

## Analyzing Combinatorial Properties of Polysemic Lexical Units to Characterize Metaphorical Links

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### Abstract

The DiCo is a formal database describing derivational and combinatorial properties of French lexical units. The work presented in this paper exploits the information provided by the DiCo in order to propose a typology of lexicalized metaphorical meanings. According to the degree of “activeness” of the metaphors, we will suggest different lexicographic treatments for metaphorical meanings.

### 1 Introduction

It is a well known fact that metaphorical lexical units appearing in dictionaries are “dead ones” (Ricoeur, 1975): their use is no longer regarded as a part of a process of metaphor since they are lexicalized. Consequently, most of the time, dictionaries don't give any characterisation of the link holding between a metaphorical lexical unit and the lexical unit it is derived from. However, all those metaphors can't be treated the same way. Considering that some of them are stronger than others, we propose to distinguish here different types of metaphors. We assume a **polysemy link** is oriented and holds then between a **source** lexical unit and a **target** lexical unit that share the same form and a common semantic component. A **metaphorical meaning** is a derived lexical meaning by means of a metaphorical polysemy link. For instance, the target lexical unit *birth#2* (of a nation) has a metaphorical meaning derived from the source lexical unit *birth#1* (of a child) by means of a metaphorical polysemy link. Roughly, a metaphorical polysemy link relies on an analogy between the denotations of a source and a target lexical units: in our example, the analogy consists in the notion of “beginning”. We will characterize these different metaphorical links using the DiCo, a combinatorial dictionary for French developed at the OLST (University of Montreal) according to the principles of the Explanatory and Combinatorial Lexicology (ECL) (Mel'čuk *et al.*, 1995). This database is a good reference since it provides various information on lexical units (accidental structure, semantic type of lexical units, syntactic and lexical combinatory, semantic derivals, etc) (Jousse and Polguère, 2005).<sup>1</sup> We will focus on lexical combinatory to build up

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<sup>1</sup> The Dicouèbe, the online version of the DiCo database is available at <http://olst.ling.umontreal.ca/dicouebe>. See (Steinlin *et al.* 2004)

our typology. The first section of the paper presents our corpus and the methodology we adopt. The second one will show our results and the conclusions that can be drawn from the analysis of the data.

## 2 Methodology

### 2.1 Corpus

We have extracted from the DiCo nomenclatory a set of a hundred pairs of nominal lexical units. Each of them is made of a metaphorical lexical unit and the lexical unit it is semantically derived from. For example, the pair CLÉ (*key*) contains *clé#1* 'instrument' and *clé#2* 'means to access something'. The selected nouns denote on the one hand entities (concrete as well as abstract) and on the other hand facts.

### 2.2 Hypothesis

We assume that the more we observe common collocations between the two lexical units of one pair, the stronger the metaphoric link is. To determine the strength of the metaphorical link, we have to consider two types of criteria: first, the position of the lexical units in the link (source or target) and secondly, their semantic type (*eg.* person, artefact, feeling, event, characteristic, etc). In the DiCo, semantic types are represented by semantic labels organized in a hierarchy (Polguère, 2003). We have chosen to compare metaphorical links of lexical units labelled either as entity or its daughters (person, artefact) or as facts or its daughters (event, characteristic), and from that, we do the two following hypothesis.

**The first hypothesis deals with nouns denoting entities.** We assume that the more the target lexical unit is abstract, the more the metaphorical link is strong. To demonstrate that assumption we distinguish two groups of entities among the target lexical units: the concrete ones and the abstract ones. "Concrete" refers here to referents that can be apprehended by the human senses (*Nouveau Petit Robert*, 2000). For example, the pair *flèche#1* (concrete) and *flèche#2* (concrete) belongs to the first set, whereas the pair *plaie#1* (concrete) and *plaie#2* (abstract) belongs to the second one.

**Our second hypothesis deals with the comparison between nouns denoting entities and those denoting facts.** The metaphorical links that apply on lexical unit labelled fact (process, achievement, state ...) may be stronger than the ones that apply on lexical unit labelled entity. For example, we suppose that the metaphorical link between the two meanings of *combat* (*fight*) (see above) is stronger than the one holding between the two meanings of *flèche* (*arrow*).

## 3 Analysis

### 3.1 Analysis criteria

As previously mentioned, we will use restricted lexical cooccurrence (*i.e.* collocations) as a criterion to distinguish different types of metaphor's strength. We identify the intersection between the set of collocatives controlled by the source and the one controlled by the target. In the DiCo, collocations are encoded by means of lexical functions that represent the semantic relation holding between a lexical unit and its collocative(s). For example, **Labreal12**

(*torchon#1=dishcloth*) = *essuyer (to wipe)*, **Labreal12** (*ciment#1=cement*) = *enduire (to plaster)*; **Magn** (*gifle=slap*) = *magistrale (stunning)*, **Magn** (*victoire=victory*) = *écrasante (overwhelming)*. We can thus rely on this formal descriptive tool to help us characterize more precisely the intersection. In other words, the intersection will be considered from both a quantitative and a qualitative point of view.<sup>2</sup> More precisely, as our corpus is exclusively made of nouns, we will focus on adjectival collocatives (*overwhelming victory, bitter fight*, etc.) and verbal collocatives (*to give a slap, to deal a slap, to celebrate a victory*). Let us now analyse our data in two steps. The first one will concern entities. The second one will deal with facts.

### 3.2 Metaphors of entities

We have compiled some of our results in two tables (Fig.1 and Fig.2) presented below. The first table represents the collocatives intersection and the second, their differences. Empty cells mean that the intersection is null. For instance, the two lexical units of FLECHE share neither adjectival nor verbal collocations.

Lexical unit	Adjectival collocatives	Verbal collocatives	
Fleche#1 ( <i>arrow#1</i> )			
Fleche#2 ( <i>arrow#2</i> )			
Mouche#1 ( <i>fly#1</i> )			
Mouche#2 ( <i>fly#2</i> )			
Verrou#1 ( <i>bolt#1</i> )		Installation : mettre, poser ( <i>shoot, bolt</i> )	Break : céder, sauter ( <i>give way, blow</i> )
Verrou#2 ( <i>bolt#2</i> )			
Sentier#1 ( <i>path#1</i> )	Bad : ardu, battu, épineux, semé d'embûches	Use : s'engager, suivre	Orientation : mener
Sentier#2 ( <i>path#2</i> )	arctueux, bêteux, thorny, full of pitfalls	enter, follow	lead

Figure 1. Intersection of collocations for lexical units denoting entities

Lexical units	Adjectival collocatives		Verbal collocatives	
Fleche#1 <i>arrow#1</i>	Bad : empoisonnée <i>poisoned</i>		Realization : atteindre, transpercer, traverser, cribler <i>reach, transf. cross over, riddle</i>	Use : décocher, lancer, tirer, recevoir <i>let fly, throw, shoot, receive</i>
Fleche#2 <i>arrow#2</i>	Orientation : descendante, montante ( <i>down, up</i> )		Realization : indiquer, pointer ( <i>indicate, point</i> )	Use : suivre ( <i>follow</i> )
Mouche#1 <i>fly#1</i>	Type : noire, verte, à merde <i>black, green/bottle, blow</i>	Size : grosse <i>big</i>	Activity : voler, voltiger, battre des ailes <i>bat, flutter about, beat its wings</i>	Sound : bourdonner, vrombir <i>buzz, whir</i>
Mouche#2 <i>fly#2</i>	Type : artificielle <i>artificial</i>		Realization : pêcher, prendre <i>fish, catch</i>	Use : jeter, lancer <i>throw, dump</i>
Verrou#1 <i>Bolt#1</i>	Size : gros, large <i>big, large</i>	Solidity : solide <i>solid</i>	Use : couvrir, verrouiller, installer, actionner, faire jouer, tirer, fermer, pousser <i>unbolt, bolt, bolt down, action, work, slide back, bolt, unbolt</i>	

<sup>2</sup> We will only use "popularisations" of lexical functions (see Polguère, 2000), and we will take the liberty to simplify the encoding.

Verrou#2 <i>lock#2</i>	Last : dernier, ultime ( <i>last, ultimate</i> )	Realization : empêcher, interdire, bloquer <i>prevent, forbid, hinder</i>	
Sentier#1 <i>path#1</i>	Bad : accidenté, escarpé <i>bumpy, precipitous</i>	Use : emprunter <i>take</i>	Orientation : bifurquer, déboucher <i>branch off, come out of</i>
Sentier#2 <i>path#2</i>	Bad : Apre ( <i>harsh</i> )		

Figure 2. Difference of collocations for lexical units denoting entities

As we can see, the above tables emphasize on the fact that a distinction has to be made between target lexical units denoting concrete entities (*flèche#2, mouche#2*) and those denoting abstract ones (*verrou#2, sentier#2*). Indeed, Fig. 1 shows that the pairs FLÈCHE and MOUCHE have no common collocations while they both have their own separate ones, as shown in Fig. 2. On the contrary, the pairs VERROU and SENTIER share collocations, especially verbal ones. We can note that the metaphorical link between *flèche#1* and *flèche#2* and between *mouche#1* and *mouche#2* relies on an analogy of **form** of the concrete objects denoted. As for *verrou#1* and *verrou#2*, and *sentier#1* and *sentier#2*, the analogy relies on the **function** of the concrete object denoted by the source lexical unit. That latter type of metaphor consists in transposing a concrete reality on an abstract one in order to express it. Thus, it seems normal to use collocatives denoting the handling of a concrete object (*faire sauter le verrou = to break a lock*) to denote the handling of the abstract “object” (*faire sauter le verrou de ta volonté (=to break the lock of your will)*). Let’s now compare entities to facts.

### 3.3 Metaphors of facts

Following the same pattern, Fig. 3 represents the collocatives intersection and Fig. 4 represents their differences. They are both presented below.

Lexical units	Adjectival collocations		Verbal collocations		
Combat#1 <i>fight#1</i>	Intense : acharné, âpre, dur, <i>fierce, bitter, hard</i>	End : décisif <i>decisive</i>	Act : livrer, meser <i>fight, carry on</i>	Positive end : gagner, remporter, vaincre, <i>win, carry off, defeat</i>	Phases : Commencer, engager, entamer <i>start, enter, open</i>
Combat#2 <i>fight#2</i>	intense, sans merci <i>severe, merciless</i>			Negative end : perdre, lèse <i>lose</i>	Interrompre, cesser, prendre fin <i>break off, stop, come to an end</i>
Gifle#1 ( <i>slap#1</i> )	Intense :		Realization :		
Gifle#2 ( <i>slap#1</i> )	magistrale, retentissante, violente <i>thorough, resounding, violent</i>		asséner, administrer, donner / encaisser, se prendre <i>throw forward, administer, give / take, receive</i>		
Hécatombe#1 <i>Hecatomb</i>			Positive end : échapper, survivre <i>escape, survive</i>	Negative end : être, être victime <i>suffer from, be subject to</i>	Cause : causer, entraîner, provoquer <i>cause, provoke</i>
Hécatombe#2 <i>Massacre</i>					
Poids#1 ( <i>Pulse#1</i> )			Realization :		
Poids#2 ( <i>Pulse#2</i> )			battre, prendre, léter, sentir ( <i>pound, take, touch, feel</i> )		

Figure 3. Intersection of collocations for lexical units denoting facts

Lexical units	Adjectival collocations		Verbal collocations
Combat#1 <i>fight#1</i>	Intense : sanglant, meurtrier <i>bloody, murderous</i>	Not intense : léger <i>light</i>	Negative end : être défait <i>be defeated</i>

Gifle#1 <i>slap#1</i>	Intense : forte, sonore strong, resounding	Deserved : méritée deserved	Realization : envoyer, lancer, lancer throw, slash, give	Beginning : tourner la joue turn the cheek	
Gifle#2 ( <i>slap#2</i> )	Intense : Cinglante ( <i>blow</i> )		Realization : essuyer ( <i>suffer</i> )		
Hécatombe#1 <i>Heccatomb</i>	Intense : épouvantable, grande ( <i>abysmal, great</i> )		Positive end : Récupérer ( <i>come through</i> )		
Hécatombe#2 <i>Heccatomb</i>					
Pouls#1 <i>pulse#1</i>	Intense : Rapide, précipité Quick, rapid	Not intense : Faible, lent Weak, low	Bad : anormal, irrégulier anomalous, irregular	Realization : chercher, tester, vérifier take, check	Behaviour : ralentir, affaiblir slacken, weaken
Pouls#2 ( <i>pulse#2</i> )					

Figure 4. Difference of collocations for lexical units denoting facts

As we can see in Fig. 4, target lexical units have no or few collocatives of their own. Indeed, their sets of collocatives are most of the time included in the set of the source collocatives. This consideration can be explained by the fact already mentioned that an abstract situation has to be expressed by means of concrete terms (eg. *prendre le pouls de* = *take the pulse of*). However, source lexical units have more collocations because we suppose that some of them can't be imported by the metaphor: for example, every collocation that deals with a specialization (eg. *catastrophe maritime, aérienne* = *sea, air disaster*) won't be in the target's set of collocatives. This can also be explained by the polysemic nature of the collocative: for example, relational adjectives are less prone to have metaphorical meaning. More generally, collocatives with metaphorical meaning (eg. *gifle retentissante* = *resounding slap*) will be more easily imported by the target lexical units.

Now comparing Figure 1 and 2 to Figure 3 and 4, we can see that facts tend to have greater intersections. It means that facts generate metaphors that are stronger than the one generated by the entities. One possible explanation, as facts denote whole situations, is that the analogy relies on more than one aspect of the denotation. For instance, *Combat#2* borrows to *Combat#1* the actants (*adversaire, victime* (= *opponent, victim*)), the aspectual phases (*engager, cesser* (= *enter, stop*)), the degrees of intensity (*acharné, sans merci* (= *fierce, merciless*)), etc.

#### 4 Conclusion and perspectives

The observation of the combinatorial properties of metaphoric lexical units puts in evidence the following facts. Among the entities, two sets emerge. The pairs composed of concrete-concrete entities don't share many collocations whereas the pairs of concrete-abstract entities share more collocations. As for the pairs of facts, they share almost all their collocations. Thus, we can say that metaphors of facts are more active than metaphors of entities. These first results sketch a rough typology for lexicalized metaphors that could be refined in at least two ways. On the one hand, we will considerate more specific labels. On the other hand, we will exploit another part of the lexical description provided by the DiCo, which have been ignored here: the semantic derivatives, like typical nouns for actants, instruments, localization, etc. These results will be taken into account for the modelization of the different

types of metaphors in lexicographical definitions. Roughly, the denotation of a weak metaphor will include the source lexical unit in the definition of *flèche* (signe **de la forme d'une flèche** servant à indiquer une direction = *sign formed as an arrow* used to indicate a direction). Concerning strong metaphors, since the analogy is more complex, it deserves a more elaborated explanation that doesn't fit with the organisation of the definitional paraphrase. It will then be detailed outside the two definitions, in a part devoted to the characterization of the polysemy link (see Barque and Polguère, 2005).

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