

JANUSZ KACZMAREK

University of Łódź

Department of Logic

kaczmarek@filozof.uni.lodz.pl

ABSTRACT OBJECTS: SPECIES, KINDS, CONCEPTS

Abstract. In the paper I present Kotarbiński's approach to abstract objects and show some mistakes in his investigations. By formal ontology I try to explain Kotarbiński's view and proffer a new solution, a formal solution that is – I hope – in the spirit of Lvov–Warsaw (Lwów–Warsaw) School.

Keywords. Abstract objects, general objects, universals, existence, properties, Kotarbiński's ontology, formal ontology.

1. Philosophical characteristics of general objects

In ontology we study real things as well as ideal, abstract, or general ones. Ingarden distinguished in his existential ontology the following types of objects: 1) ideal (or Platonic ideal entities), 2) absolute being (God), 3) purely intentional objects (like works of art), and 4) objects of the real world like substances (Socrates), processes (100-metre sprint), or events (birthday of Plato). Here, we are only interested – according to Ingarden's terms – in ideal (general) objects. In this case we think usually about mathematical objects (triangle, number), about ideal entities (beauty, justice), and also about species and/or genera (a man, an animal), or concepts (like the concept of man, the concept of the ether, the concept of natural sciences). In turn, Meinong distinguished so-called complete and incomplete objects.¹ The first are objects, such that for every property P they either have P or non- P (where non- P is a property called the complement of P ; for example: if P is whiteness, then non-whiteness (non- P) is the complement of whiteness). Incomplete objects, by contrast, are objects such that for some P they neither have P nor non- P . Incomplete objects are counterparts of Platonic forms, ideal objects, or general ones, and these we are interested in. On the whole, these kinds of objects are characterized as existing (or subsisting – according to Russell) out of time and space. They are called eternal objects by Whitehead and interpreted as Platonic beings, which are unchangeable, and independent of our cognition.

¹ See MEINONG [1915], § 25.

As we know, Kotarbiński rejected the Platonic approach to ideal (or general) objects. The class of objects rejected by him was rather wide and rich. He threw off such objects as species, genera, properties, state of affairs, or sets (in the mathematical sense). He was, simply, a nominalist. In his *The problem of the existence of ideal objects* (comp. KOTARBIŃSKI [1920]) he criticized the existence of universals. Kotarbiński started from the following definition of universal: An object Go will be a general object on the ground of object O , that possesses only collective (or common) properties for objects O .² Based on this definition, Kotarbiński proved that the definition leads to contradiction. Namely, let p be a peculiar property of an object O' ; that means that for any other object O'' , such that $O' \neq O''$, p is not a property of O'' ; this kind of p has to exist, because otherwise two or more objects O would be identical; but on the ground of the principle of excluded middle, Go has p or the negation of p (i.e. $\neg p$); next, if Go has p then Go has a property peculiar to O' and not to O'' , so Go does not possess common properties to O ; in the same way, if Go has $\neg p$, then Go has a property that is not a property of O' and Go does not possess common properties of O . Thus, it is a contradiction.

This means – according to Kotarbiński's dictum – that the concept of a general object cited by him is a contradictory one.

2. Criticism of Kotarbiński's approach from Ingarden and Ajdukiewicz

Kotarbiński's paper was a continuation of the controversy on the existence of universals, begun by Łukasiewicz in 1906 when the latter published his *Analysis*.³ Kotarbiński's standpoint was then criticised, for example, by Ajdukiewicz and Ingarden. As far as the details of this criticism are concerned, we propose referring to the original papers.⁴

Let us remark, however, that both Ingarden and Ajdukiewicz did not accept – and what's more, they rejected – Kotarbiński's reistic attitude. Ajdukiewicz, in his review of *Elements*, criticised reism in its ontological version and the concept of the reduction of different ontological categories to the category of things.⁵ He accepted only the so called reism in its semantic version as a method of eliminating utterances with onomatoids, i.e. with apparent names.⁶ In turn,

² See KOTARBIŃSKI [1920], reprint [in:] Wybór pism, t. II; Selection of Papers, vol. II, p. 13.

³ Comp. ŁUKASIEWICZ [1906].

⁴ Comp. INGARDEN [1923] and AJDUKIEWICZ [1930].

⁵ Comp. AJDUKIEWICZ [1930].

⁶ For example, the sentence: Wisdom is a property of some human beings (with two apparent names *wisdom* and *property*) can be replaced by: Some human beings are wise.

Ingarden (in reply to KOTARBIŃSKI [1920]⁷) reprimanded Kotarbiński for using ambiguous terms and, in consequence, ambiguous definitions and theorems to explain the reistic approach. For example, Ingarden rejected the definition of an ideal object as only an “object of our mind”, as well as the reistic understanding of mathematical abstract objects or the definition of general objects as in point 1 above.

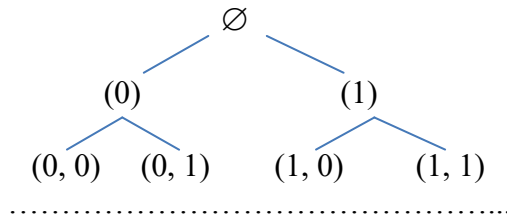
One can conclude that Kotarbiński’s ideas were misbegotten. But, on the other hand, the decided response from the Polish philosophical academic world shows that the problems touched upon were the main ones; and theses concerning general or ideal objects, properties or species were not clearly formulated at this time. For the most part, criticism from other philosophers was a consequence of a radical formulation of reism. Kotarbiński’s “Ockham razor” was later called by Janina Kotarbińska “Kotarbiński’s besom”.

In what follows, I will approach Kotarbiński’s considerations using some tools of formal ontology and the exact concepts proposed by this field of philosophy.

3. On some representation of general objects and individuals

I will present a formal approach to general or ideal objects, to their structure, and to individuals. Terms, concepts, and definitions are introduced in KACZMAREK [2008a], and KACZMAREK [2008b].

Let us recall the so called binary tree defined in mathematics. So, if X is a set and \leq is a reflexive, antisymmetric, and transitive relation, then $\langle X, \leq \rangle$ is to be called a partially ordered set. If $\langle X, \leq \rangle$ is partially ordered and for any $x \in X$ the set $O(x) = \{y: y \in X \ \&y \leq x\}$ is a chain, then $\langle X, \leq \rangle$ is a pseudo-tree. If, additionally, any set $O(x)$ is a well-founded set (i.e. every nonempty subset of $O(x)$ has a minimal element), then the pseudo-tree $\langle X, \leq \rangle$ is called a tree. The set of all functions a_i from $\{0, 1, \dots, n\}$ to $\{0, 1\}$, for $n \in \omega$ (the set of natural numbers), with relation of inclusion \subseteq is an example of a tree and is called a *total binary tree* (shortly: *TBT*). The set \emptyset is a minimal object referred to as a *root* of the tree. We can represent a fragment of this tree by the following picture.



⁷ See INGARDEN [1923].

Precisely, for example the object $(0, 1)$ is a function a such that $a(0) = 0$, $a(1) = 1$ i.e. the set $\{<0, 0>, <1, 1>\}$.

Now, we employ the total binary tree to define formally the set of well-known beings, namely the set of *species* and *genera* called a *Porphyrian tree*.

Let T be a countable (and infinite) set and T' its infinite subset. Let us define a set PT of all functions $e: T' \rightarrow \{0, \frac{1}{2}, 1\}$ such that $e(t) \in \{0, 1\}$ for $t \in \{t_1, \dots, t_n\}$, where $\{t_1, \dots, t_n\}$ is a subset of T' , $n = 0, 1, 2, \dots$, and $e(t) = \frac{1}{2}$ for $t \in T' - \{t_0, t_1, \dots, t_n\}$, and let \leq be a relation fulfilling a condition: $e \leq e'$ iff $e_1 \subseteq_{01} e'$, where \subseteq_{01} refers to inclusion on the sets of these pairs $\langle t, k \rangle$ of e and e' for which $k = 0$ or $k = 1$. It is a fact that $\langle PT, \leq \rangle$ is a tree. Moreover, $\langle PT, \leq \rangle$ is isomorphic with the binary tree (defined on a set of natural numbers). A counterpart of \emptyset in PT is the function $e: T' \rightarrow \{\frac{1}{2}\}$. We can call this tree, by analogy, a *total Porphyrian tree*. Why?

Example 1. The set T we interpret as a set of properties, each function e as a general object or an idea that has its content. Namely, let t_1, t_2, t_3, t_4 , represent properties “is material”, “is organic”, “is sensual”, “is rational”. If we now look into a function $e': T' \rightarrow \{0, \frac{1}{2}, 1\}$, such that $e'(\{t_1, t_2, t_3, t_4\}) = 1$ and $e'(t) = \frac{1}{2}$ for $t \in T' - \{t_1, \dots, t_4\}$, then we will interpret the function e' as the idea of a man (human being), because any human being is a material, organic, sensual and rational substance.

Now we will take some finite subset PT_{FIN} of PT . Let $\emptyset \neq PT_{FIN} \subseteq PT$ and PT_{FIN} be a set fulfilling the following conditions:

- (1) there exists $e \in PT_{FIN}$ such that for any $e' \in PT_{FIN} : e \leq e'$,
- (2) for any $e' \in PT_{FIN}$: if there exists e'' such that $e'' \neq e'$ and $e' \leq e''$, then there exists $e''' \in PT_{FIN}$ such that: (a) $e''' \neq e''$, (b) $e''' \neq e'$, (c) $\sim(e'' \leq e''' \text{ or } e''' \leq e'')$ and (d) $e' \leq e'''$. Then it is easy to prove that $\langle PT_{FIN}, \leq \rangle$ is a tree.

We have to explain that Condition (1) forces one root, and also Condition (2) that after any object e (in the sense of relation \leq) there exist $0, 2, \dots, n$ elements (but not 1), for $n \in \omega$. The structure $\langle PT_{FIN}, \leq \rangle$ is parallel with the structure of genera and species that is due to philosophers like Plato, Aristotle, Porphyry and others. Thus, the relation \leq may be called *over* and its converse *under*. In this way, the concept that one species (e.g. a man) is *under* another (e.g. an animal) may be grasped.

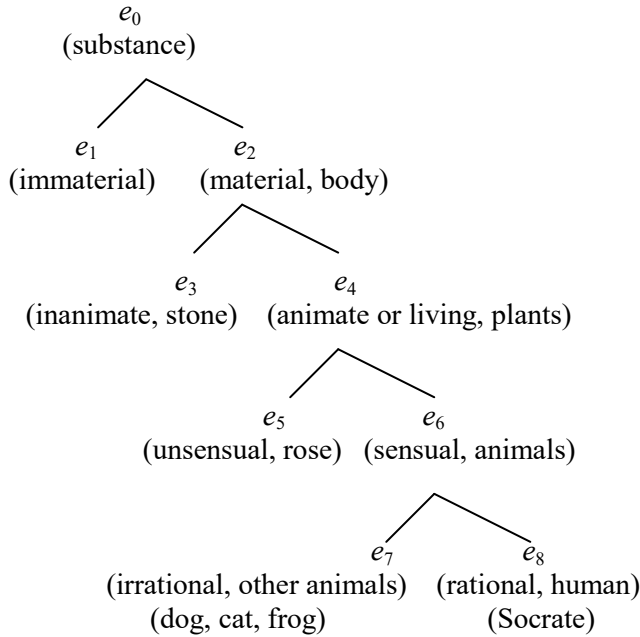


Figure. Classical Porphyrian tree. According to **Example 1** e_2 and e_8 are functions $T' \rightarrow \{0, \frac{1}{2}, 1\}$ and $e_2(t_1) = 1$, $e_2(T' - \{t_1\}) = \frac{1}{2}$, $e_8(\{t_1, t_2, t_3, t_4\}) = 1$ and $e_8(T' - \{t_1, \dots, t_4\}) = \frac{1}{2}$.

Let us now define that the structure $\langle PT_{FIN}, \leq \rangle$ is a simplified Porphyrian tree structure, shortly: *PTS*. An element e from PT_{FIN} is to be called an incomplete object (in Meinongian terms). If $e(t) = 1$ or $e(t) = 0$, feature t is an *essential positive* or *negative* feature, respectively. Next, if $e(t) = \frac{1}{2}$, then t is an *accidental or unspecified* feature. Of course, it is necessary to point out that we do not treat these properties (features) as the properties of incomplete objects (of genera or species). They are properties of complete objects (individuals) generated by the first, and following Ingarden's ontology we accept that these properties belong to the content of an idea and are not the idea's properties. They construct the content of the idea and are properties of what exemplifies the given idea.

If $e \in PTS$ and for any $e' \neq e$: $\neg(e' \text{ under } e)$, then we can call e *natural species* in *PTS*. If *NS* is a set of all natural species of *PTS* and $G = PTS - NS$, then elements of G are to be called *proper genera* of *PTS*. Of course, any two species of *PTS* are incomparable with regard to *under*. It means that for any two species e' and e'' : $\neg(e' \text{ under } e'')$ and $\neg(e'' \text{ under } e')$.

In the light of these definitions we can propose formal definition of complete objects. Namely, let $e \in NS$, D_e be a domain of e and U_e be a set of all functions

o from D_e into $\{0, 1\}$ such that $e \subseteq_{01} o$. Then any function $o \in U_e$ is called a complete object generated by species e . Next, a set $U_{PTS} = \bigcup_e U_e$, for any $e \in NS$, is an universe (or domain) of PTS .

Remark. It is evident that a set of complete objects generated by e can be interpreted as a set of individuals (like Socrates, Plato, Thomas) with the same essence (species). Evidently, Socrates has positive and/or negative properties fixed in the species as positive and/or negative, respectively, but additionally, all accidental properties from the content of the species (with value $\frac{1}{2}$) are positive and/or negative (i.e. with a value of 1 or 0) in the case of the individual – Socrates. For example, in the so called intended interpretation, the property “is healthy” has value $\frac{1}{2}$ in species “a man” but value 1 in individual Socrates (being healthy is a positive accidental property of Socrates at a given time).

4. Kotarbiński’s argument in formal ontology

Formal ontology, in my opinion, has an advantage over ontology that is inscribed in natural language. It allows us to construct rigorous definitions and arguments that are used in considering ontological problems. Above we gave Kotarbiński’s proof for the thesis that the notion of a general object is contradictory. The reasons for the thesis can be different.⁸ Still, I want to propose an exact (and formal) definition of a general object and recreate Kotarbiński’s line of reasoning wherein he speaks about an object possessing a property and uses the principle of excluded middle.

4.1. Let us assume that any object e is a general one if and only if e is an element of PTS (in line with what was proposed in point **3**). In a part of his argument, Kotarbiński posits that any general object Go has a property p or negation $\neg p$. If so, in the proposed formalism we can say:

(i) For any object e from PTS and any property t : $e(t) = 1$ or $e(t) = 0$.

We interpret Kotarbiński’s claim hoping that it is an appropriate interpretation. If so, it is easy to prove that Condition (i) is not true in PTS structures because we have the following true sentence:

(ii) For any e there are exist a property t such that: $e(t) = \frac{1}{2}$,

⁸ Compare criticism of Kotarbiński’s attitude given in AJDUKIEWICZ [1930] or INGARDEN [1923].

Thus the sentence:

(iii) $e(t) = 1$ or $e(t) = 0$

is not true.

Of course the following sentence is true:

(iv) For any object e and any property t : $e(t) = 1$ or $\neg(e(t) = 1)$,

because, as we fixed in PTS structures:

(v) For any e and t : $e(t) = 1$ or $e(t) = 0$ or $e(t) = \frac{1}{2}$.

But from Kotarbiński's paper⁹ we conclude that he did not think about the formulation of (iv). A problem we touch on here concerns a controversial question: how to understand a connective of negation (the so called *de dicto* and *de re*) and an application of the principle of excluded middle. I think that Kotarbiński had in mind Condition (i). This means that his argument is misguided. In the class of PTS, the principle of excluded middle does not work.

4.2. In a similar way I criticise Kotarbiński's view according to which he ascribed any property to an object. For example, in his second proof against general objects, he claims that if an universal has a property "being a general," then it is a common property for all things exemplified by the universal. Thus – according to Kotarbiński – each thing exemplified by an universal is also general and, in consequence, exemplified things and universals are identical. I am opposed to this view.

According to the formal ontology given above (point 3),¹⁰ with each class of objects there is bound some class of properties that are owned by the objects. For example, a number can be even or odd but it cannot be healthy or not. In turn, Socrates can be healthy but neither even nor odd. Similarly, ideas have properties different from individuals exemplifying those ideas. In our formal ontology we can show for example that the idea of a human being (like other species) is not "more general" than another. Formally:

(vi) If e is a species, then for any object e' from PTS: $\neg(e' \text{ under } e)$.

This kind of property (or its negation) has no other object exemplifying the general object (idea) e .

⁹ Compare KOTARBIŃSKI [1920].

¹⁰ For details see KACZMAREK [2008a], pp. 121–129.

5. Conclusions

My opinion of Kotarbiński's work in the area of ontology and semiotics is this. His work is an example of proper and multisided investigations despite different criticisms. In the present paper I pointed out some gaps in Kotarbiński's ontological proposal evident from a formal ontology point of view. This criticism, of course, would not be possible without readable definitions and argumentations that were pioneered or excerpted by Kotarbiński. One can have ontological objections to these formulations, but in any case we can appreciate the Author's attitude.

As we know, logical and formal tools were just being developed in the 1910s and 1920s. An old problem of general objects or universals was entertained by numerous logicians (e.g. Leśniewski, Łukasiewicz, Ajdukiewicz and Kotarbiński) in this new logical form with the hope of finally elaborating it. Łukasiewicz's analysis of general objects and Meinongian incomplete objects probably resulted in the construction (discovery) of many-valued logics,¹¹ Leśniewski's works on the connective "is" led us to the so called Leśniewski's Ontology,¹² and Kotarbiński's reism initiated the ontological and semiotic question: how much can we cut out with Kotarbiński's besom or Ockham's razor? Kotarbiński's ontological attitude, also by its radicalism, is therefore a trampoline for following logically oriented ontological investigations.

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¹¹ See: ŁUKASIEWICZ [1910] 2nd ed. pp. 112–123, Chapter XVIII.

¹² See: LEŚNIEWSKI [1930].

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