Nawoja Mikołajczak-Matyja

*Adam Mickiewicz University of Poznań*

# The Prototypicality of Semantic Opposition in the Light of Linguistic Studies and Psycholinguistic Experiments

**Abstract**

This paper aims to use the results of linguistic analyses, including corpus studies, and psycholinguistic experiments to present the relation of semantic opposition in terms of the prototype theory of concepts. A synthesis of linguists' views on the factors defining the prototype of the category of semantic opposition is presented, and an attempt is made to determine the relationship between these factors. The need to distinguish prototypical and canonical examples of the relationship is also indicated. The results of the most important corpus studies concerning the relation of opposition are analysed in order to find ways of delineating the peripheral zones and the boundaries of the relation based on real contexts of use. The particular role of opposition pairs extracted from cohyponymic multi-element sets in forming the boundary areas of the category of opposition is highlighted. It is determined, on the basis of selected studies, which psycholinguistic techniques can provide evidence of the psychological reality of the prototypical nature of the category of semantic opposition, and which may serve as a basis for distinguishing the prototype of the category from the canon. In conclusion, some semantic, corporal, and psycholinguistic criteria are proposed for locating particular examples of the relation within the structure of the category of semantic opposition – that is, conditions for classifying examples as, accordingly: a) belonging to the strict centre of the category, b) lying near the centre, c) located in the peripheral part, or d) forming the fuzzy boundary of the category.

**Key words**

semantics, corpus studies, psycholinguistics, semantic relations, prototype theory, semantic opposition

**Streszczenie**

Artykuł stanowi próbę wykorzystania efektów analiz językoznawczych, w tym wyników badań korpusowych, oraz rezultatów eksperymentów psycholingwistycznych do przedstawienia relacji opozycji semantycznej w terminach koncepcji prototypów pojęciowych. Zawarto w nim syntezę poglądów językoznawców na temat czynników wyznaczających prototyp kategorii relacji opozycji semantycznej i próbowano określić zależności między tymi czynnikami. Wskazano konieczność odróżniania prototypowych i kanonicznych przykładów tej relacji.

Przeanalizowano rezultaty najważniejszych badań korpusowych dotyczących relacji opozycji w celu znalezienia sposobów określania stref peryferyjnych i wyznaczania granic tej relacji na podstawie realnych kontekstów użycia. Podkreślono szczególną rolę par opozycyjnych wyodrębnionych z kohiponimicznych zbiorów wieloelementowych w budowaniu pogranicznych stref kategorii opozycji. Określono, na podstawie wybranych prac, które techniki badań psycholingwistycznych mogą dostarczać dowodu na realność psychologiczną prototypowego charakteru kategorii relacji opozycji, a które mogą stać się podstawą odróżniania prototypu kategorii od kanonu. W podsumowaniu zaproponowano semantyczne, korpusowe i psycholingwistyczne kryteria ustalania miejsca konkretnego przykładu relacji w strukturze kategorii opozycji semantycznej, czyli warunki klasyfikowania przykładów jako, odpowiednio: a) należących do ścisłego centrum kategorii, b) pozostających w pobliżu centrum, c) znajdujących się w części peryferyjnej, d) stanowiących zmienne pogranicze kategorii.

**Słowa kluczowe**
semantyka, badania korpusowe, psycholingwistyka, relacje semantyczne, teoria prototypów, opozycja semantyczna

# 1. Introduction

In recent decades there has been increasing interest in lexical-semantic relations not only among linguists themselves, but among all researchers dealing with the meaning of language, its expression, processing and representation in the user's mind. The source of this interest is, on the one hand, the development of technology that enables both corpus studies and modern psycholinguistic and neurolinguistic experiments, and on the other, the popularity of cognitive linguistics and the trend for verifying theories associated with it in various fields of language research. One of the fundamental cognitive theories is the prototype theory of concepts. The growing popularity of prototype theory as a basis for explaining linguistic and psychological phenomena results in attempts to (re)define semantic relations according to the assumptions of that theory; that is, in terms of prototypes (or core), periphery and fuzziness of boundaries in the relationship category that is the subject of analysis.

The aim of the present paper is to propose an interpretation of the internal structure of the category of semantic opposition with the use of theoretical linguistic analyses and the results of corpus and psycholinguistic research, which will make it possible to suggest criteria for treating individual examples of such relationships as belonging to different parts of the structure.

The most important semantic relations, understood as relationships between the meanings of lexical units, are synonymy, hyponymy, meronymy and the relation of opposition (cf. classification in: Bańczerowski et al. 1982; Grochowski 1982; Lyons 1977).[1] The last of these, explained in terms of mutual negation

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[1] The term *relation of opposition* is treated here as a starting or base term; more detailed terminological issues will be addressed in section 2.

of the senses of lexical units (Grochowski 1982), is treated as distinct from the point of view of linguistics, as well as psycholinguistics, psychology, and philosophy. It is defined, for example, as being more "primal" than the others (Jones 2002: 8) or as "archetypal" (Murphy 2003: 169). Such terms are derived both from structuralist approaches to language, emphasising the universality of opposition as a feature of language structure (e.g. de Saussure 1961), and from recognition of the role of opposition in thinking and culture. Thus, on the one hand, attention is paid to the universality of the lexicalisation of opposition in natural languages and its relevance to the organisation of text and discourse (see Cruse 1995; Fellbaum 1998; Jones 2002; Jones et al. 2012; Justeson and Katz 1991; Lyons 1977; Murphy 2003; van de Weijer et al. 2014; Willners 2001). On the other hand, opposition is treated as "cognitively primary", the proof of which is, among other things, the high level of recognition of the opposition relationship by language users, the existence in general language of a non-specialist name for this relation (Cruse 1995, 2000; Markowski 1986), and the very early acquisition of the relation in the process of acquiring a first language (among recent works on this subject see, for example: Phillips and Pexman 2015). The universality of the tendency to dichotomise the world, which results in searching for two-element contrasts, is evident in a variety of cultural phenomena (e.g. in belles-lettres, in religious dogmata and in the structure of myths[2]), and it is a common subject of philosophical considerations and syntheses: opposition is the foundation of many philosophical theories, both European (e.g. the theories of early Greek philosophers and physicians explaining natural phenomena; see review in Lloyd 1966) and non-European (such as Confucian philosophy, e.g. Chan 1967). The exploration of detailed problems concerning semantic opposition therefore seems to be an essential component of the development of knowledge about human functioning – linguistic as well as extra-linguistic.

Sections 2–5 below contain an attempt to synthesise the views of linguists concerning the factors defining the prototype of the category of semantic opposition, a description of borderline cases of this category revealed by contemporary corpus investigations, and consideration of the question of how the psychological reality of the category structure can be confirmed by means of psycholinguistic data.

## 2. Determinants of the prototype of semantic opposition

Determining the characteristics that form the internal structure of the category of semantic opposition is a complex task, due to differences in the way the breadth of the category is perceived and due to the overlapping of factors

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[2] Cf. below (sections 4.2 and 5) regarding Lévi-Strauss's (2010) analyses.

determining the *prototypicality* and the *canonicity* of examples of opposition. Given the aim of the present work – establishing criteria for placing examples in different parts of the structure of the category of opposition – the prototype is defined as a group of central elements of the category, i.e. elements with the greatest number of characteristics significant for the category (cf. for example discussion in Kleiber 2003; Taylor 2001).

As the first and basic criterion for the prototype of the opposition category one may suggest **binarity**, understood as the restriction of opposition to bilateral, two-element relations. This is one of the criteria given by Cruse (1994) in an attempt to determine the prototype for *the general category of opposites* (Cruse 1994: 178), which includes subcategories (such as *complenymy*, *antonymy* and *conversion*), but is distinguished (by Cruse) from *incompatibility*. In other works, Cruse uses the term *opposition* only for two-word relations (e.g. Cruse 1995, 2000: opposition as binary incompatibility), as did Lyons (in the work *Semantics*)[3]. Murphy (2003) treats binarity as a necessary feature of *antonymy*, which in Murphy's terms is a category at least as broad as the *general opposition* considered by Cruse (1994). Lyons and Cruse restrict the use of the term *antonymy* to gradable opposites. In Polish works, Grochowski sees a fundamental principle of the building of opposition in the search for differences between two elements. He applies the term *contradiction* (sprzeczność) to pairs of lexical units whose members mutually imply each other's negation (like the non-gradable pair *married/unmarried*), and the term *antonymy* (antonimia) for pairs in which one member implies the negation of the other, but negation of the second does not imply the first (like *long/short*) (Bednarek, Grochowski 1997;[4] Grochowski 1982). Such a narrower meaning of the term *antonymy*, limited to gradable opposites, has also been adopted by some other Polish authors, including Markowski (1986, 2012) and Bańczerowski et al. (1982) (in the latter work the term *proper antonymy* is used for gradable opposites, while for non-gradable, contradictory opposites the term *complenymy* is used). The third relation commonly included in the opposition relation category is *conversion*, defined as a two-sided implication between two lexical units having at least two arguments with the order of two arguments of the units being reversed (cf. e.g. Grochowski 1982), as for the pair of units *wife/husband*. The category of semantic opposition considered here includes all of these types of relations and, additionally, the relation of cohyponymy (see section 4.2).

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[3] In the Polish translation of Lyons's work the English term *opposition* (as the name of the two-word relation) is translated as *przeciwstawienie*, and the more general term *contrast* as *opozycja* (see Lyons 1984, translated by A. Weinsberg: 270).

[4] These implications hold, more precisely, between statements containing the two lexical units (Bednarek, Grochowski 1997).

A criterion for the prototype which is as important as binarity and equally interwoven with determination of the overall breadth of the category is **minimal semantic contrast** between units. While the *incompatibility* of meanings is defined by the existence of at least one feature contrasting those meanings (cf. Leech 1987), in describing the narrower category of *opposition* the emphasis is on the **smallest difference** between units.

The simultaneous closeness and difference of meaning between the elements of an opposition is considered to be a feature distinguishing it from other semantic relations and giving it an exceptional status (Cruse 1995; Muehleisen and Isono 2009). The role of minimal contrast is usually treated as an evolution of the contrast principle proposed by Clark (1970), and is formulated as follows: "For two words to be minimally different, they must share all their crucial semantic properties but one, i.e. they differ in only one relevant criterion" (Kostic 2015: 18). Therefore, the starting point for the search for a semantic opposite of a lexical unit is the significant similarity (and not "maximal difference") between that unit and another,[5] described according to the purpose of the analysis as: the basis of comparison, which can be expressed by the common archisememe/archilexeme (Mettinger 1994), the common semantic domain (Muehleisen 1997 in Jones 2002), a set of common features (Murphy 2003), or a plan of equivalence (Davies 2012). Against this background, the element of contrast is emphasised, which is in turn described in terms of, for example, distant values in some semantic dimension (Mettinger 1994), a single feature (in the componential analysis) (Murphy 2003), or a plan of difference (Davies 2012). The smaller the number of "differences in similarity" the more prototypical is a given example of opposition: "The most prototypical examples of contrast relations involve items that differ on one point of meaning" (Murphy 2003: 172). Therefore, for example, the units *male* and *female*, marking distant points in a single gender dimension, are a prototypical example of opposition, while the units *ivy* and *mystery*, which differ in such dimensions as abstract/concrete, dead/alive, and many others, are not perceived as standing in the opposition relation (e.g. see Murphy et al. 2015: 236–7). The minimum contrast factor is related to the binary factor: the difference becomes clear when there are only two elements.

Another feature that determines the prototypical nature of an opposition is the **significance or importance of the minimal contrastive feature**, a refinement of the principle of minimal contrast: "The [best] antonyms are those that [...] extend their similarities to as many properties as possible while maintaining a single **relevant difference**" (Murphy 2003: 172, author's emphasis). The

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[5] For example, it is stated that: "Two things that have no basis of comparison, i.e. do not share any common property (such as *inkpot* and *free will*, for example), do not form an opposition" (Trubetzkoy 1958 in: Mettinger 1994: 64/78).

role of the differentiating feature is the reason why *yesterday/tomorrow* is a better type of opposition than *Monday/Wednesday*: the relation to *today* is a more important part of the meaning of the units in the first pair than the relation to the word *Tuesday* in the meaning of the units of the second pair; that is to say, in the case of *Monday* and *Wednesday*: "their location in opposite directions along the time axis relative to *Tuesday* […] is not encoded in their meanings, but has to be inferred" (Cruse 2000: 168).[6] Cruse (1995, 2000) defines the opposition in this pair as latent. Also more prototypical are fundamental oppositions such as *large/small* (the minimal difference comprises the whole meaning of the words), rather than pairs such as *giant/dwarf* in which the *large/small* opposition is encapsulated by many other characteristics. What is important, therefore, is the proportional participation of the differentiating feature in the totality of meaning of the units (Cruse 1995). It seems that a similar interpretation can be made of the criterion of "number of opposed values of features making up the dimension of opposition" formulated by Herrmann et al. (1979: 587).

Given the previous factors – minimal semantic contrast and its importance – it is possible to interpret two other factors as being derived from them: the **ease of identifying the differentiating dimension** (Cruse 1995; Herrmann et al. 1979) (which can be interpreted for example in terms of interpersonal agreement of the dimension name given by language users, see section 5) and **systemicity** as considered by Mettinger: a systemic opposition (such as *broad/narrow*) is a relatively stable, context-independent relation anchored in the semantic structure of a language, i.e. in the language system (Mettinger 1994: 62; cf. also section 4.1 below).

A confirmation of the significance of all of the previous factors is the factor called **inherentness of contrast** (e.g., *top/bottom*), understood as logical necessity and distinguished from accidental or pragmatic contrast (e.g. *coffee/tea*), the latter being felt by the language user only in the (frequent) situation of choice between two denotata (cf. Cruse 1995, 2000).

In addition, certain factors related to the (mutual) positioning of members of the pair on the differentiating dimension are suggested as being crucial for prototypicality: **diametric opposition**, **symmetry** (Cruse 1994; Herrmann et al. 1979; Markowski 2012), and **exhaustiveness of the superordinate domain** (Cruse 1994). For example: the members of the pair *tall/squat* are not opposed either diametrically or symmetrically, the members of *huge/small* are opposed diametrically but not symmetrically, while the members of the pair *huge/tiny* are symmetrical but they do not exhaust the dimension to such a degree as *large/small* (Cruse 1994). Diametricality and symmetry can be regarded as being associated with the minimal contrast condition.

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[6] Thus, one can define the meaning of *Wednesday* as, for example, the third or fourth day of the week (cf. Hornby 1988 vol. 2: 974; Szymczak 1981 vol. 3: 455).

In recent decades, particular emphasis has been placed on the role of context in defining semantic relations. A factor proposed as a condition for "good" adjectival opposition is **similarity in the collocation profile** of both members of the pair, i.e. the fact that they both describe objects of the same type (Markowski 2012; Muehleisen 1997: 113, in Jones 2002: 11). According to Jones, between the members of a prototypical pair of antonyms, there must exist not only opposition of meaning, but also a strong and established lexical relationship; for example, on the scale of height, such a relation exists between the connected *tall/short* but not between *lofty/petite* (Jones 2002). As a result of the factor of similarity in the collocation profile, the following contextual conditions of good, strong opposition can be considered: **high rate of observed co-occurrence of the members of a pair**, **high observed-to-expected ratio of their co-occurrence**, and **low ratio of the frequency of each member to the frequency of their co-occurrence**. Such criteria are met, for example, by the pairs *good/bad*, *female/male*, *peace/war*, *private/public* (Jones 2002: 117).

Reflections on semantic binary opposition concern different grammatical categories, most commonly adjectives, nouns, verbs and adverbs (cf. e.g. Cruse 1995, 2000; Jones 2002; Lyons 1977; Markowski 2012; Murphy 2003). In one of the most prominent corpus studies on semantic opposition, no relevant link was found between the grammatical category of the pair and the functions that the pair fulfilled in the text, and it was therefore stated that antonymy (in the broad sense of the term) is a phenomenon which functions the same irrespective of word class (Jones 2002: 148). However, regardless of these facts of use, the role of prototypical opposition seems to be taken up chiefly by **words denoting directly a specific dimension, i.e. adjectives or adverbs**. Knowledge of the world of activities and the world of objects (with their units denoted by nouns and verbs) is rich and multidimensional; only the features that are isolated within them can be directly opposed (cf. Smielov in Markowski 1986; Markowski 1986, 2012; Murphy 2003). When features are combined, it becomes difficult to isolate the minimum difference.

## 3. Canonical versus prototypical oppositions

The co-occurrence of elements of the opposition pair is essential in determining the possibility of treating the pair as canonical. The existence of a "canon" of a relation – a basic set of instances of the relation, common to many language users, easily and quickly identified by them with the notion of the relation – and division into canonical and non-canonical cases is more often asserted in the case of opposition than in the case of other relations (Jones et al. 2007). The best candidates for the set of canonical oppositions are pairs representing semantic dimensions which are clear and central to human life (such as length,

speed, temperature, life: *long/short*, *slow/fast*, *hot/cold*, *dead/alive*). The salience of the dimension provides the possibility of versatile and similar use of both elements of a pair in a context, and consequently their frequent occurrence and co-occurrence in texts, which in turn becomes the basic reason why they are so easily and rapidly acquired by users (Jones et al. 2012; van den Weijer 2014). According to Murphy, the information that two lexical units are semantically opposed may initially appear in the mind of the user both by its being received (in ready-made form) from the environment and by a process of inference, but later on the information is reinforced in communication acts, and also during the process of learning at school (Murphy 2003). As a result of numerous experiences of this type, the pair becomes a part of the "canon" of our conceptual knowledge. The role of co-occurrence as the basis of both prototypicality and canonicity may make it difficult to distinguish between these two concepts (some authors consider them to be identical; cf. e.g. Jones 2002: 11). A basis for distinguishing them can be found in psycholinguistic data (see section 5).

# 4. The peripheral part of the category

## 4.1. Data from corpus studies

One of the basic assumptions of the theory of prototypes concerns the fuzziness of the category boundaries, i.e. the existence of borderline exemplars for which membership of the category is debatable (e.g. Rosch 1975; Taylor 2001). With respect to the notion of semantic opposition, such cases can be considered primarily in terms of what is called contextual opposition (or, by some authors, contextual antonymy): the pairs of words considered outside a given context cannot be explicated as differentiated by minimal contrast, e.g. *nice/hardworking* in the context: "It does not matter if she is *nice* but it is important whether she is *hardworking*" (Markowski 1986: 37).[7] The necessity of considering such borderline cases is clearly suggested by the results of corpus studies on lexical-semantic relations conducted in recent decades.

One of the first and most significant works of this type, aimed at giving a coherent description and strictly semantic explanation of the relation of antonymy (in the broad sense of the term), is the monograph of Mettinger (1994), which used as material (in addition to 350 pairs of lexemes from *Roget's Thesaurus*) more than 350 pairs of oppositions from 43 English-language novels. Starting with examples of pairs such as *profit/pleasure*, which can be interpreted as contrasts of meaning in specific contexts (for instance, seeking someone's company for *profit* and not *pleasure*), Mettinger draws attention to

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[7] "Nie jest ważne, czy jest ładna, ale czy jest pracowita" (Markowski 1986: 37).

the fact of usage of both systemic and non-systemic opposition in communication acts. In systemic oppositions (such as *pain/pleasure*, *love/hate*, *broad/narrow*) the contrast criterion is strictly semantic, i.e. anchored in the semantic language structure, which manifests itself in the existence of a comparison base – the archisememe – common to both members of a pair. In non-systemic oppositions (such as *profit/pleasure*, *head/tail*, *love/money*) the contrast is only revealed in specific contexts, i.e. only at the *parole* level, bases for comparison can be omnifarious, and an attempt to identify such a base (referred to as a "common integrator") and interpret the contrast requires greater recourse to encyclopaedic and/or pragmatic knowledge. However, among the examples considered as non-systemic, Mettinger distinguishes several groups of oppositions as stronger than others:

– collocationally fixed opposites that are "almost terminological in nature" (Mettinger 1994: 71), e.g. *venial/mortal* (sins);
– encyclopaedic opposites with a terminological tinge, e.g. *theory/practice*;
– pseudo-binary opposites, contrasting pairs within a larger, multiple opposites set, e.g. *present/past*, *tomorrow/today*, *listening/looking*.

Mettinger introduced the concept of "adversativity" as a criterion determining the entire structure of the category of opposition. Adversativity is a higher-level cognitive property, characterised by the simultaneous existence of a conceptual integrator, showing the sameness of two entities in terms of certain features, and a conceptual differentiator, stating in respect to which characteristics two entities are different. In the case of systemic oppositions, the adversativity is completely lexicalised, that is to say, it has found its place in the language system: the task of the conceptual integrator is performed by the archisememe, and the task of the differentiator by the semantic dimension in which the meanings are contrasted; for example, for the pair *man/woman*, the integrator is "an (adult) person" and the differentiator is the dimension "sex". In the case of non-systemic terminological oppositions, the task of the integrator is realised by the "frame", i.e. some configuration of knowledge; for instance *oral/rectal* (methods of taking temperature): the frame is "taking temperature". In the case of encyclopaedic oppositions, adversativity can be realised by a great variety of integrators. The sender contrasting a given pair of words in a given context assumes that the receiver can reveal a proper common integrator, either on the basis of knowledge (as with the pair *leisured/working*) or by inference from the context (as with *life/literature*). It is therefore possible to assume a scale of increasing amount of encyclopaedic knowledge necessary for establishing integrators and differentiators, with a zero value in the case of systemic oppositions (Mettinger 1994: 160–162).

Another important work utilising corpus data which leads to discussion of "borderline" cases of bipolar opposition is Jones's (2002) monograph, the main

purpose of which was to identify the basic functions fulfilled by opposition pairs in contexts, based on analysis of instances of co-occurrence for members of 56 pairs of "good oppositions" in a set of 3000 sentences extracted from a body of texts (from one journal) containing 280 million words. One of the two strongest of the eight identified functional classes of antonymy is *ancillary antonymy*: a strong, fixed binary opposition (one of the 56 starting pairs), here referred to as pair A, is used to signal and amplify the contrast between another pair of words (pair B) in the same sentence. For example, in a sentence "It is meeting public need, not private greed" (Jones 2002: 46), pair A (*public/ private*) is responsible, according to the intent of the sender, for generating, strengthening or at least confirming the contrast in pair B (*need/greed*), which is weaker than the contrast in pair A. The function of pair A depends on the basic contrast of B: in the sentence "... unemployment may rise more quickly now, but more slowly later" (Jones 2002: 46) contrast B (*now/later*) is stronger than contrast B in the previous example, so pair A (*quickly/slow*) only confirms the contrast B "to the point of assigning antonymity" (Jones 2002: 47). The B pairs, in Jones's opinion, are potentially very diverse, and are divided into eight major types. The first five types comprise pairs linked by a cohyponymy relation, concerning respectively: politics (e.g. *communism/fascism*), people (e.g. presidents of a given country), geography (e.g. cities), time (e.g. *six months ago/today*) and quantification (e.g. numbers such as *40%/45%*). The next two B types are pairs standing in a relation of synonymy (e.g. *acquaintances/friends*) and meronymy (e.g. *chapter/end of chapter*), and the last type is described as linguistic: members of a B pair are convergent in terms of morphology or phonetics, or even visual outline. For example, in the sentence "the rich get to choose, and the poor get the queues" (Jones 2002: 52) pair B is formed by the rhyming *choose/queues*, contrasted by *rich/poor* (pair A). However, some B pairs have such a weak initial contrast that they do not fall into these eight categories: only the presence of pair A gives them a momentary quality of contrast, as in the case of *democracy/book* or *poetic/animal*.

Cases of ancillary antonymy account for as much as 38% of the material analysed by Jones. The role of this function, and at the same time the frequency of appearances in contexts of B pairs with varying degrees of initial contrast, has been confirmed in numerous subsequent studies inspired by Jones's work, e.g. in corpus studies based on spoken texts (Jones 2006), texts of children's language and language addressed to children (Jones 2007), and texts from other languages, including Swedish (cf. Murphy et al. 2009) and Japanese (cf. Muehleisen and Isono 2009).

In one of the most recent works on this subject, a different classification of B pairs (in contexts containing ancillary antonymy) was used, in order to investigate the role of factors such as opposite conjunctions, parallelism of structure and types of semantic relations in creating contrast relations in discourse.

In the semantic analysis, B pairs were assigned to the following classes: canonical and non-canonical antonyms, cohyponyms and near-cohyponyms (i.e. those whose shared hyperonym was more than one taxonomic level up in the hierarchy), other non-co-referential relations – numbers and "unlike things" (such as *ivy/mystery*) – and co-reference relations: synonyms, words with partially overlapping meanings and identical expressions (Murphy et al. 2015).

It is also noted that any syntactic structure typical for any of the contextual types of opposition identified by Jones (2002) can be used in natural contexts to contrast non-canonical opposition pairs and pairs that do not function as oppositions outside the given context. Theoretically, any two words of a language can be contrasted in context (Murphy 2003).[8]

The foregoing considerations of contextual opposition suggest that, after the rejection of any incidental (or very closely dependent on a specific context) contrast of a given pair of words, a particularly important role in the construction of the borderline area of the category of semantic opposition can be attributed to the relation of cohyponymy. This issue will be discussed in more detail in the next section.

## 4.2. Cohyponymy as a basic relation in the borderline area of semantic opposition

Lexical units that are hyponyms of the same hyperonym are said to stand in the relation of cohyponymy (Bańczerowski et al. 1982). The relation of cohyponymy can therefore be interpreted as such a variation of semantic incompatibility (exclusion of meanings) in which there is a common (close) hyperonym of incompatible units. Thus, for the word *woman*, incompatible units may be, for example, *man*, *cow*, *tree*, *screwdriver* (examples from Leech 1987), but of these the only obvious cohyponym of *woman* will be *man*, with the common close hyperonym *human being*.[9] If one of the features of "good" opposition is binarity (see section 2), then also pairs of cohyponyms such as *hand/leg* (with the common hyperonym */human/ limb*) are strongly fixed examples of opposition (perhaps even canonical, but probably non-prototypical). This is not the case when a hyperonym includes in its range a larger number of hyponyms: specific (e.g. names of seasons, days of the week, card colours, geographic directions) or non-specific (e.g. names of flowers, animals, cars, furniture, etc.). According to Hurford et al. (2007) such multiple incompatibility has traditionally not been considered a kind of opposition, but formally it is similar to binary opposition.

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[8] A similar statement with regard to (all) adjectives was formulated by Markowski (1986).

[9] For Cruse cohyponyms, i.e. hyponyms of the same hyperonym, can be words whose meanings do not mutually exclude; for example, *queen* and *mother* as hyponyms of the word *woman* (Cruse 1995).

Jones describes cases of this type as a borderline set of antonyms: "Multiple incompatibilities may be seen as non-gradable antonymy extended to three or more terms. Whether such examples remain within the boundaries of antonymy is debatable" (Jones 2002: 18). Markowski, in his work that essentially deals with adjectival antonymy in a narrow sense, treats the adjective names of colours, shapes and smells as not standing in (such) an antonymy relation, because there is neither minimum difference nor a clear principle ordering relations of pairs within these semantic groups.[10] The same can be said, in his view, about noun sets such as the names of animals. Clearer oppositions can be found among (pairs of) names of geographical directions (e.g. *north/south*) and in the pair *summer/winter*, which contains the antonymous adjective elements *hot/cold* (Markowski 1986).

Consideration of the role of context as a factor shaping lexical relations results in an increased tendency to classify pairs selected from among sets of cohyponyms as examples of opposition. Mettinger's reflections on systemic and non-systemic opposition (Mettinger 1994; cf. section 4.1) suggest that if a pair from a larger set is often opposed in a context, it may be treated as an opposition: the context points to a common integrator.

The objective of the contextual research of Lobanova et al. (2010) was to identify potential opposition pairs on the grounds of the structures in which prototypical oppositions emerge in contexts. Pairs extracted from the contrasting structures were qualified by five judges as examples of categories of various relations, including antonymy and cohyponymy. It was proposed that those pairs of cohyponyms which function in contexts as antonymic pairs should be treated as subtypes of the antonymy relation (non-canonical). Examples given of such pairs include *appearance/reality* and *downtown/suburbia*: "when these pairs occur together, their chance of being in opposition seems to be high" (Lobanova et al. 2010: 48).

The suggestion to treat at least some of the examples in multi-element sets of hyponyms as belonging to the category of semantic opposition can also be found in Murphy (2003). This work proposes that the basic types of opposition – gradable and complementary (non-gradable) – are not restricted to pairs: intertwined with a relation analogous to gradable antonymy are sets of lexical units that are not logically restricted to two-element contrasts, such as the names of tastes or emotions, and analogous to complementarity – sets such as the names of colours of cards (since it is a true inference that if the ace is a spade, then it is not a diamond, heart or club, and also that if the ace is not a spade, then it is a heart, diamond or club; cf. Murphy 2003: 195).

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[10] There is a problem of indicating (common) hyperonyms for adjective pairs. In the groups mentioned, that function may be fulfilled rather by a noun, such as *smell, shape, colour*. In this case, we are dealing only with the relation of quasi-hyponymy, according to the terminology of Lyons (1984).

Moreover, Murphy explicitly suggests that some pairs of other multi-element sets can become even strong examples of binary opposition. This concerns not only pairs such as *summer/winter* (see Markowski's view above), with a symmetrical and diametric contrast, based on a common feature of "temperature extremes" on opposite ends of the scale, but also pairs from sets such as *solid/liquid/gas* or *animal/vegetable/mineral* or even pairs such as *gin/tonic* (with minimal difference: separate ingredients of the same drink) or *dog/cat*. This last pair Murphy proposes to regard as a canonical opposition (although not a prototypical one, since it is still based on encyclopaedic and contextual knowledge) because of the high frequency of co-occurrence of the members and the large number of similarities between them (names on the basic level denoting animals that are four-legged, furry, domesticated, of similar size, kept at home but not in cages, etc.). She also gives as an example of a canonical pair *table/chair*, a pair linked by a strong association. As an example of cohyponyms having "inherent potential for contrast" the names of integers, especially low-valued ones, are indicated (Jones 2002: 51).

For Cruse, adopting a less pragmatic approach to semantic relations, opposition (binary) is a subtype of incompatibility, different from the "ordinary" incompatibilities such as *dog/cat* (derived from multi-element sets) (Cruse 1995: 257). He also claims that some lexical entities inherently lack opposition, including entities that are members of multi-element sets of cohyponyms: "Ask someone for the opposite of *table*, or *gold*, or *triangle*, and he will be unable to oblige" (Cruse 1995: 257–8). However, even Cruse admits the possibility that pairs from multi-element sets may be treated as examples of opposition if they contain some basic contrast. This concerns not only pairs like *summer/winter* (containing the opposition *hot/cold*) but also *cellar/attic*, *tip/tail*, *cradle/grave* (containing oppositions of direction, space and time respectively), and even *emperor/clown* (which are as top and bottom with respect to court rank) (Cruse 1995).

The last example directs attention to yet another piece of evidence of the importance of considering the boundaries of the relation of opposition, namely the role of cultural factors in displaying the contrast between the members of a pair. For example, the pair *heaven/hell* is considered to be one that cannot be reduced to one simpler opposition (it includes many opposites: *up/down*, *good/bad*, *light/dark*, *bliss/torment*, etc.) but has a deep cultural significance (cf. e.g. Cruse 1995; Murphy 2003).

Pairs extracted from multi-element sets, including instances such as *dog/cat* or *heaven/hell*, pairs of colours (e.g. *green/red*) or flavours, as well as *fire/water* or *nobility/peasants*, Markowski (2012) unites under the common name of *pragmatic antonyms*. These are pairs of words that lack contradictory or opposing semantic elements, but denote phenomena or objects traditionally recognised (especially culturally) as opposites (Markowski 2012: 120–121). It

seems clear that some pairs whose opposition is undebatable can be perceived as even more opposed as a result of historical, cultural or social factors; for example, in contemporary times, *heterosexual/homosexual* or *marriage/partnership* (Okuniewska 2004). Such pairs may become, at least for a time, canonical. Likewise, physical conditions alone may influence the degree of opposition attributed to pairs. A strong opposite of the word *mountain* may be, for a Pole or an American, the word *valley*,[11] but for a Japanese it may be *ocean* (Hofmann 1993; Murphy 2003).

Culturally significant pairs from multi-element sets are an important subject in the field of cultural anthropology: anthropologists have discovered a tendency to classify phenomena in pairs or groups of oppositions in many societies, ancient and contemporary. Members of these communities often describe social organisation and life in terms of a simple dualistic structure, which may indicate a predilection for matching complex phenomena to simple dichotomous classifications (Lloyd 1966). This also applies to phenomena not considered in terms of opposition outside a given culture: among other things, species of animals, plants, types of food and various artefacts. For example, Lévi-Strauss's analysis of South American Indian myths reveals that there exist, functioning within the general framework of myth, not only oppositions such as *human/animal* but also *human*/specific animal species, e.g. *human/ape*, *human/jaguar*, *human/bird*, *human/pig*, as well as oppositions between different animal species, e.g. *monkey/jaguar*, *jaguar/deer*, *lizard/crocodile*, *hummingbird/dove*, or even opposition between two species of pig, based on the features of long snout/short snout and having a tail/not having a tail (Lévi-Strauss 2010).

As can be seen, the borderline area of the relation of binary semantic opposition, with the potential significance of relations of cohyponymy as a central issue, is an interesting and important element of the reconstruction and understanding of the structure of natural language.

# 5. Psychological reality of the prototypical structure of semantic opposition

Evidence of the psychological reality of the prototypicality of the concept of semantic opposition is provided by data obtained from various kinds of psycholinguistic research.

In terms of the reality of differentiation of the internal structure of the concept (at least at the interpersonal level), with a hypothetical core or centre, one

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[11] According to Cruse, pairs of this type are so-called *counterparts* based on directional opposition (1995).

can interpret the differences in the strength of free associations which are semantic opposites of stimulus words. For example, in Polish association data from the 1960s, the response *dark* ('ciemny') to the stimulus *light* ('jasny') was given by more than 30% of respondents, while the response *quiet* ('cichy') to the stimulus *loud* ('głośny') was given by 13.2% of respondents, and the response *smooth* ('gładki') to the stimulus *rough* ('szorstki') was given by only 12%. Thus, although all of the aforementioned antonymic associations represented the most common responses for the given stimuli, the pair *light/dark* ('jasny'/'ciemny') seems to be closer to the hypothetical centre (prototype) of the concept of opposition than the others.[12]

Classical evidence more directly indicating a clear differentiation in the internal structure of the category of semantic opposition comes from an experiment conducted by Herrmann and others, in which respondents rated on a five-point scale the strength of opposition in 100 pairs (mainly adjectives, but also nouns and verbs). The highest rating (average 5.0) was assigned to the pair *maximize/minimize*, a slightly lower value (4.71) to the pair *cruel/kind*, a much lower value to *boring/extraordinary* (2.86) and the lowest average (1.14) to, among others, the pair *courageous/diseased*. Another group of respondents, given the same 100 pairs, performed the task of deciding whether or not each given pair was an instance of antonymy. There was a very high correlation between the results of the two tasks, as well as between the evaluations of the respondents (in both tasks) and the factors postulated as decisive for the prototypicality of the relation: the symmetry of members of the relation on the axis, and the clarity of the dimension common to both members (interpreted in terms of interpersonal agreement of the dimension name given by the respondents). The assessed strength of opposition was also lower, according to the researchers' hypothesis, for the so-called connotation pairs (i.e. pairs such as *popular/shy* constructed by replacing one of the members of the "denotative" pair such as *popular/unpopular* with a connotation feature associated with it, like *shy* for *unpopular*) (Herrmann et al. 1986). The source of a strong feeling that an opposition pair is "good" (and hence the source of the so-called "clang association" or "clang phenomenon") may be frequent use and/or perception of the elements of the pair together in the same syntactic structures (Charles, Miller 1989: 374; Jones et al. 2007: 131).

The results of such psycholinguistic studies can also be considered as a basis for the differentiation between canonical and prototypical pairs (see section 2): both pairs frequently produced in free association tests, and pairs indicated

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[12] The Polish data come from Kurcz's work (1967, 1976) and were developed based on the Kent-Rosanoff 100-word list. The newer association data obtained from the same material indicate consistency in the differences for these pairs, with a generally weaker tendency to give antonymic responses: *dark/light* 12.8%, *loud/quiet* 4.8%, *rough/smooth* 4.4% (cf. Łobacz, Mikołajczak-Matyja 2002).

most frequently and quickly by (many) respondents instructed to give examples of the relation of opposition, may be treated as canonical. On the other hand, tests involving grading pairs as good examples of the relation of opposition may indicate both prototypical but non-canonical pairs, as well as differentiation between canonical pairs. Thus, the pair *maximize/minimize*, which received the highest rating in the research cited above (Herrmann et al. 1986), is rarely given spontaneously as an example of opposition, and hence is a prototypical but non-canonical pair, while the (minor) differences between the averages for the pairs *love/hate*, *good/bad*, *big/little* may be seen as reflecting differences in the degree of prototypicality of these canonical pairs (cf. also the discussion in Murphy 2003).[13]

Another study of this type conducted in the late twentieth century is that of Ogino and Noguchi (1998 in: Muehleisen and Isono 2009), which used a similar technique and was based on material from the Japanese language. Native speakers of that language assessed the strength of the opposition of 165 pairs of words in various grammatical categories. There were differences between the mean scores, including between pairs from different grammatical categories representing the same concept; for example, adjectives (as in the rough translation *wide/narrow*) were rated higher on the opposition scale than corresponding verbs (*to widen/to narrow*) and sometimes higher than pairs represented by simple kanji symbols, denoting "pure concepts" *(WIDE/NARROW)* (Ogino and Noguchi 1998 in: Muehleisen and Isono 2009).

Demonstrating the internal differentiation in the category of opposition and defining the clarity of the distinction between its central and peripheral parts was the goal of a study by Paradis et al. (2009). The research material consisted of 53 pairs of gradable adjectives: canonical (e.g. *slow/fast*), non-canonical (e.g. *slow/sudden*), synonyms (e.g. *fast/rapid*) and semantically unrelated words (e.g. *big/white*). In one test, the respondents assessed on a scale the extent to which each pair was a "good opposition", and in another, another group provided an opposite to one of the members of the pair (directed association test). The results of the first test produced statistically significant differences between the mean scores for the canonical pairs and for all of the others, and also between non-canonical oppositions and synonyms or semantically unrelated pairs. In the second test, a gradual decline in interpersonal agreement was revealed: from pairs for which all respondents gave the same semantic opposite to the stimulus, up to a word for which 29 different responses were obtained. Both experiments prove the clearly prototypical structure of the relation of opposition; moreover, the first study confirms the possibility

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[13] The strength and durability of canonical links has been demonstrated, for example, in people diagnosed with aphasia (Crutch et al. 2012) and paranoid schizophrenia (Cacciari et al. 2015).

of drawing a border between canonical oppositions and those that are less conventional in character.

The results of the second test (on providing opposites) were also compared with corpus data (obtained from the World Wide Web) in an earlier study which had the aim of developing syntactic diagnostic tools for canonical antonyms (Jones et al. 2007). There was a high degree of convergence between pairs obtained in the psycholinguistic study and pairs co-occurring in specific, meaning-contrasting syntactic structures. However, this convergence does not apply to pairs with more specialised meaning, such as *laparoscopic/open* (about a surgical procedure), which are present in a variety of contrasting structures, but were not provided by respondents in the psycholinguistic test (Jones et al. 2007).

Antonyms that can be classified as prototypical or canonical have long been used to study the representation of linguistic processing in brain processes (e.g. Bentin 1987 in: van de Weijer et al. 2014). In newer studies using ERP indicators,[14] it has been found that such antonyms are processed quickly and automatically (Roehm et al. 2007). In recent years, a study has confirmed the internal differentiation of the category of opposition using the amplitude indicator N400.[15] The study used pairs of canonical and non-canonical adjective antonyms, and pairs of adjectives that were not semantically related (all from the Swedish language). The respondents' task was to decide whether the elements of each pair of adjectives represented a semantic opposition. There was a statistically significant difference between canonical pairs (lower N400 amplitude) and the others, and the use of a noun giving a natural context for both members of the pair (e.g. *answer* for the pair *correct/incorrect*) also led to a statistically significant difference between non-canonical and unrelated pairs (van de Weijer et al. 2014).

An interesting research question would appear to be the psycholinguistic reality of the role of cohyponymy as a criterion for classifying borderline examples of semantic opposition. According to Lobanova et al. (2010; cf. section 4.2 above), the recognition of cohyponymic pairs as examples of opposition confirms the importance of cohyponymy for the organisation of the mental lexicon. The most classical methods of psycholinguistic research – analysis of free associations and language errors – prove the important role of cohyponymic connections in the lexicon structure. The canonicity of cohyponymic pairs such as *hand/leg* or *table/chair* (see section 4.2) is strongly confirmed in tests. For example, in Polish association data both from the 1960s and from the early twenty-first century, the reaction *leg* was the dominant association for the stimulus *hand*, while *chair* was

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[14] ERP – an event-related potential – is the brain response, measured by means of electroencephalography; it is the direct result of a specific sensory, cognitive, or motor event.

[15] The N400, as a component of ERP, is a part of the normal brain response to words and other meaningful stimuli. It comprises a negative-going deflection that peaks around 400 milliseconds post-stimulus onset.

the dominant reaction to *table* in older studies (given by 30.2% of respondents) and the second-ranked reaction in the newer study (24.4%),  and *table* was the dominant reaction to *chair* in both studies (18.8% in both cases) (Kurcz 1967, 1976; Łobacz, Mikołajczak-Matyja 2002).[16] Cohyponyms accounted for about 75% of the 181-element set of linguistic errors of the noun substitution type classified by Garrett (1992 in: Murphy 2003: 51). However, data such as errors and free associations, even if they provide a reliable basis for hypotheses about the centre of the opposition category (because they can be confirmed by the results of tasks such as giving opposites or by high scores for strength of opposition on a given scale), cannot be considered sufficient in the case of cohyponymy. The strength of the connection for a given pair in the lexicon is not necessarily evidence of its being considered by language users to be an opposition.

The cultural role of cohyponyms also cannot be considered as sufficient evidence of their cognitive, conscious oppositional character. As Lévi-Strauss emphasises in reference to his analysis of South American Indian myths (see section 4.2), the purpose of the analysis is to show "how myths think in people" and not how people think, because people from the community mostly do not recognise the systems of relations contained in myths (Lévi-Strauss 2010: 19). Obviously, this does not exclude the possibility that the myth structure leads to a clearer perception of the contrast between the members of a given pair comprising an element of the myth.

Stronger evidence of cognitively conscious opposition in a pair of lexemes may come from the results of sorting experiments. A study by Chaffin and Hermann (1987) shows, for example, that respondents group pairs such as *rake/fork* together with antonym pairs. Such a pair, unconnected even by a clear relation of cohyponymy (lack of a lexicalised close common hyperonym), may be perceived by respondents as being oppositional under the influence of an experimental situation in which the material consists only of pairs of lexemes provided to be grouped.

However, the thesis of the possibility of treating some pairs standing in the relation of cohyponymy as borderline instances of the opposition relation should also be confirmed by other studies, using, for example, the technique of directed associations with stimuli from multi-element sets of cohyponyms.

# 6. Summary

As a summary of the foregoing discussion and research results, the following synthetic description of the structure of the category of semantic opposition is

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[16] The relationships *hand/leg* and *table/chair* can be interpreted as being reinforced by the comparable subjective frequencies of their members (e.g. the rank difference for the first pair is only 70 within a set of more than 5,000 ranks) (data from: Imiołczyk 1987).

proposed, indicating the criteria for determining the place of a particular example of the relation in that structure:

1. It is suggested to include in the strict centre of the category examples that:
   - meet all of the conditions for prototypicality: the basic ones – binarity and minimal contrast – and all others related to them (among others, the inherentness of contrast, the ease of identifying the differentiating dimension and the weight of the differentiating feature, also diametricality and symmetricality), as well as those based on the frequency of co-occurrence in contexts;
   - are perceived as strong oppositions by the users of a language (in tests of assessment of strength of opposition);
   - are adjectives or adverbs;
   - are such that their membership of the canon is confirmed by psycholinguistic data such as language errors or association tests, both free and directed.

   Therefore, the strict centre of the category should certainly include pairs such as *up/down*, *big/little*, *good/bad*, *male/female*.

2. As close to the centre (or as comprising the "broader centre") it is proposed to recognise instances that meet all of the conditions for prototypicality and have a high strength of opposition as confirmed in psycholinguistic studies, but are not necessarily canonical (such as the pair *minimize/maximize* from Herrmann et al. 1986).

3. Increasing distance from the centre would correspond to a decreasing number of prototypical conditions fulfilled by the given example of the relation.

4. Still inside the category, but close to its hypothetical boundary, would be examples of "non-systemic, but quite clear opposition" as discussed by Mettinger, as well as Cruse's non-inherent oppositions and Markowski's "pragmatic antonyms", i.e. pairs selected from a larger set, but only those whose contrast has been enhanced by pragmatic, cultural, and other factors, for example, *oral/rectal*, *present/past*, *coffee/tea*, *listening/looking*. This zone may also contain three-element sets such as *solid/liquid/gas*, *animal/vegetable/mineral* and *animal/plant/human being*.

5. The boundary (variable and fuzzy) of the relation may be formed by pairs of cohyponyms extracted from multi-element sets whose contrasts are attested by a specific context (e.g. they function as B pairs with their contrast underlined by well-established oppositions – A pairs – as discussed in Jones's work on ancillary antonymy). The degree of their stabilisation at this border would be a function of the frequency of their contrasting in contexts, and its reality could be determined in psycholinguistic studies, such as assessment of strength of opposition and

directed associations. Such pairs may come from such fields as politics, people, geographical proper names, and units of time or numbers, but also from many others.

6. The structure described above would be "loosely" overlapped by a canon of the opposition, that is to say, apart from cases of the strict centre (as in point 1), canonical pairs could occupy different places in the structure, even near its border. For pairs such as *table/chair*, strongly interconnected (as proved by both their high frequency of co-occurrence and, for example, results of free association tests), membership of the category of opposition or their place within that category would be decided by the rate of co-occurrence in structures clearly contrasting their meaning, by the results of tests of directed associations (providing an opposite to the word X), and by average ratings of the strength of opposition. Interpretation of such pairs as exemplars of the category of opposition would require recourse to encyclopaedic and/or pragmatic knowledge.

The proposal presented above for how to locate concrete examples of relations in different areas of the category of opposition is an attempt to apply synthetically the results of theoretical linguistic analyses, corpus studies and psycholinguistic tests. The idea of conceptual prototypes is an important element of modern linguistics and cognitive psychology, and therefore it is valuable to draw attention to possibilities of its being treated as a common perspective for interpreting data acquired in various ways.

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Institute of Linguistics
Faculty of Modern Languages and Literature
Adam Mickiewicz University
Al. Niepodleglości 4
61-874 Poznań
POLAND
nawomiko(at)amu.edu.pl