The Polysemy in Georges Perec's Crossword: Culioli's Modelling Approach

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Abstract. This article presents a discussion on polysemy in a crossword by Perec. We apply Culioli's modelling approach in terms of operation of location and construction of a notion and its notional domain. Polysemy is seen as part of the intangible cultural heritage within languages.

Keywords: Polysemy, Operation of Location, Modelling, Crosswords, Semantics.

1 Introduction

In the last five years (2019-2024) there have been the following trends in the research on crossword puzzles based on some spheres of use and some practical applications**.**

The main area where crossword solving can be applicable is for pedagogical purposes according to target groups, subjects to learn and abilities to develop. The examples given here will comprise mainly university students in their BA, MA or PhD studies, although research on the effect of solving crossword puzzles for educational purposes is yet to find its place in the educational process from lower secondary to upper-secondary education as well. The majority of subjects we have come across and where crossword puzzles can be of assistance are in a variety of spheres: in chemistry for assessing students' understanding of the Periodic Table of Elements before and after using crossword puzzles (Rahayu et al., 2023); in medicine for simplifying medical terminology learning for healthcare students by an online chatbot, Termbot (Hsu et al., 2023), for reinforcing concept retention among students in undergraduate dental program's restorative dentistry module (Qutieshat et al., 2022) or for strengthening and consolidating knowledge and concepts studied during lecture time (Nirmal et al., 2020); in specialized language learning for mastering vocabulary (Sandiuc & Balagiu, 2020); in physics for vocabulary-building activities (Rambe et al., 2019) and sciences in general mostly where terminology needs to be studied and acquired. There are distinctive benefits of using digitally enhanced crossword puzzles in the teaching and learning processes, where active learning experience and revision is provided and critical thinking (Mshayisa, 2022), deeper comprehension and revision (Pearson, 2020), practical use (Franco & DeLuca, 2019), teamwork, self-evaluation and reflection

(Joshi, 2021) take place intensifying the process of learning and assisting in-depth knowledge acquisition.

Another possible area of digitized crossword puzzle application is for medical purposes to test cognitive abilities and to find solutions for health issues by combining several approaches, crossword solving included. Transcranial direct current stimulation (tDCS) is popular for modulating cortical excitability in individuals with disabilities, but its efficacy in older adults is unclear (Rodrigues et al., 2023) However, improvement was noticeable in participants in the project and their learning response of crossword puzzles. Cognitive training and games are also well-received for treating medical conditions in Cancer-related cognitive impairment (CRCI) (Von Ah et al, 2023), suggesting potential for long-term implementation. Computerized cognitive training (CCT) was explored as a possible therapy for mild cognitive impairment (MCI) (D'Antonio et al., 2019). Other scientists (Pressler et al., 2021) have come to the conclusion that further research is needed to assess more accurately the effects of computerized crossword puzzles. The benefits of applying CCT (Ng et al., 2021) were seen in improving the cognitive abilities for people throughout their whole lifespan as well as being extremely cost-effective and more practicable if delivered over the Internet. Reducing the risk of dementia in senior citizens (Wu et al., 2023) by engaging in certain mentally stimulating activities in older age is associated with a reduced risk of dementia. Specifically, activities like adult literacy, playing games, and doing puzzles were linked to lower dementia risk. Likewise, cognitive informal activities (Cegolon & Jenkins, 2022) like solving crossword puzzles, playing chess and cards turned out to slow down the process of cognitive decline, and not just in people over 50 years of age.

2 Exposition of the Investigation

The elaboration of semantic models is justifiable considering the above-mentioned applications of crossword puzzles and their digitalization.

2.1 Possible Approaches for Crossword Digitalization

The latest approaches (2019-2024) comprise the development and application of models for digitized or automated creating and solving of crossword puzzles. Thomas and Sangeetha (2020), for example, have proposed a model for an automated solution generator, drawing upon the WordNet (the lexical database for English) and the lexical relations in this database. Possible solutions are then generated using this database, which helps define the words hidden behind the prompts given. Looking for algorithms (Gourvès et al., 2024) for filling crossword grids by respecting the rule of no reuse of words is an approach that looks at conventional crossword filling puzzle where the structure of the graph takes the shape of a tree. If the rule of using a word just once is applied, the difficulty comes from "structural restrictions". But even if the reuse of words is permitted, fixed-parameter tractability cannot be obtained and the results are far from positive. Using the Proverb crossword solver (Littman et al., 2002) through an

open framework, distinct modules tackle particular clue types leveraging concepts from information retrieval, database querying, and machine learning. Each specialized module produces a candidate list for every clue, which is then consolidated and integrated into the puzzle grid by a centralized solving mechanism. Last but not least, Blum and Vempala, (2020) explore human capabilities in computation, focusing on cryptographic protocols, puzzles, and games like sudoku and chess. To address this, the researchers propose a model of human computation and complexity measures.

2.2 Polysemy in Crossword Puzzles

Among the types of main procedures used in the development of definitions in crosswords, Drillon (2015) points out polysemy, a linguistic phenomenon discussed by Bréal (1897), who defines polysemy as one of the "laws" in semantics. According to this "language law", more than one diverse meaning can co-exist in one linguistic unit, adding new ones to the previous meanings, so that the literal meaning exists alongside the metaphorical, the specialized terminological meaning and the general, abstract and concrete ones, *etc.* Moreover, once a given meaning has appeared, it is not lost, and even if it becomes obsolete and is even no longer used, it passes and is preserved in the historical (diachronic) dimension of meanings and remains in the collective memory as cultural heritage. This property of language to infinitely multiply the meanings of its linguistic units is supposed to be inseparable from cultural diversity, because each meaning is associated with a certain momentary intellectual and social condition of a given culture. Thus, even in this early definition, a hypothesis was stated that places polysemy in a socio-cultural dimension.

Polysemy is not at the heart of the concerns of structuralists and remains neglected for a long time in linguistic studies. It was the cognitivists who started conducting research on polysemy. Recent cognitivist linguistics research (Palma & Theissen, 2023; Col et al., 2020; Col, 2017; Laffargue, 2019, Strappazzon, 2018; Dostie, 2018; Pauly, 2010) defines polysemy as a linguistic phenomenon of essentially semantic interest. All these diverse studies converge, since they treat polysemy as a plurality of meanings. Polysemous linguistic units, however, always represent the connection with the subject's experience of the world and the forms of expression of that experience. The study of polysemy revolves around the subject as a social and cultural entity and the utterance it generates.

2.3 Relations of Location and Culiolian Discussion of Polysemy

The *relation of location* (Culioli 2020a) is a fundamental notion in the theory of operations of enunciation (TOE) (Culioli, 1999, 2020a, 2020b) of the French linguist Antoine Culioli (1924 – 2018) since each term or linguistic item is always located to another one in the act of enunciation and during the construction of an utterance. The operation of location is in fact a linguistic operation, which establishes a relation between two terms, x and y, where x is in relation of location to y, so that y becomes the *locator* and x is the *locatum*. The *locator* is the one, which provides a property determination allowing the existence of the *locatum*. Thus, there is no isolated term or

linguistic item in a way each term or linguistic item acquires a *referential value* if it is immersed in a *system of location*. Instead of therefore talking about the *polysemy* of the *livre [book]* (Culioli 2000), we should think of values such as *lecteur [reader]* and *lisible [readable]*, for example, with which *livre [book]* is associated, i.e. for which *livre [book]* is *locator*. They, *lecteur [reader]* and *lisible [readable]*, in turn relate / locate to others, such as *écrit [writing]*, *écrivain [writer]* and so on. Referentiality therefore resides in the continuity and dynamism of the relationships of location between these values and allows the construction of the *class of occurrences* of '*livre' [book]* and the *notion* of /*livre*/ *[book]*. This guarantees the *deformability of linguistic units*. The class of occurrences of '*livre' [book]* and the notion of /*livre*/ *[book]* are not pre-constructed, nor pre-defined, but are developed according to the speaker's subjectivity, which is conditioned by the speaker's own experience and the values that the speaker attributes to his/her own representations, as well as by his/her subjective grammar and pre-lexical practices of a cognitive nature.

The operation of location is denoted ∈ and it can take three values: *identification* (denoted =), *differentiation* (denoted ≠) and *disconnection* (denoted ω). These three values have their discourse markers. The personal pronouns are typically markers for indicating subjective location (identification: *je [I]* ; differentiation : *tu [you]* ; disconnection : *il/elle [he/she]*), while the tense forms are some of the discourse markers for spatio-temporal location (*présent* (present tense) for identification, *passé composé* (present perfect / perfect tense) for differentiation and *passé simple* (past simple tense) for disconnection). Discourse markers can be of any kind and are not limited to the examples above.

The three types of operation of location are in the regulator of the construction of a /*notion*/ (denoted /…/) such as /*livre*/ *[book],* and its '*class of occurrence*' (denoted '…') such as '*livre*' *[book]*. In the case of identification, the *interior* of the notional domain is constructed, where the occurrences have all the constitutive properties of the notion. In the case of disconnection, an *exterior* of the notional domain is defined and the occurrences have none of the properties of the notion. Finally, the *boundary,* which is a result of a differentiation, is the hybrid zone of the notional domain in a way the occurrences combine the properties from the interior and the exterior.

Finally, constructed from a notion, the notional domain allows the structuring of a class of occurrences associated with it. The notional domain is thus organized around an occurrence, a typical linguistic unit, which is used as reference and is called organizing centre.

2.4 A Culiolian Approach to Grid N 1 by Georges Perec

The polysemous property of linguistic units is used as the main crossword making procedure when creating the relationship *Definition – ANSWER* II, III, VII, X horizontally and 4, 10 vertically of grid N 1 by Georges Perec (2012 [1999])[1]:

II. Évitent de moucher. - ÉTEIGNOIRS
[Avoid snuffing (out). – CANDLE EXTINGUISHER]

[1] Proper names and idiomatic expressions in position of an answer are not considered here.

III. Elles ont peut-être rencontré les précédents. – ATTRISTÉES
[They may have encountered the previous ones. – SADDENED]
X. Difficile d'avoir une touche avec elles. – SENSITIVES
[Difficult to keep in touch with them. – SENSITIVE]
10. Ce ne sont pas les mêmes dans la salle et sur le plateau. – ASSISTANTS
[They are not the same in the theatre hall and on the film set. – ASSISTANTS]

In the majority of these cases, it is the polysemous property of the answer, which is the basis of the creation of the definition. A good definition must then respect the principle of the double index (Drillon, 2015) and offer the crossword doer at least two markers, which lead to the correct answer.

***SENSITIVES* and *ASSISTANTS* or Relation of Location within Polysemy**

The polysemous property is seen in answer *10- ASSISTANTS* and in *touche* as part of the definition *X*. In each of the two definitions, *X.* and *10.,* there are two markers of a grammatical nature, *elles [them]* and *Ce… sont… [They are]*, which function as *locator,* term *y*, to which the *locatum,* term *x*, *SENSITIVES* and *ASSISTANTS*, refer. Two relations of grammatical location are thus established between the terms *x* and *y*, which guarantee the grammatical forms of feminine plural and plural. The term *x ASSISTANTS* is also located to the two terms *dans la sale [in the theatre hall]* and *sur le plateau [on the film set]* which are presented as *locator* terms *y*. These relations of spatial location confirm actually the lexicographic *general* meaning and specific *cinematographic* meaning of the polysemous linguistic unit *assistant*[2]. Each of the units *dans la salle* and *sur le plateau* is on the other hand in relation of negative location with *pas les mêmes [not the same]*. Finally, *SENSITIVES* is located to the polysemous *touche*[3], in a way to allow the collocation « touches sensitives » [sensitive keys], which discards the polysemy and directs towards the correct answer.

As a result of the above relations of location, *ASSISTANTS* is associated with referential values *Ce ... sont …* [*They are*], *dans la salle [in the theatre hall]*, *sur le plateau [on the film set]*, *pas les mêmes [not the same]*. Likewise, *SENSITIVES* is associated with its referential values. In a Culiolian perspective on referentiality, this allows the construction of the meaning of *SENSITIVES* and *ASSISTANTS.* Due to the singular referentiality provided by Perec, the crossword definitions of *SENSITIVES* and *ASSISTANTS* differ from the lexicographical definitions of « sensitif » and « assistant ». This singular referentiality thus demonstrates the deformability of linguistic units, since it distorts their lexicographic semantics. However, it is not possible to indicate the successive order of the above operations of location.

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[2] The general meaning: *Personne présente en un lieu déterminé, là où se déroule un événement* [Person present at a specific location, where an event takes place]. The cinematographic meaning: *Assistant monteur, assistant-opérateur.* [Assistant editor, assistant operator]. (https://www.cnrtl.fr/lexicographie/assistant).

[3] In French *touche* means both *key* and *contact, touch* (for ex. *keep in touch with sb*).

ÉTEIGNOIRS and *ATTRISTÉES* or Construction of a *Notion* and Its *Notional Domain*

There are relations of location between *ÉTEIGNOIRS* and its referential values *-ent [*grammatical mark of plural*]*, *moucher [snuff out]*. These locations and referentiality lead to the construction of the crossword definition *Évitent de moucher [Avoid snuffing (out)]* of the crossword answer *ÉTEIGNOIRS [CANDLE EXTINGUISHER]*. In the Culiolian perspective, the operation of location is the regulator of the construction of a /*notion*/ such as the crossword answer /*ÉTEIGNOIRS*/ and its '*class of occurrence*' such as '*ÉTEIGNOIRS*'. Each linguistic item such as *-ent*, *moucher,* is thus related to '*ÉTEIGNOIRS*' by identification, differentiation or disconnection, which are the three types of operation of location. There is an identification between *ÉTEIGNOIRS* and *-ent*, since the grammatical form of plural is guaranteed and the interior of the notional domain of the notion /*ÉTEIGNOIRS*/ is established. There is also a differentiation between *ÉTEIGNOIRS* and *moucher,* since the semantics of the former differs in a degree from the semantics of the latter[4]: both refer to extinguishing candles and *moucher* thus shares a property of the occurrence *ÉTEIGNOIRS*. However, *moucher* indicates the process, while *ÉTEIGNOIRS* indicates the object of extinguishing. As a result, the hybrid zone of the boundary of the notional domain of the notion /*ÉTEIGNOIRS*/ is established. There is no exterior of this notional domain.

In a similar way, the notional domain of the notion /*ATTRISTÉES*/ is constructed. There is an identification between *ATTRISTÉES [SADDENED – f.pl.]* and *Elles [They – f. pl.]*, since the grammatical form of feminine plural is guaranteed and the interior of the notional domain of the notion /*ATTRISTÉES*/ is established. There is a differentiation between *ATTRISTÉES [SADDENED – f.pl.]* and *les précédents [the previous ones – pl.]*, since the grammatical form of plural is guaranteed, but the grammatical form of feminine is not confirmed. Consequently, *les précédents* shares a property with the organizing centre *ATTRISTÉES*, but not all its properties, and the boundary of this notional domain of the notion /*ATTRISTÉES*/ is established.

However, the operation of location in the case of *ATTRISTÉES* is not limited to the only definition *III.* and its answer, but goes to the answer *ÉTEIGNOIRS* of the previous definition *II*. There is a differentiation between *les précédents [the previous ones]* and *ÉTEIGNOIRS [wet blanket, spoilsport, killjoy]*. As *éteignoir* in French is polysemous[5], a boundary of the notional domain of the notion /ATTRISTÉES/ is established, since

[4] The lexicographic meaning of *moucher*: « *Couper le bout de la mèche consumée qui empêche la chandelle d'éclairer » [Cut the end of the burned wick which prevents the candle from lighting]*. The lexicographic meaning of *éteignoir:* « *Petit ustensile conique et creux dont on se sert pour éteindre les bougies, les cierges, les chandelles, en le posant sur la mèche enflammée » [Small conical and hollow utensil used to extinguish candles, tapers, candles, by placing it on the burning wick]* (https://www.cnrtl.fr /definition/).

[5] In French *éteignoir* is polysemous and means *A. candle extinguisher, B. wet blanket, spoilsport, killjoy* (https://www.cnrtl.fr/definition/%C3%89TEIGNOIR). In the definition *II*, *éteignoir* is used with its meaning *A.*, while in the relation of location with *les précédents* of the definition *III*, it is used with its meaning *B*.

ÉTEIGNOIRS does not share all properties with /ATTRISTÉES/, but only some of them.

As a result, a syntactic relation is constructed, since the horizontal cells of II and the horizontal cells of III are connected. Thus, the last operation of location contributes to the syntactic organization of the N1 grid. According to Perec's classification of crossword definition (2012 [1999]), such definitions "find their reference in the very lexis of crosswords" and should be considered as meta-definitions within the integrity of a crossword grid. Therefore, metadescriptive property is added to the notional domain of the notion *ÉTEIGNOIRS,* which contributes to the stylistic singularity of Perec's grid N1.

In both cases, */ÉTEIGNOIRS*/ and /ATTRISTÉES/, no exterior of the notional domain is defined.

3 Conclusions

We started our research by pointing out two main applications of crossword puzzles, the pedagogical area and the area of health care. Both areas converge in a way they mainly use computerized crossword puzzles. This use justifies the research towards the elaboration of semantic models of crossword puzzles. However, in this study, we did not come out with a formalized semantic model. As a linguist and according to the Culioli's point of view[6], we only assumed the task of describing in explicit way the primitive rules underlying a semantic model of a crossword puzzle.

The above descriptions rely on the Culiolian concept of operation of location as a main regulator of the construction of the notion and its notional domain with its three zones, the interior (defined by identification), the boundary (defined by differentiation) and the exterior (defined by disconnection). The Culiolian concept of the construction of a notional domain allows to take into account the semantic and syntactic particularity and the stylistic singularity of the crossword author.

The approach to polysemy in the enunciative dimension of crosswords enriches our scientific knowledge on the way in which grids are constructed. Polysemy contributes to the syntactic particularity of the organization of a grid and therefore contributes to the stylistic singularity of the crossword author.

The polysemous units are not the same in different languages: the ones in French, which were studied above, do not always have an exact equivalent in English. The polysemy phenomenon, which is largely spread in languages, is carried out by specific for each language linguistic units thus contributing to the variety of languages. Although UNESCO pays special attention to oral language traditions and expressions, including riddles, as a vehicle of the intangible cultural heritage

[6] «Le linguiste n'est pas à singer le mathématicien. Son travail est de construire une théorie pré-formalisée, comportant des expressions primitives et des règles explicites de construction, […]» ["The role of the linguist is not to imitate the mathematician. Her/his work is to construct a pre-formalized theory, comprising primitive expressions and explicit rules of construction, […]"] (Culioli 2020a:33).

(https://ich.unesco.org/en/oral-traditions-and-expressions-00053), languages are generally considered intangible cultural heritage.

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Received: March 15, 2024
Reviewed: April 23, 2024
Finally Accepted: May 15, 2024