively everybody can think about Sherlock Holmes in just the same sense as he can think about Baker Street, which "really" exists in London. Historically, this problem of intentional objects forms one of the roots of formal ontology, as well as of the philosophy of mind:

One of the most influential thinkers of ontology at the beginning of our century was the Austrian philosopher Alexius Meinong, Ritter von Handschuchsheim. His best known conception deals, among other things, with objects that do not exist. This doctrine is part of Meinong's Object Theory (*Gegenstandstheorie*) which is based on certain assumptions concerning the correspondence of various types of mental states to objects. Thus, there are objects of higher order, founded on the so-called objects of passive perception. Such founded objects are said to subsist (*bestehen*) rather than exist. According to Meinong, the entities we assume or infer are very complex objects called *objectives*. Objectives are built from other objects. They do not exist either; they may either be or not be a fact (*tatsächlich*). They can be expressed, for example by a that-clause, although their being an objective does obviously not depend on their being expressed by a sentence. "Objectives" are the "propositions" of Bertrand Russell and George Edward Moore who were, by the way, heavily influenced in many ways by Meinong. On that basis, non-existing objects or objectives, which are not facts, turn out to be genuine objects or objectives nevertheless – their status does not depend on thought or expression. The non-existence of a huge golden sphere is very different from the non-

existence of a huge uranium sphere, a difference which provides them with an objective status. Yet Meinong never claims that non-existing objects subsist, or have any other form of being (*Sein*). What he assumes them to have is a certain nature (*Sosein*), unaffected by their existence or non-existence. To say that a huge uranium sphere is heavy and round is not to say that there is such a thing. Contrary to Russell's opinion, "there is a *P*" does not follow from "something is a *P*". Meinong's incompletely determined objects, which violate the law of excluded middle, play an extremely important role in his theory of knowledge; they are the "pointers" through which the human mind refers to the completely determinate, existing objects. A very recent contribution to that tradition is (Pańniczek 1998).

Another string of investigations – which will be analyzed in closer details in 2.3 – involves quantification theory. Logical and linguistic theories of quantifiers try to solve the problem of intentional objects by quantifying over non-existing individuals (allowing, therefore, for empty singular terms), or by skipping the classical presupposition of a non-empty domain (allowing for empty general terms). In that sense, free logics and other quantification theories can and have to be conceived as contributions to formal ontology (see, for example, (Lambert 1991) or (Wessel 1972)).

The other dominating area of formal ontology, besides the one about intentional objects, is that of complex or compound beings of all kinds. We have already mentioned set theory and mereology, but at least starting with Russell's facts and Davidson's events there is a growing awareness of the fact that several different philosophical entities can be formed from (or built out of, or defined based on) sentences. The discrimination of these entities provides us not only with a rich, but controlled ontology. It further yields a better understanding of what the objects of intensional logic are: What is it that we believe, what is necessary or possible, what can be promised or forbidden . . . (for examples of such projects see (Barwise and Perry 1983), (Meixner 1994), (Perzanowski 1994) or (Stelzner 1984)). A generalized approach according to which terms, denoting philosophical objects (facts, truth-values, states of affair . . .), are formed from sentences in a natural manner and differ in their logical behavior (criteria of being satisfied and substitutability) can be found in (Wessel 1999).

Again, it was a Polish logician, Jerzy Perzanowski, who first suggested the name "ontologic" for this area of research (see his foreword to (Scheffler and Urchs 1995)). Perzanowski's "The Way of Truth" in (Poli and Simons 1996) is a very fine example of that kind of investigation. In the framework of what he calls *qualitative ontology* he starts from the standard Parmenidean principle of identity: Being is and nonbeing is not. He defines five conjugate notions of a being (understood as a subject of qual-

ities). Perzanowski's aim is to prove theorems concerning these notions. For that purpose he needs some appropriate formalism. The axiomatics of "Primitive Theory of Being" is a first, but useful, approximation. He considerably improves the expressive power of this theory by assuming two additional abstract concepts of being: as a collection of all beings and as the unity or idea of all beings. By means of classical logic he thus achieves a substantial contribution to the ancient controversy between Plato and Parmenides concerning being and nonbeing: *Beings are; Nonbeings are not; The being is; The nonbeing is; Being is; and Nonbeing is.*

Jacek Pańniczek – another representative of the Polish inquiry into formal ontology – contributes to this volume. His paper "Objects versus Situations" establishes itself within the traditional core of ontologic.

Uwe Meixner's work belongs to this part of ontology too (compare (Meixner 1987), (Meixner 1991), (Meixner 1997a) and his most recent (Meixner 1997b)). He emphasizes the need for formal techniques in order to obtain lucid and precise proofs of ontological theorems.

However, other traditions of research have developed independently. There is a vast amount of literature in philosophical logic on issues like identity across possible worlds, indiscernibility, haecceitism, etc. In all these cases, highly powered technical means of modern logic are used to approach ontological problems which are as ancient and venerable as philosophical questions can be.

2 Things

These are perhaps the most perspicuous of the ontological categories: Things are what we first and foremost perceive, they are what proper names and definite descriptions first and foremost refer to. Things are concrete entities confined in space and time and separated from other such entities, properties which makes them both countable and nameable. We usually associate things with material objects, and here we can include animals and human beings among material objects. But we hesitate to call sounds, clouds and rainbows for things. Apparently, our intuition should allow them to be regarded as things as long as they are countable, nameable and localizable. But when it comes to thoughts and abstract objects, people are usually reluctant to see them as things because such entities can be numbered and named but never really located in space and time.

Things are not only concrete entities with certain properties; they have properties which exhibit regularities in common with other things. Because of the similarities among these regular properties, things are also

named by mass terms or natural kind terms. These properties are sometimes divided into essential or accidental properties, depending on whether one thinks that they share with other individuals what makes them of a certain kind, or thinks that they could be lost while the individual continues to be of the same kind.

2.1 Russell on Things

Russell's ideas were somewhat different. His reflections on things are developed in connection to his theory of descriptions. These ideas are well-known, and we shall not repeat them here. Instead, we will concentrate on what he said about *things as constituents of facts* in his *Philosophy of Logical Atomism* (cf. (Russell 1964)).

Logical atomism means that in the analysis of what exists one arrives at logical atoms, some of which are 'particulars'. These are not necessarily physical atoms, but rather things such as small patches of colour or sounds – momentary things, as Russell puts it. Sometimes he also calls everyday physical things such as Socrates and Piccadilly 'particulars', although they are rather "series of classes" and, therefore, "logical fictions" ((Russell 1964), p. 191). The main semantic difference between such particulars and propositions and facts consists in their ability to bear proper names, while propositions can be true or false, and facts might be asserted or denied. Their common feature consists in their belonging to the real world.

Things appear as components or constituents of facts on the metaphysical level. Every fact involves a complete sentence, sentences consist of words, and these words may turn up in different sentences. Hence, there is, for example, a Socrates-constituent in 'Socrates is mortal' and in 'Socrates is wise'. Accordingly, things are nothing but the meanings of names. Russell even defines "Particulars = terms of relations in atomic facts" ((Russell 1964), p. 199). What we call a particular is, therefore, a logical question; what particulars we can find in the world is an empirical one. In a strict sense only 'this' and 'that' are real proper names, because they may name things which are not complex, not series of classes. Socrates is rather something like a series of experiences, and so 'Socrates' is an abbreviation for a description. Real particulars are logically independent of each other (like substances), but usually do not have the property of persistence through time: They last a very short time. Russell argues for an understanding that takes things we call real to be series of classes of certain particulars, those particulars – the real things – being sense data. The reason why people connect sense data into more or less persistent things (persons, chairs, and so on), is that some series of sense data

are ordered in a more familiar and convenient way: by similarity, spatial connectedness, etc.

2.2 Strawson on Individuals

In the late 50s, Peter Frederick Strawson delivered a substantial contribution to the topic of the present volume. In his (Strawson 1959), he not only discussed questions raised by Russell, Ramsey, Quine and others; he also described problems which became central issues in the contemporary thinking on ontology and philosophy of mind. Strawson tries to work out a *descriptive* metaphysics; that is, he starts with the question of how people really behave while identifying things, facts, propositions, persons, . . . , and what their linguistic behavior really is. Strawson harbours no doubt that particulars (historical events, material objects, people and their shadows, for instance) are part of the ontology – usually, we talk about such particulars and our natural language contains expressions that enable us to identify those particulars which we talk about (cf. (Strawson 1959), 1.1.(1)). He is, on the whole, concerned with two questions: (i) Are there particulars that are *more basic* than others in some sense (and in which sense, if any at all)? (ii) Is there an ontological basis for the traditional differentiation between subjects and predicates? Besides those questions, Strawson deals with many more specific problems which are not of present concern.

2.2.1 Ontological Priority

‘Ontological priority’ might be understood in various ways. As already mentioned, Russell’s logical atomism was based on the idea that there are *logical atoms*, *i.e.*, logically unanalysable entities which are the end of a philosophical analysis. It seems natural to ascribe to such entities a higher (or more basic) degree of existence than to entities that are composed by such atoms. A similar kind of argument is used in so-called ‘combinatorialism’, *i.e.*, the position that ‘merely possible’ worlds are ontologically dependent on (and therefore existentially derived from) the ‘actual’ world, since the former are constructed from the *really existing material* of the latter (in (Bacon 1995), p. 65, Bacon introduces a corresponding idea with respect to trope theory). Strawson uses the term *category-preference* for all attempts to grasp ontological priority, but he himself uses it only in a more definite sense. In general, category-preference means to ascribe a distinguished status to a certain class (or category) of entities in comparison with other classes (categories). This distinguished status is something Strawson ascribes to *material bodies* (or to particulars having material

bodies), but only within the circumscribed framework of *identification of particulars* (cf. (Strawson 1959), 2.(1)).

Strawson's idea consists in the following consideration (which can be found in the very first part of his (Strawson 1959)): In order to communicate, every participant has to identify the particular(s) about which the utterance is made. Usually, or very often, we use proper names for this purpose. But, according to Strawson, as soon as people leave the area of direct localization, bare names for demonstrative identification are useless. That is why names should be supplied with an appropriate *description* of the particular. Such a description will involve other particulars, preferably some already identified; and it is here that ontological priority enters the picture. There might be cases of which particulars of a type *A* are not identifiable without talking about particulars of a type *B*, but it is at the same time possible to identify *Bs* without involving particulars of type *A*. So, the very possibility of talking about *As* depends on the possibility of mentioning *Bs* – and this means that *Bs* are ontologically prior to *As*. Strawson states in passing two valuable remarks. First of all, he says that it is not necessary that every single particular of type *A* depends on one or more *Bs* in the way suggested. Ontological priority is a relation between types of particulars, not between particulars. Second, the paradigmatic kind of direct, almost definitory, dependence described between *As* and *Bs* is only the most obvious case. There might, for instance, be more indirect and relative forms of dependence. Later on Strawson returns to the idea of conceptual priority (cf. his discussion in (Strawson 1992), pp. 21 ff.).

Strawson must meet an important objection – something which he actually does. It is possible to question the whole construction by denying the supposition that there is a system of identifiable particulars which form the basis of ontological priority. Thus, the question is whether or not there is a description for any particular which relates that particular only to directly localizable particulars (that is, to the participants of the discourse and their immediate surrounding)? Strawson's answer is well known. A system of relations in which every particular finds its definite place and which involves all directly localizable particulars really exists. It is the system of spatial and temporal relations. Strawson observes that all entities in space and time are necessarily parts of the system, while *if* there are particulars outside space and time, it is reasonable to suppose that they are unambiguously related to entities in space and time. Whereas Strawson is very cautious about this point, most philosophers would simply include the feature of 'being in space and time' in the definition of an existing particular, even adding 'once and only once' (compare, for instance, Russell's understanding of particulars as whatever is given

in sensation, or is of the same nature as things given in sensation).

Furthermore, the empirical fact that we cannot locate all particulars exactly in space and time, and the fact that there might be (and sometimes are) relations other than spatio-temporal relations to identified particulars which allow for a much more precise identification of a certain particular, are really not objections against the special role of the system of spatial and temporal relations. The system of spatial and temporal relations is much more general than any rival system and includes all participants of communication; and a spatio-temporal relation to an identified object need not be perfect in order to identify the particular – it merely has to be successful.

If it is true that people identify particulars as constituents of a system of spatio-temporal relations, then what remains to be settled are the other constituents of the system. The requirements of such a category of objects are that we know that these objects are able to constitute the necessary framework and that they convey essential features to the framework. Thus, the objects must be three-dimensional and exist continuously over time. Moreover, they have to be part of our experience, and because our senses are limited, they have to be of a certain variability, many-faceted, stable and durable. Strawson concludes that of all kinds of objects we know *only* material bodies, or entities with a material body, fulfill all such restrictions. Somewhat oversimplified, one can say that *physical things and persons* are paradigmatic candidates for ontologically basic particulars in our everyday and philosophical ontology.

The following two examples show how this idea works in philosophical practice (cf. (Strawson 1959), 1.3.(7)). Private particulars, as Strawson calls experiences and mental states, are ontologically dependent on persons in the sense stated, because it is possible to identify persons without reference to their experiences but not *vice versa*. Events and processes are just as dependent on material bodies because it is impossible to ‘re-identify’ them as the same particulars without reference to the latter.

According to Strawson, the notion of particulars is *not* so much grounded in ontology as in language. It is rather the principle of the impredicability of particulars which distinguishes them from universals; for universals may appear both in the subjects and the predicates position. So long as we have no reason to rely on the difference, the distinguished role of particulars among all entities to which we refer with the help of identifying descriptions is a matter of tradition only. Strawson also suggests what the rational background is for the distinction between particulars and universals in the second part of his (Strawson 1959). He mentions the grammatical criterion discussed below as early as in (Strawson 1952), pp. 145 ff., where he, on the one hand, introduces the referring role and,

on the other hand, the ascriptive, descriptive or classificatory role of expressions within a statement.

2.2.2 Subjects and Predicates

The sentences of natural language are constructed in a controlled and regular manner. From a grammatical point of view the simplest form of sentence involves an expression in a substantival mode and an expression in an asserting mode. This distinction is the essential sense of Strawson's *grammatical criterion*: Every expression can be used in a substantive mode, but only expressions for non-particulars are qualified for being used in the asserting mode. He presents us with tables of A- and B-expressions corresponding to such a distinction ((Strawson 1959), II 5.1). One table reports a *functional* difference, a second table shows a difference with respect to the *linguistic parts* of a statement, a third table is related to the long-discussed *constituents* of a statement (those are *terms*, as Strawson often uses the word in its non-linguistic sense), and finally there is a table where Frege's distinction, which is, according to Strawson, a non-linguistic counterpart to table II (see figure 1), is quoted.

Tab.	A _(I-IV)	B _(I-IV)
I	referring to something naming something indicating something designating something mentioning something	describing it charakterizing it ascribing something to it predicating something of it saying something about it;
II	singular term referring expression subject subject-expression proper name;	predicative expression predicate-expression predicate ascriptive expression
III	subject subject-term term referred to	predicate predicate-term term predicated term ascribed;
IV	object	concept.

Figure 1: Strawson's tables I–IV.

Grammatically, A-expressions are substantival, whereas B-expressions are verbal; the latter may contain A-expressions as parts, and tokens of both

kinds of expression together form a statement. Of course, this is still rough, but it allows us to divide simple statements in a desirable way: ‘Socrates is wise’ has to be divided into the A-expression ‘Socrates’ and the B-expression ‘is wise’, and not into ‘Socrates is’ and ‘wise’. We may exclude a division between ‘Socrates is’ and ‘wise’, because – although ‘Socrates is’ fits the provisional description of a B-expression – ‘wise’ is certainly not an A-expression. What is common to both kinds of expression is more easily seen in the third and fourth of Strawson’s tables. Expressions of both kinds introduce terms into statements, whether they be terms for things, properties, or more structured entities. The difference consists in the substantival mode *versus* the asserting mode of introduction. ‘Wisdom’, then, introduces the corresponding feature in the substantival, ‘is wise’ introduces it in the other mode. The latter mode necessarily involves a *copula*. This is a categorical – and not only a factual-grammatical difference between A-expressions and B-expressions. Up to a point, it explains why there are these differences: To be an A-expression or a B-expression just means to be used in a certain mode.

One of the often overlooked insights of Strawson’s discussion is his predication theory. He distinguishes between sortals and characterizing universals which may be considered as a parallel to the traditional distinction between general terms (common nouns) and verbs/adjectives (verb phrases). Corresponding to this distinction, Strawson believes in a difference with respect to predication, too. Thus, there is a difference between how a particular is connected with a sortal universal and how it is connected with a characterizing universal. Both kinds of predication are *ties* or a sort of operation, but they are in no way relations. Those critics of the A-expression–B-expression–distinction who refer to a possible mono-categorical system with certain relations between the corresponding entities are therefore wrong: There are no relations of the required type. So the main categorical difference between particulars and universals is formulated by the categorical criterion: Particulars *and* universals may be of certain kinds and may be characterized by certain features, while *only* universals have examples or characterize something.

Summing up, we see that according to Strawson everything can appear *as* an individual, because the linguistic means for referring to it in a subject’s position are to hand. Properties, events and propositions may all be individuals in a Strawsonian sense. Some categories of individuals are more entrenched than others. As we use identifying descriptions in order to form statements about particulars, some of these particulars are ontologically prior in the sense described above.

2.3 Quine: To be is ...

In a nutshell, ontological questions emanate from the question “What exists?”, and the right answer is “Everything”, as Willard van Orman Quine says; and we are left with all the details (cf. (Quine 1980), p. 4). Quine’s permanent starting point consists in a discrimination in language: Natural languages such as English, Danish, or German contain expressions for singular terms, for instance, Pegasus, Plato, the author of Waverley, and redness, and expressions for general terms, for instance, horse, winged horse, philosopher’s beard, red, and eats. It seems natural to suppose that singular terms of a special kind, namely *names*, play the most important role in answering the question of what there is. Quine’s main thesis of ontology may, however, be summarized in the statement that *this supposition is not true*.

2.3.1 The Force of the Quantifier

Obviously, some singular terms are used to express non-existence. “Pegasus does not exist” or “Plato has no beard” are uttered just in order to deny the existence of Pegasus and of Plato’s beard. How can we even state such sentences, Quine asks, if the subject of predication does not exist? The answer is twofold. First, the burden of having existence, of existential commitment, lies not on names, but on variables. In natural languages, *pronouns* rather than nouns serve to express existence. Quine writes that *something*, *nothing* and *everything* range over our whole ontology, while whatever is said with the help of names can be said in a language without names. So, a theory is committed to those and only those entities to which the bound variables of the theory must be able to refer in order to make the affirmative sentences of the theory true (cf. (Quine 1980), p. 103). Second – and this clarifies the relation between ontology, models, and language – the ontological commitment does not show what exists, but what is said to exist, the latter being another, albeit related, matter. It is just in this sense that one has to embrace “ontological relativity”. “What exists?” and “What is an *F*?” cannot be answered in terms of an uninterpreted theory (a *theory form*, as Quine calls it in (Quine 1969), pp. 53 f.). One has – uncritically – to posit a domain for interpreting the variables (and inside the theory form there is no reason for preferring one sound model to another), or to indicate a *G* claiming “*F* is a *G*”.

Now the notorious *No entity without identity*-slogan becomes trivial. Suppose we have a singular term *a* which, independently of any theory, refers to anything one may wish – a person, a fictive historical event, a kind, a number, an attribute, etc. The important question is whether

or not a is used *inside* a theory to name an object! Quine provides us with an answer in the spirit of the remarks above: If the theory affirms the identity $\exists x(x = a)$, then a obviously belongs to the possible values of the quantified variables, and therefore there is a (cf. (Quine 1969), pp. 93 f.). We will not go into substitutional and referential quantification, but instead point to the fact that singular existence is bound to the existential quantifier through identity, and that Quine declares that existence is what existential quantification expresses. A statement like $\exists xF(x)$ means that F s are among the objects of the world. Of course, one may have different reasons for admitting existential sentences in different cases: because of the testimony of the senses, computation, or the coherence of theory (cf. (Quine 1969), p. 97). Within such a context it is possible to compare middle-sized bodies and ancient gods.

Quine's famous comparison of physical objects and Homer's gods is therefore less provoking than appears at the first sight (cf. (Quine 1980), p. 44). It is obvious that macroscopic physical objects are not the same as visual experiences, in so far as the former are used as a convenient tool for systematizing and organizing the latter. Science, as well as everyday behavior and common sense, is based on such a convenient, quick and reliable systematization. Quine is probably right in his suspicion that equally convenient, quick and reliable systematization based on Homer's gods would bring about a civilization much more similar to that of the ancient Greeks.

What are physical objects? Quine describes them as the four-dimensional material content, however sporadic and heterogeneous, of some portion of space-time (cf. (Quine 1986), p. 30; (Quine 1981), p. 124). It is *our* choice whether or not we quantify over physical objects, sense data or something else. But the fact that this is a choice, and therefore a fact that depends (also) on us, does not mean that we have no reasons for making a particular choice. On the contrary, Quine's arguments for a naturalized epistemology show that people do have common sense reasons and scientific rationalizations for dealing with physical objects (cf. (Quine 1990), pp. 1 ff., 52 ff.; (Quine 1981), p. 10). Common sense is *body-minded* orientated in the sense that it identifies physical objects with bodies (whose parts can themselves only be bodies). Bodies are physical objects of a special kind. They are roughly spatially continuous, rather chunky, and stand out in contrast to most of their surroundings. They are individuated over time by continuity of displacement, distortion and discoloration (cf. (Quine 1981), p. 13). The more sophisticated doctrine of generalized physical objects yields the possibility of systematizing changing bodies and acknowledging stages on par with them. In a good sense, time slices, colours or (point-)events can now be considered as cases of

physical objects. Anyway, the ontological commitment to physical (and other) objects is a question of *learning appropriate words*, and most importantly, words with shared reference (certain general terms). For Quine this act of learning is a process primarily based on the understanding of sentences as the central semantic entities, and it is the central position of sentences which makes all Quinean objects theoretical. The question of one's ontological commitment to objects becomes a question of verbal *reference* to objects (cf. (Quine 1981), p. 2); a question we will consider in the following section.

Finally, one possible objection to Quine's quantification-based idea of existence should be mentioned. As he recognizes himself by following Hao Wang, *different* theories of quantification force us to accept *different* theories of existence. But since there are, as a matter of fact, different quantificational approaches in logic, the selection of one of them determines essentially the theory of existence. In this way ontology becomes dependent on the philosophy of logic.

2.3.2 Meaning, Reference and Quantification

A central point of Quine's ontological conception is crucial: There is a difference between *meaning* and *reference*. A singular term can refer to (designate) whatever one likes; similarly, a general term can denote equally freely (or, as Quine later uses to say, *be true of* whatever one likes). The meanings of singular or general terms – if there are any – are something completely different. For instance, “the author of *Waverley*” and “the author of *Ivanhoe*” refer to the same person, but do have different meanings ((Quine 1980), p. 47; (Quine 1981), pp. 43 ff.), and consequently the reference may be clear where the meaning is not comparably as clear. As he puts it, the meaning of the phrase ‘Evening Star’ is by no means as clear as the star in the sky.

At the first glance, meanings are something like *ideas*, a notion which at best leads us into the jungle of synonymy and analyticity. Quine rejects ideas as well as propositions and attributes as possible candidates of meanings. Statements (sentences, utterances), classes and terms allow for the apparatus of quantification, identity and substitution, which in turn enables us to use “meaning” in two really important contexts: “to mean the same as” and “to be meaningful (significant)”. It is the first context which may open up for some insight: First comes “to mean alike”, then come meanings. We do not wish to repeat Quine's views on synonymy and analyticity here. The strategy of turning away from ideas and looking to the words is the backbone of Quine's *nominalistic* approach. Ideas, and their fashioned substitutes – propositions – are called religious fall-backs,

thriving in dark places (cf. (Quine 1990), p. 36).

Reference is closely related to topics that are usually dealt with in logic. Our referential apparatus, being applicable to singular and general terms (adjectives, verbs, common nouns) and sentences, includes pronouns, plural endings, copulas as well as predication, identity and principles of individuation. It can be, and in fact is, learned in various ways. It is this referential apparatus which closes the circle to existential commitment through quantification, and not “meanings”. Beginners in logic are sometimes confused because there is no clear and explicit counterpart for variables in natural languages (whereas individual constants or predicate letters do have such counterparts). Quine finds such counterparts in *relative clauses*, namely in “such that”-constructions (cf., for instance, (Quine 1990), pp. 92 ff.; (Quine 1981), pp. 5 ff.). Consider the following sequence of expressions:

- (i) I bought Fido from a man who found him.
- (ii) Fido is such that I bought him from a man who found him.
- (iii) Fido is a thing such that I bought it from a man who found it.
- (iv) $\exists x(x = \text{Fido} \wedge F(x))$ (where “ F ” is the appropriate expression).

Clearly, expressions like “an x such that $F(x)$ ” (“a thing such that I bought it from a man who found it”) play the role of *complex general terms*. As Quine correctly observes, “An α is a β ”, where α and β are such expressions, is *not* a predication (“is” doesn’t indicate predication), but rather couples two terms (“is” indicates *meaning inclusion* in the sense of (Sinowjew and Wessel 1975) and (Wessel 1998)). Ontologically, the consequences are quite clear. Suppose (i) to be true in a theory. By (iv), Fido is among the possible values of the variables; therefore, F s exist. In that sense, variables introduced by the referential tool of relative clauses are, by their origin, substitutional variables. It is the next step which is ontologically non-trivial: Not all F s do have names (unlike Fido, which has). So speaking about all, or some, F s with the help of proper object variables of referential quantification includes all those objects which we cannot or do not want to specify by names. And completing the way from individual reference to quantification theory is just the step which makes Quine accept the possible values of boundable variables to be the objects of a theory.

Quine discusses the question of whether or not we are committed to the existence of attributes or properties. Attributes come into being through the shift from concrete general to abstract singular terms, as described below, and through the relative clauses described above. In the worst case, we may end up with attributes corresponding to everything we can say about anything (cf. (Quine 1990), pp. 101 ff.). In fact, this is a continuation of the discussion of Ramsey’s argument – although, as far as we

know, Quine does not explicitly mention the argument anywhere. Quine's example "This is square" (cf. (Quine 1980), p. 76) invites the introduction of the attribute *squareness*, which Ramsey could have used to form the sentence "Squareness is a property of this" or "This has squareness". While Ramsey believes the sentences to be equivalent, Quine insists that they are different: They differ just in their ontological implications. The term "square" in the place of a predicate is simply not open for quantification. There is no commitment to an abstract entity of any kind. That changes with the latter sentences. The term "squareness" in the place of a subject is an abstract singular term. As with all singular terms, it is subject to the whole apparatus of substitution and quantification. We can now speak about "all properties", or "squareness as common to this and that", as phrases which introduce a corresponding abstract entity into our ontology. Quine lays down the strong requirement that even those who recognize them as attributes should not read $F(x)$ as " x has F ", with F in the position of a name ((Quine 1986), p. 67; (Quine 1981), p. 111).

Sometimes the familiar first-order quantificational notation leads to confusion. The object language of first-order logic uses expressions like " $\forall x(F(x) \supset G(x))$ " or " $\exists x\exists y(F(x) \wedge G(y))$ ", where $F(x)$, $G(x)$ and $G(y)$ stand for any open sentence. It is not uncommon to look at " F " and " G " as variables, where their values are sets or properties. By contrast, Quine suggests viewing them as schematic letters, embodying various forms of statements (cf. (Quine 1980), pp. 107 f.; (Quine 1986), pp. 66 f.). According to such an interpretation, F s and G s are not boundable variables, and the constant predicate letters they are standing for are not names of (existing or non-existing) classes or attributes. Quine therefore calls the F s and G s "dummy predicates".

Consequently, even in an interpreted language "being in the lexicon" doesn't mean to be a name. As was clarified in section 2.3.1, "being a name" means for a term that it can stand in the place of a variable, that it leads to true sentences (predications) when used in universally quantified true sentences. Predicate terms, however, figure in the lexicon, but they are not names (cf. (Quine 1986), pp. 27 f.).

It is well known that according to Quine it is possible to accept classes. Thus, the paragraphs immediately above the present one should not be understood as a rejection of classes in total. The $F(x)$ and $G(y)$ can explicitly be reformulated in a way as committing one to classes: $x \in z$ and $y \in z'$. Here, the z s are boundable variables whose values obey a clear identity criterion. Classes, according to this position, are abstract entities by being universals. In contrast, collections or aggregates are concrete entities – the class of horses is something different from the collection of all horses, the species of horses, or any flock of horses (for the difference

between species or kinds and classes, see (Quine 1969), pp. 21 f.). Quine urges that one has to understand the importance of the transition from a first-order to a set-theoretic notation. The former doesn't commit us to other entities than the possible values of the individual variables, the latter includes classes in the possible values of boundable variables and therefore introduces classes into the ontology.

Calling it a "critical paraphrase into canonical notation, guided by the maxims of scientific acceptability and ontological economy", Strawson summarizes Quine's doctrine as follows ((Strawson 1992), p. 43): Whatever kinds of thing people refer to, or attempt to refer to, whether they do it generally, by using variables and quantification, or determinately, by using names or other singular terms, people are committed to believe in them. Whether or not this synopsis is adequate depends on one's understanding of "refer to".

2.4 Trope Theory

In his work on tropes John Bacon distinguishes five ontological approaches to metaphysics ((Bacon 1995), p. 85):

- (i) Universalism: universals and similarities (of possible worlds) are considered as basic, but individuals are constructed;
- (ii) Particularism: individuals and possible worlds are regarded as basic, while universals are constructed;
- (iii) Substance-attribute view: individuals and universals are claimed to be basic, whereas states of affairs and possible worlds are constructed;
- (iv) Trope theory: tropes together with some of their metarelations are taken to be basic, but states of affairs and possible worlds are constructed; and
- (v) Substance-trope theory: individuals, tropes and likeness are assumed to be basic, whereas possible worlds are constructed.

From a formal point of view, all these different approaches can, to some extent, be modelled into one another. Though none of them can be exactly reduced to any other (since in general they are not even explicated precisely enough to allow the appropriate kinds of proof), this fact demonstrates an approximate equivalence among these alternatives. So it seems that the choice of a specific form of ontology is largely a question of taste rather than one motivated by essential differences in expressibility. Therefore, as Bacon puts it, Carnap's principle of tolerance might be the wisest counsel.

From a philosophical point of view, however, one can easily find differences. A few criteria such as consistency, homogeneity, and range as well

as degree of adequacy may be used to measure good metaphysics. Perhaps, one could add also atomicity as a desirable feature. In the light of these requirements, what then are the main advantages and disadvantages of the above five conceptions of basic ontologies?

Universalism speaks for itself by its philosophical elegance and long tradition. Furthermore, it is a one-category ontology: In order to make Plato's ancient ideas appropriate to a contemporary discourse, the only extra entities needed are similarity relations which are universals themselves. *Particularism* for its part comes close to common sense. Furthermore, it is well supported by research within e.g. model theory and modal logic. Unfortunately, this doesn't help much from a philosophical perspective: Its standard foundation, viz. possible worlds, is considered bizarre from almost all other positions in metaphysics. The *substance-attribute* view comes even closer to common sense. On an intuitive level, the world is made up of things equipped with properties and related to other things. These relations and properties, however, seem to exist in some other way than particular things do. The main problem for the substance-attribute view is to spell out that difference. The *substance-trope* theory assumes both basic individuals as well as tropes in the characterization of individuals. It would seem that this is to assume too much. Each individual has its unique bundle of tropes – a prodigal ontology. In addition, the theory has problems dealing with universals, and it needs strong assumptions to cope with this defect. Finally, there is the *straight trope* theory. Tropes, or particularized relations, can be understood in two different ways. Either they are ordered triples made from a relation and two particulars, or particularized relations regarded as fundamental with no internal structure or parts. Such abstract particulars share a family resemblance with monads, the Leibnizean “metaphysical points”. They are abstract, because they are not concrete things or substances even though they are spatio-temporally localized. Nevertheless, they are particulars in contrast to universals. Universals arise from such tropes as resemblance classes.

It seems that the trope theory has some advantages over alternative metaphysical approaches. This framework yields derived concepts like time, cause, and moral obligations. As John Bacon says, “Trope theory makes a little more sense of things than the other four ontologies”.

So let us take a closer look at Bacon's approach. It deals with objects having properties and standing in relations to other objects, instantiated universals, wholes which have both a particular and a universal side as “architectonic building blocks” of what exists. According to his proposal, in trope theory facts are considered to be existing tropes, events to be particularly lively tropes, and universals to be constructions through maximal similarity bundles. Tropes also seem to fit together nicely with mental

phenomena.

Nevertheless, in this case, similarity turns out to be a troublesome relation, especially when combined with maximality. Somebody's being in love with somebody else, as well as somebody's hating somebody else, seem both to be entirely included in somebody's feeling a strong affection towards somebody else. That excludes at least two of them from being bundles in Bacon's sense, *i.e.*, simple universals. Even a desperate differentiation between "approximate" and "precise" similarity doesn't improve the situation. His construction broadly rests upon the assumption of non-actually existing possible worlds. Besides the totality of existent tropes, which forms the (actual) world, there are nonexistent tropes and possible worlds, formed by (every?) sets of tropes. Without such non-actual worlds, which are motivated mainly by their facilitating the explication of uninstantiated properties, Bacon's trope theory seems to collapse into a rather modest metaphysical construction. Choosing *kernels* from bundles, *i.e.*, tropes such that all tropes like them are similar to each other, leads to an account of individuals. Some bundles are relations; monadic relations, or universals, are properties. But in trope theory some additional (meta-)relations in the set-theoretic sense are also needed.

Having introduced the basic notions, Bacon proceeds with more and more sophisticated constructions leading him to trope-semantics and its modal logic, to quantification, "time", and to some notion of causality. He compares his proposal with alternative ontological approaches to metaphysics: particularism, universalism, substance-attribute view and concurrent versions of trope theory.

In conclusion, Bacon cautiously advertises the supremacy of his own approach:

Yes, we need basic relations, but fewer kinds than the substance-attribute theorist of universals, it would seem. [...] I have preferred to start with tropes because they are first for us in experience. That they are also basic to being generally is a theoretical hypothesis to be recommended for its potential fecundity. ((Bacon 1995), p. 78)

Furthermore, trope theory has an "epistemic advantage": It considers as basic those entities we are acquainted with in every-day life.

Several of the present contributors make tropes a central topic of their discussion. In her paper "Tropes and Things", Käthe Trettin provides us with an original modal theory of individual qualities. This version of a trope theory is designed especially in order to deal with the so-called Riddle of Identity through Time and Change. Daniel von Wachter deals with the question of boundaries of tropes. By means of a so-called field ontology, he argues that tropes do not have determinate boundaries. Moreover, he also maintains that field ontology can solve the problem of determinable

properties as well as the question of the completeness of things.

3 Facts

The notion of fact is rather new, and it was not until the late 19th century that the term acquired the technical meaning it has today. As long as Aristotle's metaphysical analysis of the material world into substances and attributes was taken to be both basic and exhaustive there was neither need nor room for facts. What led to their recognition was the gradual realization that the substance-attribute distinction had a hard time handling relations. Attributes were considered as inhering in substances and their particular existence was seen as being entirely dependent on these substances. So if the sun has the property of being yellow, and this property is inherent in the sun, then the fact that the sun is yellow does not add anything new to what is already there. It is also obvious that if we see the world as making sentences true or false, then the sentence 'The sun is yellow' is true in case the yellowness is present in the sun. Since the substance and the property do the entire job here, a philosophical entity like a fact is redundant.

Now take the situation where Adam is taller than Eve. There cannot be such a case because Adam has no inherent property of being taller than Eve. For although being taller than is not an entirely independent property, it cannot be a property of just *one* substance. Such a relation does not signify a property of an individual but a connection between two individuals. We have here two individuals, Adam and Eve, who function as relata for a relation. As individual substances they each have an inherent property of being of a certain height, and all this can be described within the vocabulary of substances and their attributes. But these facts (facts as soon as we have admitted facts) do not provide us with the relation that Adam is taller than Eve. Nevertheless, for a long time there were attempts to view relations as attributes present in one or both substances involved, and that part of their existence that could not be reduced to the substance-property distinction of the relata was taken to belong to the mind. But when it was first recognized that relations hold between two or more things, dividing the world into substances and properties was not enough. In addition to a reference to Adam and Eve, a complete description of the situation must include a reference to the fact that Adam is taller than Eve.

Offering facts as a kind of philosophical entity immediately raises two questions: 1) what is their nature; and 2) how are they identified? The first of these questions concerns the debate about whether facts are some-

thing over and above the relations and their relata, or whether facts are reducible to these constituents. To answer this, Francis Herbert Bradley and Bertrand Russell both agreed that facts are something over and above relations and their relata, but they disagreed about the consequences. Bradley took facts to have ontological priority; the ultimate constituents of the world are facts, and things, attributes and relations are abstractions from them, whereas Russell argued that facts were composite elements which were built up from their constituents as things, attributes and relations. What Russell apparently had in mind might perhaps be explainable as a kind of supervenience according to which facts somehow supervene on relations and relata.

What led Bradley and Russell to agree about the irreducibility of facts to the relations and the relata that are presumed to be their constituents was the by now classic argument attributed to Bradley. Consider the set of Adam, Eve and the relation of being taller than. From those three elements we can create two different facts: one that Adam is taller than Eve, and another that Eve is taller than Adam. A relation and a number of relata do not suffice as a fact, the relation has to be related to the relata in a proper way before we have one or the other fact. And even if we attempt to solve the problem by introducing some further relations, this would not help us; rather we will produce an infinite regress.

A reductionist will, on the other hand, not accept Bradley's and Russell's argument. Presumably, he will argue that the complete description of Adam and the one of Eve, including the properties of Adam being 1.80 meters tall and Eve being 1.70 meters tall, is enough to assign the relation to the relata in the appropriate order. Thus the relata and the relation being taller than add up to the fact that Adam is taller than Eve.

The second question concerns how we can identify facts. The answer depends partly on what stand is taken on the first question. Those who like Bradley and Russell are not reductionists would say that a fact is the sort of thing that is expressed by sentences; that is, a fact can only be individuated in virtue of the sentence which corresponds to the fact. Reductionists, like the young Wittgenstein, on the other hand, would say that a fact is what is the case; that is, a fact is an actual state of affairs that exists in its own right and independently of any language, and it may therefore be picked up by other means than language. This dichotomy gave rise to a discussion in the 50s when Austin and Strawson debated the notion of truth.

But, as we saw, Bradley and Russell were not in agreement either. Bradley's holistic view on facts, together with the idea that a fact is only identifiable in terms of its linguistic counterpart, lead naturally to the conception that facts are the same as propositions, or at least true

propositions. Facts are what is thought or said, not what is thought about or spoken of. Accordingly, facts are no longer seen as concreta but abstracta. There are, however, some general arguments which suggest this conception is not satisfactory. First, a false proposition seems to be a genuine proposition to which nothing like a fact corresponds. Second, facts don't have semantic properties, whereas propositions definitely have. The fact that Adam is taller than Eve is neither true nor false, but propositions, if they exist at all, may have this feature. Moreover, as Russell points out, a proposition like the one that Adam is taller than Eve is about, of, or intentionally directed towards something, while a fact isn't.

3.1 Russell's Classification of Facts

3.1.1 Facts as Entities

Bertrand Russell's lectures on the philosophy of logical atomism (cf. (Russell 1964)) are definitely one of the earliest systematic treatments of the notion of 'fact' in modern philosophy. For Russell, logical atomism is a doctrine that acknowledges that there are many different and separate things in the world, that the world is not a single and indivisible unity. Among these things, we find *facts* and *beliefs which have reference to facts* – although we may not be able to define what facts are. Russell introduces (but does not define) facts as truth makers for propositions, as “the kind of thing that makes a proposition true or false” ((Russell 1964), p. 182). Facts are, therefore, different from what he calls ‘particular existing things’ or ‘particulars’, because Adam, the rain or the sun cannot by themselves make propositions true or false. Facts are like particulars in belonging to the objective world; they are not created by human thought or belief. Since propositions are linguistic entities (“a sentence in the indicative, a sentence asserting something, not questioning or commanding or wishing”, may be “a sentence of that sort preceded by the word ‘that’” ((Russell 1964), p. 185)), facts are related to language. Sentences of a certain kind *express* facts, facts *make* sentences true or *show* that they are false. Our statements are intended to express facts, that is, express things in the real world.

A more or less complete description of the world should mention not only particulars, but also *how* these particulars are, and this brings in facts. These facts are involved when we speak truly and when we speak falsely. The same fact, the same physical action, for example, makes true ‘Eve strikes Adam’, while it makes false ‘Eve keeps her distance from Adam’. From this Russell draws two consequences. First, propositions cannot be *names* for facts. According to Russell, every fact is related to

two *different* propositions – to one which it makes true, and to other one which it makes false (a descriptive sentence and its negation). Russell is obviously not aware of the even stronger idea that his own examples suggest: A fact can make false not only one proposition. Nevertheless, since ‘Eve strikes Adam’ and ‘Eve does not strike Adam’ *correspond* to the same fact, neither the former nor the latter sentence can be the name of that fact. The second conclusion consists in the observation that there is no dualism of true and false facts; facts simply are. This is in accordance with his explication of facts as extra-linguistic entities.

In many respects expressions for Russell’s facts (mainly that-clauses) are description-like symbols. In contrast to proper names, the clause ‘that Eve strikes Adam’ is understandable and significant, even if Eve doesn’t strike Adam at all. Russell’s conception of names and descriptions leads him to the counterintuitive claim that expressions for facts can never take the position of logical subjects. But if it is really the case that facts cannot be named, it is only a consequence of his analysis that they cannot attain subject position. Given that one of our most urgent motivations for dealing with facts in philosophy stems from causal theory and from questions concerning adverbs, this feature is probably one of the weakest points of Russell’s theory. Russellian facts do not have any properties and do not stand in any relations to each other.

Propositions describe things that have properties and stand in various relations; if they do so correctly, they express facts. As things and qualities might be mentioned in several different sentences, there can be different facts about the same things or different facts about the same qualities. In some sense, things and qualities are *the constituents* of facts. There might be, for instance, a fact about Eve that she strikes Adam, a fact about Eve that she leaves, and a fact about Adam that he sees Eve. All facts, in that sense, are *complex* entities, consisting of particulars and (monadic or n-adic) relations (*Eve* is a constituent of all three facts, *Adam* is a constituent of two of them, and *to strike*, *to leave* and *to see* are each constituents of exactly one of the facts mentioned). Russell, apparently, argues psychologically and epistemologically rather than ontologically. Facts are complex *because* propositions (which are sentences, symbols) are complex; the constituents of propositions are the meanings of the symbols one has to know in order to understand the proposition ((Russell 1964), p. 196). Yet Russell qualifies his view by saying that an “orderly, proper procedure” would start from the complexity of facts. The general complexity of facts has, nevertheless, nothing to do with the observation that some facts are *atomic*. As we shall see, the opposite predicate of ‘atomic’ is not ‘complex’, but ‘molecular’, a distinction which leads us to Russell’s classification of facts.

3.1.2 Classifying Facts

Russell outlines several classifications of facts, none of them – as he mentions himself – being complete or final. Besides the division of facts into *logical* and *empirical* facts, and the obvious division of facts according to whether the constituent relation is *one-placed*, *two-placed*, ..., *n-placed*, ..., (which we are not dealing with here), Russell distinguishes *positive* facts from *negative* facts, and *atomic* facts from *molecular* ones. These distinctions play an important role not only with respect to facts, but to every other kind of philosophical entity as well. The reader will observe that Scheffler's and Shramko's, Stekeler-Weithofer's, and Stelzner's contributions in the present volume can be seen as sequels to this basic discussion.

Positive and Negative Facts Simple examples explain what positive and negative facts are: 'Socrates is not alive' corresponds to a negative fact, while 'Socrates was alive' expresses a positive one (cf. (Russell 1964), pp. 184, 211 ff.). It might therefore be suggested that the occurrence of 'not' (or of any other natural or formal language negation) determines whether or not a proposition asserts a positive fact – but this is, as Russell puts it, not true. Being a positive or a negative fact does not depend on syntactic properties of the corresponding proposition; rather, one has to take into account the meaning of the proposition. That's why it is hard to define the content of this distinction. Still Russell thinks that negative facts are irreducible parts of the world. A complete description of the world consists not only of what there is, but also of what there is not.

From this philosophical point of view, Russell considers one of the most common arguments against irreducible negative facts, namely that every negative fact reduces to a (possibly indeterminate) incompatible positive fact. According to this common position, 'Eve does not strike Adam' is made true not by a corresponding negative fact, but by a certain positive fact, say, by her leaving the party instead (provided that she cannot leave *and* strike him a blow at the same time). Russell presents us with two rather sophisticated arguments in order to show why negative facts are not reducible in this way. First, 'incompatibility' is a relation which itself constitutes *negative* facts ('that leaving and hitting are incompatible' is a negative fact). Second, the presence of an incompatibility relation between a positive and a negative fact presupposes the existence of *both* facts. Hence, incompatibility does not allow the removal of negative facts. In order to avoid underrating the argument, one has to keep in mind that Russell discusses the possibility of reducing *all* negative facts.

Although negations are neither sufficient nor necessary markers of neg-

ative facts, Russell's examples suggest that negated propositions (often, or usually) express negative facts. Two conclusions might therefore be drawn from that observation: (i) There are negative atomic facts (Russell doesn't deal with that topic), and (ii) there are at least some irreducible molecular facts, namely negative ones. A molecular fact is expressed by a complex sentence, that is, by a sentence containing logical operators. But are these the only irreducible molecular facts?

In the beginning of 20th century it was not only philosophers like Russell who adopted a positive attitude to negative facts. Werner Stelzner's contribution "The Impact of Negative Facts for the Imaginary Logic of N. A. Vasil'ev" shows that the understanding of negative facts plays a prominent role in the origins of modern non-classical (relevant) logic. A similar positive view reappears in the revival of interest in analytic ontology which has taken place within the last ten years. Scheffler and Shramko argue in this volume for negative facts as being some of the basic elements of ontology. Semantically, their idea requires a revised understanding of what state descriptions are. The approach shows that ontological decisions for or against negative facts have their formal counterpart in appropriate theories of predication.

Disjunctive Facts In his *The Philosophy of Logical Atomism* Russell prefers a language based on *Negation*, *Disjunction*, *Generalization* and *Existential Quantification*. His view on general and existential facts is dealt with in the next section. Thus, the remaining interesting issue is how he addresses the question of the existence of irreducible disjunctive facts.

Russell's tentative answer is in the negative. It is not ontologically necessary to have disjunctive facts, because atomic (or, accordingly, negative) facts can serve as truth makers for disjunctive propositions. The sentence 'Eve leaves or strikes Adam a blow' does not presuppose a complex fact about Eve, like one expressed in terms of 'leaving or hitting', in order to be true; a fact like 'that Eve leaves' would be sufficient as well as a fact like 'that she strikes Adam'. Russell's argument simply uses truth tables – a fact expressed by 'Eve's leaving' guarantees not only the truth of the corresponding proposition, but also that of every proposition which contains the atomic sentence as a disjunctive part. The picture changes, however, when it comes to general propositions.

Singular, General and Existential Facts So far, we have given an exposition of Russell's theory of singular facts – facts whose corresponding propositions do not contain quantifiers. In contrast, *general facts* are

expressed by general propositions that contain a general quantifier as the main operator or by equivalent propositions. Propositions expressing *existential facts* start with an existential quantifier or are equivalent to such propositions. Both kinds of fact are irreducible, but for different reasons (cf. for the following (Russell 1964), pp. 228 ff.).

An example of a general fact is stated by the sentence ‘All men are mortal’. One might expect that at least in the case of factually finite numbers of individuals such facts are reducible to an enumeration of expressions of singular facts such as ‘Eve is mortal’, ‘Adam is mortal’, etc. There is, however, a significant difference between the general fact and the mere enumeration of corresponding singular facts. The difference consists in our knowledge that *all* men are mortal – in order to express this idea by enumerating all men, we have to add that the enumeration is *complete*. Russell claims that this addition can be made only by stating a further general fact: ‘Adam, Barry . . . , are all the men there are’, or something like that. Now we also have to reduce that general fact. It is, therefore, not possible to reduce all general facts to singular ones.

A special problem arises with respect to disjunctive structures inside general sentences. They play an important role because in Russell’s language they express systematic knowledge – ‘All Q are P ’ is a lawlike sentence, $\forall x(Q(x) \supset P(x))$, that is, in Russell’s negation-disjunction-notation $\forall x(\sim Q(x) \vee P(x))$. Since general facts are not reducible to singular facts, and since these general facts have an inner disjunctive structure, there are irreducible (general) disjunctive facts.

It is worth mentioning that Russell draws far-reaching conclusions from the irreducibility of general facts. If there are irreducible general facts, and if people are able to grasp them somehow and over and above the singular facts, there must be a specific human ability of knowing them and dealing with them. This ability is non-inductive and allows the ascription of truth to at least some general sentences in a non-inductive manner.

The irreducibility of existential facts depends on Russell’s well-known theory of existence. The proposition ‘There are human beings’ means ‘The propositional function x is a human being is sometimes true’, and expressions like ‘Eve exists’ or ‘There is Adam’ are neither propositions nor propositional functions. There is simply no singular proposition which corresponds to a (correct) existential proposition, in the same way as there are corresponding singular propositions for general propositions. And since there aren’t any such singular propositions, there is no possible reduction of existential facts.

Russell’s ideas on facts became much less prominent than other aspects of his philosophy – surprisingly, because many of his arguments concern not only facts, but all kinds of philosophical entities. It must be admitted,

however, that in his *Philosophy of Logical Atomism* Russell is not consistent everywhere and that his lecture stands in need of an interpretation and explication.

3.2 Wittgenstein's World of Facts

In Ludwig Wittgenstein's *Tractatus* (1921) we are introduced to his notorious picture theory of meaning. In general, he accepts Frege's idea that the meaning of a sentence is equivalent to the conditions under which the sentence is true or false. But how, then, do we explain the meaning of elementary sentences, *i.e.* the meaning of smallest meaningful unity? Here he suggests that such sentences should picture a fact.

To have a picture, however, something must be pictured. But what is this? In Wittgenstein's terminology there might be two candidates: fact (*Tatsache*) or state of affairs (*Sachverhalt*). As a matter of fact he makes a distinction between them, but exactly how he does it is debatable. Four possible suggestions have been put forward: i) A fact is a totality of states of affairs, existing or not existing; ii) the word 'fact' sometimes designates a totality of states of affairs (existing or not existing) and sometimes singular states of affairs (existing or not existing); iii) a fact is a set of existing states of affairs; and iv) a fact is an existing state of affairs ((Favrholdt 1965)). Each of them is supported by different quotations. Undoubtedly these separate meanings are due to the fact that Wittgenstein was not careful enough on this particular point when he wrote *Tractatus*. Here we shall, nonetheless, argue in spite of the possible ambiguity that the most reasonable candidate for a Wittgensteinian fact is none of the four suggestions above, but (v): A (positive) fact may either be a totality of existing states of affairs or an individual existing state of affairs.

The opening sentence (1) of *Tractatus* claims: "The world is everything that is the case". The second main sentence (2) states "What is the case, a fact, is the existence of states of affairs". Thus (2) supports (iii), but not (iv). The combination of (1) and (2) suggest the world is the existence of states of affairs. This does not suit (1.1) that the world is the totality of facts unless (iv) is the correct interpretation. Together they support (v).

Now in (2.06) Wittgenstein says "The existence and non-existence of states of affairs is reality. (The existence of states of affairs we also call a positive fact, and non-existence a negative fact)". It follows from this and (2) that reality is something more than the world. Reality contains both positive and negative facts, whereas the world only contains the positive facts as he mentions in (2.04) "The totality of existing states of affairs is the world". Moreover, the totality of positive facts of the world

excludes other states of affairs from taking part in the world, the totality of negative facts. This is expressed in (2.05) as: “The totality of existing states of affairs also determines which states of affairs do not exist”.

When it comes to the nature of facts and state of affairs, Wittgenstein holds: (2.01) “A state of affairs is a combination of objects (entities, things)”; (2.011) “It is essential to a thing that it can be a constituent part of a state of affairs”; and (2.014) “Objects contain the possibility of all situations”. On the basis of these statements, we can conclude that Wittgenstein takes (a) states of affairs to be *possible* facts; (b) *positive* facts to be *actual existing* states of affairs; (c) *negative* facts to be *possible but not actual existing* states of affairs. Reality contains not only the world but also, it might be said, all possible totalities of facts, that is all possible worlds. Furthermore, a fact, or rather a positive fact, is either a state of affairs or a conjugation of states of affairs. A state of affairs is a certain combination of simple, qualityless objects, and an object is characterized by the states of affairs in which it can partake. By themselves, states of affairs are independent of one another.

3.3 Ramsey’s Facts

Wittgenstein’s facts were concrete objects though perhaps of a more inexplicable kind. Frank Plumpton Ramsey, however, doesn’t see them as truth makers. What is the objective factor when we make a judgment, believe something, think that something is the case, or claim something? There is indeed a difference between that in virtue of which we might be judging, believing, thinking, and claiming and what makes the judgment, belief, thought and claim true or false. Russell once believed that the objective counterpart was a proposition that may be either true or false. He later abandoned the idea because a proposition such as ‘that Caesar died in his bed’, in contrast to ‘that Caesar was murdered’, would require the existence of an objective falsehood. But then there is no way in which we can tell the difference between truth and falsehood. The relation between the proposition and the objective factor would be identical in both cases. Consequently there cannot, according to Russell, be a simple object which is the fact ‘that Caesar died in his bed’. A judgment does not correspond to a single object, but is a multiple relation between the state of the mind and the many objects which are the constituents of the proposition.

Ramsey ((Ramsey 1978)) agrees. He also considers whether a judgment could refer to a complex object as ‘Eve-strikes-Adam’. We usually identify such a situation with a fact; and we would therefore take the fact that Eve strikes Adam as one we can perceive. This view is also the one which Ramsey attributes to Russell. Nonetheless, it is not always the

case that objects of perception are facts, we may simply be mistaken in our perception. Still, as Ramsey points out, the significance of such a statement about misperception is the same as the one which is concerned with genuine perception. Both mean the same, even though one statement is false and the other is true. This brings him to the conclusion that “a phrase beginning with ‘the fact that’ is not a name, and also not a description; it is, therefore, neither a name nor a description of any genuine constituent of a proposition” (p. 43). It cannot be a name of a fact because the statement of misperception is false, and being false there is no fact of which the statement is a name. Neither can it be a description. Here Ramsey admits that we sometimes seem to use such a phrase as a description, but in other contexts we don’t. ‘The death of Caesar’ and ‘the murder of Caesar’ are apparently two different descriptions of the same event, but a person may know that Caesar had died without knowing that he has been murdered. In other words, those two phrases cannot be substituted when it comes to propositional attitudes. Thus, they cannot describe an event.

Ramsey summarizes his view by saying: “The connection between the event which was the death of Caesar and the fact that Caesar died is, in my opinion, this: ‘That Caesar died’ is really an existential proposition, asserting the existence of an event of a certain sort” (p. 43). He therefore believes with Russell that a judgment is a one-to-many relation between a mental factor and many objects. But he takes these objects to form the propositional content of the judgment. As a consequence, Ramsey claims that truth is a vacuous notion, the truth of a statement does not mean that the statement corresponds to a fact. For by saying ‘It is true that Caesar died’ or ‘It is a fact that Caesar died’, we do not say anything further than what is expressed by the ‘that’-clause: ‘Caesar died’.

3.4 The Debate Between Austin and Strawson

As an advocate of the correspondence theory of truth, John Langshaw Austin addressed the issue of the nature of facts in a paper in the *Proceedings of the Aristotelian Society*. Is it so, he asked, that the word ‘fact’ means the same as ‘a true statement’? Is it so that for every true statement there exists one and its own precisely corresponding fact ((Austin 1964))? Both questions are answered in the negative. Even though a state of affairs can only be described in words, he says, such a state of affairs is “*toto mundo* distinct from the true statement”. He then continues to say that many so-called statements which seem to be true or false do not have a descriptive content: Thus, they can be neither true nor false.

In the same volume Strawson responded to Austin’s paper. He denies

that facts are something in the world. As Strawson says: “The only plausible candidate for the position of what (in the world) makes the statement true is the fact it states, but the fact it states is not something in the world” ((Strawson 1964), p. 37). A fact is neither an object nor a complex object combining a particular and a universal element. Statements refer to such objects but they do not refer to facts; rather they state facts.

In other words, Strawson holds that a fact is what a statement states, not what it is about. His reason for holding such a view is that ‘fact’, like ‘true’, can be put in front of a “that”-clause. By claiming that facts are in the world, Austin has not been sufficiently wary of the behavior of the word ‘fact’ in ordinary language. For instance, we have that ‘It is true that ...’ and ‘It is a fact that ...’; or ‘That’s a fact’ and ‘That’s true’. The difference rests only in style not in substance. Facts can also be known, stated, learned, forgotten, overlooked, commented on, communicated, or noticed, and each of these verbs can be followed by a “that”-clause, or “the fact that”-clause. We can say that facts, according to Strawson’s view, are nothing but contents expressed by statements or true propositions. The consequence is that facts cannot act as truth makers, and we therefore also see that Strawson rejects the correspondence theory of truth. Rather he agrees with Ramsey that we do not say anything about a truth bearer when we make an apparent truth ascription; rather, we are involved in an illocutionary speech act.

Thus, the debate between Austin and Strawson grew out of two quite different views of facts, and both theories were apparently supported by plausible arguments. As we will see in the next section, their disagreement rests on an ambiguity underlying the ordinary use of ‘fact’, and a similar ambiguity can be found behind the use of related terms.

3.5 Mellor’s Fact Dualism

D. Hugh Mellor draws a distinction between facts and *facta*. Facts are, according to him, actual states of affairs. In his own words: “Actual states of affairs, corresponding to true statements, I shall call *facts*, like the fact that Don falls, which exists iff ‘Don falls’ is true” ((Mellor 1995), p. 8). Facts are, however, defined in terms of truth. As he claims, “to say that *C* and *E* are facts is just to say that the sentences ‘*C*’ and ‘*E*’ are true, which tells us nothing about what in the world makes them true” ((Mellor 1995), p. 161). So facts correspond to truths, but they cannot be used to define truth. He also believes that facts, corresponding to sentences like ‘Don falls’ and ‘Don dies’, although true everywhere and always if true at all, can be localized in space and time. For instance, ‘Don falls in the streets of Berlin on 3 April 1998’ and ‘Don falls in the streets of London

on 1 May 2003' state two different facts, located in those places and times.

Facta, on the other hand, are what make sentences true. He explains his usage in the following way: "I shall use the Latin word '*facta*' (singular '*factum*'), . . . , for the entities in our world, whatever they may be, whose existence or non-existence makes true statements true" ((Mellor 1995), p. 162). Facta consist of at least one particular together with a universal, that is a property or a relation. But what about facts? They seem to be too abstract for that even though they are located in physical space and time. The difference between facts and facta is that it may be a fact that Don falls iff 'Don falls' is true, or it may be a fact that Don does not fall iff 'Don falls' is false, but it can only be a factum that Don falls, not a factum that he does not fall, since 'Don falls' is false, or 'Don doesn't fall' is true, because a factum does not exist.

One might wonder why Mellor finds it necessary to introduce facta in addition to facts as a basic ontological category. Both actual states of affairs and facta are located in space and time. Why should we need such an ontological dualism between facts and facta? Facta exist quite independently of whether we speak or think about them – their existence is not entailed by that of the corresponding concepts or predicates – whereas facts seem to be dependent on whether or not we think or speak about them – their existence is entailed by the corresponding concepts and predicates. Sometimes one has a feeling that 'facts' in Mellor's use covers both meaning and reference at one and the same time.

Mellor's distinction between facts and facta reflects a long dispute about the nature of facts. Some authors see facts as concrete entities to which sentences refer, that is, what sentences describe. Others consider facts to be propositions, abstract entities which are expressed by sentences; that is, facts are what true sentences state, not what they are about. So by making a distinction between facts and facta, Mellor seems intentionally to avoid the issue, suggesting a term covering each issue in question instead of saying that facts are either concrete entities or abstract entities.

One can ask, however, whether his grounds for proposing such a terminological division between fact and factum are strong enough to turn the tide. On the one hand, we take facts to be truth makers, and on the other hand we equate fact and truth as when saying 'It is true that *S*' and 'It is a fact that *S*'. Focusing on the first use we think of facts as concrete; focusing on the second use we regard them as abstract. How can both uses be correct? What we have here is apparently two different ways of using 'fact', in a *de dicto* and a *de re* manner.

Classically the distinction comes with modal logic. It mirrors the difference, say, between (i) $\Box\forall xP(x)$ and (ii) $\forall x\Box P(x)$, or in plain words

between

- (i) It is necessary for all x that x is P ,
- (ii) For all x , x is necessarily P .

Here the first use of necessity is *de dicto*, the second is *de re*. A similar difference in the use of ‘fact’ is to be found between

- (a) It is a fact for all x that x is P ,
- (b) For all x , x is in fact P .

And also in the use of ‘truth’ we can recognize a similar pattern

- (A) It is true for all x that x is P ,
- (B) For all x , P is true of x .

Now, since (a) corresponds with (A), or they are considered equivalent, and since the same holds for (b) and (B), it may seem more reasonable to say that facts and truth are two different things in the sense that when we are dealing with the world, and not with the language, we are talking about facts and we are using ‘truth’ in a *de re* manner, whereas when we are dealing with language, or don’t separate the world from our talk about it, we are talking about truth and are using ‘fact’ in a *de dicto* manner.

3.6 Armstrong’s Theory of States of Affairs

Facts play the role of making sentences true or false. In his most recent work ((Armstrong 1997)), David M. Armstrong, recalling Mellor’s views of facts, takes this role as the main reason for holding that facts exist. Armstrong uses the term ‘state of affairs’ instead of ‘fact’, but he says that the phrase ‘state of affairs’ is similar to Wittgenstein’s use of the term ‘fact’ in *Tractatus* (p. 19). As we saw, Wittgenstein thinks of a fact not merely as a possible state of affairs but as an *actual* state of affairs. In what follows it will be assumed that this is also Armstrong’s view.

The truth maker argument for facts is this: Assume that a is F . Thus, it is true that a is F . Now, what is it that makes this a truth? It cannot be the mereological sum of a and F which exists by necessity if and only if a and F exist because another particular, and not a , could be F . Neither can it be the existence of a and F and a relation of instantiation, since these entities would all exist without a being F if it were the case that a particular other than a instantiates F . So it is only the fact that a is F which can serve as the truth maker.

Armstrong also claims that the relation between truth maker and truth bearer is internal in the sense that it is impossible for the truth maker to exist without making the corresponding truth bearer true. For if the truth maker wasn’t sufficient for having a true bearer, then the truth maker would have to be supplemented with something else. As he argues, “A contingently sufficient truthmaker will be true only *in circumstances*

that obtain in this world. But then these circumstances, whatever they are, must be added to give the full truthmaker” (p. 116).

That the truth relation is internal is what Jan Faye explicitly denies in his paper “Facts as Truth Makers” in this volume. The circumstances he points to are the conventionally established relation of correspondence between a type of sentence and a type of fact without which a fact token cannot serve as truth maker of a true sentence token.

Armstrong characterizes states of affairs as saturated entities, whereas universals are taken to be unsaturated entities (*i.e.*, state-of-affairs types), which are saturated by ‘thin’ particulars. He also emphasizes that although we talk about universals and particulars as if they are constituents of facts connected by a fundamental tie, they are conceptually as well as ontologically derived from them. “It is often convenient to talk about instantiation, but states of affairs come first” (p. 118). There is no relation of instantiation over and above the state of affairs itself. Universals cannot exist separated from particulars, there are no non-instantiated universals, and indeed any particular must saturate some universals. In earlier works, Armstrong talks directly about universals and particulars as abstractions from state of affairs which we can single out from one another in our thought, but which cannot exist outside the states of affairs.

The claim that facts are ontologically fundamental, while particulars and universals are abstractions, raises several questions which call for more thorough discussion than can be undertaken here. The first is: If particulars and universals cannot be separated from each other but exist together in a plurality of facts, one might be tempted to say that attributes are tropes rather than universals. The second is: If particulars and universals are abstractions in the sense that their existence is dependent on the existence of states of affairs, but they are objects of our thought, what criteria do we have that show particulars and universals to be real entities? Armstrong’s answers to these questions seem to be clear. Universals don’t collapse into tropes, and particulars and universals are real.

Other philosophers also regard facts as more fundamental than particulars and universals. In this volume Johannes Persson in his “Examining the Facts” takes facts to be truly the basic entities from which particulars and universals can be constructed. He suggests, in contrast to Armstrong, that these facts themselves should be seen as tropes existing without substances as “thin” particulars. Accordingly, facts are used to account for universals and tropes to account for facts in the sense that tropes are facts and from them we generalize to universals and “thick” particulars.

4 Events

Events form another of the basic categories of ontology.² They are supposed to furnish the ontological space with force and change and time. Events support the dynamical structure of reality. They are related to the most basic ontological relations: space-time localization and causality.

This is sufficient to warrant a closer look at them. It is hardly surprising that dozens of conceptions of events are to be found in the literature. Although a common core is not easily found, we shall mention only a few of them. Let us start by considering the first approach to a logically based analysis of events.

4.1 Events as Compresent Experiences

The philosophical interest in events derives in large part from the role that events are supposed to play in causal relations. Indeed, no profound causal theory leaves unmentioned the question of events, and usually an explication of events refers in one way or another to causality. This does not always mean a positive opinion about the causal nexus, however. Russell's work on facts and events – the first contemporary contribution to an analytic ontology of events – is a case in point. Logical atomism leads to his well-known critical attitude towards causality (see his (Russell 1992)).

Russell's opinion on the nature of events is presented in "The Principle of Individuation" ((Russell 1997)). He sets out with the remark that

[several] considerations, of which the theory of relativity has been the most influential, have led to the conclusion that, if there are particulars, they are not persistent entities which move, but events, as limited in temporal duration as in spatial extent. It is therefore events, not particles, that we have to consider in seeking a theory of particulars. I assume [...] that a single event may last for a finite time and occupy a finite volume; and that two events may overlap both in space and time. ((Russell 1997), p. 294)

In order to arrive at a concept of event adequate for common sense and physics, Russell has to add further characteristics. In particular, an event that wholly precedes another event should be different from the second. Moreover, the relation "... wholly precedes ..." must be transitive. Russell's aim is to define, in a way which minimizes the unverifiable assumptions involved, a class of entities with these properties. The basic notion is that of a "complex of compresence".

If I see something and at the same time hear something else, my visual and auditory experiences have a relation which I call 'compresence'. [...] I go

²It goes without saying that this category is intertwined with other ontological classes. In particular, events have much to do with facts and processes.

on until there is no further experience which is compresent with each and all members of the group. I thus arrive at a group having the two properties: (a) that any two members of the group are compresent, (b) that nothing outside the group is compresent with every member of the group. Such a group I shall call a ‘complex of compresence’. ((Russell 1997), pp. 295 f.).

As far as any one person’s experience is concerned, such maximal classes of compresent experiences have all the required formal properties of, and may thus be called, “events”. Russell proceeds with ‘connecting people’ by means of synchronizing their experiences. Contrary to what he promised, he needs rather solid additional assumptions in order to define an improved version of complexes of compresence, so-called “total momentary experience”. So far as time and physical space are concerned, these entities are satisfactory candidates for events. Additional trouble arises when perceptual space is considered. Then we need a restricted relation of compresence which leads to a sub-group of total momentary experience of the kind “all that I see over there”.

4.2 Events as Causes

A less cognitively coloured notion of event might be thought desirable. For that purpose one may start with a very rough approximation and call an event any entity located in time (other than times), thereby including facts, citizens and things. That is in fact what Hugh Mellor does in (Mellor 1998). As his next step, however, he refines that explication: In the realm of the general concept introduced before he now distinguishes truth-making facts from particulars. Furthermore, particulars split up into things, which are subject to change, and unchangeable particulars, called events. Examples of events thus defined are elections, meals, speeches, collisions, and so on (cf. (Mellor 1998), p. 85). According to Mellor, the difference between things and events is obvious for everybody. That is not to say, of course, that it will be obvious for all philosophers as well. Anticipating criticism from that side, Mellor decides to explain some characteristic differences between things and events in greater detail. Things, unlike events, do not have temporal parts – they are wholly present at every subinterval of the period of their existence.

This difference is not as clear as it might seem at the first glance. If anything is a thing, then surely a stone is. But any stone, not to mention more subtle things like persons or thunderstorms, can hardly be considered as temporally stable, *i.e.* as ontologically stable for the entire time of their existence. A stone came into being as hot, slowly crystallizing matter and it has continuously weathered since then. It turns out that the stone is only more or less stable; it is stable within reasonably narrow temporal limits and with respect to sufficiently wide criteria of identity. The same

is true of thunderstorms, persons, elections, meals and speeches as well.

It seems, nonetheless, reasonable to say that persons and other things exist as a whole at every moment of their existence, and this is why, for example, we attribute responsibility to a person. For a person who is not fully present at any given moment could not be held responsible for his or her action at that time. How could one punish a later part of me for what an earlier and different temporal part of me had done, if I didn't actually possess all my qualities at the later time, the same qualities which also made *me* responsible at the earlier time? In contrast, elections, meals and speeches are not fully present at any moment of their existence; they take time, they last a day, an hour or a few minutes.

A dominant feature in the discussion of causation is whether causes are events or facts, or perhaps both. In his paper "Events, Facts and Causation" Bo Rode Meinertsen argues that it is necessary to distinguish clearly between semantics and metaphysics in an account of causation. Analyzing Jaegwon Kim's and Jonathan Bennett's influential theories and evaluating the question of facts *versus* events as *relata* of causal relations, Meinertsen argues for a distinction between causal relations and causal explanations and for a realistic account of causation.

Closely connected to the notion of causation is inductive inference, and Nelson Goodman has posed a problem based on the idea that inductive arguments require a proper or a "natural" characterization of events and facts in terms of projectible predicates. By constructing so-called bent or non-projectible predicates Goodman argued that we cannot distinguish between genuine and spurious induction involving bent predicates. Lars Gundersen, however, argues against the generally accepted opinion that Carnap's ideas about positionality can be put to use in a satisfactory response to Goodman's challenge. Furthermore, he argues that the traditional rejections of a response framed in positionality terms conflate the new riddle of induction by Goodman with the old riddle of induction raised by David Hume.

4.3 A Wide Range of Opinions

There is a large variety of possible views on the individuation of events. Jaegwon Kim and John Lemmon stand at opposite ends of the spectrum.

Kim's basic idea is to identify particular events through nominalizations of sentences made up of a noun phrase and a verb phrase together with a dating adverb: "Frege walked from Wismar to Jena in the spring of 1893". The general form of this nominalization is:

SUBSTANCE's having A PROPERTY at A TIME.

Most naturally, this leads to a further principle of individuation of events: Any two such expressions stand for one and the same event if and only if they involve the same substance, the same property, and the same time. Such events are very frail entities. Any further specification results in additional properties and thus changes the event under consideration. Consequently, Frege's journey from Wismar to Jena in spring 1893 was not the same event as Frege's journey to Jena in spring 1893. Although the substances and times are the same, the properties are different. Yet, provided that Frege undertook only one journey from Wismar to Jena in spring 1893, such a characterization seems to be at odds with our intuitions. So one could say that Kim's events are sliced very thinly. That makes them subject to various criticism. Not only does such an ontology seem unduly overcrowded with events, but some consequences are hardly acceptable from an intuitive point of view. Take, for instance, the following real decision of the Supreme Court of the German Empire. According to German laws those days a bilker was somebody who left without paying his bill because he had no money to settle it. In an apparently clear case of a bilker, it was revealed that the gentleman was not really unable to pay his bill. Actually, he had the money to pay but refused to do so. Instead, he preferred to claim contrary to the fact that he had no cash at all. This further detail confused the wise judges of the *Reichsgericht* considerably, and after careful deliberations they came to the conclusion that the case under investigation deserved another classification than the one the man was accused of, and he was acquitted! In a very sophisticated sense it is indeed true that someone who refuses to settle his bill, although he actually has the money to pay, is not a bilker, so the issue did not involve an event of bilking. But from the innkeeper's point of view (and from the perspective of any reasonable person) there is no substantial difference between those two cases - the two events are identical and should be treated equally. So beware us of too fine-grained events!

On the other hand, Lemmon's events are thick. His suggestion is that events are identical if their spatio-temporal location coincides. Such an individuation treats events much like objects or bodies. Not only will Frege's walk from Wismar to Jena be identical with his journey from his birth place to the town of his university; it will also be identical with his thinking through fundamental problems of arithmetic, if this occurred at the same time.

This is also the position of Wolfgang Spohn: "Events are small inexhaustible parts of our large inexhaustible real world" ((Spohn 1983), p. 172). Every truth belongs to the real world. But what belongs to a given event, and what does not belong to this event? This, again, is the question of individuation of events. And here Spohn's answer is quite

similar to Lemmon's: "the most clear and simple idealization consists in identification of an event with a certain space-time region, resp. with all what happens within this space-time region" ((Spohn 1983), p. 173). To Spohn it is not events but states of affairs which give rise to an adequate causal theory. His own approach, he claims, cannot be transformed into an event-based causal conception. He concedes, however, that events might stand closer to states of affairs than seems to be the case at first sight. The bridge is *physically maximally specific states of affairs*. This concept denotes a state of affairs such that for a given spatio-temporal realm it indicates every basic physical property of all particles or fields – or whatever the physical ontology consists of – in that realm. Moreover, if a moderate materialistic or physicalistic standpoint expressed by physical supervenience of all non-physical properties is assumed, then events may be identified with true physically maximally specific states of affairs.

4.4 Davidson on Events

Donald Davidson's work on events marks an important turning point in this field of research. With his work the topic "events" matured into a proper subject of research in analytic philosophy, especially in formal ontology. Davidson too regards events as the relata of causal relations. The mind-body problem, he suggests, is best discussed in terms of events. Actions are also species of events, the notion of event lies at the very core of action theory. The concept of an event is thus one of the central categories in Davidson's philosophy. According to him, events are a fundamental ontic category, forming part of the metaphysical stuff the world is made of distinct from substances or continuants.

He takes events to be individuals, concrete particulars, *i.e.* spatio-temporally located singular entities. Davidson does not simply postulate the existence of events. He argues for their existence and for their specific nature. Davidson's strongest arguments for the existence of events and for their specific properties are of a semantic nature. The core assumption is that a semantic theory, by relating language and reality, will embody an adequate metaphysics for the nature of reality.

How then does Davidson extract an ontology from semantics? Given a language L , an adequate semantic theory for L must be finitely axiomatizable, producing theorems satisfying his Convention (T) for every sentence s of L . Such theorems state the necessary and sufficient conditions under which s is true in L . The finiteness of the theory is an unavoidable precondition for a language to be learnable. It is not trivial to uncover the need for events in such a semantical setting. However, Davidson finds good reasons for upholding the existence of events in examples like the

following:

- (i) Fred meets Mary.
- (ii) Fred meets Mary at noon.
- (iii) Fred meets Mary at noon on Baker Street.
- (iv) Fred meets Mary at noon on Baker Street lying under a car.
- (v) Fred meets Mary at noon on Baker Street lying under a car with a spanner in hand.

There seems to be no limit to the number of adverbial modifiers attachable to these sentences. If we treat each of these sentences as involving a new predicate with a different number of places, we offend against the assumption that a semantic theory be finite. Now Davidson's idea is to treat adverbial modification as the conjunction of the surface predicate ("meet" in the above examples) with an appropriate relation between an entity and the time, location, or other specific modifications. To put this idea to work, he has to introduce an existentially bounded event variable as an additional argument to each of the relations. For instance, the Condition (*T*) links the third of the above sentences with the following formal structure *p* :

$$\exists e (\text{meet}(\text{Fred}, \text{Mary}, e) \wedge \text{at}(\text{noon}, e) \wedge \text{on}(\text{Baker Street}, e))$$

The sentence "Fred meets Mary at noon on Baker Street" is true in English iff *p*. Then, in the above example, any sentence occurring earlier in the list (i)–(v) may be inferred from any later one by means of logic. The three place relation is common to all of them. The requirement of finiteness is thereby met, and each sentence is assigned its truth condition.

Davidson has one more argument to offer in order to support his view that the quantifier ranges over events. Singular causal statements, he argues, should be analyzed in terms of a dyadic causal relation, calling for quantification over causes and effects. That, according to Davidson, provides a further strong motivation for treating the quantifier as ranging over events – since these are the entities which stand in causal relations.

Davidson's famous criterion for individuating events is that two designators refer to the same event iff the event referred to by the one designating expression has the same causal ancestry and the same causal consequences as that referred to by the other designator ((Davidson 1980), p. 179). Davidson later came to accept that this was not adequate as a criterion of individuation³, although this doesn't detract from the truth

³In a reply to Willard Van Quine, he takes the following standpoint: "[Quine] says my suggested criterion for individuating events is radically unsatisfactory, and I agree. I accepted it only tentatively, but stressed that I thought it was about as good a criterion as we have for physical objects. Quine has made clearer to me what was wrong with my original suggestion, and I hereby abandon it. [...] I may also have made the mistake of thinking that if objects and events are both individuated by

of the same causes and effects claim. The reason is that, as a criterion of individuation, it appeals to other entities of the same kind, and so involves a certain circularity. The position is no worse than that with continuants, however, as he points out in reply to Ernest LePore:

Consider material objects: One standard ground for the individuating material objects is spatio/temporal continuity. Two designators refer to the same material object just in case their referents have the same spatial and temporal continuities. But we fix a spatial/temporal framework by identifying and reidentifying other material objects! Such circularity as there is here is unavoidable given that material object is a basic category of classification of particulars; a 'non-circular' account could only be given if the individuation conditions for material objects could be given in terms of some other, independent, category of particulars.

Since material objects have not met with a corresponding scepticism, we should not, by parity of argument, exaggerate our scepticism in case of events. Although Davidson's criterion does not tell us anything of practical importance about the identity of events, and in particular does not help us to reduce events to a more basic ontic category, it contains an important truth about events by locating them in our conceptual space.

It tells us that whatever an event is, it plays an important role in causation. It is the sort of thing that can stand in causal relations. This is enough to distinguish events from many other ontic categories. (Both quotes are from (LePore 1985), p. 161).

Davidson's conception gave rise to a broad discussion in the literature in which many philosophers have participated. One of these is Jan Faye who in (Faye 1989), pp. 153 ff. critically examined Davidson's view and contrasted it with his own approach in which he first distinguishes between event types and event tokens, claiming that we can overcome the circularity of Davidson's principle of individuation if we can identify types of events without any reference to their types of causes and types of effects. Second, he argues that such an identification is indeed possible based on a distinction between natural and nominal events according to which natural event terms in a given language are not defined by a definite description (including causes and effects), but function like natural kind terms or mass terms as it has been posited by Saul Kripke and Hilary Putnam.

spatiotemporal location, we must identify events with objects. But Quine makes us see that this is a separate matter" ((Davidson 1985), pp. 175 f.). However, he does not fully reconcile to Quine's position: "Occupying the same portion of space-time, event and object differ. One is an object which remains the same object through changes, the other a change in an object or objects. Spatiotemporal areas do not distinguish them, but our predicates, our basic grammar, our ways of sorting do. Given my interest in the metaphysics implicit in our language, this is a distinction I do not want to give up" ((Davidson 1985), p. 176).

Several papers in the present volume deal with various aspects of Davidson's position. Uwe Scheffler and Marko Winkler collaborate in pursuing his problem of how events with and without attributes are interrelated. In a broader framework they reduce the problem to a question about predicate terms forming operations. Like Davidson, Arto Suuronen in his contribution "Effects or Consequences of Action" characterizes actions as a special subclass of the category of events, and by doing so, he hopes to link questions of ontology with considerations of ethical relevance. Also Pirmin Stekeler-Weithofer addresses Davidson's ideas in his "Questions and Theses concerning (Mental) Events and Causation" by arguing that Davidson's 'anomalous monism' supports metaphysical, naturalist or physicalist, essentialism. In order to reach this conclusion, he develops his own formal analysis of events, in the spirit of Montague, in terms of event-variables as they are proposed by Davidson to prove his point.

4.5 Further Alternatives

There is no shortage of alternative approaches. Richard Montague proposed that events be understood merely as properties ((Montague 1974)):

An event P occurs at a moment t iff t has the property P .

Time might be taken to be points or intervals. We thus obtain either momentary events or events with temporal duration. What then is a property? Let I be the set of all possible worlds, and for all $i \in I$, let A_i denote the set of individuals in I . U is the set of all individuals. By a *property* we mean any function from I into the power set of U .

Similar ideas can be found in the work of many other authors, e.g. of Franz von Kutschera (comp. (Kutschera 1993)). One of the best known conceptions is proposed by David Lewis. He does not introduce events on the basis of an analysis of natural language, but as mere stipulative definitions in connection with his theory of causation (cf. (Lewis 1986), pp. 241 ff.). In his own words⁴:

1. An event is a localized matter of contingent fact.
2. It occurs.
3. It is contingent that it occurs; no event occurs at every possible world. Hence we have nonvacuous counterfactuals about what would have been the case if a given event had not occurred, as we must if we are to place that event in a history of causal dependence.
4. An event occurs in a particular spatiotemporal region. Its region might be small or large; there are collisions of point particles and

⁴All quotes are from (Lewis 1986), pp. 243 ff.

there are condensations of galaxies, but even the latter occupy regions small by astronomical standards.

5. An event occurs in exactly one region of the world, if it occurs at all.
6. If an event occurs in a region, it does not occur in any proper part of that region. The whole of the event occupies the whole of its region. Parts of it, but not the whole of it, may occur in parts of its region. Also, an event is unrepeated: it does not occur in two different regions of the world.
7. An event [...] *is occurring in* every region that is part of the region in which it occurs; and [...] it occurs in the region that is the mereological sum of all regions in which it is occurring.
8. To any event there corresponds a property of regions: the property that belongs to all and only those spatiotemporal regions, of this or any other possible world, in which that event occurs.
9. Two events can occur in exactly the same region.
10. For any two events there is some region of some world where one occurs and the other does not. [...] Our correspondence between events and properties of regions is therefore one-to-one.

By the above descriptions he achieves a characterization of formally eligible properties of regions that includes all events. But such a characterization contains too much: not all these properties are events. In addition, he has to say the following:

- Events are described essentially, but also accidentally.
- They stand in logical relations.
- Events have a spatiotemporal mereology.
- The complete history of the world's events is the complete history of the world.
- Events are predominantly intrinsic; but
- they are not disjunctive.

Number ten of the above description allows us to identify an event with its corresponding properties, or in other words, with the class of all spatio-temporal regions where it occurs. So in Lewis' account, events are no longer irreducible elements of being.

Philosophers sometimes look with suspicion at the event as a fundamental entity. In the present volume Erwin Tegtmeier casts doubt on whether there is any ontological difference at all between facts and events. To support his claim he defends an ontology based on the category of facts, but without the category of events. Within this approach he adequately analyzes events as facts. It turns out that such a fact-ontology is much more in harmony with a Humean than with an Aristotelian notion of causality.

Another attempt to get rid of events altogether is Wilfried Sellar's "No-event theory" (cf. e.g. (Seibt 1990), pp. 256 ff.). Still another idea is due to Roman Ingarden (cf. (Ingarden 1964)). According to Ingarden, an event is brought forward by the very first moment of existence of a state of affairs, its "coming-into-existence", as he used to say. This gives an intuitive account of event as something that happens, something that occurs (or becomes extinct, ceases to exist). The problem with this notion is that the existence of events collapses into time points. That idea makes the notion difficult to handle, for example as applied to relations of causal relations. Therefore the conception needs to be underpinned with a more sophisticated notion of time.

Such an attempt is undertaken from a more epistemological point of view on ontology in Max Urchs' contribution to this volume. Roughly speaking, he claims that whether some state of affairs lasts a short or a long time depends on the cognitive perspective one assumes. Thus, the specification of the duration of a state of affairs emerges by making up the framework of possible experience, the so-called *episystem*, in such a way that the specific properties of events, such as, how long an event lasts, become dependent on the underlying *episystems*. This has consequences for our understanding of all sorts of relations between events, and in particular for that of causation.

The duration of events is not the only issue a theory of events must address. Are there, for instance, structured events and, in particular, are there negative events? In common speech there seems to be little doubt about the existence of negative events: Sherlock Holmes solved one of his cases because of a dog that didn't bark. A good deal of Stoertebecker's fame arose because he did not die immediately when decapitated (but moved to release his fellow pirates). A lightning *not* followed by thunder makes much more of an event than its positive version. And the question of whether an alternative event is itself an event (and can, for example, cause something) raises a variety of issues. Various ideas for remodelling such questions within an ontological frame of events have been put forward. A recent contribution to the analysis along these lines is Uwe Scheffler's ((Scheffler 1999)). Besides developing his own conception of events, including e.g. novel proposals concerning similarity, the monograph presents a carefully written overview of contemporary work in the ontology of events.

This volume presents yet another view on events. Uwe Meixner concentrates on the question of what is essential to events – more precisely: what are the properties which are essential to all events. Meixner explicates four fundamental modal intuitions concerning events. On the basis of them, he obtains a new classification of events which should help to

clarify some aspects of the more recent controversy about events.

Davidson's and Scheffler's writings make a substantial appeal to linguistic matters in answering metaphysical questions about events. They are by no means the only philosophers to adopt such an approach. Nevertheless, Philip Peterson complains in (Peterson 1997) that too little interest is paid to linguistic phenomena when introducing these entities. He attempts to bridge this gap by developing his own theory about facts, propositions, and events – without falling victim to “abstract or abstruse metaphysical analyses typical of some aprioristic philosophical analysis today” ((Peterson 1997), p. 1). We certainly hope that all the present contributions succeed in steering clear of this peril. Certainly, Peterson's desire to see the results of other disciplines – linguistics, but also the sciences – in order to fuel further philosophical analyses, is a legitimate one. Quite a number of papers in this volume provide good evidence that their authors share this attitude.

5 Processes

Somehow things and persons retain their identity through time. They may have incompatible properties at different times, but there is still something which is identical from one moment to another. Bill Clinton is the same person today as he was yesterday, and today he is the same as he will be tomorrow; today the Brandenburger Tor is the same as it was in the past and as it will be in the future. We then account for changes in terms of things possessing different properties at different times because things are fully present all the time. Events, however, cannot change because different temporal parts of an event are themselves different events. Take, for example, a soccer match, the first half of the match is not the same entity as the second part, although these events are parts of the entire match. Things endure over time in the sense that they are wholly present at different moments of time, whereas events, except point-like event, perdure over time in the sense that they do have temporal parts and therefore cannot be fully present at any moment of time.

Nonetheless, things and events seem to stand in an intimate relationship with one another. An event occurs every time a thing changes one of its properties. Perduring events cannot exist without enduring things. But do events have to involve the same things throughout their entire course? In the soccer match 22 players participate in the game, although they could be exchanged for 22 new players from the same two clubs, or nations, during the match, and we would still have a single event. Indeed, nobody in the Hundred Years War would have participated from

the very beginning to the very end. Still we characterize the battles in Europe between 1337 and 1453 as one long war. So even though we cannot have events without things possess certain properties at certain times, and lacking them at certain other times, it seems not to be the case that an event needs the same changing things to participate throughout the course of its existence for it to be a single event.

There are, of course, well-known problems of how things retain their identity over time if they change their properties. In order to avoid them it is either argued that every thing must have some essential properties which are never gained or lost (essentialism), or it is said that all properties may eventually change as long as this transformation happens continuously in one and the same location or at least in consecutive locations (genidentity). But are these answers satisfactory?

Take Thomas Hobbes' famous ship *Thebe* lying in the harbour. A thief steals some planks every night, and every morning the timber is renewed. Finally the whole ship has been renewed, no material from the original ship is part of the new ship; nevertheless the new one is similar to the old one. Is it the same ship? Some people may say 'yes' until the thief assembles all the stolen planks putting them into the right place with respect to each other, and the old *Thebe* is now lying next to the new *Thebe*. Then the answer is apparently 'no'. So for a thing to continue to be the same thing over time, it seems to be a necessary condition that much, if not most, of its material continuously takes part in its existence.

But is it a sufficient condition? To answer that question let us look at another example. In 1804 two very valuable golden horns were stolen from the Royal Cabinet in Copenhagen. These horns had been found one hundred and two hundred years earlier at a spot close to each other, and they dated back to the Iron Age. When they were found, drawings were made of them. After they were stolen the thief melted both of them, and when the police caught him, all they found was the material. Now, imagine that this material had been used to construct the horns based on the drawing – or perhaps using a form or a cast instead of a drawing. Would the horns have been the same simply because the material is the same? Here most people will probably answer 'no'. The horns are reconstructions out of the same material, but they are nevertheless not identical with the old ones. There has to be some continuation of form or a structure in addition to the continuation of material.

Thus, the conclusion seems to be that things' identity over time requires the persistence of some material over time as well as of certain properties, a form or a structure which allows us to identify the things.

What about processes? Can they be explained in terms of the categories of event and thing? It is obvious that an enduring thing that does

not change any property over time will not undergo a process. A process requires that a thing changes some of its attributes from one moment to the next, and therefore processes are usually characterized as a continuous series of events. Thus, ontologically processes can be reduced to things and events. But such a claim is correct only if our notions of enduring and perduring entities are entirely consistent with each other.

We saw, however, that one and the same event is not necessarily constituted by the same things throughout its entire duration. Moreover, a process does not consist of the same events when it begins and when it ends. So how can we make sure that we are dealing with a single process? If neither the same things nor the same events are required to make up the process at two different moments in time, how can we then identify the process through space and time? Clearly, as long we just consider a process that consists of the changing properties of a thing, or group of things, it raises no problem because in that case there is an entity which keeps the events together. These processes have the ability to transmit their own structure as things taking part in them continue to exist over time. But there are also processes such as, for example, that involving an explosion of a car bomb causing the windows in the surrounding buildings to shatter, after which some of the fragments injure a child inside one of the buildings. Examples like this one have led some philosophers to argue that processes cannot be explained in terms of things and events. On the contrary, some of them even hold that processes are the ontologically fundamental category in terms of which things and events have to be explained.

5.1 Process Philosophy

The idea of considering the dynamic unity of a process as the basic ontological constituent goes back to the Greeks. Heraclitus is famous for having said that nobody can step into the same river twice. Since that time philosophers have been divided between those who followed Parmenides, taking *being* to be the ultimate entity, and those who held, with Heraclitus, that *becoming* is the most fundamental and irreducible trait of the world. If one posits being as the ultimate, one will try to explain change, as we have seen, in terms of the being possessing incompatible properties at different times, whereas a proponent of ultimate processes takes changes to be *sui generis* in the sense that all existence is coming-into-being in the present. A process is the dynamic continuity of change in which novel elements are incessantly added to what already exists.

So process philosophers would be inclined to see time as a dynamic part of the world; temporal becoming is an objective feature because there exist

tensed facts about things which may make the same numerical statement true at one moment but false at another. Some philosophers will even maintain that every statement about the future does not have a truth value at all; it is neither true nor false, until, perhaps, what the statement is concerned with becomes present. Accordingly, truth is not a tenseless property of a belief, proposition or sentence. In contrast to these ideas, the static view of time is normally associated with the primacy of being, and becoming is not thought to be a real part of the mind-independent world. Rather, such a view regards the separation of time into past, present and future to have its origin in the mind of humans. There are no tensed facts; all facts exist tenselessly, and all statements about actual states of affairs are therefore tenselessly either true or false.

Notice further that no proponent of substance ontology and of the unreality of becoming denies the existence of processes – the adherent merely holds that processes are reducible to events which, again, may or may not be reducible to things having a certain property at a given time. Furthermore, according to this conceptual scheme, a process can be characterized as an event or a continuous series of events dependent on the context of measurement. A flash of lightning is, from a common sense perspective, a single event, whereas from a scientific perspective it is a series of events occurring at different stages during an interval of time. What characterizes a process philosopher, then, is the belief that processes are *sui generis*; such entities cannot be reduced to a series of events which might be the change of accidents in an underlying substance because their description has to rely on the objectivity of temporal becoming.

Since process philosophers consider processes to be ontologically more fundamental, or at least not less fundamental, than things, these processes will act as truth makers for every sentence about persisting and changing entities over time, *i.e.*, they are the real truth makers of tensed sentences. Indeed, processes in this sense have characteristic features, and we can even say that a process in combination with a (lasting or changing) property forms a dynamic fact. Such dynamic facts should be distinguished from static facts which, if any such there are, consist of a thing and its property at a time. But, again, this does not settle the issue of whether the individual processes and their properties constitute dynamic facts, or are themselves abstractions from dynamic facts.

A possible way of avoiding the dilemma of choosing between things and processes, *i.e.* between static and dynamic facts as the most fundamental entities of ones ontology, would be to argue that facts are the ultimate entities, and that the division of facts into things and processes is a mere way of speaking, depending on whether we can cut the world of facts into countable and non-countable entities. But such a view would certainly

jeopardize both substance philosophies as well as process philosophies.

5.2 Whitehead's Actual Occasion

In the 20th century a few philosophers have opted for a process philosophy. Alfred North Whitehead is probably the best known but his basic metaphysical terminology is very different from the one found in contemporary analytical philosophy with its close ties to science and common sense. Whitehead turns his back on substance metaphysics, seeing René Descartes' ontological dualism as a trap that led to philosophical scepticism. Instead he introduces the notion of an actual entity or actual occasion as his fundamental metaphysical concept. Its meaning is not concerned with that of an enduring, substantial entity. Rather, an actual entity is a process of becoming that knits together what he calls "prehensions" or concrete facts of relatedness. There are two kinds of "prehensions": the positive one that is a "feeling" without conscious awareness, and the negative one that is an "elimination from feeling".

Thus, the actual world is a process, and the process is the becoming of actual entities. Becoming of an actual entity is seen by Whitehead as the potential unity of many entities in which novel "prehensions" become. This process is called a concrescence, and "in the process of concrescence, there is a succession of phases in which new prehensions arise by integration of prehensions in antecedent phases" ((Whitehead 1929), p. 35). So new prehensions are, so to speak, extruded from the immediate past. The prehensions of actual entities are the real concrescence of many potentials, and the nature of "being" is its potential for every becoming. An actual entity is therefore its process of concrescence.

Without spending further effort on the presentation of Whitehead's process metaphysics, we shall proceed to consider how the process category might fit into an ontological scheme of science.

5.3 Johanna Seibt's Dynamic Mass Theory

Johanna Seibt has formulated a modern version of a process philosophy with a view to accommodating the ontology of science (Seibt 1997). In her frame of thought all entities are non-countable individuals or 'dynamic masses'. They exist as activities of four dimensions or less. They are more or less homoeomerous; in the limiting case persons, things, or events are considered as four-dimensional minimally homoeomerous dynamic masses. Activities not performed by any particular subject are the prime examples of dynamic masses. Such subjectless activities are expressed by 'feature-placing' sentences like 'It is raining', 'It is itching' or 'The snow covered

the ground'. Examples of dynamic masses in physics are, for instance, electromagnetic waves travelling through space.

Dynamic masses can combine into complex dynamic masses, and it is these combinations and their parts to which we refer whenever we refer to changes and changing entities. Whether we talk about generations, destructions, locomotion, subject-related activities, actions, shapes, phenomenal qualities, masses, collections, things, events, or persons, dynamic masses are what we are talking about. Moreover, dynamic masses do not require that changes are reduced to a sequence of states, for all types of changes are seen as entities in their own right.

In her present contribution "The Dynamic Constitution of Things", Johanna Seibt develops her theory of dynamic masses further. First she argues that the old Aristotelian substance ontology is a myth. Then she expands on her theory of things as consisting of dynamic mass processes, stressing, in contrast to other recent approaches, that such processes should not be considered as particular entities that are countable concrete occurrences. Rather, dynamic mass processes are non-particular individuals some of which may sometimes occur as particulars. After developing her theory – based on the conception that an ontology describes which entities one is committed to if the sentences in a language were be true – she concludes by making some remarks on how her theory undercuts traditional problems concerning the contingency, material constitution, and persistence of things.

Processes are also the central theme in Paul Needham's paper, "Hot Stuff". Here the motivation for their introduction derives from science, and is contrasted with Davidson's manner of introducing events. The appeal is not to the more abstruse reaches of microphysics, to be considered shortly, but to the more familiar world of macroscopic phenomena, and in particular, to the development of an adequate conception of heating. Like Davidson's approach, however, processes are seen as complementing the ontology of continuants rather than the one category being thought of as reducible to the other.

6 Physics and Ontology

One of the main obstacles for a thing or an event ontology derives not from metaphysical difficulties concerning the identity of ordinary things and events through time, but from the empirical sciences themselves. Quantum mechanics questions the old notion of thing as an entity whose development in space and time is well-defined. The description of a classical trajectory requires both a specification of a free particle's momentum and

of its location in space and time. But, according to Werner Heisenberg's indeterminacy relation, we cannot ascribe both properties simultaneously to one and the same object. Thus, we have difficulties of interpreting the development of quantum entities as of either a thing always having a certain spatio-temporal location, or as of an event always obeying a causal description.

Sometimes quantum objects can be described as if they were waves, attributed with a certain wave length and frequency, and sometimes they are described as particles having a precise position with mass, charge, spin and a discrete energy localized in a small volume. It is impossible to see how these diametrically opposed characteristics can be integrated into one picture of one and the same object.

Furthermore, the fact that an electron can change discontinuously from one orbit around an atom to another – from one energy level to another, raises problems for the understanding of electrons as enduring things whose existence through space and time is a continuous set of changing states of events. In addition to this, one can point to the probability distribution of a particle in different regions of space in a diffraction experiment before the actual measurement, or the nonseparability of quantum objects in a singlet state. None of these features can be assimilated with the ordinary concept of a thing or an event.

In a Bell-type experiment, for example, we talk as if there are two entities forming a single system which we describe by using one and the same state vector until a measurement takes place. Usually, we consider an entity to be different from another entity when they have separated properties, and therefore two quantum entities should be describable by different state vectors as distinct entities. But this isn't so. The result of a measurement on one of the 'particles' is correlated with the result obtained from the measurement on the corresponding 'particle' in a region far away, as though the 'particles' are still in one entangled state after leaving the source. The notion of separable states located in different regions of space-time cannot serve as a criterion of individuation. But because we measure two occurrences with opposite values, whenever we make a measurement with two separated apparatuses, there is a natural tendency to think of the system as consisting of two entities all along. In which way we choose to see the situation, it raises troubles for any understanding of quantum entities as ordinary things or events.

There are other difficulties too. First, subatomic particles are taken to be indistinguishable if they have the same invariant properties in common. All electrons have the same rest mass, charge, spin, etc. If we cannot use space and time to identify a quantum object, how can we then individuate quantum objects among a set of entities sharing these properties? They

do not have properties that can turn them into individuals apart from the sortal ones. But sortal properties cannot serve as individuating properties. Second, it has been proven that in strong gravitational fields the number of particles actually varies with the observer. If the observer moves with uniform acceleration, he may perceive thermal radiation with a spectrum of particles corresponding exactly to that emitted by a hot body, whereas a static observer will not perceive anything at all in the same space-time region.

Indeed, one can tackle the problems mentioned above in a different manner. First, one might hold that all attempts to ascribe an independent reality to subatomic particles must be relinquished, dealing with the results of observation. Second, one could argue with Niels Bohr's interpretation of quantum physics that all attempts to ascribe dynamic and kinematic properties to subatomic particles independently of concrete results of observation should be abandoned. Finally, one might claim that the state vector represents a reality independently of what takes place in connection with measurements. The first position avoids the ontological issue entirely, the second one takes quantum entities to be real but holds that quantum mechanics or quantum field theory does not tell us anything about the specific nature of these entities, and the third position maintains that our best theories teach us a lesson about what there is and how we can describe what there is.

Three of the papers in this volume address the special issue of applying our ordinary notions of thing and event in the domain of quantum physics. They have in common the view that an ontology of quantum physics is possible, and must be based on something different from individual things or events whose individuating facts are their position in space and time. Mauro Dorato argues in his paper "Facts, Events, Things and the Ontology of Physics" that what should replace things and events as the fundamental ontological entity is the field. The field is real in the sense that it carries energy. It can be considered to be an enduring substance spread out in space-time, a substance whose identity need not change between different regions of space-time, although its properties, the values of various quantities, may change from one area to the next. Andreas Bartels, on the other hand, advocates in his "Objects or Events? Towards an Ontology for Quantum Field Theory" a solution in which the fundamental entities of quantum field theory are events of the type 'Quantum system S is in quantum state Ψ ' – a kind of entity that cannot be identified in terms of its spatio-temporal location. Rather, it is a Davidsonian entity identifiable by its location inside the causal net of the world. Finally, Meinard Kuhlmann also looks into the quantum field theory in his "Processes as Objects of Quantum field Theory", discussing

various suggestions about how we can reconcile quantum entities with the assumption that things or events are ontologically the fundamental entities. He tries to argue that a realist interpretation of Feynman diagrams is not possible as long as it is based on the substance ontology, but such a view becomes more natural in case we accept a process ontology.

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