

# *Scrutiny of Ajdukiewicz's concepts of definition*

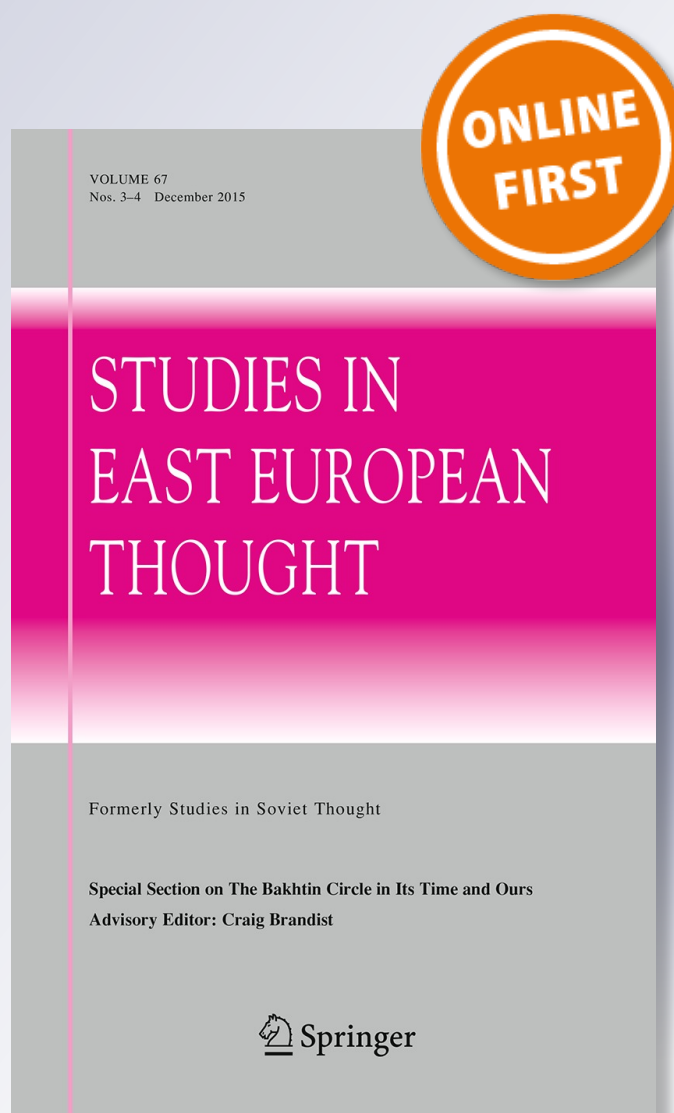
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## Scrutiny of Ajdukiewicz's concepts of definition

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**Abstract** The paper provides an analysis of two traditionally accepted distinctions between nominal and real definitions. The historical background is Kazimierz Ajdukiewicz's conceptions of definitions as well as remarks by other members of the Lvov-Warsaw School of philosophy. The aim of the paper is to show that the analysed distinction, at least in Ajdukiewicz's version, cannot be sustained.

**Keywords** Nominal definition · Real definition · Kazimierz Ajdukiewicz

1. Basically, only two concepts of definition will be subject to scrutiny here: one connected to the term 'nominal definition', the other related to the term 'real definition'. Ajdukiewicz was clearly intrigued by these concepts since he referred repeatedly to the distinction between them, trying to defend (i.e., justify) it in a variety of ways.<sup>1</sup>

First, a conceptual framework will be introduced to serve as a tool for the reconstruction of Ajdukiewicz's writings on nominal and real definitions. This is essential since what Ajdukiewicz has to say concerning this subject does not fulfil the condition of monosemy and the postulate of always assigning only one term to a given notion. Our conceptual framework will adhere as closely as possible to

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<sup>1</sup> He even attempted—in a somewhat unintuitive way in our opinion—to make this distinction for a formalized language (Ajdukiewicz 1936).

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Ajdukiewicz's terminological system; however, there will be additional references to, among other things, the findings in this regard of Ajdukiewicz's teacher (and father-in-law), Twardowski included in his *Zasadnicze pojęcia dydaktyki i logiki* [*Basic Concepts of Didactics and Logic*] (Twardowski 1901).

Subsequently, we will explicate Ajdukiewicz's statements concerning nominal and real definitions within the conceptual network we will introduce, with the special emphasis on those statements which are unacceptable and the reasons why they are unacceptable.

The authors hope that the results of the scrutiny of Ajdukiewicz's approach to the concepts of nominal and real definitions will constitute a contribution to the general theory of definition.

## 2. Let us start with a clear definition of the subject.

We are going to consider language  $J$  and domain  $D$ . Let  $J$  be a set of expressions including, in particular, names and sentences:  $\{w_1, w_2, w_3, \dots, n_1, n_2, n_3, \dots, z_1, z_2, z_3, \dots\}$ , and let  $D$  be a set of objects including, in particular, features and relations  $\{x_1, x_2, x_3, \dots, c_1, c_2, c_3, \dots, r_1, r_2, r_3, \dots\}$ . What is more, a certain class  $K$  of semantic relations between elements of language  $J$  and elements of domain  $D$ , including, among others, the relation of signifying  $o$  and the relation of stating  $s$ , will be distinguished.

Simultaneously, we assume that  $J \supset \subset D$ ,  $K \supset \subset D$  and  $J \supset \subset K$ .

Let us now distinguish (following to a great extent the example of Twardowski)<sup>2</sup> the following types of features:

- (a) a perceptible<sup>3</sup> feature of object  $x$ ;
- (b) a distinctive feature of object  $x$ —that is, a feature reserved only for object  $x$ ;
- (c) a constitutive feature of object  $x$ —that is, a distinctive feature of an object that makes it possible to establish what the other distinctive features of object  $x$  are, based on the fact that object  $x$  has this feature as well as on the basis of some additional principles<sup>4</sup>;

<sup>2</sup> Twardowski wrote: 'The characterization of an object [...] [consists in] mentioning one or several of its distinctive features.' (Twardowski 1901: 80) Distinctive features are 'features that enable us to distinguish some objects from others' (Twardowski 1901: 65). On the other hand, 'a description means listing discernible parts and discernible features of an imagined object. [...] So each description includes a partial statement of the contents of a concept of the object which we imagine; this statement is partial since it only concerns discernible features. And a description differs from a definition in that (1) it is limited to discernible features; therefore, when we DESCRIBE a dog, we cannot say e.g. that it is a domesticated animal since we do not discern this feature when we imagine a dog; (2) an object of description must be imagined simultaneously; therefore, one cannot talk about a description of God or an atom.' (Twardowski 1901: 82) .

<sup>3</sup> Instead of speaking of a 'perceptible feature' Twardowski used the term 'discernible feature' (Twardowski 1901: 82), whereas Ajdukiewicz preferred 'diagnostic feature' (Ajdukiewicz 1963).

<sup>4</sup> Cf. Marciszewski (1970a, b): 43.

- (d) a valent feature of object  $x$ —that is, a feature that is important to a distinct user of language  $J$  (especially to one who formulates definitions of expressions of language  $J$ )<sup>5</sup>;
- (e) a diagnostic feature of object  $x$ —that is, a feature attributed to object  $x$  by users of language  $J$  who denote object  $x$  by means of a determinate expression of language  $J$ .

With reference to the foregoing distinctions among features, we want to distinguish the following types of sentences:

- (a) a characterization of object  $x$ —that is, a sentence mentioning<sup>6</sup> at least one feature of  $x$ ;
- (b) a complete characterization of object  $x$ —that is, a sentence mentioning all features of object  $x$ ;
- (c) a description of object  $x$ —that is, a sentence mentioning at least one perceptible feature of object  $x$ ;
- (d) a clear-cut characterization of object  $x$ —that is, a sentence mentioning at least one distinctive feature of object  $x$ ;
- (e) a constitutive characterization of object  $x$ —that is a sentence mentioning some constitutive feature of object  $x$ ;
- (f) a valent characterization of object  $x$ —that is, a sentence mentioning all valent features of object  $x$ ;
- (g) a diagnostic characterization of object  $x$ —that is, a sentence mentioning a diagnostic feature of object  $x$ .

3. Twardowski considers a definition and a characterization of some object as being identical—and this even concerns a complete characterization, which may seem surprising.<sup>7</sup> Therefore, we obtain:

- (a) a definition of  $x =$  a complete characterization of  $x$ .<sup>8</sup>

Sometimes, definitions are also considered to be identical with a complete (cf. Twardowski), constitutive, valent or diagnostic characterization—and, additionally, it is required that they be descriptions.

<sup>5</sup> Cf. Kotarbińska (1955: 35); Kotarbińska uses the term 'essential feature'.

<sup>6</sup> By saying 'a sentence mentioning feature  $c$  reserved for object  $x$ ' we mean a sentence stating that feature  $c$  is possessed by object  $x$ .

<sup>7</sup> This impression is toned down by Twardowski's comment that 'these are usually short definitions based on the relation between superior and subordinate concepts' (cf. below, note 9). Consequently, the definition 'A square is an equilateral rectangle' is a brief way of saying that squares have all the features of rectangle and, additionally, they are equilateral.

<sup>8</sup> For the sake of simplicity here and below we will reduce formulas like 'name  $x$  signifies...' to the form ' $x = \dots$ '.

Apart from that, Twardowski assumes the following terminological conventions<sup>9</sup>:

- (b) a set of all features of  $x$  = a complete concept of  $x$ ;
- (c) a complete concept of  $x$  = the meaning of name 'x'.
- (d) On the basis of these conventions we obtain:
- (e) a definition of  $x$  = a definition of meaning of name 'x'.

Therefore—on the basis of Twardowski's semiotic doctrine—we have two contexts of the word 'definition': 'definition of  $x$ ' and 'definition of the meaning of name 'x''.

4. Ajdukiewicz struggled with the issue: what is it that is really defined—objects or their names?

Let us assume that name 'x' signifies object  $x$ . Ajdukiewicz called a clear-cut characterization of object  $x$  'a real definition of object  $x$ ' while indicating the meaning of name of  $x$  was for him 'a nominal definition of name "x"'; and he emphasized that these two terms are not subordinate to the term 'definition',<sup>10</sup> or, according to a weaker interpretation, allowed by some of his statements, real and nominal definitions do not constitute two *mutually exclusive* types of definitions, since some sentences are both real and nominal definitions (in an object language).

<sup>9</sup> We modify these conventions considerably since—unfortunately—their original formulation is burdened with different faults. Here is the most important statement of Twardowski on this subject. Twardowski believed that a certain object could be presented by means of different concepts. 'And since a concept is a meaning of a word mentioning objects that are subordinate to this concept [...], then different meanings can be related to a certain word.' (Twardowski 1901: 75) 'Definition serves to "establish" meanings of words and, consequently, concepts. Since different concepts of the same object (the same objects) are possible, a definition must choose among them and show the most appropriate concept which should always be used when presenting certain objects. Undoubtedly, the most appropriate concept of an object is the most precise one, that is, a concept by means of which one can present ALL features of an object. Therefore, a definition indicates those concepts, listing all the features of an object. DEFINITION is a number of judgements stating what the features of an object (objects) are as represented by a certain name. Since all features of an object constitute the contents of the relevant concept [...], one can say that a definition is a number of judgements stating what the features of the contents of a concept are as represented by a certain word. [...] In many cases, [...] definitions [...] would have to be composed of a [considerable] number of judgements [...], which would make them lengthy and difficult to remember. Therefore, usually definitions are given in a short form, based on a relation between the contents of superior and subordinate concepts.' (Twardowski 1901: 76) Let us note that if (according to Twardowski) the concept of  $x$  is identified with a meaning of a name denoting ('listing') objects signified by ('subordinate to') the concept of  $x$ , this formula should be considered as burdened with a direct vicious circle.

<sup>10</sup> Among others, he wrote: 'If, however, we examine more closely the meaning of the terms "real definition" and "nominal definition", we must come to the conclusion that it is not so, that the content of the concepts corresponding to those terms is not a specification of the content of some more general concept, and this means in turn that there is no general concept of definition of which the concepts of real definition and nominal definition would be specifications.' (Ajdukiewicz 1958: 296) And further: 'Hence it follows that the word "definition" which appears in the terms "real definition" and "nominal definition" has in isolation no meaning at all. If we use the word "definition" without any adjective, we use it elliptically and ambiguously, meaning either real definitions or nominal definitions [...].' (Ajdukiewicz 1958: 297).

And we are inclined—in view of the conceptual framework we have introduced and limiting ourselves to normal definitions—to present this issue in the following way:

- (1) A definition of such-and-such is a sentence which indicates a clear-cut characterization of such-and-such according to the speaker's intentions.
- (2) A real definition of such-and-such is a definition of some object belonging to *D*.
- (3) A nominal definition of such-and-such is a definition of the meaning of some expression belonging to *J*.

According to (1)–(3), real and nominal definitions create mutually exclusive subsets included (in the strict sense of the word) in a set of definitions.

The division of definitions into real and nominal, that is, a division with regard to, let's say, intention, is distinguished by us from a division of definitions with regard to a structure (viz., language), that is, the division into object- and (meta-) language definitions<sup>11</sup>:

- (4) Object definitions—are definitions of structure: *x* is...<sup>12</sup>
- (5) Language definitions—are definitions of structure: name 'x' signifies...<sup>13</sup>

Now we can state that the most natural method of formulating real definitions is by giving them the structure of object definitions; and the most natural method of formulating nominal definitions is by giving them the structure of language definitions. Otherwise, according to the stipulations stated above:

- (a) every real definition has its equivalent in a certain nominal definition and vice versa<sup>14</sup>;
- (b) intentions connected to nominal definitions are sometimes expressed with/by object definitions.

<sup>11</sup> Cf. (Kotarbińska 1955: 31–32). Initially, Ajdukiewicz called these definitions; respectively, 'real definitions' and 'nominal definitions' (Ajdukiewicz 1934: 35).

<sup>12</sup> Basically, here we mean normal definitions, that is, those with identity and equivalence as definitional functors. For equivalent definitions, an object definition would be of the structure: *p*, if and only if...

<sup>13</sup> Other variants of language definitions—for identity definitions—would be of the structure: name 'x' means the same as name.... Equivalent language definitions would be of the structure: sentence '*p*' states that... (or: sentence '*p*' states the same as sentence...). Let us emphasize that in the above-mentioned variant, the language definitions, in fact, state a certain syntactic relation, namely, synonymy; using these definitions—replacing one expression (*definiendum*) with another (*definiens*) does not require knowing the meaning of either of these expressions. Therefore, we believe that the best variant of nominal definitions would be a variant that directly states the meaning of a defined name (as: connotation/denotation of name 'x' is...).

<sup>14</sup> This not only concerns normal definitions but also—as we believe—e.g. axiomatic (pseudo-) definitions, at least as long as they can be paraphrased by means of normal definitions; we believe this is possible, although normal paraphrases would have a much more complicated form than their axiomatic originals.

Let us also mention that sometimes a condition of translatability applies to definitions. In one of Ajdukiewicz's statements this is expressed as follows. Let us assume that according to a definition, word 'A' means the same as expression 'B'. This definition fulfils the condition of translatability when it is true that 'whenever we accept as true any sentence containing word "A", we may also accept as true a sentence obtained from the former one by substituting the expression "B" for the word "A"' (Ajdukiewicz 1958: 300–301).<sup>15</sup>

5. Let us now confront the above-mentioned stipulations with Ajdukiewicz's statements concerning definitions in general, as well as nominal and real definitions.

Most often, Ajdukiewicz considers a real definition to be equivalent to a 'clear-cut characterization of any object', and it should be emphasized that it is a matter of any object at all. On one occasion he even says straightforwardly—which is especially significant—that this object can be any *expression*.<sup>16</sup> We cannot accept this view as this would lead to identifying real definitions with definitions *per se* and, consequently, to considering nominal definitions as a subset of real definitions, which would probably run contrary to the intuitions that Ajdukiewicz himself appealed to.

Let us take a closer look at this matter. What can be defined in fact with this—in our opinion erroneous—view?

Firstly, an individual object or a class, respectively a set, could be so defined. Therefore, the definition of Fryderyk Chopin would be a sentence stating that he is the author of the *Revolutionary Étude*, thereby providing a clear-cut characterization of this composer. A definition of a composer would not be a clear-cut characterization of a certain composer but a set of all composers.

Secondly, an object as the meaning of some name could be so defined, e.g. the name 'Fryderyk Chopin' or the name 'composer'.

According to Ajdukiewicz, both would be cases of real definitions.<sup>17</sup>

Apart from the two terms—'real definition' and 'nominal definition'—Ajdukiewicz also used the following terms: 'definition of objects' and 'definition of words'. Still, in this second case he meant the distinction between, respectively, connotative and denotative definitions,<sup>18</sup> which determine the denotation of a defined name in a different way.

6. Let us now quote an extensive excerpt from Ajdukiewicz's article 'On Definition' ['O definicji']:

The concepts [of real and nominal definitions] are clearly different with regard to their contents.

<sup>15</sup> Mortimerowa says here that definition is 'a means of translation' (1987: 80–81).

<sup>16</sup> Here is how Ajdukiewicz phrased it: 'One can formulate real definitions of objects of all types and orders: one can formulate clear-cut characterizations of singular objects, of classes, of properties (if they are distinguished from classes), of relations, etc. One can also formulate real definitions of words, since these too are objects which can be characterized univocally.' (Ajdukiewicz 1958: 298).

<sup>17</sup> Cf. comparable examples in (Ajdukiewicz 1963).

<sup>18</sup> Ajdukiewicz's terms: 'content-related' and 'scope-related'; see: (Ajdukiewicz 1963) and (Ajdukiewicz 1965: 64).



What is the relation of denotations of these terms? The denotations intersect. There are sentences which are both nominal definitions of a certain word on the grounds of a certain vocabulary, and real definitions of an object symbolised by this word. This concerns nominal definitions formulated in the object language. The definition 'A square is an equilateral rectangle' is, on the one hand, a device enabling the substitution of the word 'square' in every sentence including it by the expression 'equilateral rectangle'; therefore, it is a nominal definition of the word 'square'; on the other hand, this sentence constitutes a clear-cut characterization of the class 'square'.

And nominal definitions formulated in a metalanguage (e.g. the definition 'the word "square" means the same as the expression "equilateral rectangle"') do not constitute clear-cut characterizations of any object. On the other hand, real definitions, which have the form of a definition by postulates, do not provide means of translation for any word; therefore, they are not nominal definitions. Thus, the concept of real definition and the concept of nominal definition intersect with regard to their denotations. (Ajdukiewicz 1956: 247)

We object to such formulations as, e.g., 'the nominal definition of a certain word'.<sup>19</sup> The nominal definition of  $\alpha$  is a definition of the meaning of the name ' $\alpha$ '.<sup>20</sup> On the basis of Ajdukiewicz's formulation, we obtain, after a proper replacement, the following formulation: the definition of the meaning of name 'a certain word', which is not the same as a definition of a meaning of a certain word, and that is what Ajdukiewicz meant.

What is more, according to Ajdukiewicz's concept of real definition as a clear-cut characterization of a certain object, and contrary to the position he adopts in the cited excerpt, language definitions ('formulated in a metalanguage') are clear-cut characterizations of a certain object; namely, they are characterizations of the meaning of proper names. Moreover, contrary to Ajdukiewicz's statements, we believe that at least some axiomatic definitions (namely those for which there is a normal paraphrase) have equivalents in the form of nominal definitions.

7. Let us now take a closer look at other excerpt from 'Three Concepts of Definition'. Here we can find that:

There are people who see red when they encounter anything that smacks of Platonic idealism. And the concept of a real definition does smack of Platonic idealism. If one calls the sentence 'a square is a rectangle having four equal sides' a real definition of the square, then one refers to a clear-cut characterization of the genus square, i.e., of a certain *universal*. Consequently, the opponents of Platonism avoid speaking of real definitions of objects and endeavour to replace all statements about real definitions of certain objects by statements about object-language nominal definitions of the names of those objects. They will, e.g., protest against the formulation that, when we try to

<sup>19</sup> A similar formulation can be found in, among other places, Ajdukiewicz (1958: 303, Ajdukiewicz (1963), and Ajdukiewicz (1965: 83–95).

<sup>20</sup> Cf. e.g. Ajdukiewicz (1959: 29).

answer the question, ‘what is justice?’, we are looking for a real definition of justice, or that we are trying to give a clear-cut characterization of justice. The opponents of Platonism will say that, in seeking an answer to the question, ‘what is justice?’, we are trying to give a true nominal definition of the word ‘justice’ in the language in which that question is formulated, and which already includes the word ‘justice’. They will be right in so far as such an answer to that question will be a nominal definition of the word ‘justice’ in that language. They will, however, be wrong in so far as those who ask the question, ‘what is justice?’, are concerned not with the word ‘justice’, but with what that word signifies. The meaning of this remark can be formulated more precisely as follows. The sentence ‘John asks ‘what is justice?’’ is an intensional sentence, which can be translated into another intensional sentence ‘John is looking for a real definition of justice’. But the opponents of Platonic idealism translate it into the intensional sentence ‘John is looking for an object-language nominal definition of the word “justice” in English’. Now, although the terms ‘a real definition of justice’ and ‘an object-language nominal definition of the word “justice” in English’ have the same denotation, if the former is replaced by the latter in an intensional sentence, that sentence can be transformed from a true to a false sentence. And it seems that this is what happens. That is the reason why, I think, that the general theory of definition cannot dispense with real definitions and confine itself to nominal definitions alone. (1958: 306–307)

We are not convinced by Ajdukiewicz’s argumentation from—let us call it—‘intensional paraphrase’. Let us assume that John does not know what a real definition is. If so, replacing the expression ‘what is justice?’ with the expression ‘what is the real definition of justice?’ in the sentence ‘John asks what justice is’ will result in a false sentence.

8. In some contemporary discussions, the opposition between nominal and real definitions is understood in a quite unconventional manner. For example, according to James Cargile, nominal definitions rely on “giving the meaning of word or other linguistic things,” while real definitions rely on “clarifying a given meaning, which is a proposition or property or relation, by showing it to be a compound of other propositions or properties or relations” (Cargile 1991: 21). Cargile writes further: “The claim that the word ‘bachelor’ means an unmarried male is a nominal definition and the thing defined is the word ‘bachelor’. The definition gives the meaning of the thing defined, and the meaning is the property it expresses, the sense of the term” (*ibid.*) It appears from the author’s further considerations that he treats a sentence of the structure ‘ $A = B$ ’ as a real definition, when its element ‘ $B$ ’ (*definiens*) is a compound phrase. According to standards adopted in this article, this way of treating the matter is too vague to permit a responsible stance with respect to it. (For instance: equality or equivalence: meaning given to the term  $T$  by a nominal definition = property expressed by this definition = sense of the term  $T$ , are hardly instructive, to say the least.)

Unfortunately, such theoretical looseness is typical for the majority of contemporary philosophical texts on this topic as reported, for instance, in Harris

and Hutton (2007). What is striking is the degree of sloppiness in drawing the distinction between real and nominal definitions. Examples of analytic definitions of natural language expressions are confused with instances of synthetic, usually regulative, definitions of terms which belong to languages of scientific theories. And both are confused with determinate characteristics of individuals (for instance of the Earth) or kinds (for instance of gold).

That is why we are convinced that participants of these recent discussions may well draw profit from our proposals. We are convinced that the distinction of real and nominal definitions cannot be sustained, at least not in Ajdukiewicz's versions.

9. In the first edition of *Mała encyklopedia logiki* [*Small encyclopaedia of logic*] (1970b), Witold Marciszewski provides a list of interpretations of two terms: 'real definition' and 'nominal definition', which is very useful in research in the theory of definitions. It is also worth mentioning that in the second edition of *Mała encyklopedia logiki* (1988), the entry 'nominal definition' has the same wording as in the first edition, and, similarly to the first edition, it refers to the entry 'real definition'; however, the latter is missing.

This we consider to be a proof for the existence of the *malin génie* once mentioned by Descartes.

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