Logic and Logical Philosophy
Volume 14 (2005), 119–126
DOI: 10.12775/LLP.2005.009

Book Reviews

Pavel Materna, **Conceptual Systems**, Logos Verlag, Berlin 2004, pp. 190.

In his previous monograph, *Concepts and Objects* (Acta Philosophica Fennica, Vol. 63, Helsinki 1998), Pavel Materna developed a theory of concepts based on Transparent Intensional Logic (TIL) founded by Pavel Tichý (see his *Foundations of Frege's Logic* (Berlin: Walter de Gruyter, 1988) and *Pavel Tichý's Collected Papers in Logic and Philosophy* (Prague: Filosofia, Dunedin: University of Otago Press, 2004)). A short chapter of the book was devoted to conceptual systems, a topic highly interesting from various logical and philosophical points of view. However, the chapter was too short to enable a thorough discussion. Materna's new book, *Conceptual Systems*, is a sequel aimed at elaborating the topic partly and insufficiently discussed in the previous book.

Materna's considerations in *Conceptual Systems* are important both for philosophy of science as well as for semantics. Regarding the former, Materna discusses a vast variety of problems connected with comparison of theories and their incommensurability; regarding the latter, he makes two crucial steps: firstly, he proceeds in a Churchian way and identifies meanings with concepts; secondly, he claims that "the *meaning* of an expression E (of any language) can be identified with that *concept* which is the best analysis of E" (p. 7). The importance of conceptual systems for semantics can be expressed as follows: "which analysis is the best one is unambiguously determined by a given conceptual system" (*ibid.*). (What is to be taken as the best analysis within a given conceptual system is discussed on pp. 92–95.)

 ISSN: 1425-3305

Therefore, the meaning of an expression is to be relativized to a conceptual system.

Materna starts his book with a passionate defense of what he calls *logical analysis of natural language*. He advocates the idea that language is a code and that, therefore, there is something it encodes, viz. meaning. Both thoughts are quite unpopular because of the arguments given by late Wittgenstein, Quine and their followers but Materna tries to endow the thoughts with good sense. He does so not by rebutting the arguments but by developing a positive theory that is based on a clear definition of meaning immune to Quinean attacks on the very notion of meaning. What is important is that meaning can be defined independently of the notions of synonymy and analyticity (p. 8) and thus the famous definitional circle Quine described in his "Two Dogmas of Empiricism" is broken. This is the core of the positive theory alluded to. Of course, Tichý's notion of *construction* plays a central role in this enterprise (Materna summarizes the theory of constructions on pp. 31–40). The definition of construction is free from invoking synonymy or analyticity and, thus, if meaning (of an expression) is identified with construction, the aim is achieved. One might object that the definitional circle is only a part of Quine's critique; the other part is that meanings are often treated as abstract entities and any logical analysis of natural language based on meanings as abstract entities is to be defended against Quine's antipathy to abstract entities (apart from sets) in general. Tichý and Materna's response is a methodological one (p. 5): if, as claimed by Menger's comb, abstract entities are necessary for explanation, they cannot be ommited. Of course, a theory of meaning needs meanings as abstract entities and, hence, the approach is well established.

This sort of defense of abstract entities, including constructions, is very important for Materna, because it enables him to deal with a vast variety of phenomena from a non-holistic point of view. In particular, Materna shows later that the problem of incommensurability of (scientific) theories can be interpreted non-holistically and non-relativistically. As far as I can see, this is one of the most interesting achievements of Materna's theory.

What is Materna's theory of concepts? First of all, let us introduce his auxiliary notion *concept** (p. 42). Each concept* is a closed construction, i.e., a construction involving no free variable. Concepts* can be said to identify objects (objects may be either extensions or intensions or (other) constructions). The idea that concepts* identify objects is on a par with the idea that constructions (v-)construct objects (p. 40). This is important because it reveals a "procedural" character of concepts*. To simplify things a bit, a construction is an abstract prescript suggesting how to build an object from other objects. Concepts* are thus ways of identifying objects via other objects (if the concepts* are complex). Identificationary nature of concepts* implies that they cannot be set-theoretical entities. This is the core of Materna's theory of concepts, a vantage point enabling him to criticize almost any theory of concepts (pp. 14–20). For concepts are usually treated as sets; sets, of course, cannot identify anything and hence, regarding usual theories, it is quite unclear what is the role concepts are to play.

Now the identification of concepts* with (closed) constructions has one unpleasant consequence. There are some constructions that do not construct anything; e.g., the construction expressed by "the greatest prime number" constructs nothing, because no prime number is the greatest one. The construction is a concept* and, thus, there are some concepts that do not identify anything. Such concepts are *strictly empty* (p. 42). We face the dilemma: either we may say that strictly empty concepts* are not concepts* at all, provided concepts* are means of identification, or we should admit that concepts* need not be means of identification. (Notice that other kinds of empty concepts* Materna discusses on pp. 42–45 are not vulnerable to the objection because they are identifying either the empty set (so-called *quasi-empty concepts**) or an intension that is, by chance, not defined in a given world (so-called *empirically empty concepts**). Although Materna presents no attempt to reconcile the identificatory nature of concepts* with strictly empty concepts*, he seems to have an excuse for this exception (p. 44). Regarding "the greatest prime number", he suggests that *if* there were such a number, it *would* be identified by the concept* THE GREATEST PRIME NUMBER and, hence, it makes sense to speak of the identificatory nature of the concepts*. I find this excuse rather perplexing because of its modal nature. For to say "if there were such a number, it would be [...]" is tantamount to saying "there is a possible world in which there is such a number and it is [...]". Of course, mathematics is the same in any possible world (and therefore it makes no good sense to speak about possible worlds with respect to the mathematical discourse), so there cannot be such possible worlds. This point can be strengthened when the notion of *ontological definition* Materna introduces on p. 89 is taken into account. It is claimed that complex concepts$^{(*)}$ are ontological definitions *excepting strictly empty ones.* What is defined are objects, neither concept nor expressions (p. 88). So, if strictly empty concepts$^{(*)}$ do not define anything, it makes no sense to ponder on what would be the case when there would be something identifiable by a strictly empty concept$^{(*)}$. Materna's excuse is not satisfactory.

Anyway, I think there is a way out. Being a means of identification seems to be a definitional feature of concepts*. This thesis is to be weakened in the following way: What is sure is that each *simple* concept* identifies something and *this is guaranteed on logical basis alone*. It is given by the fact that simple concepts* (as (closed) constructions) are trivializations. And there cannot be such a trivialization that does not construct anything; thus, if each trivialization constructs something, then each simple concept* identifies something. The problem arises with respect to complex concepts*; THE GREATEST PRIME NUMBER is a complex concept* consisting of certain simple subconcepts*. For each simple concept* there is an object identified by it; anyway, it is to be admitted, this does not guarantee that there is some or other object for the complex concept* consisting from simple concepts*. Otherwise, composing logical objects (constructions, concepts*) would invoke some ontological consequences in the area of extra-logical objects. However, *this cannot be guaranteed on logical basis alone*. (A sort of category mistake can be detected here.) Each simple concept* is a concept* *of something*; compound concepts* need not be concepts* *of anything*.

On the basis of concepts* Materna defines the notion of *concept*. Some concepts* enter the relations of α- or η-*equivalence* (for definitions see p. 51) and concepts* that are α- or η-equivalent are *quasi-identical* (p. 52). Now a concept is the set of all concepts* quasi-identical with a given concept*. Materna took over this approach from his previous book. But this solution was not satisfactory because many valuable features possessed by concepts* are closed to concepts. Concepts* are structured entities while concepts are flat, because they are sets; concepts* are ways of identifying something, while concepts are not, because sets cannot identify anything. In *Conceptual Systems*, Materna tries to remove these drawbacks. What he is after is to find an appropriate logical articulation for the following idea. Constructions (1) and (2) are different because involving different variables:

(1) $\lambda x_1 \lambda x_2 [^0\!\geq\ ^0\!x_1\ ^0\!x_2]$

(2) $\lambda x_3 \lambda x_4 [^0\!\geq\ ^0\!x_3\ ^0\!x_4]$

Though being different, the two constructions are similar in that both of them represent the same procedure, i.e., both represent the relation $\geq$. Again, (1) and (2) differ from (3):

(1) $^0\!\geq$

because (3) involves no variable. Anyway, (3) represents the same procedure as (1) or (2). Hence, the apparatus of constructions is too fine-grained because the cardinality of the set of constructions is higher than the cardinality of the set of procedures. Materna claims that "each member of the class-concept defines the *procedure* that is an *explicans* for *concepts*" (p. 53). (What is less satisfactory is that the notion of procedure was not strictly *defined* by Materna; there are only some informal hints as to how to understand it.) The tools required are supplied by normalisation (p. 56). (As Materna acknowledges, the idea of normalization here is due to A. Horák's *The Normal Translation Algorithm in Transparent Intensional Logic for Czech*, PhD Thesis, Brno 2001.) It is possible to define the notion of concept normal form; one concept* can be chosen (for the exact method see the respective definitions) to be the concept of the normal form, NF(C). Every other concept* α- or η-equivalent to the chosen one *points* to the chosen concept*. Thus, (1)–(3) point to the same NF(C). NF(C) remains structured.

Having defined concepts and discussed some notions such as homonymy, vagueness, compositionality, etc., Materna starts his considerations concerning conceptual systems. His discussion is two-fold: initially, he takes into account conceptual systems *simpliciter*, i.e., without considering their connections to languages, and then he adds their connections to languages.

To simplify things a bit, a conceptual system, **CS**, consists of two subsets: the set of primitive concepts, **PC**, and the set of derived concepts, **DC**. Primitive concepts are always simple. However, it does not hold that every simple concept is primitive; for being primitive is a relational property in the sense that a concept is primitive *with respect to a conceptual system* (p. 77). Materna claims: "The number of primitive concepts is finite" (p. 78). This is to be understood, perhaps, so that for *any* conceptual system it holds that the number of its primitive concepts is finite. If this is so, then there cannot be conceptual systems with infinitely many primitive concepts. I find this restriction unintelligible. Of course, conceptual systems having infinitely many primitive concepts are uninteresting for us, but this is not an argument against their existence. It is possible to have a conceptual system having as its **PC** the set $\{{}^0 0, {}^0 1, {}^0 2, {}^0 3, \ldots,$ *ad infinitum*$\}$. And, surely, there is an arithmetical conceptual system based on this set of primitive concepts (plus some other primitive concepts, e.g., ${}^0{=}$, ${}^0{+}$, etc.). Of course, we do not work with this system but with the other one involving the concepts ^{0}successor and ${}^0 0$ instead of infinitely many trivializations of numbers.

There are two basic kinds of conceptual system: mathematical ones and empirical ones. "Mathematical conceptual systems have to contain only such primitive concepts which construct extensions" (p. 81). This is obvious because it makes no sense to suppose that mathematics differs with respect to possible worlds. Empirical conceptual systems are such that their sets of primitive concepts "contain at least one concept of a (non-trivial) intension" (p. 83). Materna stated the difference in terms of primitive concepts but the same holds for sets of derived concepts too. As it is argued on p. 84, it is impossible for a conceptual system having only concepts for extensions in its **PC** to contain, in its **DC**, a concept identifying an intension. The gap between the two kinds of conceptual system is insurmountable.

Conceptual systems may develop in that their *area*, i.e., the set of objects identified by **PC**∪**DC** (see p. 86), is extended by adding new concepts. Even with respect to empirical conceptual systems, Materna makes an interesting observation that such conceptual system may involve new empirical concepts (concepts of intensions) even though the number of primitive empirical concepts does not increase. Adding some mathematical or logical concepts suffices. Consider an example offered by Materna himself (pp. 98, 106). Imagine a conceptual system containing empirical concepts ^{0}cat and ^{0}wild without involving the (logical) concept of conjunction. Of course, it is impossible to have (4) in the conceptual system:

(4) $\lambda w \lambda t \lambda x\, [^0\wedge\ [^0\mathrm{wild}_{wt}\ x][^0\mathrm{cat}_{wt}\ x]]$.

Anyway, adding $^0\wedge$ to the stock of primitive concepts of the system leads to the consequence that there are new *empirical* concepts among derived concepts of the system. At the earlier stage of the system, only properties *being cat* or *being wild* can be predicated to individuals; however, later also complex properties, e.g., *being wild cat*, can be predicated too. This is an instance of so-called *inessential extension* of the area of a given conceptual system. The area of a given conceptual system extends *essentially* provided new empirical *primitive* concepts are added (p. 98). In both cases, the original conceptual system is *creatively extended*, either *mathematically* (if the extension is inessential) or *empirically* (if the extension is essential) (see pp. 105–107).

Languages can develop too; in the most interesting case, their development is dependent on development of the conceptual system underlying the particular language. Of course, languages can also develop definitionally (p. 97) providing that new (simple) expressions are introduced as definitional abbreviations for some (complex) expressions; in this case, no new concept occurs in the respective conceptual system. In the former case, we may say that the language undertook a *creative extension* (p. 107). Thus, an interesting case of language development is such that the conceptual system underlying the language is supplemented by a new concept. Strictly speaking, we should talk here about two conceptual systems, each of which underlies the language in question in different stages. (For, **PC** of a conceptual system is a set; when a new concept is added, the other set is obtained.) Of course, this extension leads to interesting methodological questions such as: "Which system is better?"; "How can the two systems be compared?"; "Can they really be compared?"

The above questions have something to do with the notion of *expressive power* of a given conceptual system. The expressive power of a conceptual system is the set of *problems* that can be formulated within the system (p. 104). *Problems* are concepts that are not simple (p. 99). Two kinds of problem are to be distinguished: singular ones and general ones. *Singular problems*, unlike *general problems*, are concepts that do not involve λ-bound variables (p. 99). Hence it is obvious that the concepts identifying intensions can be only general.

Can we compare conceptual systems as to their expressive power? Regarding non-empirical, e.g., mathematical conceptual systems, the answer can be positive. Consider two conceptual systems, $\mathbf{CS_1}$ and $\mathbf{CS_2}$, such that the former is based on the set of natural numbers, $\mathbf{N}$, and the latter on the set of integers, $\mathbf{I}$. Clearly, there are some problems that can be connected with $\mathbf{CS_2}$ but not with $\mathbf{CS_1}$. Is it really so? Notice that in the case of $\mathbf{CS_1}$ we may introduce the concept $\textsc{subtraction}_1$ that is different from the concept $\textsc{subtraction}_2$ involved in $\mathbf{CS_2}$, because certain instances that are forbidden for the former are allowed for the latter; i.e., the object identified by $\textsc{subtraction}_1$ differs from the object identified by $\textsc{subtraction}_2$—the two objects are, in fact, different relations. However, as Materna points out (p. 112), $\mathbf{CS_1}$ and $\mathbf{CS_2}$ are comparable because, given that $\mathbf{N} \subset \mathbf{I}$, $\mathbf{CS_2}$ enables us to answer also questions (all of them) posed by $\mathbf{CS_1}$, but not vice versa. Hence, we may say that the expressive power of $\mathbf{CS_2}$ is greater than the expressive power of $\mathbf{CS_1}$. Therefore, the problem of incommensurability does not arise with respect to non-empirical conceptual systems.

However, as Materna shows, the incommensurability problem is relevant for empirical systems. What is important is that Materna's theory enables us to present the problem without usual holistic or relativistic background. First of all, "the core of the problems with incommensurability is—from the logical viewpoint—the problem of *incomparable conceptual systems*" (p. 140). It is said that "conceptual systems $\mathbf{CS}$ and $\mathbf{CS}'$ are *incomparable* iff at least one of their members is incomparable with all concepts of the other" (p. 142) and "two concepts C and C' are *incomparable* iff the intersection of empirical contents of C and C' is empty" (p. 140), the empirical content of a concept being the set of all its empirical subconcepts (see p. 137). The immediate consequence of these definitions is that incomparability of two conceptual systems is due to the occurrence of a new simple empirical concept in one of the two systems. Of course, if there is a concept in $\mathbf{CS}'$ that does not occur in $\mathbf{CS}$, using the former it is possible to formulate such claims that cannot be formulated using the latter. The two systems enable us to formulate different claims and are, thus, incommensurable. "Therefore it cannot be claimed that *due to new concepts* the old theory is corrected by the new, 'incommensurable' theory" (p. 144). For to formulate different claims is not to correct some theory. There must be some other criteria for correcting a theory.

On p. 142, Materna claims that incomparability is a symmetric (and irreflexive) relation. However, as far as I can see, the definitions mentioned above enable us to construe the relation as asymmetric. Suppose that the set of primitive concepts of $\mathbf{CS}$ is $\mathbf{P}_{\mathbf{CS}}$ and the set of primitive concepts of $\mathbf{CS}'$ is $\mathbf{P}_{\mathbf{CS}'}$; it further holds that $\mathbf{P}_{\mathbf{CS}'} = \mathbf{P}_{\mathbf{CS}} \cup \{C\}$ where C is a simple empirical concept. It surely holds that C is incomparable with all of the concepts involved in $\mathbf{P}_{\mathbf{CS}}$; hence, $\mathbf{CS}$ and $\mathbf{CS}'$ are incomparable too. Anyway, all claims made using $\mathbf{CS}$ can be translated into some claims made using $\mathbf{CS}'$ but at least one claim made using $\mathbf{CS}'$ cannot be translated into any claim made using $\mathbf{CS}$. Thus, the language underlied by $\mathbf{CS}$ is translatable into the language underlied by $\mathbf{CS}'$ but not vice versa.

Conceptual Systems is a book rich in content. There are many interesting considerations, such as those regarding development of concepts or comparing conceptual systems, as well as many provocative thoughts deserving attention, e.g., the idea that there are synthetic concepts *a priori*. Together with the previous book, *Concepts and Objects*, presents Materna's important and original contribution to the investigation of concepts. Everyone interested in logic and semantics should read both of them.

Marián Zouhar[1]
Department of Logic and Methodology of Sciences
Comenius University
Gondova 2
818 01 Bratislava, Slovakia
Marian.Zouhar@fphil.uniba.sk

[1] I am indebted to Marie Duží and Pavel Materna for discussing some of the topics the review deals with.