

Polysemous qualities and universal networks, invariance and diversity

1. INTRODUCTION

The purpose of this article is to provide an analysis of the semantic organization of qualities involved in polysemous patterns. Following a joint study¹ on the typology of adjectives and qualification in twenty-two African languages, to which I added French and English, this paper is an attempt to apply the semantic map method to represent the polysemous patterns of quality expressions.

It will be shown that what is common between the semantic maps of the language sample is not exactly a high number of *recurring* polysemous patterns observable in other languages but rather the existence of underlying cognitive frameworks. These frameworks called **universal networks** (see section 4.1.) form the level of invariance on which the recurring polysemies are built up.

It is also an attempt to apply this method to language specific polysemous patterns, and explain how these *unique* polysemous patterns are made up. These patterns are characterized by two properties: (i) they are found in only one language of the sample and (ii) they almost always involve at least one quality, called **federative notion**, which is characterized by a particular semantic behaviour. Indeed, these federative notions are defined by the fact that they are regularly involved in polysemous patterns, across numerous languages (see section 4.2.); e.g., the federative notion [A] occurs in various unique polysemous patterns (e.g. [A, B], [A, C]) to which may be added recurring patterns cross-linguistically (e.g. [A, D], [A, E]).

After a short presentation of the language data and the theoretical framework (section 2), the paper will then examine and discuss a sample of the semantic maps highlighting both recurring polysemous patterns and unique polysemous patterns (section 3). The paper will aim at explaining the linguistic variability which hinges on the semantic and cognitive invariance (section 4), and the major principles involved in the elaboration of each semantic map (section 5). Section 6 will conclude with a comparison between the semantic organization of the

¹ PICS n° 2425 (2004-2006): « Typologie des adjectifs et de la qualification dans les langues africaines » Llacan (Langage, Langues et Cultures d’Afrique Noire – CNRS) / Universität Bayreuth (Afrikanistik I & II). The collaboration regarding the semantic study of polysemous qualities involved Dymitr Ibrizimow, Eva Rothmaler and Holger Tröbs (University of Bayreuth), Loïc-M. Perrin and Paulette Roulon (Llacan-CNRS).

polysemous qualities and Lazard's (1992) approach of spatial organization and grammaticalization phenomena.

2. LANGUAGE SAMPLE AND DATA

2. 1. Composition of the corpus

The study is based on a sample of twenty-four languages including twenty-one African languages, one Spanish and Kikongo based Creole and two Indo-European languages:

Kabyle	Berber (Afro-Asiatic)	Tigre	Semitic (Afro-Asiatic)
Tachelhit	Berber (Afro-Asiatic)	Zaar	Chadic (Afro-Asiatic)
Tamahak	Berber (Afro-Asiatic)	Hausa	Chadic (Afro-Asiatic)
Afar	Cushitic (Afro-Asiatic)	Kisi	Bantu (Niger-Congo)
Jola	Atlantic (Niger-Congo)	Bijogo	Atlantic (Niger-Congo)
Balante	Atlantic (Niger-Congo)	Wolof	Atlantic (Niger-Congo)
Gbaya	Ubangi (Niger-Congo)	Zulu	Bantu (Niger-Congo)
Cerma	Gur (Niger-Congo)	Nateni	Gur (Niger-Congo)
Tigemaxo	Mande (Niger-Congo)	Bambara	Mande (Niger-Congo)
Chamba Daka	Bueno-Congo (Niger-Congo)	Kanuri	Saharan (Nilo-Saharan)
Yulu	Central Sudanic (Nilo-Saharan)	Palenquero	Creole (Spanish based)
French	Italic (Indo-European)	English	Germanic (Indo-European)

The data themselves contain 110 qualitative concepts (see Appendix 1). In order to avoid ambiguities due to the polysemy of some English lexical items, French or German have been used instead. For example, the English word *sharp* can characterize something that has a pointed end as well as something that cuts easily. So, in this case, the German word SPITZ was used to designate the fact that something has a pointed end, and the word SHARP was retained to designate an easy cutting.

At the beginning, we drew up a corpus composed of 112 qualitative notions. The selection of the qualitative notions was based on the list of prototypical qualities given by Dixon (2004: 3-5), with the exception of colours which constitute a particular system² in some African languages. It should be remembered that Dixon distinguishes two kinds of semantic types typically associated with the adjective class. The first one is relative to four core semantic types, which

² Actually, such systems are defined by the fact that they mix the concepts of colours with the concepts of brightness.

are typically associated with both large and small adjective classes, and the second one relative to three peripheral semantic types, which are typically associated with medium-sized and large adjective classes. In all likelihood, it does not seem that this opposition be significant in the present study. Each observation presented in this paper concerns notions relative to core semantic types as well as peripheral ones, without distinctions.

	<i>Core semantic types</i>		<i>Peripheral semantic types</i>
Dimension	big, small, long, short, wide, deep...	Physical property	hard, soft, heavy, wet, rough, strong, clean, hot, sour; well, sick, tired, dead, absent...
Age	new, young, old...	Human propensity	jealous, happy, clever, generous, cruel, proud, ashamed, eager...
Value	good, bad, lovely, atrocious, perfect, odd, strange, curious, necessary, crucial, important, lucky...	Speed	fast, quick, slow...
Colour	black, white, red...		

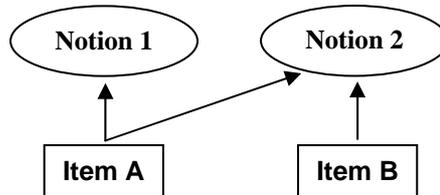
The polysemous connections in the above-mentioned qualitative notions were observed in all 24 languages of the sample. A further nine notions had to be added because they occurred at least twice in polysemous patterns in the langue sample. For example, we added the notion ACID because sixteen languages contain the pattern SOUR / ACID. Similarly, we added the notion CALM since it is involved in two different polysemous patterns: CALM / COLD in Bijogo and CALM / SOLID in Yulu. These additions concerned the following notions: ACID, CALM, CONSTANT, COWARDLY, FREQUENT, MAIGRE, NASTY, SALT and SUPERFICIAL. Moreover, we also removed from the initial data the few qualitative notions which were never involved in a polysemy (HARD-WORKER, MULTICOLOURED, WHOLE, SQUARE) as well as those which were part of a marginal polysemous pattern (that is a pattern occurring in only one language and containing a notion which does not appear in the initial corpus). It concerns the notions UGLY, HUNGRY, DRUNK, JEALOUS, ACTIVE, RUSTY and THIRSTY. Thus, some fifteen polysemous patterns were not taken into consideration in the database³.

In the language sample, 257 polysemous patterns were found (see Appendix 2). 149 of them are particular to one language, 7 are shared by a minimum of 10 (up to 16) languages, and 16 are shared by 5 to 9 languages. Thus, polysemies which are language specific are more numerous than those attested cross-linguistically (58% vs. 42%).

³ Especially for constraints relating to the organization of the semantic maps space.

2. 2. Theoretical framework concerning the notion of ‘polysemy’

By "polysemy", one usually refers to the fact that a same form is used to refer to two (or more than two) different notions. From a synchronic viewpoint, one can distinguish two kinds of polysemous phenomena: the synonymy and the strict polysemy (G. Jacquet, F. Venant & B. Victorri, 2005). *Synonymy* is used whenever the different meanings of a polysemous word can be express by another word:



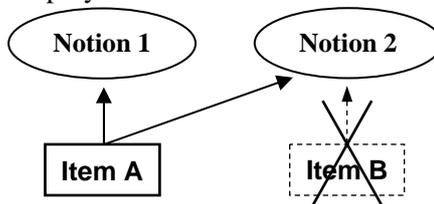
Ex. *sec* (fr.): 1. no water or moisture (DRY); 2. low fat-thin (MAIGRE) / syn. *maigre* in French

1. Un manteau sec (a *dry* coat)
2. Un homme sec (litt. a *dry* man) \Leftrightarrow Un homme maigre (a *thin* man)

Ex. ACID / SOUR (two synonyms in French, English...)

- These wines taste *sour* \Leftrightarrow these wines taste *acid*
- Ces vins ont un goût *aigre* \Leftrightarrow Ces vins ont un goût *acide*

One talks about *strict* polysemy, whenever there is no other word (no synonym) able to express the different meanings of a polysemous word:



Ex. *nooy* (wolof), *soft* (engl.): 1. pleasant to touch (DOUX/fr.); 2. not hard (MOU/fr.)

The fact that a language uses the same word to refer to different notions, while other languages use different words, seems to prove that this language resorted to a polysemous process. Conversely, the fact that no language uses different words for two distinct notions seems to prove that an analysis in terms of separate representations is difficult (M. Haspelmath, 2003: 239). Among the one hundred and ten qualitative notions, it is always possible to observe two different notions unconnected in one language but which may be involved in a polysemous pattern in at least one other language. For example, even if the polysemous pattern ACID / SOUR occurs in sixteen languages, there are eight languages in which there is no specific word for the expression of these two notions simultaneously. It is thus possible to assume that each qualitative notion used in the corpus is vindicated.

All the polysemies referenced in the database were collected from dictionaries as well as from questions elicited from native speakers by linguists specialists of the languages investigated. But, it is clear that the number of polysemies observed in each language is debatable. For instance, the study which I carried out on Wolof and French (my native language) shows three times more polysemies in French than in Wolof. One could also compare the *Trésor de la langue Française*⁴ which gives more than thirty synonyms for the notion DRY in French whereas the French semantic map given in the present paper contains two patterns only. This variation is related to the degree of specificity of the meanings developed by a polysemous word. Indeed, following Jacquet, Venant & Victorri (2005), the different meanings of a polysemous word are only valid in a limited set of contexts. And the more numerous and varied the contexts, the less the meaning is specific. For example, the word *sec* (DRY) in French is synonym with STINGY only when describing a person. But *sec* can also describe a low-fat (MAIGRE) entity - for instance a person, a diet... Therefore, the pattern DRY / MAIGRE is more salient than the pattern DRY / STINGY in French. Nevertheless, one can consider that the data is valid insofar as the observed regularities only concern the salient polysemous patterns.

It is necessary to specify what is understood by “universal” in this paper. In order to account for the organisation of the polysemous qualities, a pattern is considered as universally polysemous if it tends to be recurring across languages and cultures in more than two different languages. “Universal” is not defined by a systematic rule (remember that the so-called “universals” in typology always have exceptions), but by a tendency, or best a potentiality, based on the observation of actual recurring polysemous patterns attested in the data.

A pattern recurring only twice in the language sample could be considered as the result of a sheer coincidence or as a result of a single polysemous process. In the latter case, one is entitled to consider that what is significant from a cognitive viewpoint is the fact that two different peoples with two different cultures, having had no contact what so ever, have developed the same cognitive and linguistic process (metaphor, metonymy, generalization of a signified, specialization of a signified, cohyponymic transfer – Andreas Blank, 2000; Peter Koch, 2000 & 2004). That such a capacity was developed in a few or a lot of languages is not at stake: some universal phenomenon may be more recurring than others.

In order to reduce the possibility of sheer coincidence of polysemous patterns, and not to leave aside less recurring polysemous patterns, it seemed reasonable to limit the present study to patterns recurring at least three times cross-linguistically. Note that this is a working hypothesis

⁴ The *Trésor de la Langue Française* (TLF) is a large 16 volumes of French language dictionary, released by the Institut National de la Langue Française (INaLF, former laboratory of the C.N.R.S.)

to be further tested with in-depth studies on the basis of areal and genetic distributions. The consequence of such a methodological approach is that the more recurring a phenomenon, the higher its potential universality.

2. 3. About the semantic maps

The polysemous connection between concepts is represented by means of a line linking them together. The schema (the diagram) thus obtained symbolizes the semantic network, the semantic map, of the polysemous connections as observed in a particular language. The notions are organized on the map so as to bring close together the most frequent polysemous patterns attested in the data cross-linguistically, in order to make visible the network that they build. This organisation does not imply that the physical closeness between notions on the semantic maps is significant. Only the links matter: for practical reasons, it was impossible to represent the semantic proximity according to closeness on the semantic map when some qualitative notions are involved in up to thirteen different polysemous patterns. Furthermore, it has to be borne in mind that the qualitative notions related to each other on the map are not necessarily expressed by a same word in each language; they may also represent two polysemous words having a same notion in common.

3. PRESENTATION OF THE SEMANTIC MAPS

To start with, a sample of six semantic maps will be presented and discussed from two points of view: (i) the polysemous networks of each language and the quantitative specificities relative to the contrasting opposition ‘unique’ vs. ‘recurring’; (ii) the possible genetic or areal (borrowing) bias of some polysemous patterns.

3. 1. Diversity and invariance from a qualitative viewpoint

The semantic maps 1a to 1f (see Appendix 3) represent the semantic associations⁵ observed in six languages: Bambara, Cerma, Gbaya, Jola, Wolof and French. It is not necessary to present all the semantic maps because there is no semantic map which looks like another, even partly. It simply seems that there is a number of invariants, i.e., polysemous patterns that can be observed in several languages.

This also holds true for genetically related languages. If it is not debatable that genetically related languages may share polysemies, we think that this phenomenon is very rare. Let us take the case of the Wolof and Jola semantic maps. Map 2 represents the polysemous associations observed simultaneously in both languages (the red lines represent the patterns shared by both

⁵ At this point, the link's colours are not important.

languages, the black ones the patterns observed only in Wolof, and the blue ones the patterns observed only in Jola). These two African languages both belong to the Atlantic North subgroup, are geographically close (both are spoken in Senegal), and moreover, Wolof is the major vehicular language spoken by over 80% of the Senegalese population including some of the Jola people. Nevertheless, even though some semantic associations shared by both languages may imply genetic and/or areal features, the semantic maps for each language are really very different. In fact, there are only four patterns which are shared simultaneously by these two languages: ACID / SOUR, GOOD / GENEROUS, LITTLE / SMALL and FULL / NUMEROUS.

The polysemous patterns observed in a minimum of two languages are marked in red bold (e.g. on map 1a, the pattern SLOW / COLD occurring in Bambara can also be observed in four other languages). Patterns specific to one language are in black. Following the Bambara semantic map's example, it can be observed that polysemies particular to Bambara only (FAST / HOT, THIN / YOUNG, THIN / SMALL and HEAVY / SOLID) are scarce as compared with the nineteen polysemies⁶ also observable in other languages of the database. This remark applies to the five other languages discussed in this section and holds true for all the languages of the corpus, including the two Indo-European ones (see 1f. French semantic map): each semantic map shows more recurring patterns than specific patterns.

3. 2. Diversity and invariance from a quantitative viewpoint

Whereas most of the semantic patterns of a language can be observed in other languages, still 58% of all conceptual pairs in the database are specific to only one language (149 specific polysemies *vs.* 108 recurring polysemies, see Appendix 2). In other words, the majority of the polysemous patterns observed for each language are recurring associations cross-linguistically – in fact, 3/4 on average – while there is a majority of particular semantic associations in the database. These are only outward discrepancies. They are due to the fact that the recurrence of some polysemous patterns is so important that all languages are concerned: each language has an average of 6 specific polysemies (149 polysemies for 24 languages), i.e., one fourth of the polysemies observed on each semantic map, but although only 18 polysemous patterns are shared by 4 languages (7 % of the database), each language contains an average of 3 polysemies observable in 4 languages (72 polysemies for 24 languages).

A quantitative comparison between two genetically and areally close languages highlights the

⁶ ACID/SOUR, STINGY/BITTER, WHITE/CLEAN, DOUX/MOU, NEAR/SHORT, LITTLE/SMALL, SLOW/COLD, SMALL/NARROW, WARM/HOT, WARM/FAST, SMALL/YOUNG, HEAVY/DICK, DICK/SOLID, SOLID/HARD, WIDE/LARGE, WIDE/BIG, BIG/LARGE, LÉGER/FRAGILE and FAR/LONG.

problems linked to polysemous patterns, which may be due to genetic and/or borrowing reasons. For instance, the four polysemous connections⁷ common to Wolof and Jola can also be observed in other languages of the corpus, but only FULL / NUMEROUS is attested in another Atlantic language, namely Bijogo.

Among the 257 polysemies attested in the database, only two patterns may be explained by a genetic reason: FULL / NUMEROUS in the three Atlantic languages (Bijogo, Jola and Wolof), EXPENSIVE / HARD in the two Gur languages (Cerma and Nateni).

As for polysemies due to borrowings in case of geographical proximity, African languages only count six polysemous patterns that may be linked to areal factors (in some cases in addition to genetic factors): COLD / WET and EXPENSIVE / HARD (Cerma, Nateni), COLD / SLOW (Cerma, Nateni, Bambara, Tigemaxo), WHITE / CLEAN (Jula, Balante, Bambara), DICK / SOLID (Bambara, Balante) and BIG / ROUND (Yulu, Gbaya). Just as we assumed that a polysemous pattern shared by only two languages has one chance out of two of being the result of a same linguistic and cognitive process, there is no evidence to help decide whether these semantic connections are due to universal, genetic or areal factors. In consequence, these eight polysemous patterns represent the error margin.

Of course the number of possible borrowed polysemies increases a bit if one takes French and English into consideration, since both languages are also spoken in almost all the African countries (but to various extents according to particular socio-linguistic situations, and to speakers); the quantitative data might not be significant any more. For example, the pattern BIG / ROUND in Gbaya and Yulu⁸ also occurs in French⁹ and could be attributed to a borrowing from French. Still, we think that the sample of African languages is representative of this kind of genetic phenomenon enough.

One could add that lexical borrowing as well as polysemy are generally the consequence of a lexical gap: a language has no word to designate an entity or a concept (Yong-Ho Choi, 2001). Moreover, even if a polysemous pattern is borrowed from another language, this pattern is initially triggered by a particular linguistic and cognitive process; it is thus highly probable that speakers re-conceptualized the borrowed polysemous connection because of its lexical salience. Still, even if we do not question the hypothesis of genetically shared or borrowed polysemies, we think that they are marginal and cannot invalidate our working hypothesis.

⁷ ACID/SOUR, GOOD/GENEROUS, LITTLE/SMALL and FULL/NUMEROUS.

⁸ These two languages are spoken in Central Africa Republic.

⁹ “une femme ronde”: *a big lady* (lit. *a round lady*).

4. UNIVERSAL POLYSEMOUS NETWORKS & FEDERATIVE NOTIONS

We are now going to deal with the representation of notional space for conceptual facts observable in several languages. We call **conceptual map** the spatial representation which enables us to represent polysemous patterns shared by several languages. The purpose is to highlight (i) the existence of networks made of recurring polysemous patterns, and (ii) the existence of qualitative notions which are regularly involved in polysemous patterns and across a lot of languages. Furtherer, we should also take up a position on the psychological interpretation of the presented networks.

4. 1. Recurring polysemous patterns and universal networks

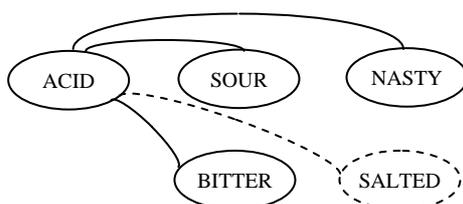
Conceptual map 3 represents the recurring associations observed in at least three languages. The patterns shared by only three languages are represented by dotted lines; and the patterns shared by a minimum of four languages are represented by full lines. It can be observed, with very few exceptions, that the notions involved in these recurring patterns do not form a set of separate pairs but are organized in networks in the sense that these notions are related to each other. The polysemous patterns observed in three languages only are also significant since they do not change anything in the principle of networks: most of the three-languages patterns are related to a pattern shared by a minimum of four languages. So, despite the fact that these semantic patterns imply a margin of error, they show that patterns with a low frequency of occurrence seem also to be built on notions involved in universal networks.

The universal polysemous networks may explain what is common between each semantic map. Nevertheless, it is impossible to decide on the mental reality of such cognitive networks, as well as that of the semantic maps. In order to prove such assumptions, we would have first to define what is a mental reality, is it related to the cultural representations shared by native speakers or is it related to metalinguistic representations built by linguists, or both?

Whatever the answer, the fact that some qualitative notions are organized in networks does not mean that these networks reflect a pre-conceptual organisation. 'Network' here refers to the fact that some concepts are related to each other within the framework of polysemous connections, nothing else. Still, we can at least suppose that these recurring polysemous connections hinge on common conceptual reasoning based on basic cognitive experiences, potentially shared by each individual. In our opinion, these universal networks can be indeed assimilated to a potential stock of polysemies. But this does not mean that all speakers share all these connexions in their minds. Actually, these patterns are based on universal cognitive abilities which can be developed very easily but which may be also hidden. The present study cannot explain why each language chooses certain recurring patterns rather than others.

4. 2. Polysemous valence and Federative notions

It is now necessary to introduce a new concept called the **polysemous valence** of a notion. In other words, the question is to determine the number of polysemous connections that a quality may involve whatever the number of languages concerned. For example, the notion GAY is connected to only one notion: it occurs in the pattern GAY / PROUD only observed in Cerma; so the number of polysemous valence of GAY is 1. The notion ACID has a polysemous valence of 4 since it can occur in four different patterns. One of them – ACID / SALT – occurs in only one language, in Bijogo; but the others can be observed in a minimum of two languages: ACID / SOUR (16 languages), ACID / BITTER (4 languages) and ACID / NASTY (2 languages).



Similarly, the polysemous valence of HARD is 13 since this notion is involved in 9 patterns shared by up to 10 languages as well as in 4 patterns specific to only one language¹⁰.

With such a method, we can bring out the notions that are often involved in semantic patterns (even if it is not a recurring polysemous pair) and those which are involved in only one semantic pattern, as the table below shows:

Polysemous notions	Valence
<i>hard, dick</i>	13
<i>weak</i>	12
<i>solid, cold, good</i>	11
<i>strong, big, doux, narrow</i>	10
<i>dickflüssig, gesund, slow, bad</i>	9
<i>wide, easy, heavy, cheap, difficult, léger</i>	8
<i>clean, bitter, fat, pure, mou, expensive, thin</i>	7
<i>warm, clair, dense, large, small, sour, nasty, smooth, wet, rude, little</i>	6
<i>young, empty, delicious, clever, lichter, sweet, calm, poor, straight</i>	5
short, acid, beautiful, white, shallow, stingy, fragile, deep, dirty, true, raw, idiot	4
brave, hot, constant, boiled, lose, proud, long, open, rotten, wise, sharp, near, round, frequent, ill, salt, far, maigre, rough, dry	3
droite, ripe, generous, stinky, fast, silent, old, spitz, wrong, handicapped, polite, lazy, painful, stubborn, shy, fearful	2
flat, cool, bent, blunt, dressed, lié, full, limping, numerous, new, gay, loud, stubborn, tight	1

A second important principle is called **federative notions**. These are notions defined by two

¹⁰ See the schema in section 3.1.

properties: the number of polysemous valences as well as the number of languages concerned by these various connections. We can thus eliminate notions for which the polysemous valence is not really meaningful since the semantic connections are only limited to a few languages. For example, the notion **EXPENSIVE** is involved in seven patterns which only occur in four languages, but **CLEVER** only occurs in five different patterns but across eleven languages.

From a quantitative viewpoint, we limited the set of polysemous patterns to the qualities which are involved in a minimum of five polysemous patterns and across a minimum of six languages. These are **SOUR**, **NASTY**, **CLEAN**, **GOOD**, **DOUX**, **BITTER**, **BAD**, **PURE**, **CLAIR**, **CHEAP**, **MOU**, **NARROW**, **WARM**, **SMALL**, **LITTLE**, **HEAVY**, **YOUNG**, **DIFFICULT**, **HARD**, **GESUND**, **FAT**, **DICK**, **DICKFLUSSIG**, **SOLID**, **STRONG**, **SMOOTH**, **COLD**, **DENSE**, **WIDE**, **WEAK**, **LÉGER**, **LARGE**, **BIG**, **EASY**, **THIN**, **CLEVER** and **SLOW** (italicized in the above table).

Finally, on conceptual map 3, we contrasted the federative notions (written in red bold) with the universal cognitive networks. Most of the federative notions are involved in networks shared by a minimum of four languages. Only five federative notions occur in a network shared by three languages: **NASTY**, **BAD**, **CHEAP**, **FAT** and **DENSE**.

5. FROM THE INVARIANCE TO THE DIVERSITY

The spatial representations of polysemous patterns for each language (by means of semantic maps) as well as the patterns shared by several languages (by means of a conceptual map) proved to be very useful to bring out a certain number of regularities concerning the organization of the semantic maps.

Semantic maps showed that all the networks built by the languages of the sample are dissimilar. However, even if there is a majority of polysemous associations specific to a particular language in the database, most of the polysemies observed in any language can be observed in other languages. We then examined, with the conceptual map, all the recurring patterns, and realized that the notions involved in such connections are organized in networks. We also noticed that all the federative notions are involved in these networks.

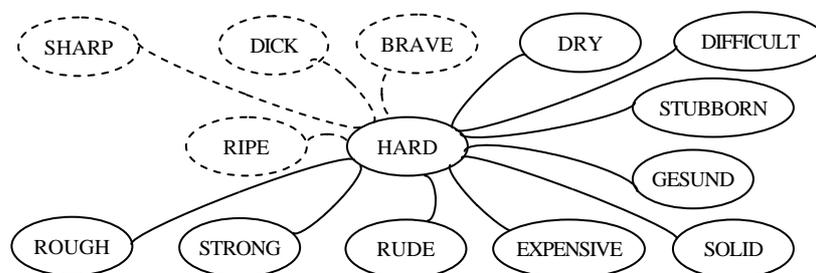
Considering such regularities, we are going to try and understand how the linguistic variability hinges on the invariance in order to model the organization of polysemous patterns represented in each semantic map. In other words, we will account for the correlation between the cognitive networks and the federative notions on the one hand, and the varied semantic maps built by languages on the other hand.

5.1 Organisation and elaboration of the semantic maps

In order to prove to this assumption, we will contrast the federative notions with each semantic map with the example of maps 1a to 1f (federative notions in red bold type). The federative notions are of consequence in the organization of these semantic networks in the sense that whenever a particular pattern occurs (represented by a black line), it almost always involves a federative notion (82% of the polysemies specific to only one language).

So, from a dynamic viewpoint, we can assume that whenever a quality is involved in recurring polysemies, and if this quality is a federative notion, then this quality should occur in other polysemous patterns specific to a particular language.

To illustrate the fact that the federative notions have a major impact on the creation of each semantic map, let us take the case of the federative notion HARD which is involved in thirteen polysemous patterns.



Since this notion occurs in a universal network (see conceptual map 3), we should observe numerous languages which contain some of the nine recurring patterns involving the notion HARD (the connexions in full lines in the above schema). But since the polysemous valence of HARD is 13, this notion also occurs in four other patterns which are particular to one language (the connections in dotted lines).

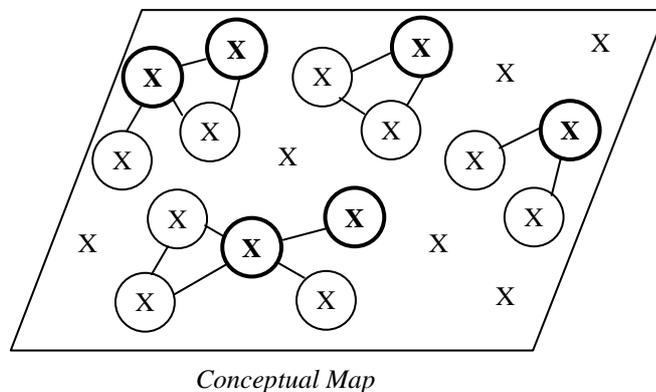
So, we can conclude that a quality which is a “federative notion” takes part in a universal network and may occur in one or several polysemous patterns observable in only one language.

The federative notions enable us to understand how the interaction between these levels of invariance (the universal networks and the federative notions) and the linguistic variability is built. In fact, the federative notions form the hardcore of the universal networks, and all the other patterns – especially those which are unique – are built from these federative notions. Besides, we previously observed a similar semantic phenomenon when we noticed that most of the patterns shared by three languages were built on notions involved in the universal networks.

5.2 Modelling

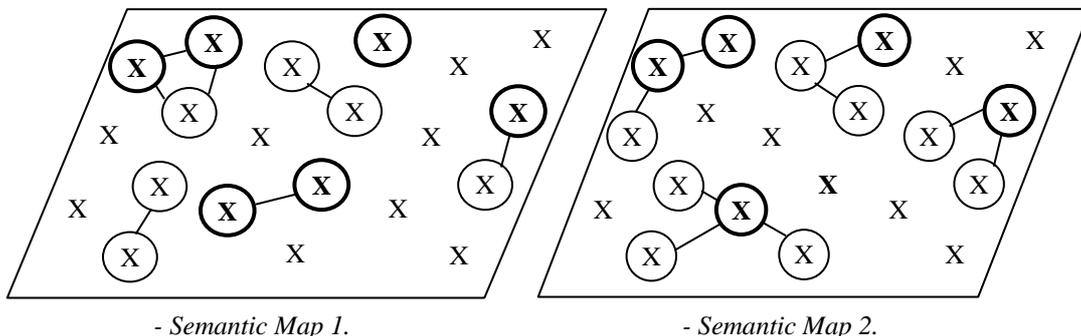
In order to sum up all these observations and to model the system related to the elaboration of semantic maps (i.e. to explain how both kinds of invariants organize the semantic maps of each language), we will use schemas symbolizing the interactions between the cognitive level (represented by the conceptual map) and the linguistic level (represented by the different semantic maps). So, at the cognitive level, between these miscellaneous qualities (symbolized by the letter 'X' on the following diagram), there are several universal networks based on common cognitive experiences and potentially shared by all speakers. And within these universal frameworks, we observed that some qualitative notions are more regularly involved in polysemous patterns than others: these are the federative notions (the letters 'X' in bold circles).

- At the cognitive level



At the linguistic level, as a first stage, we can first notice on each semantic map some polysemous connections, which come out from the universal networks. But each language does not systematically resort to the same patterns.

- At the linguistic level (*Stage 1*)



As a second stage, some federative notions build particular polysemous connections specific to only one language (these are indicated by dotted lines on each semantic map). So, we obtain two semantic maps, different from each other.

some parts of the areas which act as ‘fields of grammaticalization’ have preferential status. So, as Gilbert Lazard did, we observed two levels of invariants. Namely, at the first level, there are some universal invariants shared by almost all the languages – what we called universal polysemous networks. And at the second level, some of the notions, which participate in these universal networks, have a preferential status because they are more frequently involved in polysemous connections than others in the same semantic field – what we called federative notions.

With regard to the semantic organization of grammaticalized notions or with regard to the semantic organisation of polysemous qualitative notions, the underlying framework is always the same; it consists of two levels of invariance on which the linguistic variability hinges. But all in all, Lazard’s idea about the organization of semantic spaces is really essential because his approach is based on a scale principle and not on a quantitative threshold level. First of all, it is difficult to define the quantitative limits which enable to state about the universal character of a linguistic feature. The typical features of recurring semantic phenomena are fixed in accordance with a continuum; and what is observable for a highly recurring feature is also potentially valid for a low recurring feature. Second, the semantic features characteristics of one or a few languages seem to be related to the recurring ones since they are built on the basis of those recurring facts. In this sense, a typological method which consists in a contrastive study between what is highly recurring and what is unique, neglects an important part of the corpus: all the features shared by few languages.

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APPENDIX 1. - List of the 110 studied notions

METALIST	ENGLISH	FRANCAIS	DEUTSCH
ACID	<i>meta.</i>	ACIDE	SAUER
BAD	<i>meta.</i>	MAUVAIS	SCHLECHT
BEAUTIFUL	<i>meta.</i>	BEAU	SCHÖN
BENT	<i>meta.</i>	COURBÉ	KRUMM
BIG	<i>meta.</i>	GROS	GROß
BITTER	<i>meta.</i>	AMER	BITTER
BLUNT	<i>meta.</i>	ÉMOUSSÉ	STUMPF
BOILED	<i>meta.</i>	CUIT	GEKOCHT
BRAVE	<i>meta.</i>	COURAGEUX	MUTIG
CALM	<i>meta.</i>	CALME	RUHIG
CHEAP	<i>meta.</i>	BON-MARCHÉ	BILLIG
CLAIR	LIGHT	<i>meta.</i>	HELL
CLEAN	<i>meta.</i>	PROPRE	SAUBER
CLEVER	<i>meta.</i>	MALIN	SCHLAU
COLD	<i>meta.</i>	FROID	KALT
CONSTANT	<i>meta.</i>	CONSTANT	BESTÄNDIG
COOL	<i>meta.</i>	FRAIS	FRISCH
COWARDLY	<i>meta.</i>	LÂCHE	FEIGE
DEEP	<i>meta.</i>	PROFOND	TIEF
DIFFICULT	<i>meta.</i>	DIFFICILE	SCHWIERIG
DELICIOUS	<i>meta.</i>	DÉLICIEUX	SCHMACKHAFT
DENSE	<i>meta.</i>	DENSE	DICHT

DICK	THICK	ÉPAIS	<i>meta.</i>
DICKFLÜSSIG	THICK	ÉPAIS (NON-LIQUIDE)	<i>meta.</i>
DIRTY	<i>meta.</i>	SALE	SCHMUTZIG
DOUX	SOFT	<i>meta.</i>	SANFT
DRESSED	<i>meta.</i>	HABILLÉ	ANGEZOGEN
DROITE	RIGHT	<i>meta.</i>	RECHTS
DRY	<i>meta.</i>	SEC	TROCKEN
EASY	<i>meta.</i>	FACILE	EINFACH
EMPTY	<i>meta.</i>	VIDE	LEER
EXPENSIVE	<i>meta.</i>	CHER	TEUER
FAR	<i>meta.</i>	LOIN	FERN
FAST	<i>meta.</i>	RAPIDE	SCHNELL
FAT	<i>meta.</i>	GRAS	FETT
FEARFUL	<i>meta.</i>	PEUREUX	ÄNGSTLICH
FLAT	<i>meta.</i>	PLAT	FLACH
FRAGILE	<i>meta.</i>	FRAGILE	ZERBRECHLICH
FREQUENT	<i>meta.</i>	FRÉQUENT	HÄUFIG
FULL	<i>meta.</i>	PLEIN	VOLL
GAY	<i>meta.</i>	JOYEUX	FRÖHLICH
GENEROUS	<i>meta.</i>	GÉNÉREUX	FREIGIEBIG
GESUND	HEALTHY	EN BONNE SANTÉ	<i>meta.</i>
GOOD	<i>meta.</i>	BON	GUT
HANDICAPPED	<i>meta.</i>	INFIRME	BEHINDERT
HARD	<i>meta.</i>	DUR	HART
HEAVY	<i>meta.</i>	LOURD	SCHWER
HOT	<i>meta.</i>	CHAUD (BRÛLANT)	HEIß
IDIOT	FOOLISH	<i>meta.</i>	DUMM
ILL	<i>meta.</i>	MALADE	KRANK
LARGE	<i>meta.</i>	GRAND, VASTE	GROß
LAZY	<i>meta.</i>	PARESSEUX	FAUL
LÉGER	LIGHT	<i>meta.</i>	LEICHT
LICHT(ER)	NOT DENSE	ESPACÉ	<i>meta.</i>
LIÉ	TIED UP	<i>meta.</i>	FESTGEBUNDEN
LIMPING	<i>meta.</i>	BOITEUX	HINKEND
LITTLE	<i>meta.</i>	PETIT, JEUNE	KLEIN
LONG	<i>meta.</i>	LONG	LANG
LOSE	UNTIED	DÉTACHÉ	<i>meta.</i>
LOUD	<i>meta.</i>	BRUYANT	LAUT
MAIGRE	THIN	<i>meta.</i>	MAGER
MOU	SOFT	<i>meta.</i>	WEICH
NASTY	<i>meta.</i>	MÉCHANT	BOSHAFT
NARROW	<i>meta.</i>	ÉTROIT	ENG
NEAR	<i>meta.</i>	PROCHE	NAH
NEW	<i>meta.</i>	NOUVEAU	NEU
NUMEROUS	<i>meta.</i>	NOMBREUX	ZAHLREICH
OLD	<i>meta.</i>	VIEUX	ALT
OPEN	<i>meta.</i>	OUVERT	OFFEN
PAINFUL	<i>meta.</i>	DOULOUREUX	SCHMERZHAFT
POOR	<i>meta.</i>	PAUVRE	ARM
POLITE	<i>meta.</i>	POLI	HÖFLICH

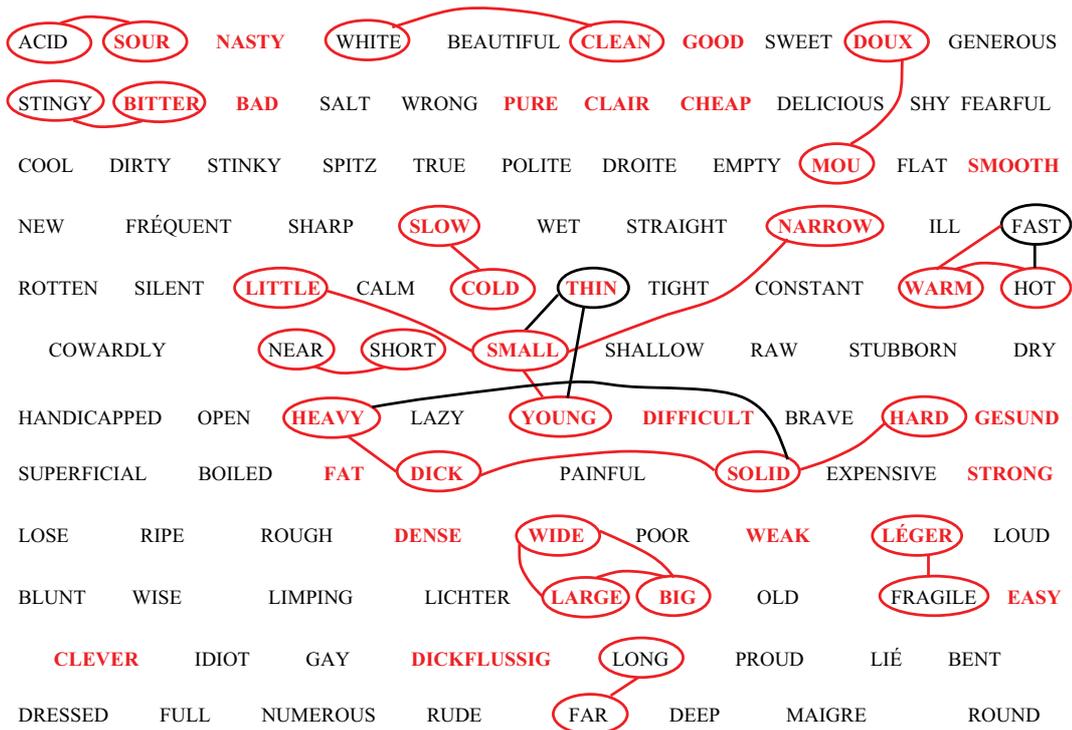
PROUD	<i>meta.</i>	FIER	STOLZ
PURE	<i>meta.</i>	PUR	REIN
RAW	<i>meta.</i>	CRU	ROH
RIPE	<i>meta.</i>	MÛR	REIF
ROTTEN	<i>meta.</i>	POURRI	VERDORBEN
ROUGH	<i>meta.</i>	RUGUEUX	RAUH
ROUND	<i>meta.</i>	ROND	RUND
RUDE	<i>meta.</i>	IMPOLI	UNHÖFLICH
SHALLOW	<i>meta.</i>	PEU PROFOND	SEICHT
SALT	<i>meta.</i>	SALÉ	SALZIG
SHARP	<i>meta.</i>	TRANCHANT	SCHARF
SHORT	<i>meta.</i>	COURT	KURZ
SHY	<i>meta.</i>	TIMIDE	SCHÜCHTERN
SILENT	<i>meta.</i>	SILENCIEUX	STILL
SLOW	<i>meta.</i>	LENT	LANGSAM
SMALL	<i>meta.</i>	PETIT (DE TAILLE)	KLEIN
SMOOTH	<i>meta.</i>	LISSE	GLATT
SOLID	<i>meta.</i>	SOLIDE	FEST
SOUR	<i>meta.</i>	AIGRE	SAUER
SPITZ	POINTED	POINTU	<i>meta.</i>
STINGY	<i>meta.</i>	AVARE	GEIZIG
STINKY	<i>meta.</i>	MALODORANT	STINKEND
STRAIGHT	<i>meta.</i>	DROIT	GERADE
STRONG	<i>meta.</i>	FORT	STARK
STUBBORN	<i>meta.</i>	TÊTU	STUR
SUPERFICIAL	<i>meta.</i>	SUPERFICIEL	OBERFLÄCHLICH
SWEET	<i>meta.</i>	SUCRÉ	SÜß
TIGHT	<i>meta.</i>	SERRÉ	ENG
THIN	<i>meta.</i>	MINCE	DÜNN
TRUE	<i>meta.</i>	VRAI	WAHR
WARM	<i>meta.</i>	CHAUD	WARM
WEAK	<i>meta.</i>	FAIBLE	SCHWACH
WET	<i>meta.</i>	HUMIDE	FEUCHT
WHITE	<i>meta.</i>	BLANC	WEIß
WIDE	<i>meta.</i>	LARGE	WEIT
WISE	<i>meta.</i>	SAGE	WEISE
WRONG	<i>meta.</i>	FAUX	FALSCH
YOUNG	<i>meta.</i>	JEUNE	JUNG

APPENDIX 2. List of the polysemous patterns observed in 24 languages

Nbr. of languages concerned	Polysemous patterns observed in the corpus	Nbr. of patterns
1	acid/salt; sour/blunt; sour/salt, bitter/solid, bitter/calm, bitter/salt, stingy/nasty, beautiful/clean, beautiful/true, white/dirty, white/poor, white/clair, cheap/mou, cheap/delicious, cheap/easy, cheap/doux, calm/solid, calm/shy, warm/ill, warm/wet, hot/fast, expensive/strong, expensive/warm, expensive/painful, clair/wide, clair/empty, constant/dense, constant/dick, brave/solid, brave/hard, bent/round, short/shallow, dense/dark, dense/frequent, straight/narrow, lose/ superficial, doux/cold, doux/easy, hard/ripe, hard/sharp, hard/dick, gesund/ clever, gesund/young, expensive/gesund, gesund/cold, gesund/slow, gesund/ solid, gesund/wet, dick/lichter, dick/frequent, dickflüssig/little, dickflüssig/wide, dickflüssig/pure, lichter/open, narrow/young, narrow/little, narrow/léger, easy/cold, easy/shallow, easy/léger, easy/sweet, weak/handicapped, wrong/rude, proud/gay, proud/large, proud/big, strong/old, strong/big, fragile/mou, cold/lazy, cold/shy, cold/silent, fat/wide, young/thin, brave/active, slow/silent, slow/wise, dressed/lié, smooth/clean, smooth/empty, heavy/wise, clever/dry, clever/deep, thin/little, mou/ fearful, open/empty, lazy/fearful, shallow/near, rotten/dirty, pure /empty, pure/polite, pure/good, stubborn/solid, limping/handicapped, clair/easy, difficult/rude, straight/short, maigre/dry, narrow/idiot, weak/ill, weak/idiot, dirty/fat, fat/rude, slow/idiot, far/lichter, dickflüssig/heavy, hot/difficult, dickflüssig/big, far/deep, poor/stingy, poor/cheap, cheap/nasty, cheap/stingy, clair/léger, raw/cold, dense/idiot, doux/léger, straight/pure, narrow/long, narrow/weak, weak/fragile, weak/bad, wrong/bad, large/numerous, heavy/big, shallow/superficial, right/good, good/true, doux/generous, delicious/doux, sour /bad, sweet/beautiful, mou /slow, true/polite, round/near, straight/good, wide/ numerous, poor/bad, small/weak, rude/rotten, heavy/solid, thin/small, smooth/ calm, smooth/ delicious, rough/difficult, rough/bad, white/big, deep/dick, léger/ thin, cool/good	149 (58%)
2	good/clean, good/doux, warm/fast, expensive/solid, expensive/hard, brave/strong, boiled/clever, boiled/cold, boiled/ripe, hard/gesund, dick/wide, dick/large, weak/mou, big/wide, wet/slow, long/deep, expensive/difficult, constant/frequent, cowardly/lose, narrow/small, big/round, acid/nasty, sour/nasty, warm/difficult, raw/rude, raw/new, slow/idiot, heavy/difficult, thin/maigre, hard/rough, hard/rude, dickflüssig/solid, spitz/strong, strong/sharp, cool/wet, straight/right, thin/weak, dickflüssig/fat	38 (14,8%)
3	bitter/stingy, raw/wet, big/old, full/numerous, clean/empty, white/clean, hard/stubborn, wet/cold, dick/fat, bitter/nasty, cheap/good, dense/dickflüssig, dense/dick, lichter/wide, lichter/large, narrow/tight, cold/calm, fat/big, weak/léger, fat /heavy, stinky/bad, bad/nasty, strong/loud, good/sweet, hard/difficult, bad/dirty, lose/open, solid/dick, short/near	29 (11,2%)
4	sour/bitter, cold/slow, narrow/thin, fragile/léger, slow/heavy, doux/smooth, weak/poor, clean/pure, smooth/flat, easy/léger, pure/true, weak/maigre, acid/bitter, dick/dickflüssig, dick/heavy, difficult/painful, stinky/rotten, hard/dry	18 (7%)
5	clair/clean, hot/warm, good/generous, good/delicious, dick/big, gesund/strong, sharp/spitz	7 (2,7%)
6	far/long, doux/sweet	2 (0,8%)
7	delicious/sweet, young/small, clever/wise,	3 (1,1%)
8	doux/mou, short/small	2 (0,8%)
9	strong/solid, large/wide	2 (0,8%)
10	hard/solid, hard/strong	2 (0,8%)
11	large/big	1 (0,4)
12	young/little	1 (0,4)
13	beautiful/good, small/little	2 (0,8%)
16	acid/sour	1 (0,4%)
	total	257

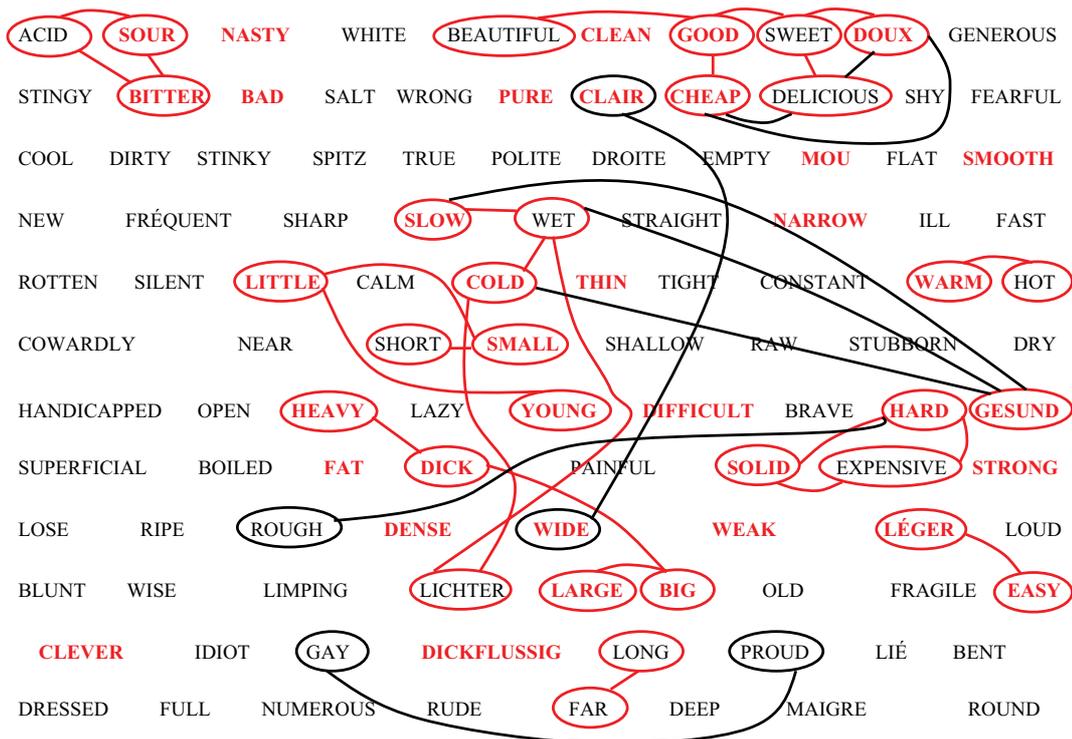
APPENDIX 3. *Semantic and conceptual maps*

1a. **Bambara semantic map**



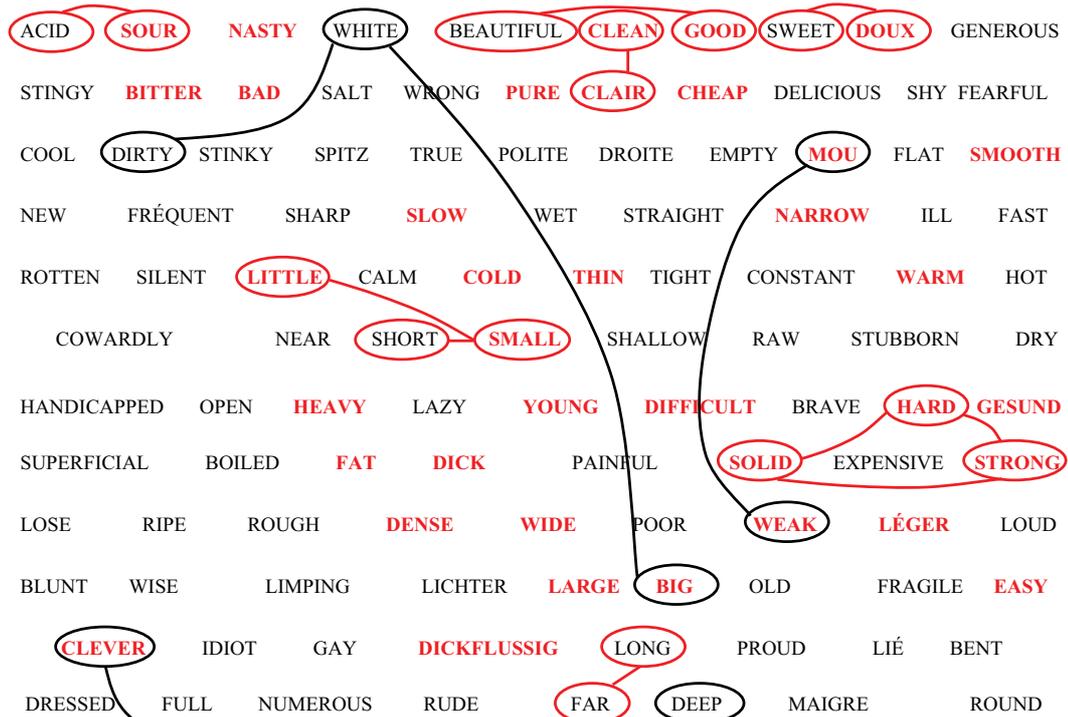
19 recurring polysemies versus 4 specific polysemies

1b. **Cerma semantic map**



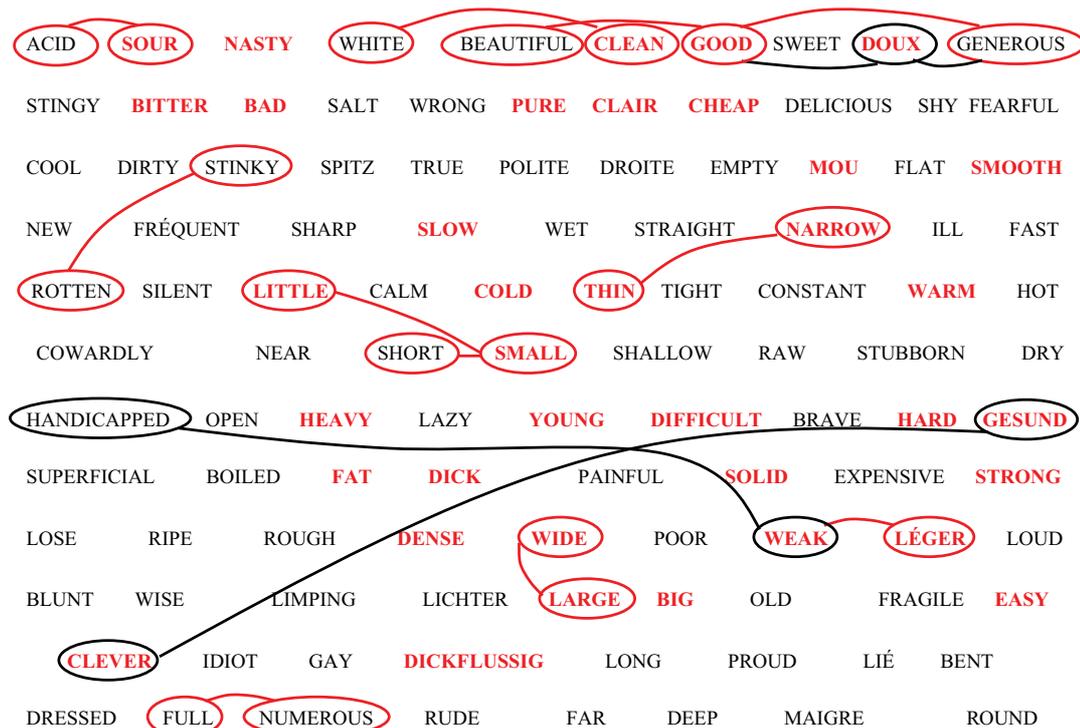
24 recurring polysemies versus 9 specific polysemies

1c. Gbaya semantic map



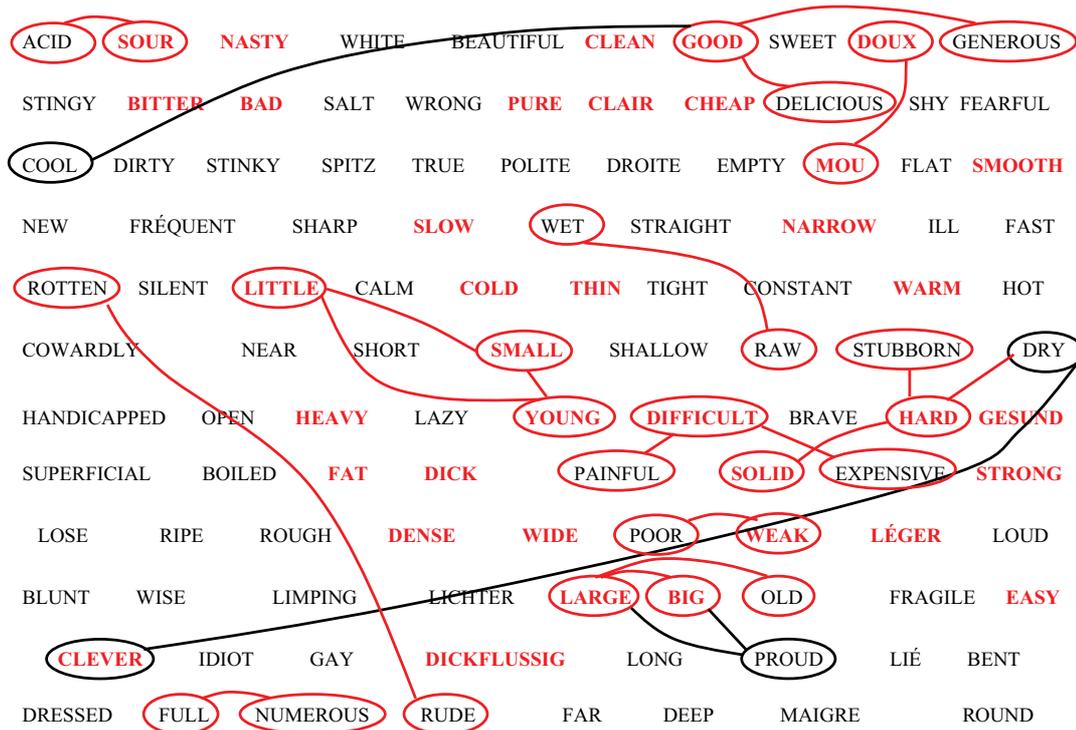
10 recurring polysemies versus 4 specific polysemies

1d. Jola semantic map



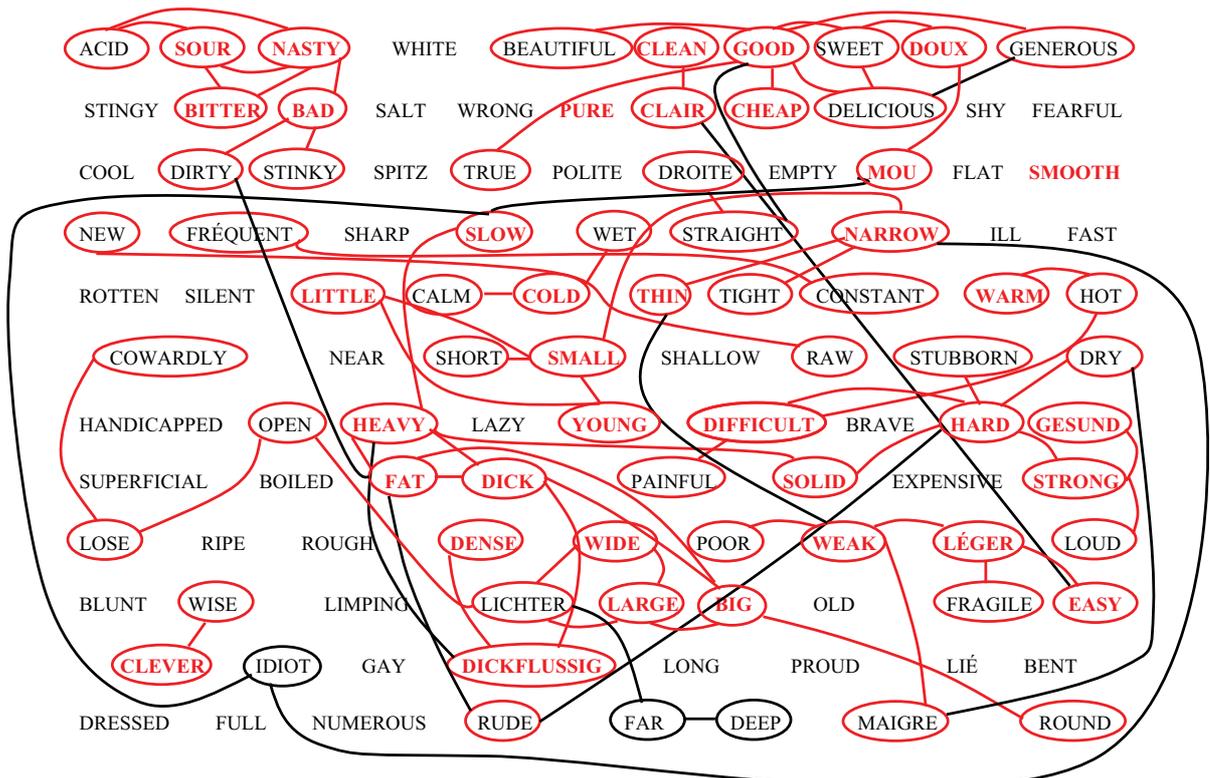
12 recurring polysemies versus 3 specific polysemies

1e. Wolof semantic map



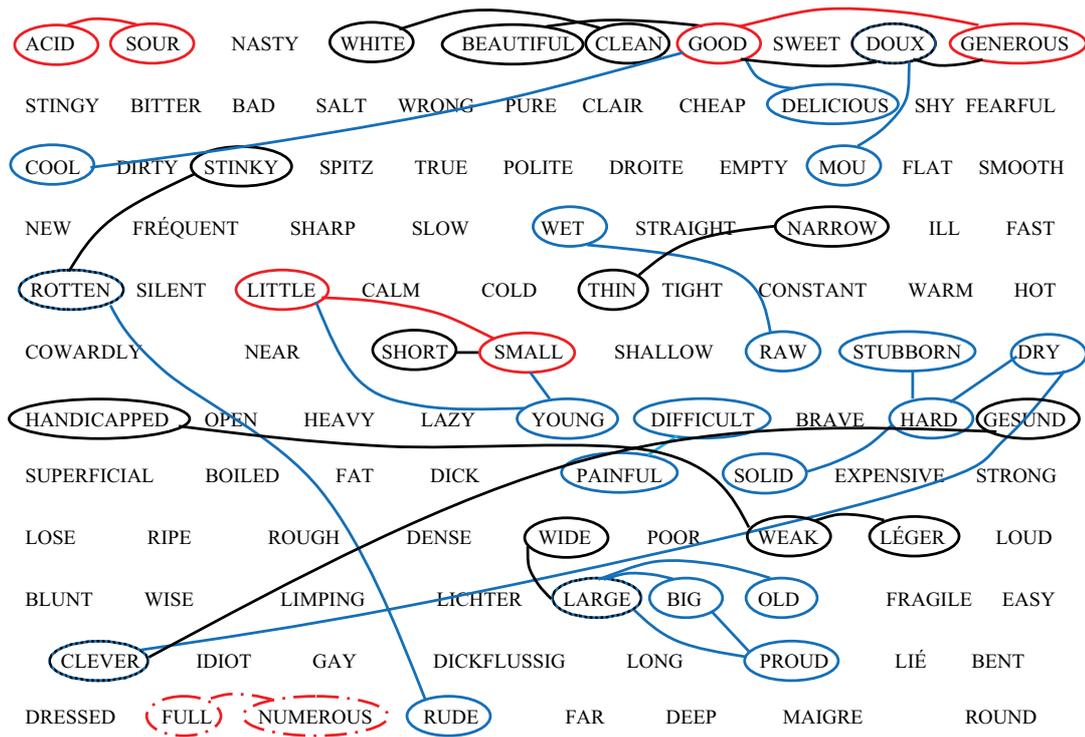
18 recurring polysemies versus 4 specific polysemies

1f. French semantic map



61 recurring polysemies versus 14 specific polysemies

2. Jola and Wolof semantic map



3. Conceptual map

