

A collection of links to thesauri, thesaurus software and classification systems on-line is now available at the web-site of the University of Applied Sciences, Cologne (Germany), Department of Library and Information Studies (<http://www.fbi.fh-koeln.de>). You may access it following this URL: http://www.fbi.fh-koeln.de/labor/bir/thesauri_new/index.htm The collection is browsable by languages and by subject areas. For the moment the descriptions are in German only, an English version, however, is under construction and will be announced when finished.

In Other News:

DIMDI has several new announcements: new features for grips-WebSearch include searching narrower terms (DOWN); new literature and patent database; DERWENT BIOTECH, a new literature and patent database; price reductions for MEDLINE and other NLM databases; and the ISTEP/ISSHP database is now available in English. For further information, visit the web site at: <http://dimdi.de>

Information Today, Inc. has just published a practical new how-to-book entitled "Finding Statistics Online: How To Locate the Elusive Numbers You Need." For more information, visit the web site at: <http://www.infotoday.com>.

Appointments:

The International Federation for Information and Documentation (FID) named Stephen Parker as the new Executive Director. Mr. Parker is a British national and a Fellow of the British Library Association. He is Editor of the quarterly journal, Information Development, and author of several books and numerous reports, conference papers and articles on various aspects of information management and information development.

Institut de l'Information Scientifique et Technique du CNRS-Nancy (INIST) has appointed Alain Chanudet to the Director of INIST. Mr. Chanudet has a law degree from the University of Nancy.

Awards:

New Award for Best Article! The Haworth Press, Inc. and Cataloging & Classification Quarterly are pleased to announce the first annual "Best of Cataloging & Classification Quarterly Award." A \$500 prize will be awarded for the best article published in each entire volume of Cataloging & Classification Quarterly, beginning with Volume 26. The prize will be determined by an awards committee, to be announced at a later date. For information on the award or to submit an article, contact the Editor: Ruth C. Carter, Ph.D, MA, MLS, 121 Pikemont Dr. Wexford, PA, 15090-8447; e-mail: rcc13@vms.cis.pitt.edu

ARTICLE

A Contribution to the Study of the Semantics of French Psychological and Communication Verbs

By Mouna Kamel

1. Introduction

The aim of this work is to propose a description of the semantics of psychological verbs, verbs that express feelings, and communication verbs. By identifying sense components, by specifying sense elements which differentiate closely related verbs, and by studying sense variations, we found new criteria permitting the constitution of verbs semantic classes so as to better structure the lexicon and to better organize semantic descriptions.

In this paper, we first represent the verb semantics by means of the Lexical Conceptual Structure (LCS), adding, if necessary, new primitives and new semantic fields. We then study sense variations with the aim of making semantic descriptions more accurate, comprehensive and flexible.

2. Verb semantic classes

Different approaches to semantic classifications have been proposed, each of them contributing to a different form of classification, whose usefulness and ease of constitution answer to different needs.

There are different approaches to classify verbs semantically. B. Levin (Levin, 1993) proposed a classification based on syntactic criteria, called alternations which turn out to form classes with a certain semantic cohesion. But these alternations are specific to the English language, and cannot be used straightforwardly for other languages. Another approach, more oriented towards Natural Language Processing (NLP) applications and for French, is proposed in (St-Dizier, 1996). Syntactic criteria and thematic roles are used at the same time. Approaches based on ontological criteria assume that most, if not all lexical semantic relations, operate within quite precise semantic domains. In (Fellbaum, 1993), verbs are first divided into state verbs and action verbs, each of these groups is then further divided into subclasses, according to certain dimensions, properties or domains. In each family of verbs, a generic verb can be specified: *act, move, become, make, be, ...* One can consider that a generic verb corresponds to an LCS primitive. Jackendoff (Jackendoff, 1972) worked out semantic classes by putting together verbs whose arguments accept the same thematic roles. This method, though based on semantic criteria, has the disadvantage of grouping verbs without semantic resemblances.

Different studies of the semantics of psychological verbs have been made (Mathie, 1995; Fellbaum 93; Sanfilippo, 1992). In (Mathieu, 1995), verbs are classi-

fied according to the nature of the feeling. If a verb has more than one meaning, it belongs to as many corresponding classes. This approach is based on the identification of semantic regularities.

Anna Wierzbicka (Wierzbicka, 1987) investigated speech act verbs, noting that she could not structure them into a hierarchical way. She then proposed to group verbs into classes if semantic links exist between these verbs. For example, *answer* is closely related to *reply*, but it is also closely related to *ask* (a question). When a verb has different meanings, each meaning is placed next to its own family. *Ask* in the sense of 'asking a question' will be closely related to the verbs *question*, *inquire*, *interrogate*, *query*. And *ask* in the sense of 'asking someone to do something' is closely related to *beg*, *implore*, ... She obtained 2 classes : *ask1* and *ask2*. The groupings she made are partly arbitrary but they are interesting because one can compare definitions of related verbs.

3.1 LCS representation

Conceptual categories and primitives of the LCS have been widely used for spatial localization verbs, other cognitive / semantic fields may be derived by analogy. We tried to represent psychological verbs by means of this set of existing primitives and semantic fields, but it seemed to us that these primitives were not adequate, for the following reasons :

A) Verbs like *love*, *feel*, *hate*, ... denote a feeling felt by someone towards somebody else or something else. We can represent this situation by using the primitive GO :

[_{event} GO_{+psy} ([_{thing} X : FEELING],
 [_{p.th} FROM_{+psy} ([_{thing} Y : LIVING_OBJECT]), TO_{+psy} ([_{thing/event} Z])])]

The +psy semantic field denotes the psychological characteristic of the verb (Pinker, 1993).

This description is nevertheless not satisfactory because there is not a real transfer of feeling : someone who feels love is not devoid of love, although the goal perceives (or receives metaphorically) his feeling. This is why we introduce a new primitive *FEEL* which represents the fact that someone feels a feeling towards something or someone else. The description becomes :

[_{event} FEEL_{+psy} ([_{thing} X : LIVING_OBJECT],
 [_{thing} Y : FEELING], [_{p.th} TOWARD_{+psy}
 ([_{thing} Z])])]

B) No existing primitive seems to be satisfactory to represent verbs like *seem*, *appear*, *look like*, ... We need therefore a new primitive, and introduce SEEM, which we define as a generic primitive for this sub-set of verbs.

John appears to be anxious

[_{event} SEEM_{+psy} ([_{thing} X : LIVING_OBJECT],
 [_{thing} Y : FEELING])]

where Y will be instanciated with the " anxious " value.

C) Verbs like *present*, *show*, *display* ... make an object visible to people. The object becomes visible, but it is not affected (GO_{+chr} is then not suitable). We need a primitive like BECOME which translates this fact :

[_{event} CS ([_{thing} X : LIVING_OBJECT],
 [_{event} BECOME_{+perc} ([_{prop} VISIBLE_TO ([_{thing} Y : OBJECT], ([_{thing} PEOPLE])])])]

The VISIBLE_TO property expresses the fact that the object Y is now visible to people.

D) Verbs like *propose*, *ask*, ... denote an exchange but there is not necessarily transfer of possession. We introduce the semantic field +com (for communication), to characterize the fact that it is only a request.

[_{event} GO_{+com} ([_{thing} Y : REQUEST],
 [_{p.th} FROM_{+com} ([_{thing} X : LIVING_OBJECT]), TO_{+com} ([_{thing} Z])])]

We propose here a study of the semantics of French psychological and communication verbs based on semantic criteria, by means of the Lexical Conceptual Structure (LCS).

3. The Lexical Conceptual Structure

The LCS is an elaborated form of semantic representation, with a strong cognitive dimension (Jackendoff, 1983 ; Jackendoff, 1990). The LCS has some similarities with approaches used in Artificial Intelligence, such as semantic nets or conceptual graphs. The LCS is basically designed to represent the meaning of predicative elements and the semantics of propositions, it is therefore substantially different from frames and scripts. The LCS should be considered both as a semantic model providing a representational framework and a language of primitives on the one hand, and as a methodology on the other hand.

The representations of these verbs show that the set of primitives already known, enlarged with FEEL, SEEM, BECOME associated with the +psy, +com, +perc semantic fields, seem to be sufficiently expressive to describe the general semantics of those verbs.

3.2 LCS based classification

Some verbs share the same LCS pattern. Bonnie Dorr (Dorr ; 1993) puts together verbs which accept the same template, and thus, constitute a semantic class. However each LCS class includes verbs from more than one linguistic class (in the sense of wordnet), and conversely, each linguistic class may include with different LCS patterns.

Patterns allow us to classify verbs according to different levels of granularity and different conceptual dimensions. For example, the following patterns accept :

```
[event ]
{ éprouver, ressentir, aimer, adorer, désirer, apprécier, envier, renoncer, hésiter, décider,
  regretter, se désoler, ... }

[st.ite ]
{ rire, pleurer, déprimer, délirer, supporter, apprécier, ... }

[event CAUSE([ ]), [event INCH([st.ite BE+psy([thing X : LIVING_OBJECT], [pl.ice ]))] ) ]
{ supporter, inquiéter, terroriser, tourmenter, ... }
```

etc ...

This representation is vague and largely under-specified : it can therefore represent the meaning of a large number of verbs.

Note that verbs such as *inquiéter*, *tourmenter*, *terroriser*, ... belong to the same semantic class, but the LCS pattern is not sufficient to take into account the level of anxiety which differentiate these verbs.

Non-branching proportional series (Cruse , 1986 ;Kamel , 1997), widely used in lexical representation, allow us to establish this gradation. For instance, the scale along the 'inquiétude' property for these verbs is :

Terroriser Tourmenter Inquiéter 0 Rassurer Calmer

INQUIETUDE-----|-----|-----|-----|-----|-----|----->

-3 -2 -1 . 1 2

This enables us to orthogonally complement LCS representations, and we can then obtain macro-lexical structures. *Terroriser* can then be described by both the previous series and by the following LCS pattern :

```
[event CAUSE([ ]), [event INCH([st.ite BE+psy([thing X : LIVING_OBJECT ], [pl.ice AT+psy([prop INQUIETUDE) ]))] ) ] ]
```

Notice, however, that verbs of a given non-branching proportional serie do not necessarily belong to the same semantic class (in the sense that they do not " accept " the same LCS template).

Let us now improve the semantic description by the study of sense variations, and show how generative actions can be represented with the LCS.

4. The Generative framework

To describe the senses of a verb, we can either adopt an enumerative approach where these senses may be close to each other, or create a system of rules which recognizes variations around basic senses of a verb. This second approach is interesting since it allows us to represent the dynamics of a language (Pustejovsky, 1995).

Our work consists in :

- investigating the notion of sense, and developing a generic model for each sense, without falling into an excessive generalization. Our goal is to define the different senses and usages of a verb, and to adjust the different usages around a small number of senses, from which a generative process can produce derived usages.
- using a sense theory, such as LCS, and showing how the lexical semantic generative operations can be described with the LCS.

4.1 Hypothesis on sense representation

A study of sense variations of psychological and communication verbs shows that :

4.1.1 LCS representations are different for 2 senses of a verb *souhaiter* in the sense of " to hope " : *Jean souhaite réussir*

```
[event FEEL+psy([thing X : LIVING_OBJECT ], [thing Y : FEELING ], [p.th TOWARD([event ]))] ) ]
```

souhaiter in the sense of " to wish something to somebody " : *Jean souhaite la bonne année à ses amis*

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[event GO+com([thing Y ], [path FROM+com([thing X : LIVING_OBJECT]), TO+com([thing Z : LIVING_OBJECT ]))] ) ]
```

4.1.2 For a given sense, the LCS pattern kernel can be more or less underdetermined, depending on arguments.

proposer un candidat (to propose a candidate)

[_{event} CS ([_{thing} I]), [_{event} GO_{+cont} ([GO_{+epist}([_{thing} J]), [_{path} FROM_{+epist}([_{thing} I]), TO_{+epist}([_{thing} K]))])], [_{path} FROM_{+cont}([_{thing} I]), TO_{+cont}([_{thing} K])])])]

proposer un gateau (to offer a cake)

[_{event} CS ([_{thing} I]), [_{event} GO_{+cont} ([GO_{+poss}([_{thing} J]), [_{path} FROM_{+poss}([_{thing} I]), TO_{+poss}([_{thing} K]))])], [_{path} FROM_{+cont}([_{thing} I]), TO_{+cont}([_{thing} K])])])]

4.2 Operations related to sense variations

The usage analysis is useful for delimiting senses. Among the most frequent usage relations, we have selection, metonymy, metaphor, co-composition (Lakoff, 1980; St-Dizier, 1997). A study of the behaviour of these generative operations shows that they would tolerate the rules described below.

4.2.1 *Selection* : the type of an argument is subsumed by the type expected by the predicate for that argument. For example, *exciter* may have for its second argument a *function*, or *chemical elements* : " exciter la soif ", " exciter des ions "

exciter une fonction or exciter des ions :

[_{event} CAUSE([_{thing/event}]), [_{event} GO_{+char,+ident} ([_{thing} X : LIVING_OBJECT ∨ X : FUNCTION ∨ X : CHEMICAL_ELEMENTS]), [_{path} FROM_{+char,+ident} ([_{prop} VALUE_OF(ACTIVITY_LEVEL(X) = " low ")]), TO_{+char,+ident} ([_{prop} VALUE_OF(ACTIVITY_LEVEL(X) = " high ")])]]]

selection may be considered if we define a constraint on the conceptual category instantiation.

4.2.2 *Metonymy* : in the argument, an entity is used to refer to another one, via the part-of relation.

In *la bourse se calme* (literally, the stock exchange quiets down), 'stock exchange' may refer to brokers and/or to currencies. The PART_OF relation denotes the different entities of the stock exchange : brokers (characterized by the +psy semantic field) and currencies (with +char, +ident).

[_{event} FEEL_{+char,+ident OR +psy}([_{thing} WHOLE_OF(X)], [_{thing} Y : FEELING]), [_{path} FROM_{+char,+ident OR +psy}([_{prop} ACTIVITY_LEVEL(X) = " high "]), TO_{+char,+ident OR +psy}([_{prop} ACTIVITY_LEVEL(X) = " low "])]]]

4.2.3 *Metaphor* : it is generally a partial homomorphism between ontologies of different conceptual domains. *supporter* can be used in the sense of " to hold ", but also in the sense of " to encourage ". To encourage somebody can mean to " sustain " his courage in a high position.

supporter in the meaning of " to hold " :

[_{event} CAUSE([_{thing} X]), [_{event} STAY_{+loc,+cont,act}([_{thing} Y]), [_{place} ON_{+loc,+cont,act}([_{thing} X])]]]]

supporter in the meaning of " to encourage " (psychological holding) :

[_{event} CAUSE([_{thing} X]), [_{event} STAY_{+psy}([_{thing} Y]), [_{place} AT_{+psy}([_{thing} PSYCHOLOGICAL-STATUS(Y) = " high "])]]]]

Metaphors may be characterized by a switch in the semantic fields, with respect to this verbs class.

4.2.4 *Co-composition* : deals with the emergence of unexpected new senses, often with an important sense variation.

This phenomenon usually may be at the origin of semi-fixed or fixed forms. We can say *fatiguer la terre* for *remuer la terre*, whereas *fatiguer le sable* has no meaning.

fatiguer la terre in the sense of " to move earth "

[_{event} CAUSE([_{thing/event}]), [_{state} BE_{+char,+ident}([_{thing} EARTH]), [_{place} AT_{+char,+ident}([_{prop} PHYSICAL_STATUS = " remué "])]]]]

Co-composition may correspond to closed LCS structures : all the conceptual categories are instantiated.

4.2.5 Sense restrictions may be represented by selectional restrictions :

paraître in the sense of " to appear before a court of justice " :

[_{event} GO_{+loc}([_{thing} X : LIVING_OBJECT], [_{path} AT_{+loc}([_{place} IN_FRONT_OF_{+loc}([_{thing} TRIBUNAL])]))]]]

paraître in the sense of " to appear on the scene " :

[_{event} GO_{+loc}([_{thing} X : LIVING_OBJECT], [_{path} AT_{+loc}([_{place} ON_{+loc}([_{thing} SCENE])]))]]]

It is now interesting to show a few generalizations over sets of verbs with respect to sense variations, which can be expressed by means of rewriting rules.

The first example is the semantics of a verb which denotes psychological characteristics. It can be extended to

make the semantics of this verb denotes physical characteristics. This is the case for verbs such as :

- { inquiéter, fatiguer, supporter } which accept the same metaphor, consequently the same ontological domain changes from psychological characteristics to physical ones
(+psy --> + char, + ident)
{ supporter, inspirer } also accept a metaphor, from a physical motion to a psychological one (+loc --> +psy)

Another example concerns display verbs. A metaphor consists of displaying an abstract entity to people's mind (in the sense of *explain, know*).

- { exhiber, montrer, étaler, présenter, exposer, .. }
there are ontological domain changes from perception

to knowledge, and to feeling

(+perc --> +epist --> +psy)

Jean expose un tableau (John exhibits a painting)

[_{event} CS ([_{thing} Jean : LIVING_OBJECT],
[_{event} BECOME_{+perc} ([_{prop} VISIBLE(" Tableau ", PEOPLE)])])]]

Jean expose une théorie (John explains a theory)

[_{event} CS ([_{thing} Jean : LIVING_OBJECT],
[_{event} BECOME_{+epist} ([_{prop} KNOWN(" theorie ", PEOPLE)])])]]

Jean expose ses sentiments (John shows his feelings)

[_{event} CS ([_{thing} Jean : LIVING_OBJECT],
[_{event} BECOME_{+psy} ([_{prop} KNOWN(" sentiments ", PEOPLE)])])]]

Verbs like *parcourir, survoler* are first motion verbs, but can be used to describe a manner of perception. We can say *parcourir une region* (to go through a region)

[_{event} GO_{+loc} ([_{thing} I], [_{path} AROUND_{+loc} ([_{place} PART-OF(J)])])]]

or *parcourir un livre* (to glance over a book).

[_{event} GO_{+perc} ([_{thing} I], [_{path} AROUND_{+perc} ([_{place} PART-OF(J)])])]]

Here, the metaphor is characterized by the change +loc --> +perc , implemented by a change in semantic fields.

As we have seen above, *propose* may concern concrete objects (*proposer un gateau*) or abstract objects (*proposer un candidat, proposer une solution*). The ontological domain change is represented by

+poss --> +epist.

These relations are based on empirical considerations, in order to obtain powerful computationally-oriented generative devices.

This work tends to show that sense variation phenomena can be described according to LCS alterations from the original sense of the verbs. This changes from the analysis of sense variations based on type concordance and the operation of type coercion.

Concerning verbs semantic classes, we can orthogonally add the classification criteria mentioned above in section II, to criteria of sense variations.

5. Conclusion

In this work, we have proposed a representation for psychological verbs and communication verbs, by means of the LCS. The definition of these representations makes it possible to build new semantic classes which can be refined according to the level of granularity desired.

The study of sense variations of verbs and the LCS representations of these variations allow us to define generative operations which can be applied with some regularities to these verb families. The next step of

this work involves showing how these generative rules work for others verb families.

References

- Cruse (1986). *Lexical Semantics*. C.V.P. 1986
Dorr, B. J. (1993). *A Machine Translation : A view for the lexicon* . The MIT Press, Cambridge, Massachusetts
Fellbaum, C. (1993). English verbs as semantic net. *Journal of lexicography*
Jackendoff, R. S. (1972). *Semantic Interpretation in generative grammar* . The MIT Press.
Jackendoff, R. S. (1983). *Semantics and Cognition* . Cambridge - Mass - The MIT Press .
Jackendoff, R. S. (1990). *Semantic Structures* . Cambridge - Mass - The MIT Press.
Kamel, M., Saint-Dizier, P. (1997). La relation d'opposition selon des séries proportionnelles sans branchement. *Terminologie et Intelligence Artificielle* - Toulouse.
Lakoff, G., Johnson, M. (1980). *Metaphors we live by* . University of Chicago Press.
Levin, B. (1993). *English verb classes and alternations* :

- a preliminary investigation*. Chicago - The University of Chicago Press.
- Mathieu, Y. (1995). Verbes Psychologiques et Interprétation Sémantique. Langue française - ED. Larousse Feb. 95: N. 105
- Pinker, S. (1993). *Learnability and Cognition : The Acquisition of Argument Structure*. The MIT Press Cambridge, Massachusetts.
- Pustejovsky, J. (1995). *The Generative Lexicon*. MIT Press - 1995
- Saint-Dizier, P. (1996). Verb semantic classes in French. *Proc. Coling'96* - Copenhagen
- Saint-Dizier, P. (1996). Generativity in the lexicon : Qualia structure versus rules. *NeMLaP*, Sydney - Janvier, 1998
- Sanfilippo, A., Briscoe, T., Copestake, A., Mart, M., A., Taule, M., Alonge, A. (1992). Translation equivalence and lexicalization in the ACQUILEX LKB. *Proceedings of the 4th International Conference on Theoretical and Methodological Issues in Machine Translation* - Montreal 1992
- Wierzbicka, A. (1987). *English speech act verbs : A semantic dictionary*. Academic Press Australia - 1987

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