

THE INTEGRATION OF THE AXIOLOGICAL PARAMETER IN THE CATEGORY ENTITY IN FUNGRAMKB CORE ONTOLOGY**

MARÍA ENRIQUETA CORTÉS DE LOS RÍOS
Universidad de Almería

AMALIA MARÍN RUBIALES
Universidad de Córdoba

ÁNGEL M. FELICES LAGO
Universidad de Granada

ABSTRACT

FunGramKB, on the one hand, is a multipurpose lexico-conceptual knowledge base for natural language processing (NLP) systems. It comprises three major interrelated knowledge level modules: lexical, grammatical and conceptual. At the conceptual level the core ontology is presented as a hierarchical catalogue of the concepts that a person has in mind. Here is where semantic knowledge is stored in the form of meaning postulates. On the other hand, axiology is considered to be a primitive, basic or key parameter, among others, in the architecture of meaning construction at different levels. This parameter can be traced back to the three subontologies in which FunGramKB can be split: #ENTITY for nouns, #EVENT for verbs, and #QUALITY for adjectives. In this paper we shall concentrate on the category # ENTITY and explore how the main categories and features of the axiological parameter (good-bad or positive-negative [+/-]) are represented and encoded within FunGramKB ontology, particularly inside semantic properties such as the meaning postulates.

Keywords: ontologies, terminology, axiology, FunGramKB, Knowledge base

RESUMEN

De una parte, FunGramKB es una base de conocimiento léxico-conceptual multipropósito para el sistema de procesamiento de la lengua natural (PLN). FunGramKB comprende tres niveles de información: el léxico, el gramatical y el cognitivo. El nivel cognitivo está formado (entre otros) por una ontología que estructura de forma jerárquica el catálogo conceptual que posee una persona que utiliza una lengua. Aquí es donde el conocimiento semántico está almacenado mediante postulados de significado. Por otra parte, la categoría axiológica, entre otras, se considera como un parámetro básico y primordial para comprender la arquitectura de la construcción del significado a diferentes niveles. La presencia de este parámetro puede comprobarse en las tres subontologías en las que puede dividirse FunGramKB: #ENTITY para sustantivos, # EVENT para verbos, y #QUALITY para adjetivos. En este artículo nos concentraremos en la categoría #ENTITY y exploraremos cómo los principales rasgos y categorías del parámetro axiológico (“bueno-malo” o “positivo-negativo” [+/-]) se representan y codifican en el marco de la Ontología de FunGramKB, especialmente dentro de constructos semánticos tan fundamentales como son los postulados de significado.

Palabras clave: ontologías, terminología, axiología, FunGramKB, base de conocimiento

1. BASIC ASSUMPTIONS

In this paper we start from two premises: The first one states that *Valuation* is an inherent aspect of categorization. In fact, in the ontogenetic development of every human being, the first categorizations are valuations. The reason is that we are valuating beings. All our actions, our thinking, our attitudes and interactions with the world and with other people, but particularly our emotions are connected with or laden with certain values. (Krzyszowski, 1997). Consequently, axiology is considered to be a primitive, basic or key parameter, among others, in the architecture of meaning construction at different levels in language (Hare in 1952; Osgood, Suci, Tannenbaum in 1957; Coseriu in 1967; Pottier in 1974; Krzyszowski, 1990, 1997; Felices-Lago, 1991, 1997; Cortés de los Ríos, 2001; and many others) .

In the second place, *FUNGRAMKB* is a multipurpose lexico-conceptual knowledge base for natural language processing (NLP) systems (Periñán-Pascual & Arcas-Túnez 2004; Periñán-Pascual & Arcas-Túnez 2005; Mairal Usón & Periñán Pascual 2009a; Mairal

Usón & Periñán Pascual 2009b; Periñán Pascual & Mairal Usón 2009a; Periñán Pascual & Mairal Usón 2009b). It is multipurpose in the sense that it is both multifunctional and multilingual. In other words, FunGramKB can be reused in various NLP tasks (e.g. information retrieval and extraction, machine translation, dialogue-based systems, etc) and with several natural languages. This knowledge base comprises three major knowledge levels, consisting of several independent but interrelated modules: (1) Lexical level: *The Lexicon* stores morphosyntactic, pragmatic and collocational information about words. *The Morphicon* helps our system to handle cases of inflectional morphology. (2) Grammatical level: *The Grammaticon* stores the constructional schemata which take part in the bidirectional linking algorithm: semantics <-> syntax. (3) Conceptual level: *The Ontology* is presented as a hierarchical catalogue of the concepts describing semantic knowledge. *The Cognicon* stores procedural knowledge by means of script-like schemata in which a sequence of stereotypical actions is organised on the basis of temporal continuity. *The Onomasticon* stores information about instances of entities and events. In FunGramKB, every lexical or grammatical module is language-dependent, whereas every conceptual module is shared by all languages. FunGramKB adopts a conceptualist approach to language, where the ontology becomes the pivotal module for the whole architecture.

As a consequence of the two previous premises, the valuation or axiological parameter can be traced back to the three subontologies in which FunGramKB ONTOLOGY can be split: #ENTITY for nouns, #EVENT for verbs, and #QUALITY for adjectives (and some adverbs). In this paper we shall concentrate on the subontology #ENTITY and explore how the main categories and features of the axiological parameter (good-bad or positive-negative [+/-]) are represented and encoded within FunGramKB ontology. To do that, we should understand first how this ontology works on the basis of the following protocol: FGKB Ontology stores semantic Knowledge in the form of thematic frames (TFs) and meaning postulates (MPs) by presenting a hierarchical catalogue of all the concepts (not 'words', unlike FrameNet or MultiWordNet) that a person has in mind and works with two reasoning mechanisms: inheritance and inference, due

to the fact that it is constructed on the basis of a deep semantic approach which not only displays concepts, but also defines them through a machine-readable metalanguage called COREL (i.e. *Conceptual Representation Language*). Within each one of the three subontologies, FunGramKB also distinguishes three categories of concepts organized hierarchically: (a) *Metaconcepts* (e.g. #PHYSICAL, #COLLECTION, #EMOTION, #TEMPORAL, etc.), which form the upper level in the taxonomy, as a result of the analysis of the most relevant linguistic ontologies, i.e. DOLCE, SIMPLE, SUMO, etc. (b) *Basic concepts*, preceded by symbol +, are used as defining units which enable the construction of MPs for basic concepts and terminals, as well as taking part as selection preferences in TFs: e.g. +BOOK_00, +DIRTY_00, +FORGET_00, etc. (c) *Terminal concepts*, which are headed by symbol \$. Terminals are not hierarchically structured and do not have definitory potential to take part in MPs: e.g. \$METEORITE_00, \$VARNISH_00, \$CADAVEROUS_00, etc.

2. THE AXIOLOGICAL AXIS IN THE NOMINAL LEXICON

In the Functional Lexematic Model (FLM), Martín Mingorance (1987), inspired by Coseriu, introduced the category CLASSEMES, which were defined as general pragmatic, semantic and syntactic determinations in the vocabulary or as a kind of grammar. He proposed some of them for the pragmatic module:

- focus
- speaker`s evaluation
- social norm, etc.
- aesthetic norm.

Faber and Mairal (1999) proposed four macro-organizational patterns which appear across a wide range of verbal domains: Space; Time; Sociocultural context and Axiological evaluation (positive/negative). The first two patterns basically affect verbs, but the last two are shared by verbs, nouns or adjectives. The axiological

pattern basically referred to Krzeszowski's Lakoffian approach based on a the three-level hierarchy of values (sensory experience, life and health, spiritual level) given by classical axiologists such as Max Scheler or Tischner. However, our proposal of axiological evaluation is based on a series of axes and scales that contribute to outlining the prototypical features characterizing its structure.

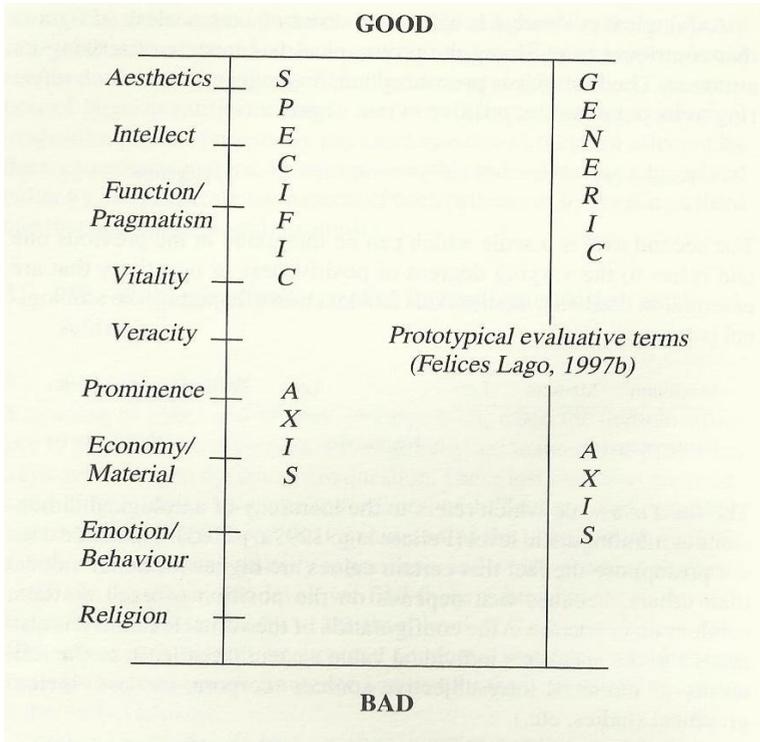
The first axis is preconceptual, lexico-genetic and dual, referring to its polar nature:

Positive (+) vs. Negative (-)

The second axis refers to the varying degrees of positiveness or negativity that are essential to domains or lexemes:

Maximum-Medium-Low ___ Low-Medium-Maximum
Positivity (+) Neutral (0) Negativity (-)

The third axis proposes a Hierarchy of axiological dimensions at intralinguistic level which are a result of an intensive research on lexicographical sources (Felices Lago 1997: 188):



3. AXIOLOGICAL REPRESENTATION AND DISTRIBUTION IN FGKB CORE ONTOLOGY.

If we link FGKB and the axiological parameter, in the following lines it will be observed how the axiological features are expanded and distributed throughout a set of semantic/ conceptual instruments (basic and terminal concepts, predications or satellites) and syntactic ones (predication operators such as polarity, quantification operators and logical connectors), in line with the process of stepwise conceptual decomposition characterizing FunGramKB.

3.1.- Syntactic features of MPs: Operators.

- Quantification Operators:

A participant can be preceded by an operator (α), which applies a specific kind of quantification to the concept expressed as a selection preference

Feature	Value
Absolute quantifier	1 / 2 / 3 / 4 ...
Relative quantifier	m / s / p
Indefinite quantifier	i

Ex: (x7: **m** +GOOD_00)Attribute): **+PRIDE_00**

The quantification operators sensitive to axiological concepts are the relative quantifiers, particularly *m*, as it acts within the gradable semantic dimensions.

-Predication operators:

Polarity operator *n* allows negative information to be explicitly stated. It is similar to *neg* in d-Prolog proposed by Nute.

Feature	Value
Aspectuality	ing / pro / egr
Temporality	rpast/npast /pres/nfut/rfut
Epistemic modality	cert / prob / pos
Non-epistemic modality	obl / adv / perm
Polarity	n

Ex: +(e2: **n** +BE_01 (x1)Theme (x3: +LEGAL_00)Attribute): **+CRIME_00**

3.2.- Conceptual features of MPs: Predications and satellites

Only **basic concepts** can be used in Meaning Postulates to define terminal concepts or other basic concepts. A sample of axiologically-loaded basic concepts used in the meaning postulates of relevant units are shown as follows:

+IMPORTANT_00; +BEAUTY_00; +PLEASANT_00;
 +INTELLIGENCE_00; +WISDOM_00; +COURAGE_00;
 +CRUELTY_00; +DISLIKE_00; +DESIRE_00;
 +DESIRE_01; +FEAR_00; +PLEASURE_00; +LIKE_00;
 +PRIDE_00; +GOOD_00;+SADNESS_00; +SORROW_00;
 +DIE_00; +GOD_00; +WRONG_00; +FUNNY_00;
 +STUPID_00; +HAPPY_00;m +BAD_00; +COMFORT_00;
 +DANGER_00; +DAMAGE_00; +DAMAGE_01, etc.

These defining units that enable the construction of meaning postulates are limited to an inventory of about 1,300 units, which come mostly from defining vocabulary in *Longman Dictionary of Contemporary English*. They can be found in predications or satellites as it can be seen below:

- Predications

(e5: +BE_01 (x5)Theme (x7: m +GOOD_00)Attribute))Referent):
+PRIDE_00
 *(e3: +BE_01 (x1)Theme (x3: +BEAUTIFUL_00)Attribute):
+FLOWER_00
 +(e2: n +BE_01 (x1)Theme (x3: +LEGAL_00)Attribute): +
CRIME_00
 (e5: +DISLIKE_00 (x7)Agent (x4)Theme)): + **DISLIKE_00**

-Satellites

(f1: x1)Manner)(e3: +BE_01 (x4)Theme (x5: +BAD_00)Attribute):
+EVIL_00
 (f2: (e4: +BE_01 (x3)Theme (x7: +GOOD_00)Attribute):
+HEAVEN_00
 (f1: (e3: +BE_01 (x4)Theme (x5: +DIFFICULT_00)Attribute)): +
PROBLEM_00

(f1: (e4: +BE_01 (x4)Theme (x8: +HAPPY_00 | +NERVOUS_00
Attrib)):+DRUG_00

4. RESULTS AND CONCLUSIONS

For reasons of space we can only offer a sample of the entire analysis carried out in order to assess the impact of the axiological classeme in the Functional Grammar Knowledge Base (FunGramKB) core Ontology. The most relevant features can be summarized as follows:

1.- There is no reason to consider #ENTITIES as less sensitive to the axiological parameter than #EVENTS or #QUALITIES, even though only 74 out of 929 #ENTITIES are sensitive to inherent axiological information in their MPs (8%) and are distributed among the two leading metaconcepts like this: #ABSTRACT 38; #PHYSICAL 36.

2.- +DAMAGE_00 and +DAMAGE_01 are the most recurrent axiologically-loaded basic concepts: 6 times. They are followed by +PLEASANT_00, 4 times, +PLEASURE_00 and also +DISLIKE_00 3 times each. But considering that +PLEASANT_00 and +PLEASURE_00 refer to the same concept (as a quality or as an entity), it can be maintained that the hedonic concept is the most prominent here, as they both account for 7 occurrences.

3.- The concepts from the core ontology in the third axis or hierarchy of axiologically-loaded dimensions can be distributed as follows:

A) GENERIC AXIS

- *PROTOTYPICAL EVALUATIVE CONCEPTS:*
+GOOD_00, m +GOOD_00, m +BAD_00.

B) SPECIFIC AXIS

- *1A) EMOTION/BEHAVIOUR:*
+ PLEASANT_00, DESIRE_00, DESIRE_01, FEAR_00,
+PLEASURE_00, +LIKE_00, +DISLIKE_00, +SADNESS_00,
+SORROW_00, +PRIDE_00, +HAPPY_00, +COMFORT_00,
+DANGER_00, +FREE_00, +SAFETY_00, +FAILURE_00,

+SAD_00, m +SAD_00, LOVE_00, +NERVOUS_00.

- 1b) *BEHAVIOUR/EMOTION*:

COURAGE_00, CRUELTY_00, +STUPID_00, pos+DAMAGE_00,
+DAMAGE_00, +DAMAGE_01, +VIOLENCE_00, FRIGHTEN_00,
+PROTECT_00, +FUNNY_00, +DEFENCE_00, +DANGEROUS_00,
+DESTRUCTION_00, +IMPROVEMENT_00, +PUNISHMENT_00,
+VIOLENCE_00 (+BATTLE_00; +FIGHT_00; +WAR_00),
+COMPETITION_00.

- 2) *VERACITY*:

+WRONG_00; n +BE_01 +LEGAL_00, +LEGAL_00.

- 3) *VITALITY*:

+DIE_00, +, pos +DIE_00, +SICK_00, +ILL_00, +DEAD_00,
+FEVER_00; +PAIN_00, +INJURY_00; +WOUND_00,
+EFFORT_00, +SUFFER_00, +DEATH_00, +PROTECTION_00,
+SEX_00, +HURT_00, +HARDSHIP_00.

- 4) *AESTHETICS*:

+BEAUTY_00, +BEAUTIFUL_00.

- 5) *PROMINENCE*:

+IMPORTANT_00, +VICTORY_00, +SERIOUS_00.

- 6) *RELIGION*:

+GOD_00, +SAINT_00.

- 7) *ECONOMY*:

+MONEY_00.

- 8) *INTELLECT*:

+INTELLIGENCE_00, +WISDOM_00, +DIFFICULT_00.

4.- Examples of axiologically-sensitive entities and their axiologically-loaded predications in meaning postulates. The case of some basic concepts included in +FEELING_00:

#ABSTRACT>> #ATTRIBUTE >> +ATTRIBUTE_00 >> +PSYCHOLOGICAL_ATT_00 >> +FEELING_00:

+**DESIRE_00**: +(e1: +BE_00 (x1: +DESIRE_00)Theme (x2: +FEELING_00)Referent) *(e2: +FEEL_00 (x3: (e3: +DESIRE_01 (x4: +HUMAN_00)Theme (x5)Referent)) Agent (x4)Theme (x1)Attribute)

+ **PITY_00**: (f1: (e4: +BE_01 (x6)Theme (x7: +SAD_00 Attribute))Result)

+**PLEASURE_00**: +(e1: +BE_00 (x1: +PLEASURE_00) Theme (x2: +FEELING_00) Referent) *(e2: +FEEL_00 (x3: (e3: +LIKE_00 (x4)Agent (x5: +HUMAN_00) Theme)) Agent (x5)Theme x1)Attribute)

\$ELATION_00: +(e1: +BE_00 (x1: \$ELATION_00)Theme (x2: +PLEASURE_00) Referent)

+**SADNESS_00** : +(e1: +BE_00 (x1: +SADNESS_00)Theme (x2: +FEELING_00) Referent) *(e2: +FEEL_00 (x3: (e3: +DISLIKE_00 (x4)Agent (x5: +HUMAN_00) Theme))Agent (x5)Theme

5.- Moreover, there are cases of non axiologically-sensitive entities, but axiologically-loaded predications in meaning postulates, as can be seen in this example:

(A) #OBJECT >> #COLLECTION >> +GROUP_00 >>+PEOPLE_00>> +POLICE_00

+**POLICE_00**: +(e1: +BE_00 (x1: +POLICE_00)Theme (x2: +ORGANIZATION_00) Referent) *(e2: +PROTECT_00 (x1)Theme (x3: +HUMAN_00)Referent) *((e3: +PROTECT_00 (x1)Theme (x4: +CORPUSCULAR_00)Referent)(e4: +HAVE_00 (x3)Theme (x4)Referent))

(B) #OBJECT >> #FEATURE >> +PART_00 >> +PLANT_PART_00 +FLOWER_00

+**FLOWER_00**: *(e1: +BE_00 (x1: +FLOWER_00)Theme (x2: +PLANT_PART_00) Referent) *(e2: n +LIVE_00 (x1)Theme (f1: +LONG_01)Duration) *e3: +BE_01 (x1)Theme (x3: +BEAUTIFUL_00)Attribute)

6.- In conclusion, the only axiological hierarchy that can be assumed at conceptual level is built into language and depends, for its relevance (positive or negative), on what is perceived by the vast majority of speakers of linguistic communities. The proposal to insert axiological notations in FGKB ontology, in the lexica under construction or, alternatively, in other levels of meaning description in the Lexical Constructional Model (LCM) should be explored as a key factor for meaning construction.

NOTE

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