

**Douglas Walton**

University of Windsor

**Fabrizio Macagno**

Università Cattolica del Sacro Cuore di Milano

## CLASSIFICATION AND AMBIGUITY: THE ROLE OF DEFINITION IN A CONCEPTUAL SYSTEM

**Abstract:** With the advent of the semantic web, the problem of ambiguity is becoming more and more urgent. Semantic analysis is necessary for explaining and resolving some sorts of ambiguity by inquiring into the relation between possibilities of predication and definition of a concept in order to solve problems of interpretation of natural language discourse. Computing is now confronting such problems of linguistic analysis (Diggelen et al. 2004), and it is worth inquiring into the development of linguistic studies that can be useful for developing the theoretical background of ontologies. Our proposal is to develop a workable solution that passes between the horns of the dilemma posed by the traditional metaphysical approach versus the modern relativistic account. We interpret the ancient notion of essential definition in a pragmatic perspective, and show how the dialectical definition by genus and difference corresponds to the semantic analysis of the *definiendum*.

**Keywords:** semantics, argumentation, definition, ontologies, classification

### 1. Introduction

Semantic analysis of a certain sort is shown in this paper to be necessary to allow interlocutors understand each other, and to deal with problems of polysemy and ambiguity. What ontologies deal with is not simply the relationship between words and meanings, but rather the organization of concepts in systems. The distinction (see for instance Niremburg and Raskin 2001, p. 154) between names of concepts and the structure of concepts, and the analysis of the latter as a tool to resolve ambiguity, suggests the need for an instrument of semantic analysis, providing a description of the concept. What will be offered in this paper is a pragmatic system of definition to be used as a dialogical tool for resolving misunderstandings and conflicts of opinion. Conceiving definition in a dialogical way is shown to conflict with both traditional and modern approaches to definition. The concept

of “essential definition” was regarded in longstanding philosophical tradition as a purely metaphysical concept, expressing the immutable essence of a thing. However, this quest for the essence of things led only to metaphysical speculations and to unsolvable conflicts of opinion arising from them. The approach failed to achieve any real success in helping rational persons to reach agreement what a thing essentially is, and as a consequence the notion of essence has long been considered as an unknowable and useless abstraction. Modern studies on definition have long abandoned the theory of essential definition and have generally moved a relativistic approach in which definitions are seen as stipulative and even arbitrary. For example, on Schiappa’s influential view (Schiappa 2003) definitions are seen as a matter of choice, preference or convenience. On this perspective, the evident impossibility of knowing what a thing essentially is, and therefore which definition is properly acceptable, or objectively better than a competitor, becomes a reason to accept any definition. The new dialogical approach to definition presented below offers a middle way between the old metaphysical account of essential definition and the dominant relativistic view that has been accepted as its alternative. The dialogical definition is based on the concept of an *endoxon*, a commonly accepted proposition that can be used to lead to a particular conclusion and, when questioned, has to be supported by arguments. In this new pragmatic approach to definition, the problem of the essential characteristics of a thing is resolved in terms of common opinion: the question the dialogical definition wants to answer is not “What a thing absolutely is”, but “What a thing is commonly considered to be, based on evidential considerations pro and contra”.

Definitions can be analyzed from a dialogical viewpoint in two regards. On the one hand, definitions are instruments for classifying, or naming, reality, and therefore potential instruments for supporting a viewpoint or leading to a further conclusion (see Zarefsky 2006, p. 404). Naming reality can be in itself an implicit argument used to support an unstated conclusion. For instance, if we classify a fragment of reality as “monopoly”, we elicit an implicit judgment on the denoted thing. As monopolies are commonly considered hindrances to the free market economy, they are commonly judged as bad. However, if we name the same fragment of reality as “strong company”, the value judgment will be noticeably different. What determines the attribution of the two distinct predicates to the same entity, and the different value judgments they can elicit, is their definition. Whereas “monopoly” presupposes that there is not competition, a “strong company” is simply a company that defeats the competition. On the other hand, definitions can be challenged, or not accepted by the interlocutor, and need to be

grounded on arguments. Definitions, in other words, cannot be considered matters of choice, but, on the contrary, should be seen as matters of common ground, or commitment. The best definition is the definition that is shown to be grounded on the deepest commitments.

Placing the notion of definition in the domain of dialogical evaluation allows one to interpret it as an instrument of semantic analysis. Definition becomes in this perspective an instrument for building what in computing is called a shared ontology (Bennett 2004; 2005), which can be organized by means of primitive concepts. The purpose of this paper is to show the role and importance of semantic analysis in communication and argumentation, and to propose reconsidering a pragmatic reconfiguration of the ancient notion of Aristotelian definition as an instrument for situating concepts within a conceptual system. In particular, we focus on the evidential ground of the concept of definition and its argumentative consequences, distinguishing it from the modern idea of definition and ontology in computing.

## **2. Implicit knowledge and levels of commitment**

One of the most fascinating aspects of human communication is not what is actually said in a conversation, but what is not said. All human communication is grounded upon what is already known or accepted as information that can be taken for granted, and makes verbal interaction possible. We can call this basis of human communication “common ground” or “common knowledge”, adopting respectively a linguistic or an argumentation terminology. In the latter approach to the implicit aspects of communication, the set of data taken for granted in a dialog is analyzed in terms of commitment (Walton and Macagno 2006), defined as propositions a participant in a discussion has gone on record on accepting, or what is implied by these. A participant in a dialog is dialogically held to defend her commitments in case they are challenged. In a discussion, participants assert propositions and explicitly commit themselves to particular propositions, but what is actually said is only the tip of the iceberg of what the participants are implicitly committed to. For instance, consider the following claim:

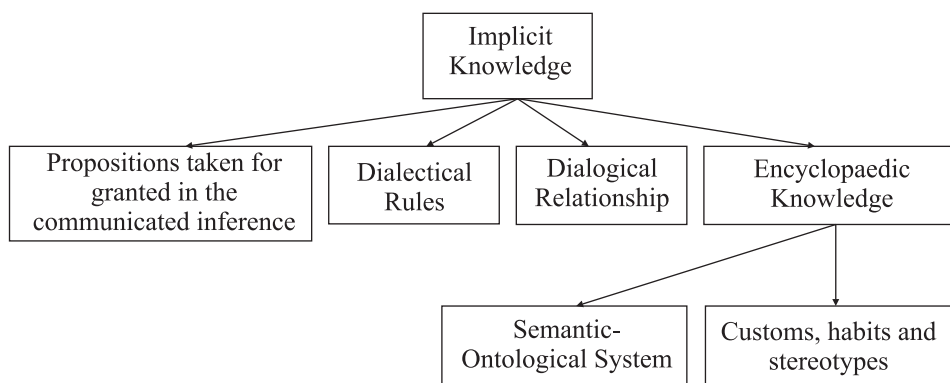
Dr. Johnson said that you have the flu, therefore you should stay in bed

In asserting this proposition, the speaker is taking for granted:

1. That Dr. Johnson’s opinion is a ground to support the point of view that the interlocutor has the flu, that Dr. Johnson is an expert, that having the flu is a reason to stay in bed;

2. That the speaker is supposed not to be lying, the expert is taken not to be biased and is taken to be telling the truth as he knows it;
3. That the speaker and hearer are in a particular relationship;
4. That both know who Dr. Johnson is, that flu is an illness, that a doctor is a human being, that staying in the bed helps when a person is ill, that beds are in houses, and so on.

We should also notice that these implicit propositions are not on the same level. Some of them (1) are directly involved in the argument, or better (Rigotti and Cigada 2004; Rocci 2007) in the communicated inference, while others (2) are the ground for the burden of proof, or rather, are dialectical rules establishing who has to prove his point of view or criticism. The implicit premises indicated at level 4 represent the deepest level, which encompasses the shared knowledge of the world, which may be conceived as the common ontology. Common ontology is the fundamental condition of human communication, because it structures the possibility of talking about the same concepts. The third layer, in turn, can be divided into two different levels. The relationship between doctors and human beings, concerning matters such as between flu and illness, is established by a semantic constraint, whereas the fact that beds are normally in houses depends upon the knowledge of society, customs, and ways of living. The first level represents the semantic information the interlocutors have to share in order to understand each other, while the second level represents a different kind of encyclopaedic information. The first level pertains to how reality is organized within a conceptual system, and thereby a linguistic system, while the second represents the way things usually are or should be. We can represent these layers of common knowledge as follows:



**Figure 1.** Levels of Common Knowledge

The focus of this paper is on the layer of knowledge of the world, and in particular on the ontological-semantic system shared by the interlocutors. This level is the most important one, since it constitutes the basis for mutual understanding, and is the object of inquiry in computing in the field of ontology. The crucial problems are how to distinguish it from the other type of encyclopaedic knowledge, how to ground it, and how to organize it.

### **3. Conceptual system and semantics**

The semantic-ontological conceptual system is the basis for communication, because it represents the level of meaning which words manifest. The failure to share a common system of concepts and instruments for situating a concept in the system itself inevitably leads to failures in understanding. To use an Aristotelian expression, the risk is one of talking about the same words and not about the same things (Aristotle, *Topics* I, 18). In computing the problem has been tackled by the study of ontology, which we now show, indicates the usefulness of a turn towards a linguistic and structuralist kind of semantic analysis. Several ontologies, as will be explained, seem not to distinguish between the two types of encyclopaedic knowledge mentioned above, risking the error of classifying concepts according to their role in a society, as opposed to classifying them according to their properties in a semantic system. The need for a linguistic grounding of ontologies stems from the necessity of finding a common ground for communication independently from cultural and sociological considerations. The solution is to reconsider the ontological-semantic structure of language in a pragmatic sense, that is, in relation to the conditions of predication.

#### **3.1. Ontologies and semantics**

Ontologies are systematizations of entities that we can interpret as concepts, independently from their existence (see for instance, Guarino 1995, p. 628). Ontologies, in particular formal ontologies, are concerned with relations between concepts, including syntagmatic relations establishing the possible inferences that can be drawn from a concept. These relations, such as the part-whole or the causal relation, generate inferences that cannot be grounded upon logical form alone, that is on the simple relation between quantifiers (see also Winston, Chaffin and Herrmann 1987, p. 489). In ontologies, in Guarino's view, there is a logical abstract level that needs to be distinguished from an epistemological and ontological layer, in which the relations are not between abstract entities but hold between concepts on

the basis of the way the concepts are organized according to their internal structure. The expression “organization of concepts” is however, extremely vague. How can concepts be organized? What are the grounds for such classifications? What problems arise from different types of classifications and how can they be resolved?

In computer science (see Dahlgren 1995, p. 813, Passin 2004, p. 142), an ontology is a system of concepts within a given domain. Ontologies are grounded on classifications of entities according to different criteria, such as the “natural”, or “social” system of classification that can be articulated into sub-systems like “foods in the store”. For instance, the concept of law can be described according to two different ontologies, the legal and the scientific one. The polysemy of the word ‘law’, which can be described as having the two interrelated meanings of statutory law and scientific law, is explained in terms of two different systems of classification, or ontologies (see Walton 2006, p. 13). The problem of ambiguity is thereby simply shifted from the equivocation caused by the use of a word to the equivocation generated by different ontologies. The solution proposed (see for instance van Diggelen et al. 2004) is to create connections between ontologies, namely a metadialogue constituted by a “ground” ontology allowing one to find a common ground between different ontological systems. However, the crucial question is how to build a ground ontology on which an ontological system is based. A solution to this problem is suggested by some theoretical developments in computer science, which propose, instead of taxonomies of concepts, definitions of concepts based on natural language. In other words, a possible answer can be a semantic-ontological description of a concept, instead of a taxonomy based upon epistemological or other encyclopaedic knowledge.

The question of how to ground an ontology might be taken as the starting point for a brief survey on some developments of ontologies. In (Dahlgren 1995, p. 810) ontologies are described as about “what there is”, that is, about the world conceived as a possible perspective on reality, such as language, mind, and culture. Language, in Dahlgren’s theory, is in particular a ground of ontology encompassing both the objects of the world and the culture that classifies them, namely, in Bateman’s (1995, p. 934) terms, common sense, intersubjective reality. In other terms, the analysis of a conceptual system should be based on the semantic properties that exist in a natural language.

The study of natural language is the basis for the construction of several ontological systems, considering both the semantic and syntactic level (see for instance, Dölling 1995; Nirenburg and Raskin 2001; Dahlgren 1995).

On the one hand, the analysis of the differences between words in the same language and in different ones is useful to discover the simpler constituents of meaning (Nirenburg and Raskin 2001, p. 154). On the other hand, linguistic theories about collocations and analysis of words in context are useful to discover semantic-syntactic properties of predicates. For instance, the predicate ‘round’ can be predicated only of things (Dölling 1995, p. 790), while ‘alive’ can be predicated only of animate beings (Jan-Beun et al. 2004, pp. 7–8). The analysis of predicates into ontological sorts becomes an instrument to analyze the possibilities of predication, and thereby a useful tool for disambiguating polysemy or homonymy (see for instance Dölling 1995). For example, the predicate ‘to telephone’ can be semantically well-formed only in contexts in which the first argument (the subject) is characterized by the feature ‘to be a person’. In a sentence such as ‘The newspaper telephoned’, the semantic ambiguity of ‘newspaper’ (the paper or the group of people forming the institution) is resolved by the semantic constraints of the predicate.

Several types of ontologies, we should notice, suggest semantic representation of concepts in order to explain the possibilities of predication. These studies can be taken as an effort to ground the concept of “what things are” in natural language.

To conclude, computer science needs to recognize two different types of answers to the problem of concept description for avoiding equivocation in communication: taxonomies of concepts and what we can call “essential” definitions of concepts. While in the former polysemy and ambiguity is described in terms of domains and standards of classification, in the latter the concept is described according to its syntactic and semantic properties. For instance, whereas the polysemy of ‘law’ is taxonomically explained referring to two different ontologies, at a semantic level it can be analyzed describing the characteristics of the two concepts denoted by the word. One cannot choose to compel a decision to act with a scientific law, but a jurisprudential law can compel a decision to act through the use of penalties. The analysis of semantic properties of concepts introduces the problem of what a semantic description is and, as a consequence, what a definition is. Some possible answers to the first question can be found in contemporary linguistic theories.

### **3.2. Ontological semantics in linguistics**

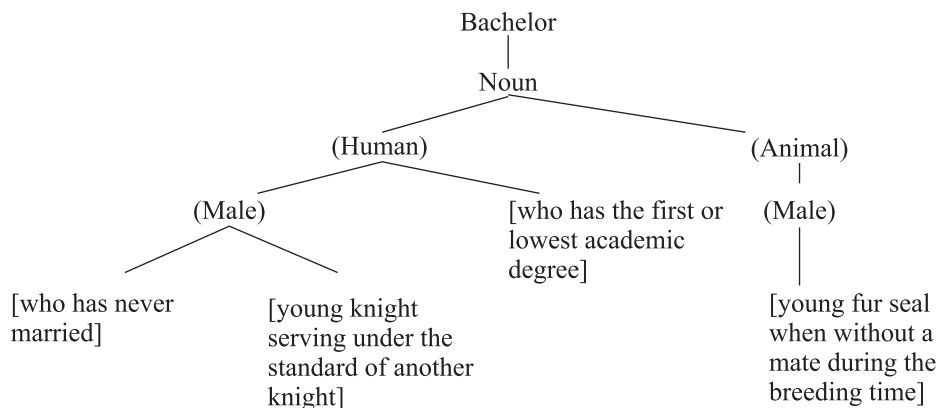
One of the first theoretical models approaching the problem of how to analyze predicate structure was that of Katz and Fodor (1964). Their approach was grounded on the notion of anomaly, or conceptual absurdity

(Katz 1972, p. 91). For instance, consider the following examples given by Katz (1972, pp. 91, 93):

- (1) Saturday is in bed.
- (2) Propositions feel oily.

The incongruity of these propositions is described in terms of predicate structure (p. 91): “a concept has a range of predication specified as a category that determines the concepts with which it can combine in forming assertions”. The structure of the predicate ‘to feel’ in (2) determines a range of predication (a category) characterized by the feature ‘animate sentient being’ occurring as subject. Likewise, in order for (1) to be meaningful, the concept occurring as subject must have the feature ‘animate being’. The categorical conditions determine what constitutes the anomaly. Anomaly is distinguished by Katz (1972, pp. 181, 221) from contradictoriness, the impossibility of attributing determinate opposed properties or relations to an entity (e.g. ‘John has a hairy bald head’).

In Katz and Fodor (1964), every lexical entry is analyzed into its semantic fundamental features, called semantic markers and distinguishers. For instance, consider the example below (p. 496):



**Figure 2.** Lexical analysis by fundamental semantic features

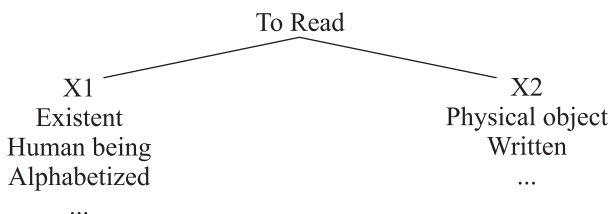
Category mistakes cause conceptual anomalies of a kind that, in Katz’ view, are necessary conditions for the semantic anomalies. For instance, the conceptual incongruities analyzed above lead to the sentences they occur in being semantically anomalous.<sup>1</sup>

<sup>1</sup> This distinction between semantic anomaly and categorical incongruity is drawn in order to explain meaningful sentences such as ‘He says he smells itchy’ (p. 95).



As with the theories of ontology mentioned above, the theory of semantic analysis of predicates can be applied to ambiguity, resolving potential sentential ambiguity to semantic polysemy or homonymy (for the notion of sentential ambiguity see Edlow 1977, p. 12). Adopting this perspective, (Katz 1964, p. 93) explained semantic anomaly as the limit of composition of the possible meanings of words. For instance, we can analyze the following case (p. 93): “The division was slaughtered by cannon fire”. Here, the possibility of the lexical item ‘division’ to refer to a kind of ‘mathematical operation’ is ruled out by the incongruity that would arise by the composition with the predicate ‘to be slaughtered’.

Katz’ predicate analysis has been developed in Rigotti (1997; 2006) and Rigotti and Rocci (2004) by explaining absurdity and congruity in terms of presuppositions and argument places. A predicate, on this view, imposes on its arguments a series of presuppositions,<sup>2</sup> namely, a set of semantic traits the argument must have in order to fit the argument place of the predicate. For instance, the predicate ‘to read’ can be analyzed as follows:



**Figure 3.** Predicate-argument analysis

The argument paradigms X1 and X2 are characterized by a set of semantic features; the failure in satisfying these congruity conditions leads to absurdity. For instance, a dog cannot read a stone. However, the failure in satisfying the presuppositions of argument paradigms can be a helpful tool for discovering polysemy. The *signifiant* ‘to read’ can manifest several predicates, whose arguments are characterized by different semantic features. In the sentence ‘The computer reads the file’, the predicate presupposes in X1 a decoding machine, and in X2 a coded piece of information. In this case the apparent incongruity can be solved by retrieving a different meaning of ‘to read’, namely ‘to decode’.

From this brief overview of computational and linguistic theories on meaning analysis, it is possible to come to understand the roles of clas-

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<sup>2</sup> Presupposition is a controversial notion in linguistics (see for instance Dineen 1979). Presuppositions in Rigotti’s approach are necessary conditions of meaningfulness.

sification and definition in resolving problematic cases of ambiguity. The classification of concepts and the analysis of predicates by means of semantic features bring us back to reconsidering the Aristotelian account of essential definition as an instrument to retrieve and describe concepts in a semantic-ontological system.

#### 4. Classification and definition

Computing studies have pointed out how ontologies need to be grounded on a semantic-ontological system. Linguistic studies, in their turn, showed how the deep structure of predicates and concepts can be founded on a hierarchy of predicates determining the conditions of congruity and meaningfulness. These investigations introduce another crucial question: how can given semantic information be organized to retrieve and situate a concept within a conceptual system? Even though several studies can be mentioned, which take into consideration definition in its different types and uses (see for instance Robinson 1950; Stevenson 1944; Schiappa 2003), none of them has analyzed definition in terms of semantic analysis, that is, a concept as used in a natural language. If ontologies can be developed as organizations of concepts according to their semantic properties, the instrument that can be used for this purpose can be found in the ancient notion of definition (*horismos*). The idea of organizing concepts by means of “logical priority” (*Topics*, VI, 4) and conditions of meaninglessness bring us to the idea of definition as a predicable, that is, a logical-semantic relation between predicates. The concept of “real” definition can be interpreted not on a metaphysical level regarding what reality is, but on a logical level concerned with the issue of how predicates should be structured (see Vanni Rovighi 2002, p. 68).

##### 4.1. Predicables and definition

In the history of definition, including the dialectical, rhetorical, and logical traditions, different types of definition have been described. For instance, Victorinus in *De Definitione* surveyed 15 types of definitions, while the modern accounts of Robinson (1950) and Leonard (1957) list 18 and 57 different types. These methods of defining are not equivalent; on the contrary, their logical and semantic properties are noticeably different. For instance, we can take into consideration four kinds of definition: etymological definition (cartoon from *cartone*, that is, heavy paper), definition by genus and difference (man is a rational animal), definition by definite de-

scription (man is a being that laughs), and definition by integral parts (a car is made up of an engine, four wheels ...). While an etymological definition can be considered to be a definition of the *signifiant*, more than of the thing signified, a definite description is useful only for identifying the concept, definition by genus and difference shows the essential semantic features of the concept signified. Moreover, while definition by genus and difference and by definite description is convertible with the *definiendum*, the same does not apply to definitions by integral parts and etymology.

In order to understand the function and role of essential definition, it is useful to define it. Definition (*horismos*) in the Aristotelian topics is described as a predicable (*Topics* I, 5), namely a class of semantic-logical relations of predication. Predicates can be attributed to a species, and consequently to individuals, in four different fashions: genus, definition, property and accident. The species, which we can interpret as the concept, is what is predicated of more individuals different in number and is conceived as a dialectical semantic relation. For instance, ‘man’ can be predicated of different people (John, Karl ...), but does not explain a semantic feature of John. For this reason, species was held to fall outside the domain of dialectic.<sup>3</sup>

The four predicables, namely definition, genus, property, and accident, are divided into two main categories: predicables revealing the essence of the “thing” and predicables not expressing the essential features of the subject. We present the Aristotelian classification as follows (see Rigotti 2006):

| SHOWING THE ESSENCE                                |  | NOT SHOWING THE ESSENCE                                   |   |
|--|--|---|---|
| Definition   | Genus  | Property  | Accident  |
| Convertible with the thing. Expresses the essence. | Not convertible with the thing. Expresses the essence. | Convertible with the thing. Does not express the essence. | Not convertible with the thing. Does not express the essence. |
| Ex: Man is a <b>reasonable animal</b> .            | Ex: Man is an <b>animal</b> .                          | Ex: <b>to talk</b> (man)                                  | Ex: This man is <b>strong</b> .                               |

Definition shows the essence of the thing, here defined pragmatically as its fundamental (most important) features. For instance, if something is a “man”, it is necessarily an animal and it is potentially reasonable. The

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<sup>3</sup> See also Crowley & Hawhee, 1999, p. 54; Green Pedersen, 1984, p. 119. Aristotle (*Topics*, I, 10), considers a dialectical proposition to be a proposition held by everybody, or the majority, or the wise. Dialectic (*Topics*, I, 14) is about science, and science is not concerned with particulars.

genus shows what the species is, but it is not convertible with the thing itself. For instance, “man” is necessarily an “animal”, but an animal is not a man.

Definition and property are convertible with the species they are predicated of. For instance, if we accept that “reasonable animal” is the definition of “man”, we can substitute “man” for “reasonable animal” in any sentence. Likewise, a property of man, one that is predicated of only one species, is “*grammaticus*”, or “able to learn grammar”. If we describe “man” as “the being able to learn grammar”, we can substitute the species with its description in any sentence, but the description does not show what the thing is.

Consider the recent controversy that led to a debate within the International Astronomical Union that led to Pluto being classified as a non-planet.<sup>4</sup> In 2006 the IAU presented a definition laying down three essential criteria for a celestial body to count as being a planet (Soter 2007, p. 1). First, it has to be in orbit around the sun (the orbit criterion). Second, it has to have sufficient mass so that it has formed into a nearly round shape (the roundness criterion). Third, it has to have cleared the neighborhood around its orbit (the sufficient clearance criterion).

Property is what is predicable of only one species. It is divided into absolute and relative. An instance of absolute property can be “pitch”, used as an adjective, which can be only be predicated of the term “black”, or “talkative”, which can only be predicated of “man”. The notion of property is extremely interesting for understating Aristotle’s approach to semantics. An absolute property can be interpreted as the relation between a predicate and its argumentative class. For instance, the predicate ‘to read’ presupposes an argument which is characterized by being human. In Aristotelian terms, we can say that “to read” is a property of human and that a human is a being who is able to read. Property is distinct from difference, because the latter express the characterizing feature of the predicate and is a condition for the predication of the property. For instance, ‘reasonable’ distinguishes ‘man’ from other kinds of animate beings, but only rational beings can laugh or read. ‘Reasonable’ can in this view be seen as the semantic feature characterizing the predication of property. Property can be also relative, permanent, or temporary. For instance we can describe man as the two legged animal if we want to identify him in a group constituted by quadrupeds. Such a relative property holds only generally, and can be subject to exceptions.

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<sup>4</sup> The debate can be found at this site: <http://www.astronomy2006.com/media-stream-archive.php>

For instance, if we describe a bird as a flying animal, the property holds only generally. Although Tweety is a bird, and birds generally fly, the inference defaults in the case that Tweety is a penguin.

Accident is described by Aristotle as “something which can belong or not belong to some one particular thing” (*Topics* 102b, 6–7). A man, for instance, can be drinking or not drinking, but this accident does not affect the fact that he is a man. However, man can drink or not drink inasmuch as he is an animal (we could also say that to drink is one of the properties of being an animal), but a stone cannot be predicated of the action ‘to drink’, because it is not under the genus ‘animal’ (see Rigotti 2006). The possibilities of predication, in other words, are established by the essence of the thing predicated.

Definition is constituted by the proximate genus and the specific difference. Aristotle defined the genus as answering the question “what is it?”, asking for the essence of the thing. For instance, a human is a being, a living being, and an animal. All these predications fall within the category of the genus of ‘human’, but only ‘animal’ is the proximate genus. In fact, if we accept the definition of man as rational animal, ‘rational’ specifies the genus animal into the two concepts of humans and irrational animals. The genus ‘animal’ can be predicated of several species, such as humans and donkeys or dogs. It expresses the fundamental features of the concept, but not all of them. Definition of relative terms (*Topics* VI, 6), which we can interpret as predicates in the predicate-argument theory, must specify the characteristics of the argumentative places it presupposes. For instance, (*Topics* VI, 8), knowledge is “conception of a knowable”.

We suggest that this system of predicables is useful for understanding the criteria underlying the concept of an essential definition and its ontological-semantic grounding. An essential definition involves the situation of the concept defined within a conceptual system by means of its distinctive semantic features. Moreover, definition by genus and difference is basically an instrument of semantic analysis in which the possibilities of predication are explained in terms of hierarchy of predicates. The approach to definition at a logical level allows one to distinguish between predicates that are essential from other accidental or proper predicates.

If we conceive the essential definition in a dialectical perspective, defining the essence of a thing becomes highlighting the simpler predicates the *definiendum* is constituted of, allowing the interlocutor to understand what the *definiendum* is. The *definiendum* is in this fashion connected with the interlocutor’s more basic commitments, or rather his shared ontology. From an argumentative point of view, the notion of “essential” characteristics

is of twofold importance: it is a criterion for distinguishing between what a thing is and how a thing is, and for separating definitions from metaphorical descriptions. We can explain these characteristics using three different definitions of “embezzlement”.

1. Embezzlement is theft of assets (usually money) entrusted in your care
2. Embezzlement is siphoning of another’s money
3. Embezzlement is a fraud committed by many employees

In (2) the definition does not show the essential properties of the *definiendum*, but, instead of explaining what it is, it hides its meaning under a metaphor. In (3) the *definiendum* is described by means of one of its properties (or accidents), but its meaning is only explained in a vague and general fashion. In (1), at last, the *definiendum* is explained by connecting it to the more generic and shared concept of “theft”, and differentiating the thing defined by the other types of theft using the difference “of assets entrusted of your care”.

Knowing what a concept is, and situating it within his own conceptual system is essential for judging the thing defined. For instance, whereas in (1) “embezzlement” is clearly connected with concepts the interlocutor is acquainted with, and is able to judge, in (2) and (3) a clear value judgment is harder to be elicited. Whereas the notion of “theft” is shared and commonly judged as negative, “siphoning” or “fraud” are vague and less known. For this reason the value judgment cannot be clearly expressed (for the use of euphemisms or vague terms in law to avoid eliciting value judgments, see Blakey 1982). Definition, therefore, is a dialectical instrument for knowing the thing defined. Knowledge is argumentatively relevant because it allows one to judge the thing defined, and therefore to act accordingly. Definition by genus and difference, moreover, is of fundamental importance at the argumentation level, because of the topics, or patterns of inference, associated with it.

#### 4.2. Definitions and inferences

As mentioned above, it is possible to define a word in several ways, such as by genus and difference, description, integral parts, and etymology. At a semantic level, as seen above, essential definition is the only type of definition explaining the congruity conditions of a predicate. At an argumentation level, we will now show, definitions are noticeably different, being characterized by different logical assumptions.

The first distinction is between definitions in which the *definiens* is convertible with the *definiendum*, and definitions in which the relation of

convertibility does not apply. Definitions by etymology and by integral parts belong to the first group, whereas essential and descriptive definitions are characterized by convertibility. In definition by integral parts, we should notice that the *definiens* is not necessarily convertible with the *definiendum*. For instance, if we consider definition by integral parts as following the scheme *X* is *A* and *B*, we can notice that there are cases in which the conversion does not hold. For example, consider the following sentence (*Topics*, 150a 1–5).

Justice is temperance and courage

As Aristotle noticed, two people, each of whom has one of these qualities, can together be just, without singularly being so. The other scheme of definition from integral whole is ‘*X* is made of *A* and *B*’. However, we consider the following argument.

A house is made of four walls and a roof. The house has been destroyed.  
Therefore, the walls and the roof have been destroyed

It should be observed in this case that the predicate attributed to the *definiendum* does not necessarily apply to the definition. This type of fallacious reasoning can be labelled as fallacy of division (see Engel 1990, p. 103 for further examples), namely improperly implicating the properties of the parts from the properties of the whole. The definition by integral whole is not convertible with the *definiendum* because it is not subject to the same predications.

Definition by etymology turns on the interpretation of a name, namely, and on linguistic strategy to manifest a meaning. This kind of definition is, however, not convertible with the species defined. What is defined is not the concept, but the manifestation of the concept. An argumentation from etymological definition can cause fallacies, such as the following fallacious inference (Walton 1996, p. 167).

The word “truth” is derived from the verb “throw”, to believe. Therefore, there is no eternal or immutable truth.

In definite descriptions by absolute property and definitions by genus and difference, the *definiens* is convertible with the *definiendum*. We can summarize the inferential patterns which characterize *horismos* and description as follows (Petri Hispani *Summulae Logicales*, 1990, pp. 52–54):

• *Loci a definito / a definitione*

| 1. Thing defined/definition as subject of predication (Positive)  | 2. Thing defined/definition as subject of predication (Negative)  |
|---|---|
| Maxima: Whatever is predicated of the thing defined is predicated of the definition as well, and vice versa.        | Maxima: Whatever is removed from the thing defined is removed from the definition as well, and vice versa.                                |
| <i>Example:</i> A company exclusively controlling the market is contemptible. Therefore a monopoly is contemptible. | <i>Example:</i> A company exclusively controlling the market is not helping the economy. Therefore a monopoly is not helping the economy. |

| 1. Definition as predicate (Positive)   | 2. Definition as predicate (Negative)   |
|---|---|
| Maxima: Whatever the thing defined is predicated of, the definition is predicated of as well, and vice versa. | Maxima: From whatever the thing defined is removed, the definition is removed as well, and vice versa.                      |
| <i>Example:</i> Bob embezzled his company's funds. Therefore Bob stole the funds entrusted to his own care.   | <i>Example:</i> Bob did not embezzled his company's funds. Therefore Bob did not steal the funds entrusted to his own care. |

In an essential definition, unlikely in the definitive description, the proximate genus must be specified, involving for this reason the inferential patterns described in the *Topics*. The predication must follow the following principal topics (*Summulae Logicales*, p. 56; *Topics*, IV, 120b 12–123a 27):

| Maxims  | Examples   |
|---|--|
| Anything predicated of the species is predicated of the genus as well                                       | Embezzlement can destroy the economy of a country. Therefore theft can destroy the economy of a country.               |
| Whenever genus is removed, species is removed as well   | Bob never stole anything. Therefore he never embezzled his company's funds.  |
| The species can be predicated of the definition of the genus, not vice versa.                               | Embezzlement is theft. Therefore embezzlement is the crime he crime of taking someone else's property without consent. |
| The genus is predicated of what the species is predicated of.   | Bob embezzled his company's funds. Therefore he committed a crime.   |
| It is impossible for something to be predicated of the genus if it is not predicated of one of its species. | Bob never embezzled, robbed, skimmed, and rustled. Therefore you cannot call him a thief.                              |
| What is placed in the genus cannot be predicated of the definition of anything contrary to the genus.       | Embezzlement is not cunning. In fact embezzlement is a crime, and cunning is not a crime.                              |



Essential definition, as shown in the subsections above, is characterized by semantic and logical properties which allow one to situate the concept defined within a conceptual system. This system, being grounded on necessary semantic features, can be common to different types of ontological classifications. In such a fashion, in a clarification dialogue essential definition can play a fundamental role, constituting the more basic classification system common to different types of conceptual representation. Moreover, topics from genus and definition characterize essential definition by means of necessary rules of inference.

## **5. Conclusions**

The conceptual system put forward in this paper showed how our pragmatically reconfigured version of the notion of essential definition can be used to situate the concept of definition within the system. Our conceptual system presented a level of common knowledge coinciding with the linguistic code used by the interlocutors, and distinguished from other types of implicit commitments belonging to the sharing of the same dialogical rules, inference rules, endoxa, and habits and customs of a society. The organization of such a conceptual system is highly useful for current computing on the semantic web, because of its capability for allowing interlocutors to understand each other and avoid harmful ambiguity. Ontologies have tackled the relation between concepts using a semantic criterion grounded on the possibilities of predication and a more logical one based upon the notion of classification. The field of linguistics offers possible theoretical developments of the principles used to organize concepts, such as a hierarchical description of predicates by means of fundamental features of meaning and their presuppositions. Modern studies on semantics lead towards a tentative of grounding descriptions of concepts on linguistic structure. The paper has shown how this direction can be pushed further by looking at suggestions offered by the Aristotelian theory of definition. We interpret definition by genus and difference in dialectical, and not metaphysical, terms, and show how the underlying principles are the semantic properties of predicates and their logical relations. By this means, definition by genus and difference is shown to be an extremely useful method for situating a concept within a semantic system. Comparison between what we now call the pragmatic version of the notion essential definition with other types of definition has demonstrated the superiority of the former both at the level of foundations and at the level of determining which logical inferences can properly be drawn from a definition.

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Douglas Walton

Centre for Research in Reasoning, Argumentation and Rhetoric (CRRAR)  
University of Windsor

2500 University Ave. W., Windsor, Ontario N9B 3Y1, Canada

[dwalton@uwindsor.ca](mailto:dwalton@uwindsor.ca)

<http://www.dougwalton.ca>

*Douglas Walton, Fabrizio Macagno*

Fabrizio Macagno

Department of Linguistics

Università Cattolica del Sacro Cuore di Milano

Largo A. Gemelli, 1–20123 Milano, Italy

fabriziomacagno@hotmail.com