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ORIGINAL RESEARCH

# The Denotation of Copredicative Nouns

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**Abstract**
Copredication is the phenomenon whereby two or more predicates seem to require that their argument denotes different things. The denotation of words that copredicate has been broadly discussed. In this paper, I investigate the metaphysics behind this question. Thus, mereological theories of dot objects claim that these nouns denote complex entities; Asher (Lexicalmeaning in context, Cambridge University Press, 2011, https://doi.org/10.1017/CBO9780511793936) thinks that they denote bare particulars; and the Activation Package Theory contends that they stand for multiple denotations. According to the Activation Package Theory, copredicative nouns stand for complex knowledge structures that offer a range of multiple potential denotations. In this paper, I claim that the Activation Package Theory contributes to solve some of the metaphysical questions that arise from copredication.

## 1 Introduction

Copredication occurs when the same expression comes along with simultaneous predications for two (or more) different meanings or senses of the word in a sentence. In this paper, I am going to focus on cases of nominal copredicaction.[1] Consider the following examples (taken from: Ortega- Andrés and Vicente, 2019):

1. The books are thick and interesting
2. The school caught fire and was celebrating 4th of July when the fire started
3. The city has 500,000 inhabitants and outlawed smoking in bars last year

In (1), the word *books* refers to the physical object, but also to the content or information that it conveys. In (2), the word *school* refers to the building but also

[1] There are some cases in which the copredicative word is not a noun. For more information about some other cases see Collins (2017).

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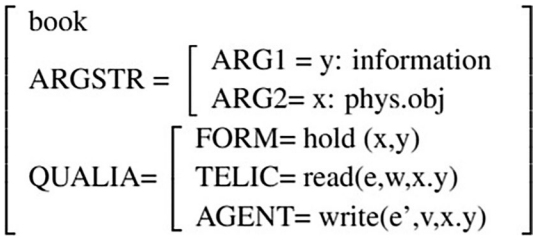
**Fig. 1** The qualia structure of the word *book*




to the people inside the building. In (3), *the city* refers to the population (500, 000 inhabitants) and the council.

Copredicative sentences have been tentatively explained by appealing to the notion of 'dot-object' (Asher, 2011; Pustejovsky & Bouillon, 1995), a complex meaning involving several 'aspects' unified by a dot (?), which has been typically used to explain the type compositionality of copredicative sentences (Gotham, 2016; Luo, 2012). The idea of dot objects was introduced by Pustejovsky when he proposes the Generative Lexicon (henceforth GL). According to GL, the two aspects are represented as aspects of the qualia structure of the word. Types can be simultaneously activated by different predicates in the same sentence (Pustejovsky & Batiukova, 2019). For instance, in (1), both senses of the word *book* are simple types that come together as the dot type physical object?information. The word *book* seems to have two main senses that copredicate: the informational content and the physical object.[2]

GL postulates that words stand for lexical structures that have four different qualias: the constitutive (the relation between an object and its constituent); the formal (what distinguishes the object within a larger domain); the telic (the purpose or function of the object) and the agentive (factors involved in the origin of the object). All senses (types) that copredicate should appear as aspects in the same argument structure. In the case of the word *book*, both types (informational content and physical object) appear in the qualia structure (see Fig. 1):

Assuming that the meaning of the sentence derives from the meaning of its parts and the way they are combined, dot types (or dot objects) allow that the respective nominals in copredicative sentences refer to (apparently) different things in the same sentence when the nominal is only mentioned once. Be that as it may, there is controversy over the metaphysical status of dot-objects. Thus, some philosophers and linguists have claimed that the phenomenon of copredication poses a serious puzzle that must be solved (Chomsky, 2000; Collins, 2017; Pietroski, 2018). The reason is that, very commonly, copredicative sentences predicate incompatible properties

[2] This intuition is not so obvious. For example, I can have four copies of the same novel, two of them in English, one in Spanish and one in German. Imagine that the book was originally written in German. Thus, there are three different ways of counting books here: copies/physical objects; informational content and language-type. The point is that the word *book* may have more related senses. Other aspects of the book can be also used as senses of the word. Even though, the more common senses are informational content and physical object, so I am going to focus on these two in the paper.

about the entities that are referred to by the copredicative words. For example, in (2) the properties that the building has—for instance, its painted colour, its size, its material, the year it was built, etc.—are incompatible with the denotation of the word *school* as teachers and pupils.

Traditionally, it has been proposed that the truth conditions of sentences depend on the correspondence between their content and what occurs in the real world. Copredication has been discussed because it generates a puzzle to the idea that the meaning/representational content of a sentence in a natural language determines its truth conditions. Chomsky (2000), Collins (2017), Pietroski (2018) and many others have used the "copredication-argument" to criticise traditional truth conditional semantics.[3] In this debate, the focus lies on the question of whether the ontology of certain kinds can be made compatible with the phenomenon of copredication and standard externalist truth conditional semantics. According to their argument, if we assume that nouns refer to sets of particulars in the world, it is not clear what the denotation of the word *school* could be in sentence (2), given that there is not such a thing in the world that has the properties that are predicated in (2):

(2) The school caught fire and was celebrating 4th of July when the fire started

The copredication-argument goes as follows: if we restrict the meaning of the word *school* to refer just to the institution, it ceases to be clear what the truth conditions of (2) could be, bearing in mind that the building is not celebrating 4th of July. Apparently, the word does not have any content—we do not know what entity it is about. Institutions are abstract objects, which means that they are not supposed to catch fire. Buildings are physical objects, which means that they are not supposed to celebrate the 4th of July. In (2), the word *school* refers to something that is both physical and abstract. Abstract objects are not physical and physical objects are not abstract, which means that this entity should not exist. Thus, if the truth conditions of (2) rely on the existence of something (the school) that caught fire and that was celebrating 4th of July, then (2) would always be false, because these are two apparently incompatible properties and (intuitively) there is not such a thing in the world that has these two properties at the same time.[4] However, it seems that (2) could be true in some specific contexts. For example, we have the intuition that it would be

[3] I will explore this idea in more detail later. However, it is important to make it explicit because the issue at stake concers what kind of entities can be the referents of copredicative words -and not so much if this or that theory accounts for the phenomenon of copredication. That is, the point is not that Chomsky (2000), Collins (2017), Pietroski (2018) do not have a particular semantic theory to deal with copredication, for their accounts make use copredication to postulate a particular internalistic theory about meaning (against externalist truth conditional semantics). The aim of this paper is to show that we can give a good explanation of copredication without rejecting externalist truth conditional semantics. For more details about the debate between internalism and externalism see Borg (2009), Collins (2009).

[4] We may think that what celebrates the 4th of july is not a group of people, but the institution. Thus, schools could be thought of as abstract objects that also celebrate things. In that case, the issue persists, because there would be some abstract objects that can have physical properties. Liebesman and Magidor (2017) pose very interesting mechanisms to claim that abstract objects may inherit physical properties in some particular cases. I will go into details about this thesis in the following sections.

true if the students and teachers of a particular school were celebrating 4th of July when the building caught fire. Therefore, they say, the truth conditions of sentences should not rely on the correspondence between the content of the sentence and real world.

Some theorists have contributed to the discussion by provinding interesting accounts of copredication.[5] As an example, Asher (2011) claims that dot objects are complex concepts. According to Asher, the denotation of copredicative words are bare particulars, which are individuated when we conceptualise them as one aspect of the dot object. Thus, for instance, the word *book* in *the book is interesting* denotes a bare particular. The predicate *is interesting* individualises the book as one aspect (informational content) of the concept BOOK.[6] Pustejovsky & Bouillon (1995) does not answer the question about the denotation of copredicative words. However, his theory of dot objects in GL has been taken by many others who developed a mereological theory of dot objects,[7] such that copredicative words denote complex entities formed by two or more metaphysical parts (see Arapinis, 2013; Arapinis & Vieu, 2015; Gotham, 2017). According to some of these theories, books are complex/composed real-world entities that have two different parts: they are partially abstract and partially physical (Arapinis & Vieu, 2015).[8] See the following sentences:

(4) The book is on the table
(5) The book on the table is very interesting

According to mereological theories, the word *book* in (4) denotes only one part (or subentity) of the complex physical?informational content. In a copredicative sentence like (5), the word *book* denotes the complex object formed by two parts: the physical object that is on the table and the informational content that is very interesting. These complex entities are in co-constitutive relation with their parts. Thus, an institution like the school, for example, is a complex entity that is co- constituted by three parts: the agents that participate of the institution, the building and the rules of the institution.

[5] Vicente (2021) summarises the main approaches to this discussion.

[6] With respect to what copredicative nominals denote, Asher (2011) holds that the entities they refer to are bare particulars that can be individuated/conceptualized in different ways, or according to different aspects. Such conceptual aspects form a complex, which is a dot object, the contribution that the nominal makes to truth-conditional contents. Therefore, it has to be noted that, according to Asher, dot objects should not be considered worldly entities.

[7] When I say " mereological theories of dot objects" I mean those theories that postulate the existence of real-world metaphysical entities. There are some other revised mereological theories that do not clearly commit with the existence of complex entities, complex entities could be interpreted as complex mental objects. However, these theories do not give many details about their metaphysical and psychological commitments.

[8] We have to make a distinction between some of these theories. Some mereological theories (Gotham 2017) explain copredicative sentences using complex objects. The main difference between Arapinis and Vieu and Gotham is that he does not fully commit with any real-world metaphysis. He postulates a semantic ontology that explains many phenomena. Thought, Gotham's theory may be compatible with many other real-world ontologies that do not postulate the existence of complex entities.

Mereological theories of dot objects have been criticised because they encounter some difficulties explaining quantificational copredicative sentences. Consider the following example:

(6) Every book in the library was read and then burnt (Asher, 2011)

In (6), books appear to be counted differently relative to the two predicates. Imagine that there are several copies of the same volume in the library, it is not expected that every physical book in the library was read. The predicate *was read* refers to every informational book and the verb *burnt* refers to every physical copy. The number of books that burnt and the number of books that were read are different. Asher uses the notion of the relative identity to explain (6). According to Asher, sentence (6) means that the physical instantiations of every book in the library burnt and their informational contents were read. The idea is that the denotation of the word *book* is a bare particular that we conceptualise as a physical object depending on the predicate and on the context. When we interpret the sentence, we use the predicated property to conceptualise the book as one aspect or the other. Therefore, in (6) we count books informationally or physically depending on the context.

Individuation criteria are related to one last puzzle for mereological theories that has not been addressed yet: the counting puzzle. The question of how we count the sub-entities that form the complex entity has been broadly discussed (Asher, 2011; Chatzikyriakidis & Luo, 2015; Gotham, 2016; Liebesman & Magidor, 2017; Mery et al., 2018). Consider the following sentences:

(7) a. There are (at least) three interesting books
b. There are (at least) three heavy book
c. There are (at least) three interesting and heavy books

According to Arapinis and Vieu (2015), in (7a) the word *book* refers to the abstract part or aspect of the whole book and in (7b) it refers to a set of physical parts of books. It may seem very intuitive that in (7a) we count three books (three informational contents) and in (7b) we count three books (physical objects). However, it is not so easy to explain how we individualise and count the books in quantificational copredicative sentences like (7c).

Many other theorists have proposed semantic type mechanisms to explain the individuation and quantification criteria of dot objects. Most of them claim that copredicative nouns have their own identity criterion that plays an essential role in individuation and counting (for instance: Chatzikyriakidis & Luo, 2018; Gotham, 2017). The predicate determines the identity criterion that must be used. For example, according to Gotham (2017) in (7c) there are three books which are different physically and informationally.

Contrary to dot-object hypotheses, some theorists claim that words like *book, school* and *city* in sentences (1)–(3) denote singular entities. Liebesman and Magidor (2017) explain copredication in terms of property inheritance: one of the typical senses of the word inherits the properties from the other, based on some particular relation between

them. Thus, for example, the physical object is the physical instantiation of the content. In (1), the physical object is informative by virtue of its informative content.

According to Liebesman and Magidor, property inheritance must be studied case by case, which means that we do not have any specific way to know when a word generates copredicative sentences and when it does not. This fact is important because it seems that there are some senses of polysemous words that, quite frequently, allow for copredication, yet other polysemous words do not generate copredicative sentences. In some cases, copredicative sentences seem to describe absurd or zeugmatic situations (see: Moldovan, 2021; Viebahn, 2018). Zeugmatic sentences are those that seem infelicitous as (8c) does. This kind of infelicity may result in absurd interpretations, or fail to produce any interpretations at all. As far as the processing literature is concerned, numerous studies have investigated the comprehension of polysemy. Moreover, copredication has been used as a diagnostic test for polysemy (Copestake & Briscoe, 1995; Cruse, 1986; Jezek & Vieu, 2014), which means that the availability of copredication is taken to reflect straight-forward access to the different related senses, while failed copredication tests indicate that one of the senses is currently not available. However, recent work (Moldovan, 2021; Ortega-Andrés, 2020; Schumacher, 2013) suggests that the incompatibility of the two apparently polysemous senses is heavily context-bound, which means that copredication should not be used as a test for determining whether a word is polysemous or not. Some polysemous words form stable copredicative patters, while others do not. Compare the following sentences:

(8) a. The newspaper fell off the table
b. The newspaper fired the editor
c. #The newspaper fell off the table and fired the editor
d. The newspaper which just fell off the table fired its editor[9]
e. The newspaper has been attacked by the opposition and publicly burned by demonstrators
f. The newspaper contains some really useful information about restaurants and concerts but publishes a lot of useless junk as well

Sentences (8a) and (8b) are simple sentences, while sentences (8c)–(8f) are copredicative sentences. Now, sentence (8c) seems to be less acceptable than sentences (8d), (8e) and (8f).[10]

Liebesman and Magidor do not try to give any kind of explanation of why some words or senses allow copredication while others do not. This is an advantage for

[9] Thanks to an anonymous referee for suggesting this example, which is very interesting for the "newspaper" discussion.

[10] Newspaper cases have been broadly discussed because they seem to present a double inherent polysemy: on the one hand, the word newspaper has the two info-content senses (the newspaper is very interesting and very well decorated), yet on the other hand, the word has the institution senses (the newspaper was selling very well when it caught fire). Some theorists have postulated that the word has two lexical entries (Arapinis & Vieu, 2015); while others suggest that they are aspects of the same lexical structure, which contains a tripartite argument structure (Pustejovsky & Bouillon, 1995). However, this theory would not explain some cases. For example, compare (8c) with (8d):

other theories that give a tentative answer to the question of why some polysemous words copredicate and others do not. For instance, Arapinis and Vieu (2015)—despite the ontological issues—and the Activation Package Theory (Ortega-Andrés, 2021; Ortega-Andrés & Vicente, 2019; Vicente, 2021) give some general criteria for distinguishing copredicative words that typically copredicate from those polysemous words that do not typically allow copredication.

The Activation Package Theory claims that copredicative words stand for complex knowledge structures that contain all possible related and conventionalised senses of the word. Copredication is explained in terms of activation packages: senses of words that typically copredicate are those that activate each other when they are selected, producing activation patterns that explain why two senses can be selected at the same time. Some senses in the knowledge structure tend to activate each other, resulting in activation packages that explain why some senses are easier to access than others (Ortega-Andrés & Vicente, 2019). Senses that belong to the same activation package typically form felicitous copredicative sentences. For instance, the two senses of the word *book* (informational content and physical object) are aspects of the same rich informational structure. They form an activation package that explains why they typically copredicate.

Why is it that some senses form activation packages and others do not? According to Ortega-Andrés and Vicente (2019), dependency and realisation relations between aspects in the structure explain the activation patterns between senses of the same activation package. For example, to be read, the book also needs a physical realisation, which can appear in many different formats: a paper-book, a digital book, etc. These aspects typically activate each other when the speaker encounters the word *book*, forming an activation package. The difference between felicitous and infelicitous sentences lies at the level of activation that a certain sense of the word has. The reason why copredication does not work in some cases is that the senses involved fail to enter a co-activation relation.

Copredicative nouns do not refer to one real complex entity, but they stand for conceptual structures that give a range of possible denotations. In copredicative sentences, the NP that copredicates has at least two denotations. Each aspect in the structure is a potential sense of the copredicative word and has its own denotation. This theory can be seen as a way of psychologising some mereological theories. Instead of proposing the existence of complex entities—as some theories do—, they claim that copredicative words stand for complex psychological structures. It may be possible to study copredicative nouns in terms of dot-concepts (for example, instead of a complex real world object, we could have the complex concept of *lunch*, the complex concept of *city*, etc.), without presupposing that they are about an existing complex entity. Given that some theories of dot objects do not explicitly commit

Footnote 10 (continued)

(8c)# The newspaper fell off the table and fired the editor

(8d) The newspaper which just fell off the table fired its editor

It seems that (8d) sounds a lot better to many people. How could we explain this difference? The question has not been resolved yet. For more discussion about this debate see also: Antunes & Chaves (2003), Dölling (forth).

with the existence of real-world complex entities, the Activation Package Theory contributes to the idea of dot objects, proposing a psychological story about how we interpret copredicative sentences. Following the Activation Package Theory, dot objects should be understood as complex structures that do not stand for one denoted entity, but they offer a range of possible denotations. Thus, the copredicative word denotes various entities that are conceptualised together as aspects of the same conceptual knowledge structure.[11]

The aim of this paper is to study the real-world metaphysics behind the question of the denotation of copredicative nouns. I explore some theories that have answered the question of the denotation and I discuss the metaphysical commitments as well as some of the questions that they leave unanswered. In Sect. 2, I analyse some classical mereological theories about real-world dot objects and I explore the metaphysical brain-teasers that follow from these theories. In Sect. 3, I present the discussion about the counting puzzle and how some semantic theories have answered it. Finally, I claim that the Activation Package Theory contributes to these semantic theories.

## 2 Classical Mereological Theories of Dot Objects

A classical mereological account for copredicative nouns claims that books are objects that have two parts: volumes and contents (see: Cooper, 2005). The hypothesis has the advantage of explaining very intuitively how we attribute apparently contradictory properties to the same thing. Books can be interesting by virtue of their informational content and can be thick or heavy by virtue of their physical parts. It is for this reason that these approaches may seem to be the best solution to the problem of the denotation of nouns that copredicate. Thus, in (1), for example, it is not difficult to think about books as something that has two parts: a physical part that instantiates the information and an abstract or informative part that expresses what the book is about.[12]

[11] Given that informational structures of different words are very different, the realisation relations that link the aspects may generate diverse activation patterns that could be reflected in the interpretation process of these sentences. It is expected that copredicative nouns show different activation patterns and that they activate different pieces of knowledge. For example, the physical object (volume) of the book physically realises some informational content; the lunch-food is made to be eaten in an event-lunch, the participants of the social organisation fulfil some specific tasks in the building and the political institution also carry out some tasks that affect the people that inhabit the geographical area. These relations are of a distinctly different nature, therefore, the activation patterns are expected to be different in each case. The idea matches the results of some neural activities that suggest that different neurological areas are activated when the words lunch and book are interpreted (Ortega-Andrés 2021; Tao, 2015). In the case of lunch, for example, there is an specific ontological relation between the object food that is eaten and the even-lunch, such that the food has to be identified as the particular food that is eaten in the particular event. Both the food and the event are conceptualised as different aspects of the complex conceptual structure lunch, so they are able to activate each other forming a package.

[12] Cooper (2011) proposes a different account for copredication. He postulates a record type theoretical approach to semantics that follows some ideas from the Generative Lexicon, such as qualia. The new theory does not commit with a real world mereological theory about the denotation of copredicative words.

(1) The books are thick and interesting

Following the idea of a mereological sum, Arapinis and Vieu (2015) postulate that institutions are complex objects that have several constitutive parts. Institutions are social organisations, but they are also the people that work for the institution, the rules of the institution, the time-organisation of the institution, the building, etc. One advantage of this theory is that it gives a set of requirements for dot objects of the type institution: composed objects (dot objects) are those whose parts are in particular coincidental relations, which means that words that copredicate are those that denote complex constitutive objects.

Arapinis and Vieu (Arapinis, 2013; Arapinis & Vieu, 2015) take the notion of material constitution that Baker (1999) proposes and extend it by introducing the idea of "agential constitution". When certain things with certain properties are in certain circumstances, new things with new properties come into existence:

> When a large stone is placed in certain circumstances, it acquires new properties, and a new thing —a monument to those who died in battle— comes into being. And the constituted thing (the stone monument) has effects in virtue of having properties that the constituting thing (the stone) would not have had if it had not constituted a monument. The monument attracts speakers and small crowds on patriotic holidays; it brings tears to people's eyes; it arouses protests.
>
> Had it not constituted a monument, the large stone would have had none of these effects. When stones first came to constitute monuments, a new kind of thing with new properties —properties that are causally efficacious— came into being. (Baker, 1999: 145)

According to Baker, in many cases the relation between the two constitutive parts is somehow "intentional", for example, the statue *David* could not be a statue without its relation to the art- world. This relation depends on the intentions of the artist and the people that consider it art (Baker, 1999: 147). This means: a piece of art would never be considered art in a world where nobody had ever beliefs, desires, intentions, hopes, etc. Agents are necessary for these objects to be constituted by their constitutives.

Extending this idea of material constitution, Arapinis and Vieu claim that the constituents of an institution are unified into a single co-constituted entity when they coincide (materially, agentively and temporally) with each other: the building has to coincide spatially, because it materially constitutes the whole, so it physically occupies a space; the agents and the rules have to coincide agentially and temporally with the other parts. Thus, an institution is co-constituted by the people that work for/in the institution, the normative rules that these people have

Footnote 12 (continued)
For the purpose of this paper, I am not going to discuss the theory in detail. For a more details about this hypothesis see Gotham (2017).

to commit with and (optionally) the building. Futhermore, to co-constitute the whole, those parts should be in the following coincidental relations:

I. The group of people (agents) that work for/in the institution are committed with some rules when they are in a specific building (agential coincidence).
II. Those rules have to be committed by the agents while they are in the building (temporal coincidence).
III. The building is the place where the agents are committed with the rules (material coincidence).

Only when the co-constitutive parts are in the coincidental relations described in I–III, they co-constitute the institution. It is important to have in mind that I–III are metaphysical-real world claims, which means that complex entities in this case are real objects, whose constitutive parts need to be in these particular relations. Only in that case they will form a complex object that is denoted by a copredicative noun.

One open question that emerges is how to generalise the theory of complex co-constituted entities to other kinds of dot objects. If we try to think about books as complex co-constituted entities (as Arapinis and Vieu do with institutions), the dot object "book" (info?physical object) would have (at least) two different aspects: the content of the book—the information that is expressed—and the physical object that somehow contains the informational content. Following Arapinis and Vieu, what is the necessary coincidental relation between the two objects?

On the one hand, we may think that there is an agential relation: readers and writers use the physical object as a way of materially communicating and transmitting the information of the book. However, the relation is not explanatory of agential co-constitution in the same way as institutions are: people that read the book are not co-constitutive parts of the book. On the other hand, we may think that the physical object and the informational content are in material coincidence, so it would be similar to the relation between the art-piece and the marble stone in a statue. Can we say that these parts of the statue coincide materially? A plausible answer would be that when we look at the statue, we look at both pieces as a whole and we cannot distinguish between them as independent things. The same occurs with the book: readers read the whole book (info?physical object).

In any case, it seems that for each kind of complex entity, the coincidental relation between aspects has to be defined differently. The ontology that results from the idea of co-constitutive entities would have many different kinds of dot objects. If the conditions under which the parts co- constitute these complex entities are different in each case, postulating the existence of complex entities forces us to worry about metaphysical puzzles that do not have an obvious answer. For instance, the proposed coincidental relations (remember I–III) suggest that the parts of the institution have to be somehow spatially co-located for constituting the whole. Thus, the agents, the building and the rules constitute the institution when the agents are committed with the rules at the building. However, it is not

clear whether the group of people that commit with the rules in the building is an entity itself. The group of agents can be divided in two different groups. For example, imagine the following situation: most of the workers of an institution are at a demonstration and there is a small group of agents in a meeting inside the building of the institution. In that case, considering the requirements (I–III) it would be difficult to individuate the agents of the institution as one only entity. See the following sentences:

(10) a. The company was at the demonstration
b. The company met in the boardroom

Following Arapinis and Vieu, in (10a) and (10b) the word *company* should refer to the agents of the company. The word *company* denotes the same co-constitutive sub-entity in both sentences. If we think that these two sentences denote the same entity (a particular group of people) they will be contradictory: if the word *company* refers to the agents that work at the company, the same group of agents cannot be at two places at the same time. It is a plausible intuition to claim that Arapinis and Vieu's theory predicts that (10a) says that the group formed by all the agents of the company was at the demonstration and (10b) says that the whole group met in the boardroom. In that case, both sentences are necessarily false. However, it seems that the sentences have a true reading. Thus, if some representatives were in the demonstration and, at the same time, some workers could be at the meeting, it seems that we could have a true reading for both sentences. For example, the sentence *Microsoft was at the conference* might be true if one representative of Microsoft was present at the conference. In that case, how is this person part of the co-constitutive whole entity?[13]

One way to explain that both sentences have a true reading is to postulate that the constitutive entity is formed by two different groups of agents: one group is at the demonstration while the other is at the boardroom. However, the group referred in sentence (10a) would not be in any coincidental relation with the other parts (remember I–III), which is a necessary condition to be a constitutive part of the whole, because according to Arapinis and Vieu (2015) agents co-constitute the whole when they are committed with the rules of the institution inside the building. Following I-III, it seems that when the institution has a building and it is one of its co-constitutive blocks, the material coincidence is necessary for the dot object to exist. If material coincidence between the building and the agents is a requirement for co-constitution (as Arapinis and Vieu propose), then how can we say that the company is in the demonstration in (10a)?

The theory could be revised, so that it wouldn't be necessary for the agents to be at the building to constitute the institution, but just to be normally working there.

[13] It is true that material coincidence is optional: not all institutions require a building, even when they typically have one. Thus, an institution that does not have a building would only be co-constituted by the agents and the rules. In these cases, coincidental relations have to be different from I–III described in the previous section: the agents have to be the ones that are committed with the rules and the rules have to be the ones that are committed by the agents, but there is not material coincidence.

The sub-entity of the group of agents would be individuated as the group of people that normally is in these coincidence relations (I–III) with the other parts. The entity is divided in two groups: one group of agents is at the demonstration and the other group is in the meeting. Thus, in (10a) the word *company* refers to one part of the co-constitutive entity: the agents that are at the demonstration.

In (10b), the word *company* refers to another group of the co-constitutive entity: the agents that are at the meeting. Now, how many parts does the constitutive entity formed by the agents have? Sometimes certain predicates can be applied to a plurality, or a group, on the basis of enough members of that plurality/group contributing to the satisfaction of the predicate—e.g. *the children sang a carol when not all of them were actually singing*—and sometimes they can't. Now, the strange thing about sentences in (10) is that the group is supposed to be defined as a part of a constitutive entity, while there is another part of the constitutive entity located in a different place. The notion of constitution makes the case more difficult to elaborate. If we think about sentence *Microsoft was at the conference,* the coincidental relations are very difficult to explain. Imagine that there is one only person at this conference, how is they representing the whole company at the conference? The proposal requires some specifications that could explain the relations between the people that are the agents of the institution and the social organisation of the institution.

A second question that arises is whether the complex entity would exist even without one of its co-constitutive parts. The answer is not clear because persistence conditions of dot objects have not been defined, which means that there are not established conditions under the complex entity that would keep in its existence—this argument has been already explained in many places, see: Ortega-Andrés and Vicente (2019); Vicente (2019)—. Consider the following example:

(11) London is so unhappy, ugly and polluted that it should be destroyed and rebuilt 100 miles away (Chomsky, 2000)

In (11), what is unhappy is the population of London; the architecture is ugly, the area is polluted and what should be destroyed and rebuilt is the architecture of the city. According to the idea that the denotation of the word *London* is a complex object, its different senses in (11) stand for different specific parts of London that are related by some specific coincidental relations. It seems that the alleged whole would survive (or would be back in existence) even if only one of its parts (its reconstructed buildings and streets) survives or comes back in existence. However, if the whole is co-constituted by its parts, forming an entity, it should not exist when only one of its constitutive parts persists. Different parts of London are supposed to be constitutive parts of the complex entity. How is it possible that the whole entity persists when some of its parts do not exist anymore?

Many objects come into existence when some other objects are transformed. For a better understanding consider the following example: a cake is made of many ingredients. These ingredients could be thought of as different constitutive parts of

the cake.[14] Imagine that we could make most of the ingredients of the cake disappear, for example, we could use some technique that makes it possible to separate all the ingredients of the cake after it has been baked. Imagine that after that, we threw away all ingredients except for the flour. In this case, should we think that the flour that has been baked in a cake still exists?, would we in this case call the flour *cake*? The answer may not be so clear. It seems that when we separate and eliminate the ingredients of the cake, the cake stops being a cake.

In (11), if we suppose that the buildings and streets are destroyed and the population decides not to move to the new London (100 miles away), then these three statements in (12) could be true:

(12) a. London has been destroyed
b. London is still ugly
c. London refused to move to its new location and ended up settling down in a different place

In (12a) the word *London* refers to the old streets and buildings; in (12b) it refers to the new streets and buildings and in (12c), it refers to the population of the old London, the streets and buildings of the new London and the population of the new London. Thus, we can refer to the parts of London in (12c) even when only one of its parts persists. According to Ortega-Andrés and Vicente, this conclusion may not be very intuitive, yet it seems that someone that maintains that denotations of terms like *London* are complex objects has also to commit to the view that the whole would persist even when only one of its parts persists. However, if we admit that case, the complex entity would be able to persist in several different entities, as it happens with the denotations of the word *London* in (12), giving rise to too many Londons. The non-existing parts of London are not able to be in any coincidental relation with the other parts. Thus, the destroyed London is not able to be in the material coincidental relation with the institution or the agents.

The persistence conditions and the individuation conditions of constitutive objects are all open questions about the theory of constitutive entities. Actually, the problem of the individuation criteria is related to one last puzzle for mereological theories: the counting puzzle. The question of how we count the sub-entities that form the complex entity has been broadly discussed (Asher, 2011; Chatzikyriakidis & Luo, 2015; Gotham, 2016; Liebesman & Magidor, 2017; Mery et al., 2018). The theories I have already explained do not give any answer to this puzzle. In the following section, I explain the debate that emerges from the counting puzzle and how the Activation Package Theory contributes to it.

[14] I do not think that the ingredients should be thought as constitutive parts of the cake in the same way as Arapinis and Vieu have described the idea of constitution. However, I think that the example helps to understand the circumstances. This example was proposed by one anonymous referee as an argument of how the persistence is a characteristic of every complex object. Actually, we may think that the flour constitutes the cake when it is in coincidental relation with many other ingredients that are also part of the cake in the appropriate circumstances (for example, they are cooked together).

## 3 Dot Objects as Conceptual Objects

### 3.1 The Counting Puzzle and the Revised Mereological Theory

The counting puzzle has been proposed against mereological theories that claim that dot objects are simple sums of parts (for different versions of this argument and discussion see Asher, 2011; Bahramian & Sabry, 2017; Chatzikyriakidis & Luo, 2015; Gotham, 2017; Liebesman & Magidor, 2017). Consider again sentences in (7):

(7) a. There are (at least) three interesting books
b. There are (at least) three heavy books
c. There are (at least) three interesting and heavy books

What counts as *three books* in (7) differs: (7a) can be true if there are (at least) three informative books in only one volume or if there are three different physical objects and each of them has one different and interesting book-content; (7b) can be true if each of the three volumes is heavy and has the same interesting content; for (7c) to be true, there have to be (at least) three books individuated both physically and informatively, the three objects have to be heavy and the three contents have to be interesting. Now, consider the following situation (S):

S: I have three physical books (A, B and C). Each of them contains three different novels from Margaret Atwood: *The Edible Woman* (EW), *Lady Oracle* (LO) and *Hag-Seed* (HS). The three contents (EW, LO and HS) are interesting and the three copies (A, B and C) are heavy.

According to mereological theories, in S we count nine sums of information + objects: A + EW, A + LO, A + HS, B + EW, B + LO, B + HS, C + EW, C + LO, C + HS. Therefore, there are more than three books (physical and informational), so the three sentences are true. Consider now sentence (13):

(13) There are (at least) four interesting and heavy books

(13) would also be true in S, because there are more than four books in the given situation (9 books). However, we have the intuition that (13) would be false in that case, because we intuitively think that there are three books in S and not nine, so there are no four interesting and heavy books in S.

Following a type semantic theory, some linguists and philosophers have proposed a criteria for individualising dot objects. Chatzikyriakidis and Luo (2015) and Gotham (2017) claim that the copredicative noun has its own individuation criteria, which determines whether the two objects are the same or not. They claim that the only correct interpretation of sentence (7c) should be that there are (at least) three volumes and three informational contents. In (13), there are (at least) four interesting informational contents and four physical volumes. Chatzikyriakidis and Luo (2015) do not intend to give an answer to the question of the denotation of copredicative words, even when they seem to agree with the idea of dot objects as concepts. Their

aim is to propose a semantic composing theory that restricts the interpretation of sentences like (7c) and (13).[15]

The revised mereological theory proposed by Gotham (2017) introduces one interesting requirement to classical mereological theories: the individual books that are counted must be different from each other in a defined way. This new consideration allows him to solve the counting puzzle. Thus, according to Gotham (2014), the books A + EW and A + LO are physically equivalent because there is only one physical book (A), but they are informationally distinct—there are two contents (EW and LO)—; while the books A + EW and B + EW are informationally equivalent—there is only one informational book (EW)—and physically distinct because there are two physical books (A and B). Consider again the sentences in (7) and (13):

(7) a. There are (at least) three interesting books
b. There are (at least) three heavy books
c. There are (at least) three interesting and heavy books

(8) There are (at least) four interesting and heavy books

In (7a), every member is informationally distinct and physically equivalent; in (7b) every book is physically distinct and informationally equivalent; and in (7c) every book is physically and informationally distinct. That explains why in (7a) we count (at least) three informational books; in (7b) we count (at least) three physical books and in (7c) we count (at least) three books that are physically and informationally distinct. In sentence (13), we count (at least) four books that are interesting and heavy.

There are many differences between Gotham theories and some other classical mereological theories (remember the previous section). Philosophically speaking, the revised mereological theory is based on the main ideas of externalism, which means that copredicative words denote real external entities. However, it is important to have in mind that Gotham uses the notion of "complex entity" only for semantic purposes. The aim of his work is to explain the truth conditions of numerically quantified copredicative sentences. Consider the following paragraph:

> I am not claiming that no internalistically-acceptable theory could make the right predictions about these (non-)entailments! One could simply take the theory proposed in this thesis and interpret it internalistically. But I do question how likely one would be to get to that kind of theory without a motivation for keeping (or making) semantic theory ontologically respectable, at least given a suitably generous conception of what is ontologically respectable. Just as a matter of methodology, the path from getting the truth conditions right to getting the entailment relations right is much clearer than that of getting the

[15] I am not going to analyse their semantic theories because it is not the question that I am investigating here. The scope of this paper is to show the philosophical puzzles that arise from some mereological theories and to argue that the Activation Package Theory contributes to the idea of dot objects by proposing a psychological approach to explain how people interpret copredicative words.

> entailment relations right without concern for truth conditions (or with concern for `truth conditions' that cannot be tested by speaker truth-value judgements) [….] Even if thoroughgoing externalism is unsustainable in the long run, the attempt to keep semantic theory externalistically viable is methodologically healthy because it forces us to consider analyses that postulate hidden complexity, giving results that internalists and externalists alike can appreciate (Gotham, 2014: 150–151)

I think I have given in the previous section enough metaphysical-philosophical reasons for doubting that copredicative nouns stand for real world complex mereological entities.[16] Philosophically speaking, these complex mereological entities generate many puzzles that must be solved.

One important point of Gothams' theory (that will be discussed later) is that every property that the parts have is inherited by the complex object. Thus, in the book case, every property that the physical part (p) has, is also a property of the dot object (p + i) and every property that the informational content (i) has is also a property of the dot object. Books understood as physical + informational sums have the properties of their components. As Liebesman and Magidor (2018) notice, this claim needs some restrictions for pure properties. For example, the physical part of the complex entity has the property of being purely physical. This property cannot be inherited by the sum p + i, because the complex entity has an informational part that is not physical. Thus, it seems that Gotham's theory needs some additional restrictions about pure property inheritance.

Liebesman and Magidor argue that even if Gotham restricts property inheritance in the case of pure properties, the problem does not get solved, because there are some properties that we want to apply to ordinary books and that will still be inherited:

(14) a. Three brand new books are on the shelf
b. Two old books are on the shelf

In a situation in which there are three brand new copies on the shelf, (14a) could be true, because the sum would inherit the property of being new. Let us now consider now a situation in which there is one new copy of *The Second Sex* and one brand new copy of *Little Women* on the shelf, then (14b) has a true reading, because two informational contents are old. Thus, the sum sometimes inherits the property of being old and sometimes inherits the property of being new from the content, but both properties cannot be inherited at the same time. One plausible explanation is that the adjectives *old* and *new* are ambiguous, so in some cases they express physical properties and in other cases they express informational properties. In one sense,

[16] In the next section I will postulate an Activation Package-story about how we interpret copredicative sentences without committing with the existence of real world complex objects. I will claim that copredicative nouns stand for complex concepts but their real-world denotation is not a real complex entity constituted by several parts. On the contrary, these complex structures give a range of posible denotations (simple real world entities).

the word *old* expresses the property of having an old physical component and, in another sense, it expresses the property of having an old informational component.[17]

One of the most important contributions of Gotham's theory is the introduction of the relations of distinctiveness and equivalence in the lexical entry of the words. Those relations are used to individuate objects as one part or the other. For example, in the case of the word *book*, there are two different kinds of equivalence:

- Two singular objects are physically equivalent if and only if they both have an identical physical part.
- Two singular objects are informationally equivalent if and only if they both have an identical informational part.

Sentences in (15) show different criteria of individuation for books:

(15) a. Marta mastered a book
b. Marta mastered a heavy book
c. Marta picked up a book
d. Marta picked up an interesting book

In (15a), the verb *mastered* individuates the book informationally and in (15c) the verb *pick up* individuates the book physically. In (15b) the verb *mastered* individuates the book informationally but the adjective *heavy* individuates it physically. The book has to be individuated both physically and informationally. In (15d), the verb *pick up* individuates the book physically and the adjective *interesting* individuates the book informationally. Thus, in (15d) the book has to be informationally and physically individuated.

Let us go back to sentences in (7) and (13). The predicate *is heavy* individualises the book physically, while the predicate *is interesting* individualises the book informationally. Thus, in (7a) books are informationally distinct, and in (7b) books are physically distinct. In (13), there are four books that are physically and informationally distinct. Here we have the truth conditions of each sentence:

(7a) There are (at least) three interesting books

i. There is a plurality of at least three books such that:
ii. every member is informationally distinct from every other member;
iii. every member is informative

(7b) There are (at least) three heavy books

i. There is a plurality of (at least) three books such that:
ii. every member is physically distinct from every other member;
iii. every member is heavy

[17] For more details about the discussion see Liebesman and Magidor (2018).

(7c) There are (at least) three interesting and heavy books

i. There is a plurality of (at least) three books such that:
ii. every member is physically and informationally distinct from every other member;
iii. every member is heavy and interesting

(13) There are (at least) four interesting and heavy books

i. There is a plurality of (at least) four books such that:
ii. every member is physically and informationally distinct from every other member;
iii. every member is heavy and interesting

Even when the theory gives a good explanation to the counting puzzle, its solution to other problematic cases is not so well tied up. Liebesman and Magidor (2017, 2018) discuss the plausible explanation that Gotham could give to sentences (16) and (17), whose truth conditions depend on whether we accept that informational contents can have the property of being on tables or not:

(16) There is one book on the table: *My Brilliant Friend*
(17) Every book Emely Brontë wrote is on the shelf

According to Gotham's theory, the predicate individuates the denotation of the word *book*. Thus, it seems that (16) means that the book *My Brilliant Friend* is on the table. However, being on the table is—at least intuitively—a property of physical objects, so the word *book* should refer to the only one volume.

Now, consider sentence (17). We know that Emily Bronte has only one written book. Suppose that there is only one copy of that book on the shelf. In that case, the sentence (17) would be intuitively true, however, if informational contents cannot have the property of being on shelves, then the sentence has to be false, because not all physical copies are on the shelf. On the other hand, if we think that informational contents can have the property of being on shelves and tables, then we can explain sentences (16) and (17) but we will have troubles with the counting puzzle. Consider the following sentence:

(18) Two books are on the shelf

The hypothesis is that the predicate *are on the shelf* individuates books both physically and informationally. According to Liebesman and Magidor, in (18) we count four books, because the informational contents and the physical objects are not physically equivalent (they do not share any physical part). The argument goes as follows: the predicate *are on the shelf* individuates the books physically and informationally, which means that there are two distinct physical books and two distinct informational contents. Therefore, we would count four books on the

shelf: sentence (18) would only be true if there are two physical objects and two informational contents on the shelf. However, intuitively, it seems that (18) could also be true if there were two physical copies of the same informational content. One easy and plausible solution is to appeal to meaning transfer mechanisms (see Gotham, 2021). Sentences (16) and (17) would be similar to sentence (19):

(19) I am parked out back

In sentence (19), what is parked out back is not the person but the car. There is a salient relation between them that explains the meaning-shift (see Nunberg, 2004). In this case, the most plausible relation is that the subject is the driver or a person who was driven in that car. Meaning-shifts allow us to "create" a new property by enriching the predicate and shifting it to a new predicate that applies to owners. Thus, the sentence (19) may actually mean (19'):

(19') I am the driver of the car that is parked out back

According to this idea, in (16) the property "being on the table" is attributed to the informational part of the book *My Brilliant Friend* by virtue of its physical instantiations that are on the table. Thus, the content of sentence (17) would be that the volumes of the informational content *My Brilliant Friend* are on the table. The content of sentence (17) would be that there is a volume on the shelf of every book Emely Bronte wrote.

At the end, it seems that mereological theories (including the revised theory) have to postulate external mechanisms—not based on dot type theory—for explaining some quantificational cases. In this sense, there seems to be a lack of explanatory power of Gothams theory itself. The hypothesis actually seems to solve the case, however, there are some other ways to explain copredication without leaving aside type semantic mechanisms and dot objects.

As we have seen, a mereological externalism may be methodologically useful for explaining the truth conditions of many copredicative sentences, but many metaphysical issues arise. It may be useful to use the notion of dot objects, not as real-world objects, but as representations of possible semantic type combinations of aspects that form conceptual structures. In that case, copredicative nouns do not denote complex entities, but they stand for complex concepts that could be decompilated in different senses. Thus, it may be possible that these senses in the structure form activation packages.

### 3.2 Simple Entities in the Activation Packages Theory

Many theorists have proposed that polysemous words stand for a lexical structure that contains general world information that needs to be accessed before selecting the correct sense of the polysemous word. These theories are very commonly called rich semantic theories of word meaning (see Ortega-Andrés & Vicente, 2019). Following this idea, Zeevat et al. (2017) contends that the general meaning of a

polysemous word is composed of a set of (moderately) universal semantic features and natural classifications of experience. Terms such as *animal*, *tree* or *tool* are represented as a set of objects with information about the degree of prototypicality (see Hogeweg, 2012; Osherson & Smith, 1981) and are organised in the same way as categorical frames (Zeevat et al., 2017).[18] Some other rich semantic theories propose that selecting the correct sense of the word requires accessing an underspecific rich concept that contains the potential conventional senses of the words. According to this idea, accessing the correct sense may consist of generating the sense of the word by internal generative mechanisms (Pustejovsky & Bouillon, 1995) or it could be an activation-selection process (Ortega-Andrés & Vicente, 2019), depending on the type of word that is interpreted.

Activation packages were proposed by Ortega-Andrés and Vicente (2019) to answer for two main questions about copredication (see also Deane 1988): (i) why are there some senses of polysemous words that copredicate and others that do not copredicate?; (ii) how do people access senses of polysemous words when they interpret a copredicative sentence? Their answer to the first question is that senses of words that copredicate form activation packages in a complex structure. Senses are aspects in a complex structure that stand for realisations of the school: ways in which the prototypical concept of a school appears to us in the world. These senses are linked by particular ontological relations that explain why they are part of the same activation package. Let us take the example *school* (Fig. 2):

Figure 2 represents the kind of information that is stored in the conceptual knowledge structure of the word *school*. Each aspect of the structure is a potential sense of the word. All aspects are conceptually linked by the relations between their associated entities. For example, schools are thought to be institutions whose purpose is to educate people. Educating is a process that requires some participants (educated and educators). It also requires a social organisation; a social representation; temporal organisation (timetable, academic course, etc.) and a building where events related to the institution take place. These pieces of information are organised forming rich semantic structures that have different aspects (or senses) that are selected when the word is interpreted. The structure should capture what typically is required by an institution.

For example, the knowledge structure of the word *school* (Fig. 2) contains information about what a school is and about different ways it appears to us in the world: the building, the organisation, the participants of the institution, etc. Knowledge structures are bodies of information of a certain category (see

[18] Frames are ways in which we organize the knowledge of what we perceive, remember, think, etc. They should be understood as systems of related concepts. For understanding one of these concepts, it is necessary to understand the whole structure in which it fits (Fillmore and Baker, 2010). Frame semantic theories are very close to cognitive semantic models, which do not postulate a settled position about polysemy. Some theories -like radial categories (see Lewandowska-Tomaszczyk 2007)- may be considered to be closer to a sense selection approach; others describe polysemy as a matter of"isolating" different parts of the potential"total meaning" of the word in different circumstances (see: Croft and Cruse 2004, Cruse 2000) while others claim that words are cues that gives access to the lexical knowledge of words, which is part of a dynamical cognitive system (see Elman 2009).

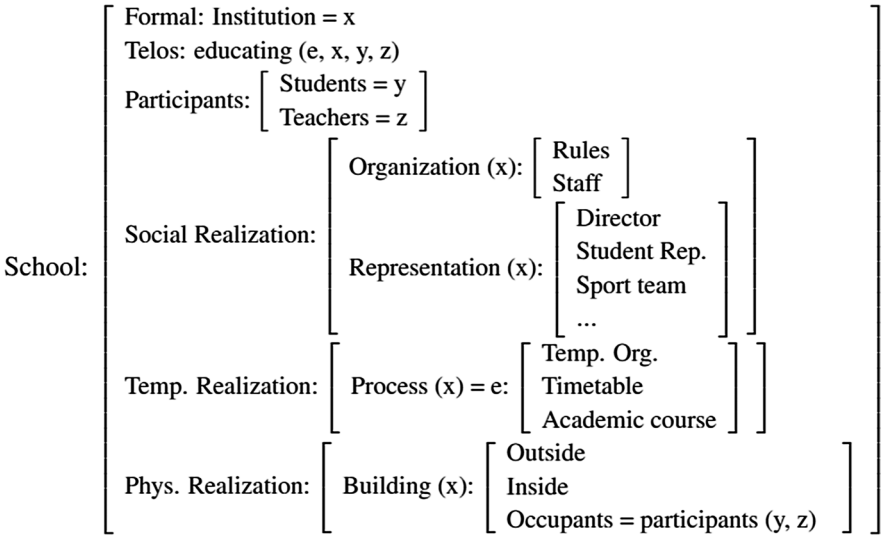



**Fig. 2** The informational structure of the book *school*

Vicente, 2019) that offer different possibilities for denotation. The potential denotation of a word-type is explained in terms of the information stored in the knowledge structure associated with such a word-type.

The senses of the word are selected from the structure when the word is interpreted. When the polysemous word appears in a copredicative sentence, it actually has two (or more) denotations. Thus, the word *school* is a compilatory term that binds various aspects of a knowledge structure associated with the term. Words are associated with a number of denotations, and sentences with a number of contents that determine different truth conditions. Consider again sentences (1) and (2):

(1) The books are thick and interesting.
(2) The school caught fire and was celebrating 4th of July when the fire started.

In (1), the word *book* refers to two different aspects of the structure: the readable content (that is the formal quale) and its physical realisation (a set of written pages or a volume). The predicate *are thick* selects the aspect"physical object" in the structure of the word *book* (see Fig. 3) which activates some aspects that are part of the same activation package, including the content of the book. Here there is an example of the possible informational structure of the word *book*:

The structure represented in Fig. 3 is an example of the information that we access when we encounter the word *book*. Each aspect in the structure stands for a particular realisation of books in the world. In the structure, the formal qualia is an informational content whose telos is to be read. Reading is an event (e) that requires an object (x)—the content or information that is read- and a reader (y).

$$\text{Book:} \left[\begin{array}{l} \text{Formal: content-information} = x \\ \text{Telos: being read (e, x, y)} \\ \text{Participants: Reader} = y \\ \text{Phys. Realization: physical object} = v \\ \text{Text Realization} = s: \left[\begin{array}{l} \text{Genre} \\ \text{Narrative style} \\ \ldots \end{array}\right] \end{array}\right]$$

**Fig. 3** The informational structure of the word *book*

One of the advantages of this theory is that it gives a plausible hypothesis about why some senses of polysemous words copredicate and others form zeugmatic sentences. For example, in the case of the book, the informational content of a book requires a physical object that instantiates it, which means that the"content" sense of the book is in some kind of explanatory dependency relation with both the physical realisation and the text realisation. The physical volume of the book is normally a physical realisation of something (the content), so when the aspect "physical realisation" is selected, the aspect "content" is also activated. The predicate *(are) interesting* selects the aspect "informational content". Both aspects are selected as different senses of the word *book* in (1). Each aspect denotes a different set of entities. The aspect "readable content" denotes a particular content (or contents) that is/are expressed in the physical objects; while the aspect "physical object" denotes a set of physical objects that realise or instantiate these informational contents. In (2), the word *school* has two related senses: the physical realisation and the building.

The aspects of the school are related by coincidental relations that explain why they form activation packages. Here are some of these relations:

I. The participants of the institution (students and teachers) are those that normally participate in the events and activities associated with the institution.
II. The social organisation is formed by some rules and representative roles that regulate the events that the participant should commit.
III. The temporal organisation sets a timetable for those particular events in which the participants of the institution normally participate.
IV. The physical realisation is the place where the events associated with the institution occur.
V. The participants of those events and activities are occupants of the inside of the building when they participate in those activities

In (2), each sense is an aspect of the lexical structure of the word *school* (Fig. 2): the participants are the group of people that normally participate in the events and activities of the school and the building is the place that physically realises the institution, where the activities of the institution normally occur. I do not think that the hypothesis of coincidental relations is able to give definitive

necessary or sufficient conditions to distinguish which uses of a particular word are able to form copredicative sentences. There seem to be many other factors involved: pragmatics, syntax, etc. However, the hypothesis explains many typical cases and that the activation patterns seem to be a plausible factor to consider.

Moreover, the thesis contributes to many theories by explaining the interpretation process that speakers may do when they interpret copredicative sentences. When the copredicative sentence is interpreted, the copredicative noun is "decompiled" by a process of activation that ends when the correct senses of the word are selected. The interpretation process of the sentence (2) would be the following:

STEP 1 The lexical structure of the word *school* is activated (Fig. 2).

STEP 2 The predicate *caught fire* selects the aspect BUILDING.

STEP 3 The selection of the aspect BUILDING highly activates other senses, forming an activation package—including PARTICIPANTS.

STEP 4 The predicate *was celebrating* requires an agential argument. Normally, these agents are the participants of the institution. The sense PARTICIPANTS -that is already activated- is selected.

STEP 5 The sentence ends so the selected aspects are interpreted as senses of the word *school*.

The copredicative sentence is then, interpreted as follows:

(2b) The building of the school caught fire, when the group of participants of the same school was celebrating 4th of July

It is important for the interpretation of the sentence that the building and the participants are aspects or realisations of the same school. Thus, the sentences are true only if there is a school-institution, whose participants were celebrating 4th of July and, during the celebration, the building of the institution caught fire. It seems that aspects have an individuation criteria encoded. Depending on the predicational ambient and other previously selected aspects in the activation package, the denoted object has different individuation criteria. For example, the predicate *caught fire* selects the aspect "building" of the structure. The school is individuated as the particular building/buildings that physically realise the school-institution; the predicate *was celebrating 4th of July* individuates the school as the particular group of participants that normally participate in the activities of that school-institution and that were celebrating 4th of July at the physical realisation of the school. Now, remember sentences in (10):

(10) a. The company was in the demonstration
b. The company met at the boardroom

According to the Activation Package Theory, the word *company* in sentences (10a) and (10b) have different denotations. The lexical structure of the word *company* would not be very different from the one represented in Fig. 2. It is an institution that has some purpose or telos; it requires a social organisation; a temporal organisation; a group of agents that participate in the activities of the institution, a

building that physically realises the institution and where most of the activities take place, etc. In (10a), the word *company* denotes a person or a group of people that represents the company in the demonstration (social representatives). So when the whole structure is activated, the aspect "social representation" is selected. In (10b), the word *company* denotes a group of people that are the participants of the institution and that are at the meeting. Sentence (10a) is true if there is a person or group of persons at the demonstration that socially represent the company. Sentence (10b) is true if there is a group of participants (workers) of the company that met at the boardroom. Now, remember the sentence *Microsoft was at the conference.* In this case, it is clear that there is one representative who is at the meeting. This particular person represents the institution. The aspect "social representative" is selected.

Sentential meanings determinate which contents and which truth-conditions an utterance of a sentence may have. They specify a defined number of situations in which the sentence will be true. Speakers and hearers have to select among the different possibilities given in the structure of the word. The activation-selection process implicates that the copredicative sentence is a shorthand of a coordinated sentence (see: Ortega-Andrés & Vicente, 2019; Segal, 2012; Vicente, 2019). Therefore, understanding the truth conditions of copredicative sentences derive from a process of sense decompilation (remember steps I–V) and the assignment of each predicate to its respective denotation. Now, let us see the propositional content sentences (1) and (2):

(1') The books [physical realisations of content-books] are thick and the book [the same content- books] are interesting
(2') The school [physical realisation of institution-school] caught fire and the school [group of occupants [of the same physical realisation of the institution-school]] was celebrating 4th of July when the fire started

The speaker expresses something like (1') or (2') by using a word that compiles both senses. The word *books* [physical realisations] denotes the physical realisation of the specific content and the informational content it transmits. The denotation of the word *school* [building] is the building that physically realises one particular institution and also the group of people that normally participate in the activities of the same institution.

All the examples I have used are explained by conjoined predicates. This proposal does not intend to explain all cases of copredication, but only the most typical cases. Eventhough, there may be other structures that seem to be formed in a different way and the model is also able to explain many of them, including anaphoric cases. For example, consider the following sentences:

(20) a. The red book is interesting
b. The book which is interesting, is red

(21) We pick up a book from the library. After reading it, I think it is very well-written

Even when in these cases coordination may not seem so obvious, STEPS 1–5 could be used to explain the content of sentences in (20). In (20a), the adjective *red* suggests that the sense that must be selected is some physical object, because colours are normally properties that physical objects have. Therefore, when the word *book* is interpreted, the whole structure is activated but the aspect "physical object" is rapidly selected. The selection of the aspect "physical object" activates other aspects of the structure, like "informational content". The predicate *is interesting* selects the aspect "informational content". Both aspects of the word form an activation package. The word *book* in this case has two senses: the informational content and the physical object. In (20b), the adjective *interesting* selects the informational content and highly activates other aspects, including the physical object, which is selected when the hearer encounters the word *red.* The content of sentences would be interpreted as follows:

(20a') The red [physical-object of the] book [realises an informational content that is] interesting
(20b') The book, which[/whose] [informational content] is interesting [has a physical realisation that] is red

In (21), when we read the word *book*, the whole structure is activated, but the aspect physical object is selected by the predicate *pick up.* The aspect physical object highly activates other aspects, including the content, which is selected by the predicate *reading (it)*, we know that it refers to some aspect related to the physical object of the book, but the predicates select different aspects of the same activation package. So the sentence is interpreted as follows:

(21) We pick up a [physical realisation of a] book from the library. After reading [the informational content of the same physical object] (it), I think (it) [the narrative style of the same book] is very good written

In the following sections, I show how this approach solves some issues that I have presented before: the counting puzzle and the locative properties apparently predicated about informational contents.

### 3.3 How Do we Count Books?

Following the Activation Package Theory, a book normally requires some physical realisation for being read (it could be a paper-book, a file in an e-book, etc.). The structure of the word *book* contains information of the physical object—that is, the physical realisation of the informational content—. In S2, the books (informative contents: EW and LO) are physically realised by each physical object or volume (A and B).

Therefore, the sense of the word *book* as object in (7b) stands for the physical realisations, while the sense of the word *book* as content in (7a) stands for the

informational-contents. In (7c) both senses in the structure of the word *book* are selected, so the adjectives cannot disambiguate what we are counting in (7). Consider again sentences (7) and (13) in S:

(7) a. There are (at least) three interesting books
b. There are (at least) three heavy books
c. There are (at least) three interesting and heavy books

(8) There are (at least) four interesting and heavy books

S: I have three physical books (A, B and C). Each of them contains three different novels from Margaret Atwood: *The Edible Woman* (EW), *Lady Oracle* (LO) and *Hag-Seed* (HS). The three contents (EW, LO and HS) are interesting and the three copies (A, B and C) are heavy.

Each sense has its own individuation criterion and it changes depending on the predicational surrounding. Thus, sentence (7a) (normally) means that there are three or more informational contents that are interesting, but we do not know how many physical objects there are. Sentence (7b) means that there are at least three volumes (physical objects) that are heavy, but we do not know how many informational contents they contain. Sentence (7c) means that there are at least three informational contents that are interesting and three volumes that are heavy and that the three volumes are physical realisations of the informational contents. Sentence (13) means that there are at least four informational contents that are interesting and four volumes that are the physical realisations of the informational contents.

In (7c) and (13) the lexical structure of the word *book* is activated and the aspect "informational content" is selected. Thus, books are individuated as a particular number of informational contents. The selection of the aspect "informational content" highly activates the activation package and the aspect "physical object" is selected, so books are individuated as the volumes. In short, when the sentence is interpreted, the predicates *is interesting* and *is thick* select the two senses in the structure and they are individuated as three or four physical objects and three or four informational contents. Sentences (7c) and (13) would be paraphrased as follows:

(7c') There are (at least) three interesting books [informational content] and (at least) three physical instantiations of the informational contents are heavy
(13') There are (at least) four interesting books [informational content] and (at least) four physical instantiations of the informational contents are heavy

According to these ideas, it is expected that sentences in (7) and (13) would generally be considered true in contexts in which the following conditions meet:

(7a) There are (at least) three interesting books

i There is a plurality of at least three informational contents
ii Each informational content is interesting

(7b) There are (at least) three heavy books

i There is a plurality of (at least) three physical books
ii Each physical book is heavy

(7c) There are (at least) three interesting and heavy books

i There is a plurality of (at least) three informational contents
ii Each informational content is interesting
iii There is a plurality of at least three physical books that instantiate the informational contents
iv Each physical instantiation is heavy

(13) There are (at least) four interesting and heavy books

i There is a plurality of (at least) four informational contents
ii Each informational content is interesting
iii There is a plurality of at least three physical books that instantiate the informational contents
iv Each physical instantiation is heavy

In S, sentences in (7) would be true, because there are three physical books and three informational contents. On the contrary, (13) would be false, because there are not four books in S. A consequence of this theory is that sentences (7c) and (13) are not expected to be true in many cases. For example, (7c) should not be true in a context where there are three copies of the same volume that contains one novel. Thus, it may be possible to create a context in which sentence (7c) generates this particular true reading, however, intuitively speaking, it seems that our first interpretation of the sentence is that there are three volumes and three contents, which means that another plausible reading of sentences (7c) and could be that there are three/four heavy volumes and each volume contains three/ four different interesting informational contents.

### 3.4 Can *My Brilliant Friend* be on the Table?

According to the Activation Package Theory, when the hearer encounters the word *book*, the whole structure of the word is activated. The predicate *is on the table* requires a physical object, so the aspect "physical object" is selected. In principle, that would mean that the book is individuated as a physical object. Now, remember sentences (14)–(15):

(13) There is one book on the table: *My brilliant friend*
(14) Every book Emely Bronte wrote is on the shelf

In (14) the denotation of the NP *one book* is one physical object. It is therefore unclear how it is possible that the physical object referred is *My brilliant Friend* (the content). Considering that Emily Bronte has written only one book, how could we refer to physical copies in (15)? Generally speaking, sentence (14) intuitively means that there is one volume on the table and its content is *My Brilliant Friend*. In this

case, the predicate *is on the table* selects the physical realisation. The next step (see steps I–IV) is that the selection of the aspect "physical object" highly activates the senses that conform the activation package, so the aspect "informational content" is available for being selected. The NP *My Brilliant Friend* selects the aspect informational content in the structure. The sentence is interpreted as follows:

(14') There is one book [physical object] on the table that physically realises the content *My brilliant friend*

According to the Activation Package Theory, in (15) the word *book* activates the lexical structure and *Emely Bronte wrote* selects the aspect "informational content" and individuates the book as the informational content that she wrote. The selection of this sense highly activates other senses and the predicate *is on the shelf* selects the physical object. Thus, the propositional content of (15) is (15') and it is true if there is at least one copy of that informational book on the shelf:

(15') Every informational content Emily Bronte wrote has a physical realisation on the shelf

Now, let us think about sentence (18):

(18) *The Second Sex* is thick

If the predicate *is thick* selects the aspect "physical object", then how is it possible that we can say something like *The Second Sex is thick*? Sentence (18) does not mean that a particular physical object is thick, but that any physical realisation of the content *The Second Sex* is thick. Thus, there is a type mismatch between both senses: the predicate *is thick* normally requires a physical object, however, the argument is an informational content. The mismatch is easily solved because both senses form an activation package, so when the NP *The Second Sex* activates the structure, and the aspect "informational content" is selected, the aspect "physical object" is also activated. The predicate *is thick* selects the aspect "physical object" from the activation package. Thus, *The Second Sex* in sentence (18) actually refers to any possible physical realisation of the content *The Second Sex*: (18') Any physical realisation of the content *The Second Sex* is thick.

In summary, it is not the case that informational contents can be on shelves or tables, but their physical realisations very commonly have these properties. We can predicate locative properties about informational contents in virtue of their physical realisations. Even when physical objects and informational contents are different entities, they stand for aspects in the structure that form activation packages. Thus, the selection of one aspect allows the highly activation and selection of the other and the properties we predicate about them are easy to recuperate.

## 4 Conclusions

Investigating the denotation of copredicative nouns requires answering many questions that arise, like the counting puzzle in quantificational copredicative sentences and the predication of locative properties to abstract objects. These issues have been broadly investigated from the semantic perspective. In this paper, I have studied the philosophical and ontological consequences that stem from these debates. The individuation and persistence conditions are significant issues that must be considered when we propose an ontological theory, even when the aim we are trying to accomplish is not purely ontological or metaphysical.

I have argued that the Activation Package Theory makes some important claims that contribute to our understanding of language. The aim of this paper was not to present arguments against those theories that do not give a definite answer to certain problems, but to set out the limitations of many theories and to suggest some paths that could be followed to resolve them. As a consequence, some semantics theories (like Gotham's theory and Asher's theory) may turn out to be compatible with the idea of activation packages if we rethink some of their metaphysical claims.

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