

# Analysing 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.

**Keywords:** lexical database, lexicographic definition, explanatory combinatorial lexicology, polysemy, metaphor.



## 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 a detailed characterisation of the link holding between a metaphorical lexical unit and the lexical unit it is derived from, since the process of metaphORIZATION is already integrated (Gréa, 2003). However, all those metaphors can’t be treated the same way. We consider that some of them are more active than others, and we propose in this article to distinguish different types of metaphors. We assume a **polysemy link** is oriented and holds then between a **source** lexical unit and a 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 *naissance#2* (d’une nation) (= *birth#2* (of a nation)) has a metaphorical meaning derived from the source lexical unit *naissance#1* (d’un enfant) (= *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 lexical unit and a target lexical unit : in our example, the analogy consists in the notion of “beginning”.

To characterize these different metaphorical links, we use 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 lexical database is a good reference since it provides different types of information on lexical units (actantial 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 and will use it as a criterion to build up our typology.

The paper is divided into the following sections. The first section presents our corpus and the methodology we adopt. The second section will show our results and the conclusions that can be drawn from the analysis of the data. We will then sketch a typology of metaphorical senses according to the strength of the link.

## 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. Some examples of the both sets, extracted from our corpus, are presented below.

#### Entities

##### PLAIE :

PLAIE#1 [*Allongé sur un lit, une **plaie** béante à la cuisse, il raconte son accident.* (= *Lying on a bed, an open **wound** in the thigh, he’s telling his accident*)]

PLAIE#2 [*La rencontre voulue par la Maison Blanche a bien failli rouvrir des **plaies** à peine refermées.* (= *The meeting asked by the White House was to open old **wounds** hardly shot.* )]

##### FLÈCHE :

FLÈCHE#1 [*Bohémond a eu la cuisse traversée par une **flèche**.* (= *Bohémond’s thigh was hit by an **arrow**.* )]

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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>.

FLÈCHE#2 [*Une **flèche** dessinée à l'encre rouge indiquait la direction de son bureau. (= A red ink-drawn **arrow** was indicating the way to his office.)*]

## Facts

### COMBAT :

COMBAT#1 [*De violents **combats** se sont poursuivis mercredi dans le nord du pays. (= Wednesday, violent **fight**s continued in the north of the country.)*]

COMBAT#2 [*Cette association se sent le devoir de mener le **combat** contre l'intolérance. (= This association feels it is its duty to carry out the **fight** against intolerance.)*]

### PAUVRETÉ :

PAUVRETE#1 [*Chaque année, en période de Noël, la **pauvreté** revient à l'actualité. (= Each year, at Christmas time, **poverty** comes back as head-line topic.)*]

PAUVRETE#2 [*La ville lutte contre la **pauvreté** architecturale de ses banlieues. (= The city fights against the architectural **poverty** of its suburbs. ]*

### GIFLE :

GIFLE#1 [*Après avoir reçu une **gifle** sur la joue droite, il tendit la joue gauche. (= He got a **slap** on the right cheek, then he turned the left one.)*]

GIFLE#2 [*Cette décision du conseil d'administration a été prise comme une **gifle** par le syndicat. (= This decision has been interpreted as a **slap** by the union.)*]

## 2.2. Hypothesis

Our working hypothesis is that the more we observe common collocations between the two lexical units of one pair, the more the metaphoric link is strong and active. To determine the activeness 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, the 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 active. 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 touched or seen, more generally, a referent that can be apprehended by the human senses (*Nouveau Petit Robert*, 2000). For example, the pair *flèche*#1 (*arrow*#1=concrete) and *flèche*#2 (*arrow*#2=concrete) seen above belongs to the first set, whereas the pair *plaie*#1 (*wound*=concrete) and *plaie*#2 (*wound*=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 more active 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), which facts, is stronger than the one holding between the two meanings of *flèche* (*arrow*).

We are now going to try to validate these hypotheses.

### **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 activeness. We identify the intersection between the set of collocatives controlled by the source and the ones 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, **Labreal**<sub>12</sub>(*torchon*#1=*dishcloth*) = *essuyer (to wipe)*, **Labreal**<sub>12</sub>(*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, pyrrhic victory, bitter fight, etc.*) and verbal collocatives (*to give a slap, to deal a slap, to celebrate a victory, to lead to 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. A and Fig. B) 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 *FLÈCHE* share neither adjectival nor verbal collocations.

Lexical unit	Adjectival collocations	Verbal collocations
Flèche#1 <i>arrow</i> #1		
Flèche#2 <i>arrow</i> #2		

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

Mouche#1 <i>fly#1</i>			
Mouche#2 <i>fly#2</i>			
Verrou#1 <i>bolt#1</i>		<b>Installation :</b> mettre, poser <i>shoot, bolt</i>	<b>Break :</b> céder, sauter <i>give way, blow</i>
Verrou#2 <i>bolt#2</i>			
Sentier#1 <i>path#1</i>	<b>Bad :</b> ardu, battu, épineux, semé d'embûches	<b>Use :</b> s'engager, suivre <i>enter, follow</i>	<b>Orientation :</b> mener
Sentier#2 <i>path#2</i>	<i>arduous, beaten, thorny, full of pitfalls</i>		<i>lead</i>

Fig. A. Intersection of collocations for lexical units denoting entities

Lexical units	Adjectival collocations		Verbal collocations	
Flèche#1 <i>arrow#1</i>	<b>Bad :</b> empoisonnée <i>poisonned</i>		<b>Realization :</b> atteindre, transpercer, percer, traverser, cribler <i>reach, transfix, pierce, cross over, riddle</i>	<b>Use :</b> décocher, lancer, tirer, recevoir <i>let fly, throw, shoot, receive</i>
Flèche#2 <i>arrow#2</i>	<b>Orientation :</b> descendante, montante <i>bottom, top</i>		<b>Realization :</b> indiquer, pointer <i>indicate, point</i>	<b>Use :</b> suivre <i>follow</i>
Mouche#1 <i>fly#1</i>	<b>Type :</b> noire, verte, à merde <i>black, greenbottle, blow</i>	<b>Size :</b> gross e big	<b>Activity :</b> voler, voltiger, battre des ailes <i>bolt, flutter about, beat its wings</i>	<b>Sound :</b> bourdonner, vrombir <i>buzz, whiz</i>
Mouche#2 <i>fly#2</i>	<b>Type :</b> artificielle <i>artificial</i>		<b>Realization :</b> pêcher, prendre <i>fish, catch</i>	<b>Use :</b> jeter, lancer <i>throw, throw</i>
Verrou#1 <i>bolt#1</i>	<b>Size :</b> gros, large <i>big, large</i>	<b>Solidity :</b> solide <i>solid</i>	<b>Use :</b> ouvrir, verrouiller, installer, actionner, faire jouer, tirer, fermer, pousser <i>unbolt, bolt, bolt down, action, work, slide back, bolt, unbolt</i>	
Verrou#2 <i>bolt#2</i>	<b>Last :</b> dernier, ultime <i>last, ultimate</i>		<b>Realization :</b> empêcher, interdire, bloquer <i>prevent, forbid, hinder</i>	
Sentier#1 <i>path#1</i>	<b>Bad :</b> accidenté, escarpé <i>broken, precipitous</i>		<b>Use :</b> emprunter <i>take</i>	<b>Orientation :</b> bifurquer, déboucher <i>branch off, come out of</i>
Sentier#2 <i>path#2</i>	<b>Bad :</b> Apre <i>harsh</i>			

Fig. B. Difference of collocations for lexical units denoting entities



As we can see, the above table emphasize on the fact that a distinction has to be made between target lexical unit denoting concrete entities (*flèche#2, mouche#2*) and those denoting abstract ones (*verrou#2, sentier#2*). Indeed, Fig A. shows that the pairs FLÈCHE and MOUCHE have no common collocations while they have some proper ones, as shown in Fig. B. 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 later 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)*). According to our corpus, we can see a correlation between the level of analogy (function, use, etc) and the type of the metaphor (between weak and strong).

Let’s now compare entities to facts.

### 3.3. *Metaphors of facts*

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

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

Fig. C. Intersection of collocations for lexical units denoting facts

Lexical units	Adjectival collocations			Verbal collocations	
Combat#1 <i>fight#1</i>	<b>Intense :</b> sanglant, meurtrier <i>bloody, murderous</i>	<b>Not intense :</b> léger <i>light</i>		<b>Negative end :</b> être défait <i>be defeated</i>	
Combat#2 <i>fight#2</i>				<b>Negative end :</b> échouer <i>fail</i>	<b>Act :</b> participer, soutenir <i>join, support</i>
Gifle#1 <i>slap#1</i>	<b>Intense :</b> forte, sonore <i>strong, resounding</i>	<b>Deserved :</b> méritée <i>deserved</i>		<b>Realization :</b> envoyer, flanquer, lancer <i>throw, slosh, give</i>	<b>Begining :</b> tendre la joue <i>turn the cheek</i>
Gifle#2 <i>slap#2</i>	<b>Intense :</b> cinglante <i>bitter</i>			<b>Realization :</b> essuyer <i>suffer</i>	
Hécatombe#1 <i>hecatomb</i>	<b>Intense :</b> épouvantable, grande <i>abysmal, great</i>			<b>Positive end :</b> réchapper <i>come through</i>	
Hécatombe#2 <i>Massacre</i>					
Pouls#1 <i>pulse#1</i>	<b>Intense :</b>	<b>Not intense :</b> Faible, lent	<b>Bad :</b> anormal, mauvais,	<b>Realization :</b> trouver/chercher, consulter,	<b>Behaviour :</b> accélérer, ralentir,

	rapide, précipité  quick, rapid	weak, low	irrégulier anomalous, bad, irregular	vérifier feel, take, check	affaiblir quicken, slacken, weaken
Pouls#2 pulse#2					

**Fig. D. Difference of collocations for lexical units denoting facts**

As we can see in Fig D, target lexical units have no or few proper collocatives. Indeed, their sets of collocatives are most of the time included in the set of the source collocatives. Why do target lexical units have less collocatives than their source ? According to us this can be explained by the fact already mentioned that an abstract situation have 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 explain 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 Fig.A and B to Fig. C and D, we can see that facts tend to have greater intersections. It means that facts generate metaphors that are more active than the one generated by the entities. One possible explanation is that, as facts denote whole situations, the analogy rely 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 put 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. From this we may say that metaphors of the second type are more active than those of the first type. 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. We believe that collocations will help characterize what found the analogy, concerning strong metaphors. We propose to draw a distinction between strong metaphors (metaphors that are more active) and weak metaphors (that are not

active anymore). Roughly, the denotation of a weak metaphor will include the source lexical unit in the definition of *flèche*#2 (signe **de la forme d'une flèche**#1 servant à indiquer une direction = *sign formed as an arrow*#1 used to indicate a direction).

Concerning strong metaphors, since the analogy is more complex, it deserved 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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