FIRST DRAFT

The implementation of the axiological parameter in a verbal subontology for natural language processing

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Abstract

FunGramKB (FGKB), on the one hand, is a multipurpose lexico-conceptual knowledge base for natural language processing (NLP) systems and 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 and a repository where semantic knowledge is stored. Axiology, on the other hand, is widely 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 into which FunGramKB can be split: #ENTITY for nouns, # EVENT for verbs, and #QUALITY for adjectives. Even if most of the specific research conducted so far has been devoted to the category #QUALITY, there is no reason to consider verbs as less of an axiological

category. Consequently, in this paper we shall concentrate on the subontology # EVENT 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 basic or terminal concepts and meaning postulates, or syntactic operators, such as modality or polarity.

Key words: Axiology, Axiological linguistics, knowledge base, FunGramKB, ontology

1. Introduction

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 assessing beings. All our actions, our thinking, our attitudes and interactions with the world and with other people, but particularly our emotions, are connected to or laden with certain values (Krzeszowski 1997). It is also assumed that the first categorization that a baby makes is evaluative in that it involves the division of all things into

good and bad in the most primitive, sensory meaning of these terms. To appreciate the presence of values as well as to evaluate, we need to recognize some system of values. Valuations constitute an aspect of all categorizations, and categorizations directly manifest themselves in language (Felices-Lago 2003). This establishes a direct link between values and language. 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 1952; Osgoodet al. 1957; Katz, 1964; Coseriu 1967; Pottier 1974; Leech 1975; Nida 1975; Lyons 1977; Stati 1979; Krzeszowski, 1990, 1993, 1997; Felices-Lago, 1991, 1997; Cortés-de-los-Ríos, 2001, and many others). One of these linguists, Tomasz P. Krzeszowski (1990), takes a step further and criticizes the excessive importance attributed historically to the "true-false" polar axis to the detriment of the "good-bad" one, which, in his opinion, is the most important parameter in linguistics. He arrived at that conclusion when, analysing a large number of sentences and words, he found out that every lexical item is assessable on the good-bad scale. Some lexical items are situated close to the "good" pole, e.g. *love, care, grow, delight,* some are situated close to the "bad" pole, e.g. *hate, abhor, die, complain,* while others are situated at various distances from the two poles, with a considerable number of lexical items displaying no ostensible charge in plus or in minus, e.g. *appear, declare, compare, etc.*

Secondly, in the last few years the comprehensive theory of constructional meaning known as the Lexical Constructional Model (Mairal-Usón and Ruiz-de-Mendoza, 2008, 2009; Ruiz-de-Mendoza and Mairal, 2008, among others) has incorporated as part of its architecture *FunGramKB* (FGKB), which is a multipurpose lexico-conceptual knowledge base for natural language processing (NLP) systems (Periñán-Pascual and Arcas-Túnez 2004, 2005; Mairal-Usón and Periñán-Pascual 2009, 2010; Periñán-Pascual & Mairal-Usón 2009, 2010). 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.[1] *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 into 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 #EVENT 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 of the three subontologies, FunGramKB also distinguishes three categories of concepts organized hierarchically:

(a) Metaconcepts (e.g. #ABSTRACT, #COMMUNICATION, #SOCIAL, #PSYCHOLOGICAL, #QUANTITATIVE, etc.), which form the upper level in the taxonomy, as a result of the analysis of the most relevant linguistic ontologies developed by other researchers, i.e. DOLCE, SIMPLE, SUMO, etc.

(b) Basic concepts, preceded by the 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. +HAND_00, +HOT_00, +MOVE_00, etc. They can be employed to define any word in any of the European languages that are claimed to be part of the Ontology. The starting point for the identification of basic concepts was the defining vocabulary in *Longman Dictionary of Contemporary English* (Procter 1978), though thorough revision was required in order to perform the cognitive mapping into a single inventory of about 1,300 basic concepts.

(c)Terminal concepts, which are headed by the symbol $. Terminals are not hierarchically structured and do not have definitory potential to take part in MPs: e.g. $AVENUE_00, $GLEAM_00, $SENILE_00.

Basic and terminal concepts in FunGramKB are provided with semantic properties which are captured by *thematic frames* and *meaning postulates*. Every event in the ontology is assigned one single thematic

frame, i.e. a conceptual construct which states the number and type of participants involved in the prototypical cognitive situation portrayed by the event (Periñán-Pascual and Arcas-Túnez, 2007). Moreover, a meaning postulate is a set of one or more logically connected predications (e_1, e_2, … e_n), i.e. conceptual constructs that represent the generic features of concepts. As stated above, the basic concepts are the main building blocks of these types of constructs in the core ontology.[2] See Figure 1.

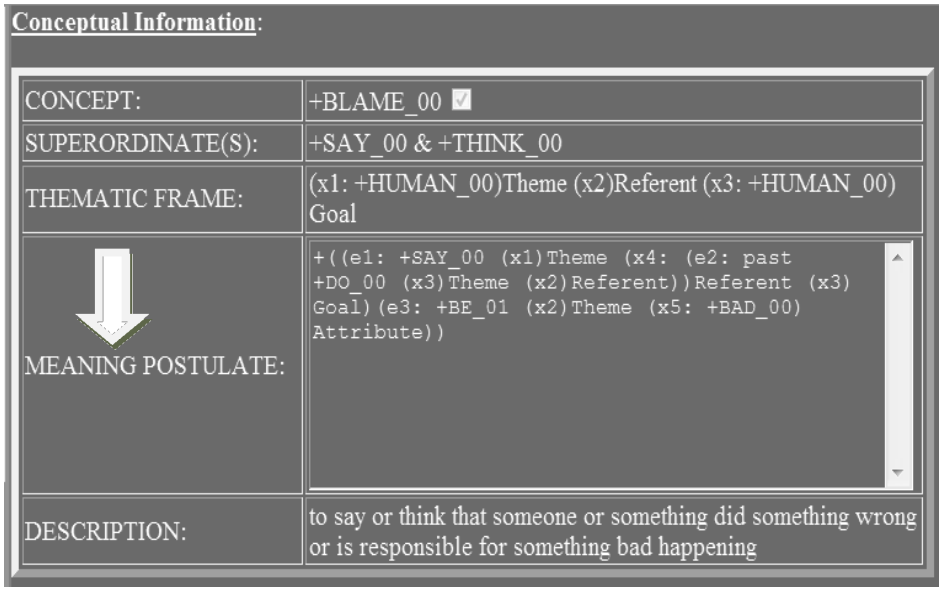

Figure 1. Meaning postulate of +BLAME_00 in FunGramKB

2. The axiological axis in the verbal lexicon: theoretical remarks

Two decades ago, the developments of the Functional Grammar lexicon into a model which could integrate semantic, syntactic and pragmatic aspects of lexemes within a framework combining both paradigmatic and syntagmatic

patterning was the pioneering contribution of Leocadio Martin Mingorance (1990, 1995) and his Functional Lexematic Model (FLM).[3] In this model**,** Martín Mingorance (1987: 380-84), inspired by Coseriu (1967, 1968), introduced the category *classemes,* which were defined as general semantic and syntactic determinations in the vocabulary or as a kind of grammar.[4] Then, he distinguished different kinds of classemes according to the pragmatic, semantic, syntactic, syntactic-semantic components, and concluded that the number and type of pragmatic classemes will depend on further research, but stylistic labels (diatopic, diaphasic, diastratic features) and such elements as "norm", "focus", "speaker's evaluation", "aesthetic norm", etc. constitute a kind of features which will condition the choice of specific lexemes according to the type of communicative situation. He offered an example of the process followed by a pragmatic classeme:

> In the selection of a verb like *gobble* in a communicative situation in which the speaker`s disapproval of someone`s way of eating constitutes the information focus, the lexical choice will be determined in the paradigmatic axis fundamentally by the pragmatic feature [NORM: SOCIALLY SET: VIOLATION], i.e. “violation of a socially set norm”,

> which is most salient differentiating feature with regard to the other verbs in this paradigm (*gorge, guzzle, wolf, devour, bolt,* etc.). (Martín-Mingorance 1987: 384).

Both norms (axiological and social) are so close to each other that it is sometimes difficult to determine whether certain features of word meanings should be counted as axiological or sociocultural. In consequence, sociocultural contexts such as biological/ social/ aesthetic norms often refer to values imposed by a given society. If, in consumption, *gobble* encodes the violation of a socially-set aesthetic norm since the semantic parameters, *quickly* and *greedily*, are negatively evaluated with respect to our conceptualization of how people should eat, then we are saying that *gobble*, the same as *wolf* or *gorge* (consumption of large quantities of food), are verbs affected by the axiological evaluation pattern for exactly the same reasons as they are affected by the social (or sociocultural) pattern. In our opinion, this redundancy can be solved either by merging common aspects of both patterns or by creating a third one that accounts for such examples.

The Martin Mingorance followers Faber and Mairal-Usón (1999) set out to demonstrate not only the principled connections between meaning and patterns of conceptualization in the human mind in a lexically-based approach, but also the relationship between lexical structure and cognition. One of the key issues was the introduction of a cognitive axis and a

typology of predicate schemas at different levels of the lexicon (lexeme, subdomain and domain). Domain-level predicate schemas, in particular, might be sensitive to what these two linguists called domain-level semantic patterns, which could be in turn responsible for their lexical architecture. These parameters also reflected the categorization of certain areas of meaning and might become primitives with cross-cultural validity. As a result, Faber and Mairal-Usón (1999: 234) proposed four macro-organizational patterns which appear across a wide range of domains: space; time; sociocultural context; and *axiological evaluation (positive/negative).* This 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 (Krzeszowski 1997:64).

Faber and Mairal-Usón (1999: 242) underlined the dominant function that values perform in the structure of concepts (Krzeszowski 1990; Felices-Lago 1991; Escalier-Fournier 1997) and followed Krzeszowski in his claim that most lexical items are assessable on an axiological scale and that, in general, words have a tendency to be axiologically loaded with positive or negative connotations in proportion to the degree of human factor associated with them.[5] They also observed that the opposition *good* and *bad* consistently appears in the lexical semantic structure of English verbs. However, previous approaches to the nature of

axiologically-loaded words had claimed that adjectives and adverbs, more than other words, carry a distinct axiological charge and, in this way, are more prototypically evaluative than nouns and verbs (Coseriu 1968; Stati 1979; Aarts and Calbert 1979; Krzeszowski 1990, 1997; Felices-Lago 1991).

Although it is true that most specific research conducted so far has been devoted to adjectives, there is no reason to consider verbs, for instance, as less of an axiological class. In this respect, some publications use examples of verbs to prove axiological implications in linguistic phenomena from different functional paradigms (see, for instance, Pauwels and Simon-Vandenbergen 1993, 1995; Simon-Vandenbergen 1995; Krzeszowski 1997: 205-208; Hunston and Thompson 1999; Martin and White 2005 or Alba-Juez and Martinez-Caro 2011, among others).

Faber and Mairal-Usón (1999: 242-48) demonstrate the significant axiological implication of verbs when they introduce the polarity of *good* and *bad* (as a subjective scale) in the lexical semantic structure of English verbs. The relevance of that scale is evident for the organization of verbal domains such as CHANGE, SOUND, POSSESSION, ACTION, THOUGHT, and FEELING. Using the Scheler/Tischner three level hierarchy of values and taking the domain of SOUND as an example, they show how sounds can be classified, according to the first level of values, as pleasant/harmonious or unpleasant/discordant. Obviously, it can be deduced

that *axiological evaluation* is based on a series of axes, scales and figures that contribute to outlining the prototypical features characterizing its structure (Felices-Lago 2003: 187). The first axis, shown in Figure 2, is preconceptual, lexicogenesic and dual, referring to its polar nature:

Figure 2. Polar nature of axiological evaluation

The second axis is a scale which can be integrated in the previous one and refers to the varying degrees of positiveness or negativity that are essential to the units affected by the axiological pattern. See Figure 3.

Figure 3. Axiological scale

The third axis (see Figure 4) is a scale which refers to the hierarchy of axiological dimensions at linguistic level (Felices-Lago 1997: 105). This scale does not presuppose the fact that certain values are higher (or better values) than others, because that may depend on the position of each domain, subdomain or lexeme in the configuration of the verbal lexicon. It is also related to the speaker`s individual value system or, at least, to the

reliability of unbiased intersubjective sources (corpora, surveys, lexicographical studies, etc.).[6]

Generic positiveness, 'good' encapsulates all specific positive dimensions, regardless of the existence of prototypical positive items.

Generic negativity, 'bad' encapsulates all specific negative dimensions, regardless of the existence of prototypical negative items.

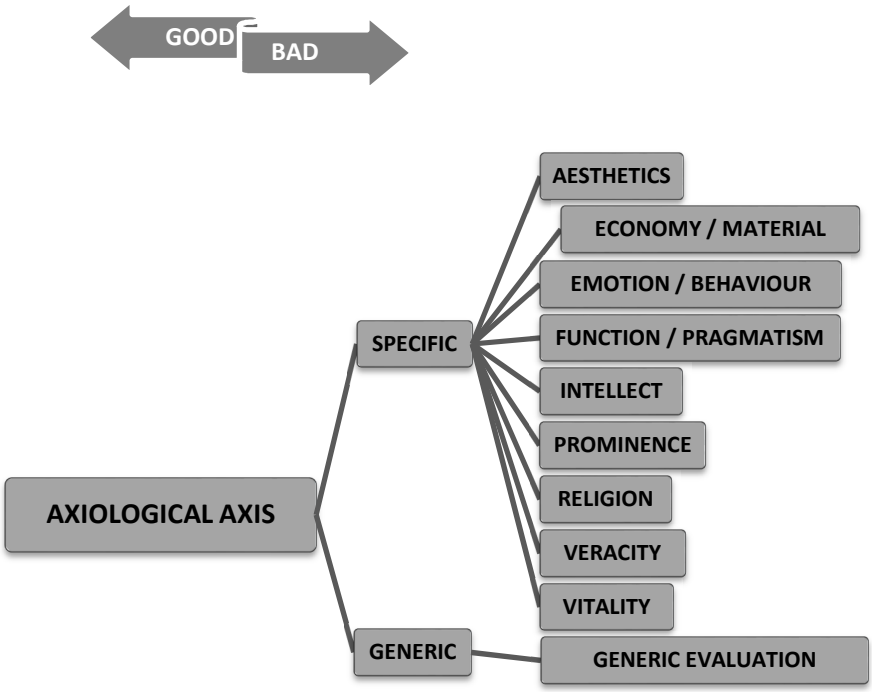

Figure 4. Hierarchy of axiological dimensions at linguistic level

As will be shown in the following section, this axiological axis (multidimensional scale) can be applied to the basic and terminal concepts

included in the #EVENT subontology and, consequently, extended to the verbal lexicon units.[7]

3. Axiological representation and distribution in FGKB core ontology

Velardi et al. (1991) distinguish two well-defined strategies when describing meaning in computational lexicography: i.e. the cognitive content in a lexical unit can be described by means of semantic features or primitives (conceptual meaning), or through associations with other units in the lexicon (relational meaning). The former approach offers a stronger inferential power and guarantees the construction of a robust knowledge base applicable to most NLP tasks, consolidating thus the concept of resource reuse.

In FunGramKB, the meaning postulate (MP) is conceived as a property of basic concepts and terminals. Periñán-Pascual and Arcas-Túnez (2004) point out that current lexicalist models agree to handle lexical meaning as a cognitive representation reflecting the speakers` shared knowledge about the referent linked to a given linguistic expression. Therefore, when representing one of the meanings of a lexical unit, we are really representing the meaning of a concept. In consequence, an MP is a set of one or more logically connected predications, which are cognitive constructs carrying the generic features of the concept. If we apply a

syntactico-semantic description to the participants (arguments and satellites), then a set of event operators allows the machine to recognize well-formed predications.

If we explore the configuration of the axiological parameter in the MPs, it will be observed how the axiological features are expanded and distributed throughout a set of syntactic operators (predication operator (polarity) , quantification operators and logical connectors) and semantic / conceptual instruments (basic and terminal concepts, predications or satellites).

3.1 *Syntactic features of MPs: Operators*

If Λ is a participant whose type is specified by Π, where indexed labels *x* and *f* are used by arguments and satellites respectively, then this participant can be preceded by an operator (α), which applies a specific kind of quantification to the concept expressed as a selection preference, as in Figure 5.

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

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

Figure 5. FunGramKB quantification operator

The quantification operators sensitive to axiological concepts are the relative quantifiers, particularly *m* (many or more) or *p* (a few or less), as they act as upgrading or downgrading intensifiers within the gradable semantic dimensions.

The polarity operator *n* (similar to *neg* in d-Prolog proposed by Nute (2003)) allows negative information to be explicitly stated and is the only predication operator likely to implement an axiological charge. If applied to a concept on the negative pole like +WRONG_00, then it neutralizes its negativity, as can be observed in the second example of Figure 6.

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:

(1) ... (e2: *n* +BE_01 (x1)Theme (x3: +LEGAL_00)Attribute[8]): *+CRIME_00*

(2) ... (e3*:* *n* +BE_01 (x3)Theme (x4: +WRONG_00)Attribute): *+SOLVE_00*

Figure 6. FunGramKB predication operators

Finally, logical connectors used in FunGramKB – conjunction (&), disjunction (|) and exclusion – allow us to coordinate two axiologically-sensitive concepts in the same predication or satellite.

(1) Conjunction: (f1: +SERIOUS_00 & +CAREFUL_00)Manner[9]: *$MEDITATE_00*

Disjunction: ... (x5: +GOOD_00 | +RIGHT_00)Attribute*): $APPROVE_00*

Exclusion: (f1: +NERVOUS_00 ^ +WORRIED_00)Manner: *$BROOD_00*

3.2 Conceptual features of MPs: Predications and satellites

Only *basic concepts* can be used in MPs to define terminal concepts or other basic concepts. A sample of axiologically-loaded basic concepts used in the meaning postulates of concepts under the subontology #EVENT are shown as follows, regardless of their subontology of origin:

(2) Entities: +PAIN_00; +RESPECT_00; +LOVE_00; +VALUE_00; +DAMAGE_00; +GOD_00; +PLEASURE_00; +FEAR_00, etc.

Events: +PROTECT_00; +ATTACK _00; OFFEND_00; +LIKE_00; +DISLIKE_00; +LIVE_00; +DIE_00, etc.

Qualities: +GOOD_00; +BAD_00; +STRONG_00; +FRIENDLY_00; +UGLY_00; +IMPORTANT_00; +USEFUL_00; +AFRAID_00; +NERVOUS_00; +VIOLENT_00; +BEAUTIFUL_00, etc.

These defining units that enable the construction of MPs can be found both in predications or satellites as it can be seen below in a few selected examples:

- In predications,

(3) ... (e3: +BE_01 (x2) Theme (x5: +BAD_00)Attribute): +*BLAME_00*

… (e2: +BE_01 (x2) Theme (x3:+PART_00 | +IMPORTANT_00) Attribute)): +*FEATURE_01*

... (e2: +BE_01 (x1) Theme (x3: +HAPPY_00) Attribute): +*LAUGH_00*

... (e2: n +BE_01 (x2) Theme : +POLITE_00) Attribute): *$SWEAR_00*

… (e2: fut pos +BE_01 (x2)Theme (x3: +PLEASANT_00)Attribute):+*EXCITE_00*

-In satellites,

(4) ... (f1: (e2: +BECOME_00 (x2) Theme (x3: m+GOOD_00) Attribute)) Result): *+IMPROVE_00*

… (f1: +VIOLENT_00)Manner): *$CONTORT_00*

… (f1: +CAREFUL_00)Manner): *+EXAMINE_00*

...(f1:+PLEASURE_00|+ENTERTAINMENT_00) Purpose): *$GAD_00*

... (f1: +FRIENDLY_00)Manner): *+INVITE_00*

Obviously, the most logical interaction between conceptual features and concepts under #EVENT is that axiologically-sensitive events include axiologically-loaded predications in MPs as occurs with concepts describing emotions:

(5) # PSYCHOLOGICAL

EMOTION

+FEEL_00

(e1: +FEEL_00 (x1)Agent (x2)Theme (x3: +ANGRY_00)Attribute): *+ANNOY_00*

(e1: n +LIKE_00 (x1)Agent (x2)Theme): *+DISLIKE_00*

(e1: +DISLIKE_00 (x1)Agent (x2)Theme (f1: +MUCH_00)Quantity): *+HATE_00*

(e2: fut pos +BE_01 (x2)Theme (x3: +PLEASANT_00)Attribute): *+EXCITE_00*

(e1: +FEEL_00 (x1)Agent (x2)Theme (x3: +AFRAID_00)Attribute): +*FEAR_00*

(e1: +FEAR_01 (x1)Agent (x2)Theme (f1: +MUCH_00)Quantity: *$TERRIFY_00*

(e1: +FEEL_00 (x1)Agent (x2)Theme (x3: +HAPPY_00)Attribute*: +LIKE_00*

(e1: +LIKE_00 (x1)Agent (x2)Theme (f1: +MUCH_00)Quantity): +*LOVE_00*

(e1: +LOVE_00 (x1)Agent (x2)Theme …: +*ATTRACT_00*

(e1: +FEEL_00 (x1)Agent (x2)Theme (x3: m +SAD_00)Attribute): +*SUFFER_00*

(e1: +FEEL_00 (x1)Agent (x2)Theme (x3: +WORRIED_00)Attribute): +*WORRY_00*

However, there are cases in which non axiologically-sensitive concepts under the #EVENT subontology may include axiologically-loaded predications in their MPs as shown in (6) and (7):

(6) # PSYCHOLOGICAL

INTENTION

+WANT_00

(e2: +BE_01 (x2)Theme (x3: m +IMPORTANT_00)Attribute: +*NEED_00*

(7) # STATIVE

RELATIONAL

IDENTIFICATION

+BE_01

(e2: +BE_00 (x2)Theme (x3: +VALUE_00)Referent): +*COST_00*

3.3 *Distribution of basic and terminal concepts among the metaconcepts*

In total, 103 out of 400 basic and terminal concepts included in the subontology #EVENT are sensitive to inherent axiological information in their MPs. That represents, approximately, 25% of all instances. This information refers not only to axiologically-sensitive concepts, but also to concepts which are not intrinsically axiological but include axiologically-sensitive defining concepts in their MPs. They are distributed among the four leading metaconcepts like this:

#MATERIAL 52;

#PSYCHOLOGICAL 31;

#COMMUNICATION 14;

#STATIVE 6

In the first place, the metaconcept #MATERIAL incorporates the following basic and terminal concepts under the subordinate metaconcepts #CREATION, #MOTION, # TRANSFORMATION and #MATERIAL (+DO_00):

(a) Under the metaconcept #CREATION: $EXCAVATE_00; $CHATTER_00; $CLANG_00; $SKETCH_01.

(b) Under the metaconcept #MOTION: $FORCE; +FEED_00; $ADVANCE_00; +DANCE_00; $FLEE_00; +ESCAPE_00; +RESCUE_00; +COVER_00; $CLAP_00; +COPULATE_00; +CLIMB_00; +TREMBLE_00; $LIMP_00; $PRANCE_00; $SIDLE_00; $STAGGER_00; $STALK_01; $STOMP_00; $STROLL_00; $BOLT_00; $CAREER_00; $LOPE_00; $GAD_00; $MOPE_00.

(c) Under the metaconcept #TRANSFORMATION: $ADAPT_00; $REFORM_00; $BOW_00; $CONTORT_00; $WARP_00; +DAMAGE_00; +BURST_00; +DECORATE_00; +IMPROVE_00; $REFORM_00.

(d) Under #MATERIAL and the basic concept +DO_00: +DECEIVE_00; +ENTERTAIN_00; $MASSACRE_00; +OFFEND_00; +PLAY_00; +PROTECT_00; +DEFEND_00; +PUNISH_00; +RESPECT_00; +DEMONSTRATE_00; +LAUGH_00; +DARE_00; +WASTE_00.

Secondly, the metaconcept #PSYCHOLOGICAL includes the following basic and terminal concepts under the subordinate metaconcepts #COGNITION, #EMOTION, #INTENTION and #PERCEPTION:

(a) Under the metaconcept #COGNITION: $BROOD_00; $CONSPIRE_00, $MEDITATE_00; $SUPPOSE_00; +BLAME_00; $MISCALCULATE_00; +EXAMINE_00; +CHOOSE_00; +IMAGINE_00; $FANTASIZE_00; +KNOW_00; $DISBELIEVE_00; +SOLVE_00; +TRUST_00; +DISTRUST_00.

(b) Under the metaconcept #EMOTION: +ANNOY_00; +FORGIVE_00; +DISLIKE_00; +HATE_00; +EXCITE_00; +FEAR_00; $TERRIFY_00; +LIKE_00; +LOVE_00; +ATTRACT_00; +SUFFER_00; +WORRY_00.

(c) Under the metaconcept #INTENTION: +NEED_00.

(d) Under the metaconcept #PERCEPTION: +HURT_00; $STALK_00; +KISS_00.

Thirdly, the metaconcept #COMMUNICATION includes the following basic and terminal concepts: $CONGRATULATE; $FLATTER; $SWEAR;

+AGREE_00; $APPROVE; +BLAME; +BLESS; +COMPLAIN; +GREET; +LIE; +DEMAND; +INVITE; $SCREAM; +THANK.

Finally, the metaconcept #STATIVE includes the following basic and terminal concepts under the subordinate metaconcepts #EXISTENCE and #RELATIONAL:

(a) Under the metaconcept #EXISTENCE: +DIE_00.

(b) Under the metaconcept #RELATIONAL: $FEATURE_01; +COST_00; +REST_00; +PRESERVE_00; $SPORT_00.

The most relevant finding of the distribution of axiologically-sensitive concepts under the subontology #EVENT is the high number of occurrences under the metaconcept #MATERIAL (half of the corpus selected) and, particularly, the connection of movement and action (concepts under #MOTION and #MATERIAL (+DO_00)) with axiologically-loaded concepts, reaching a balance between units with a positive and a negative bias. However, it is not surprising that concepts under #PSYCHOLOGICAL also reach a prominent position. In fact, intuitively, we would expect this metaconcept to be the leading domain. In this case, the number of occurrences under #COGNITION and #EMOTION is well-balanced, even though the negative bias is more common in the latter dimension. This is compensated with the slightly more positive bias of the concepts under #COMMUNICATION.

Another important fact under discussion has been the existence of certain concepts which are not intrinsically axiological but include axiologically-sensitive defining concepts in their MPs. This is the case of +EXCAVATE_00 (under the metaconcept #CREATION) and would represent many other similar concepts under the four leading metaconcepts. At first sight, it could by no means be considered as an axiologically-loaded concept, as it is not sensitive to a *good-bad* scale. However, it is a typical example in FunGramKB core ontology where non-axiologically sensitive concepts are defined by at least one axiologically-loaded concept. In this case +EXCAVATE_00 is not defined by a single concept, but three prototypical axiological units such as +CAREFUL_00, +IMPORTANT_00 and +USEFUL_00, as can be observed in its meaning postulate: +((e1: +DIG_00 (x1)Theme (x2)Referent (f1)Beneficiary (f2)Instrument (f3: +CAREFUL_00)Manner (f4: (e2: +DISCOVER_00 (x1)Theme (x3: +INFORMATION_00)Referent))Purpose)(e3: +BE_01 (x3)Theme (x4: +IMPORTANT_00 & +USEFUL_00)Attribute)). Consequently, it has been included as a target concept as well as other concepts such as $SKETCH_01, +DEMAND_00, $SUPPOSE_00 or +DEMONSTRATE_00.

3.4 Distribution of concepts from the core ontology in the axiologically-loaded dimensions

The number of axiologically-loaded defining concepts in the MPs of concepts under #EVENT, including those affected by operators, amount to sixty-four and are distributed among the axiological dimensions referred to in Figure 4 as follows:

(8) A) GENERIC AXIS

Prototypical evaluative concepts:

+BAD_00, nBE +BAD_00, +GOOD_00, m+GOOD_00, nBE +GOOD_00

B) SPECIFIC AXIS

1a) Emotion/Behaviour: +AFRAID_00, +ANGRY_00, +CALM_00, +FEAR_01, +HAPPY_00, +LOVE_00, +NERVOUS_00, +PLEASANT_00, +PLEASURE_00, +SAD_00, m+SAD_00, +WORRIED_00

1b) Behaviour/Emotion: +ATTACK_00, +CAREFUL_00, +CARELESS_00, + CRUEL_00, +DANGEROUS_00, n+DANGEROUS_00, +ENTERTAINMENT_00, +FRIENDLY_00, +NOISY_00, n+OFFEND_00,

+POLITE_00, n+BE +POLITE_00, +SERIOUS_00, +VIOLENT_00

2) Veracity: +DISHONEST_00, n+BE+LEGAL_00, nBE+WRONG_00, +RIGHT_00, n+TRUST_00, +SINCERE_00, +TRUE_00, nBE+TRUE_00, +WRONG_00

3) Vitality: +HURT_00, +INJURY_00, +LIVE_00, nBE+FREE_00, nfut+DIE_00, +PAIN_00, +PROTECT_00, +STRONG_00, +SUFFER_00, +TIRED_00

4) Aesthetics: +BEAUTIFUL_00, +LIKE_00, n+LIKE_00, +UGLY_00

5)Prominence: +IMPORTANT_00, m+IMPORTANT_00, + RESPECT_00, +PROUD_00

6) Function/Pragmatism: + DIFFICULT_00, +EASY_00, +USEFUL_00

7) Economy: +VALUE_00, n+DAMAGE_00,

8) Religion: +GOD_00

9) Intellect: [NO MATCH]

Twenty-six out of sixty-four concepts refer to emotions linked to behaviour or behaviour linked to emotional processes. That is almost half of all occurrences and implies that emotional and behavioural concepts tend to

be sensitive to the axiological axis and, in consequence, this affects a considerable number of concepts under the #EVENT subontology. Those which refer to the vitality or the veracity dimensions amount to nineteen cases, which is also a significant figure (almost one third).

It can be considered normal that the number of prototypical evaluative concepts is reduced in quantity, but not in frequency. Consequently, one would expect that these general axiological units present a higher number of occurrences in the corpus under consideration, but paradoxically, a detailed analysis of the ontology shows how the most general axiological concepts (+GOOD_00 or +BAD_00) are not the most frequently used units for definitions in the MPs of other basic or terminal concepts in this subontology. +GOOD_00 is used on six occasions and +BAD_00 only three times. Other units take the lead. +TRUE_00, for instance, is the most recurrent axiologically-loaded basic concept: nine times. It is followed by the hedonic combination +PLEASURE_00 and +PLEASANT_00, totaling eight instances, and the emotional combination of +FEAR_00 and +AFRAID_00, with seven cases. Other *evaluative* concepts come close to the number of occurrences of +GOOD_00, such as in the case of +CAREFUL_00 and +ANGRY_00, five times each, or +DANGEROUS_00 and +IMPORTANT_00, four times each.

The leading concept +TRUE_00 is used in the MPs of events such as +LIE_00, +DECEIVE_00, $FANTASIZE_00, +AGREE_00,

+DEMONSTRATE_00, $SUPPOSE_00, +IMAGINE_00, +KNOW_00 and $DISBELIEVE_00, which basically refer to cognitive processes. Only the first three instances might be rated as intrinsically axiological, which goes back to the Aristotelian debate on the nature of the truth as an essential virtue. However, concepts such as +PLEASURE_00 and +PLEASANT_00 are used as defining units in events such as $GAD_00, $STROLL_00, +COPULATE_00, $CLAP_00, +DANCE_00, $FANTASIZE_00, $FLATTER_00 and +EXCITE_00, which unquestionably are units with a positive charge in the hedonic scale. Alternatively, the negative axis is well-represented with the concepts +FEAR_00 and +AFRAID_00, which occur in the MPs of events like +CHATTER_00, $FLEE_00, +TREMBLE_00$, BOLT_00, +FEAR_00, $TERRIFY_00 or $SCREAM. In addition, it is not surprising that the most general evaluative concept +GOOD_00 is used to define concepts such as $CONGRATULATE_00 (twice), $APPROVE_00, $ADAPT_00, $REFORM_00 or +IMPROVE_00, but it is striking to find it participating in the MP of +PUNISH_00, under the influence of the polarity operator *n:* (n+BE_01 ... +GOOD_00).

To conclude, dimensions such as *intellect* offer no match in the #EVENT subontology and other categories like *religion* or *economy*, only collect one and two examples, respectively. This needs to be compared with the number of instances in the other subontologies (#ENTITY, #QUALITY) and thus infer that these axiological categories have a limited impact at

conceptual level, whereas others such as *function/pragmatism*, *prominence* or *aesthetics*, with at least three or four examples, are better grounded in the verbal subontology.

4. Conclusions

The previous discussion of the analysed data facilitates the concluding result: there is no reason to consider #EVENTS as less sensitive to the axiological parameter than #ENTITIES or #QUALITIES. Approximately one fourth of basic and terminal concepts included in the subontology #EVENT are sensitive to inherent axiological information in their MPs. This 25% exceeds all previous expectations or calculations.

In broad terms, it has been observed how the axiological features are expanded and distributed throughout a set of semantic-conceptual instruments (basic concepts in predications or satellites of meaning postulates as well as terminal concepts), and syntactic-semantic ones (predication operators such as quantification or polarity) in line with the process of stepwise conceptual decomposition characterizing FunGramKB. This reinforces *evaluation* as a fact of crucial importance for a well-founded understanding of the relationship between lexical structure and cognition.

The results obtained in the present study have shown the high number of axiologically-sensitive concepts under the metaconcept #MATERIAL (half of the corpus selected) and, particularly, the connection of movement and action (concepts under #MOTION and #MATERIAL (+DO_00)). This finding provides further evidence for the axiological link between conduct and action through movement or orientation (Faber and Mairal-Usón 1999: 242). Furthermore, it has been demonstrated that concepts under #PSYCHOLOGICAL also reach a prominent position and become the leading conceptual domain. By contrast, the positive bias of the concepts under #COMMUNICATION has been another significant finding.

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. Consequently, the proposal to insert axiological notations in FunGramKB ontology, in the lexica under construction or, alternatively, in other levels of meaning description in the Lexical Constructional Model should be explored as a key factor for meaning construction.

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Notes

1 FGKB Core ontology is seen as an IS-A conceptual hierarchy which allows non-monotonic multiple inheritance. This ontology is both universal and linguistically-motivated.

2 In figure 1, the concept +BLAME_00 (including the information in the "Superordinate(s)", "Thematic Frame" and "Meaning Postulate" sections) is represented in the machine-readable metalanguage called COREL. The natural language equivalence can be read in the section called "Description".

3 The origins of the FLM are deeply rooted in the early Functional Grammar approach to the lexicon offered by Simon C. Dik (1978, 1989), but also in the structural semantics theory of Eugenio Coseriu (1967).

4 Coseriu considered classematics as a promising field of research at that time. He considered that an in-depth analysis of their structure and types could contribute to the clarification of a key process in language: the interaction between the pragmatic, the semantic, the syntactic and the lexical component.

5 Coseriu, again, intuited and inspired this macro-organizational pattern when he stated that "… there may be classes like "positive", "negative", which justify copulative combinations as It. "bello e buono" [*noble and handsome*], "grande e grosso" [*big and tall*], "piccolo e brutto" [*small and ugly*], etc., (adjectives which belong, in each case, to the same class), or adversative combinations as Sp. "pobre pero honrado" [*poor but honest*] It. "povero ma onesto" (adjectives which belong to different classes)..." [Translated from Spanish] (Coseriu, 1977: 176).

6 From a linguistic perspective, as was claimed in Felices-Lago (2003), different axiological levels are not hierarchical according to the deterministic, religious or ideological point of view of philosophers or individuals (i.e. Tischner), even if their ideas are extremely well-presented. The only hierarchy that can be assumed for general purposes is built in language and depends, for its relevance (positive or negative), on what is perceived by the vast majority of speakers of a linguistic community as well as on the result of an exhaustive scrutiny of empirical data.

7 The relevance of this axis is based on the evidence provided by the axiological classifications of philosophers, psychologists and linguists throughout the XX century. For a more detailed study, see Felices-Lago (1991: chapters III and IV).

8 *Attribute* and/or *Theme* are thematic roles of arguments in the Thematic Frame or the Meaning Postulate predications (e1, e2, e3, etc.) in FunGramKB (see Figure 5 or 6). Other thematic roles for arguments are *Agent, Referent, Origin, Goal* or *Location.*

9 *Manner* is one of the thematic roles of satellites (f1, f2, f3, etc.). Other common thematic roles of satellites in FunGramKB are *beneficiary, company, comparison, condition, duration, frequency, instrument, means, position, purpose, quantity, reason, result, scene, speed* or *time*.

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