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A Cryptotype Approach to the Study of Metaphorical Collocations in English

Introduction

The aim of this paper is to present the Method of Nomina Abstracta Cryptotype Distribution (MoNACD) as a possible approach to the study of collocations traditionally referred to as metaphorical. The approach addresses the cognitive nature of metaphor and employs it for classification purposes. Since MoNACD is intended for computer application, which requires a certain degree of semantic formalization, it combines qualitative and quantitative methods, corpus and experimental data. The paper is structured as follows. In section 1 we introduce the research background. Section 2 deals with noun cryptotype identification practice. Section 3 contains a brief overview of collocation extraction methodology and investigation strategies. In section 4 the parameters of cryptotype modelling are presented. In Section 5 a profile of a noun distribution in six cryptotypes of the English language is described. In Section 6 possible applications of MoNACD are mentioned and illustrated with the results of investigations into near synonyms cryptotype distribution.

I. Research Background

Such language functions as cumulating knowledge and categorizing experience enable the researcher to retrace, reveal and model the links between gestalts, which had been generated in the long-term (about 40000-year lasting) prelogical state of language formation. These links are aggregated into the Linguistic Mapping of the world. By studying the relations between the gestalts of concrete and abstract nouns we can learn about how abstract entities are conceptualized and categorized in contemporary languages. Apparently, the lexis had originally been classified not for the sake of convenient storage or inter-generation communication purposes, but primarily, for Homo Sapience survival. The man of mythological thinking era was compelled to distinguish between *edible* and *inedible*, *movable* and *immovable*, *dangerous* and *safe*, *own* and *alien*, etc., which were bound to be marked in discourse in a certain way. Some of these basic attributes relevant to the species survival which happened to be in obligatory and regular use were assigned in morphologically marked (overt) word classes, namely, *phenotypes;* while those which lack morphological marker might have been stored in covert word classes, *cryptotypes*. According to B.L.Whorf, who introduced the terms in his work "A Linguistic Consideration of Thinking in Primitive Communities", "word-classes can be marked not only by morphemic tags but by … lexical selection" (Whorf, 1956). He proposed that a linguistic theory should benefit from the study of cryptotypes.

Premature, and therefore unclaimed in 1936, now the idea of describing language cryptotypes can be applied to cognitive modelling and computer representation of metaphorical collocations of conceptual abstractions such as *life, crisis, experience, opportunity* or *danger, etc*. The point is that Nomina Abstracta are far from being taxonomist-friendly. Even if a researcher manages to arbitrarily tailor them to taxonomy based on thematic principal, the result can hardly be applicable for Natural Language Processing or Natural Language Generation purposes.

We have tried to view Nomina Abstracta classification from a cryptotype perspective. A corpora-based project, currently in progress at Department of Theoretical and Applied Linguistics, Voronezh State University, is committed to identifying noun *cryptotypes* in English, with further studying the *cryptotype distribution* of Nomina Abstracta inside & across cryptotypes. The main goal of the project is to broaden the perspective on conceptual metaphor by identifying and investigating noun classes that lack specialised morphological marker, i.e. cryptotypes of the English language.

On the one hand, our approach is within the mainstream linguistic framework of Conceptual Metaphor Modelling in that it also deals with systematic correspondences

between domains when the target domain is metaphorically described in terms of the source domain, e.g. <Life is Journey> (Lakoff and Johnson, 1980, 1987, 1987). MoNACD refers to the ideas of prototype theory (Dixon, 1968, Rosh, 1977), primary metaphors theory (Grady, 1997) and central mappings in Kövecses's works (Kövecses, 2002), family resemblance theory (Wittgenstein, 1953), and also follows the Moscow School of Semantics tradition (Apresyan, 1967, Melčuk, 1988)

On the whole, we assume that MoNACD is one of the viable directions of corpus-based methodologies for linguistic description because the study of 'word-classes marked by lexical selection' appears credible in corpus-based and corpus-informed research. It is expected to lead to interesting insights into the knowledge representation cultural matrix.

II. Noun Cryptotype Identification

We approach identification of Noun Cryptotypes via verb capacity to classify (sort out) nouns as well as noun capacity to select verbs to co-occur with. Theoretically, verb syntactical valency and semantics can be the key to noun cryptotypes identification (Apresyan, 1967, Melčuk, 1995, Kretov 1987). If a verb can project syntactical positions for nouns, the syntactical valency of a verb can be regarded as the classification principal of nouns, especially in languages with scarce morphology such as English. So, verbs are approached in our project as *classifiers* of nouns; conversely, nouns are considered to be apt to select verbs in accordance with their *cryptotype intention* to occur in a certain syntactical position the verb projects. It is plausible, therefore, to classify nouns on the grounds of their 'realised valency' or 'realized *cryptotype intention'*. In the sentence *his soft question pierced her enchantment* the noun *question*, classified by the subject valency of the verb *to pierce,* is categorized in the EL as a sharp-pointed object. This is regarded as a discourse evidence of the noun being attributed to the EL cryptotype 'Sharp-pointed'.

According to A.Potebnya (1976) "the meaning of a word is subject to change, while its *inner form...* [or in different terminology *core meaning*] remains". Because the *inner form* conserved in a word generated the word combinatory potential, now it influences the word combinability. The strategy we implement is clustering verb classifiers with respect to their *inner form* retraced in OED CD.v3.1. Clustering verbs of similar semantics appears to be a challenging task, which is feasible owing to the English verb analysis in (Collins COBUILD Grammar Patterns 1: Verbs, 1996). Additionally, the research in linguistic classification of the basic elements (fire, water, air & earth) conducted at Voronezh State University (Boriskina, 2003) contributed to verb clustering.

Lexico-semantic verb clusters are formed on the basis of cognitive and communicative relevance of a semantic feature (attribute) the comprising verbs represent.

Below are six verb clusters with cryptotypes to which they attribute nouns:

1. The verbs with the inner form 'be capable of moving' would ideally be clustered in *'the verbs of motion'* with 52 representative lexemes (*to go, walk, come, travel, follow, approach,* etc.). Thus, nouns which occur as their subjects, are attributed into the cryptotype «HOMO MOVENS», e.g. the noun *crisis* belongs to the cryptotype, which is evident from <noun – verb classifiers> frequency of co-occurrence (199 corpus excerpts). Cf., *Then* **came** *the oil* **crisis**.

2. The subjects of verbs representing acts of possession and clustering due to 'able to own' semantic attribute (e.g. *to take, grab, hold, give*) are comprised in the cryptotype «HOMO TENENS». Cf., *This* **recession** *has* **taken** *a fragile sector and has made it even more fragile.*

3. The subjects of verbs which represent speech acts *(to say, answer, suggest)* are categorized as 'able to talk' and are comprised in the cryptotype «HOMO LOQUENS». Cf., *But now the* **recession** *may start* **speaking** *Japanese.*

4. The objects of verbs which represent acts of possession (*to take, grab, hold, give*); are categorized in English as 'small enough to fit the hand and be transportable with a hand' and

are comprised in the cryptotype «RES PARVA». Cf., *he thinks tax cuts might **hold** off a **recession.***

5. The subjects of verbs which represent the acts of penetrating as a sharp-pointed object does (*to prick, stab, stick, pierce, thrust, spear, pin, puncture)* are categorized as sharp-pointed and comprised in the cryptotype «PENETRABILIS». Cf., *Even a mild **recession** could **prick** the great stock market bubble.*

6. The verbs which represent the way liquid exists (*to flow, flood, pour, leak,* etc.); categorize nouns which occur as their subjects and objects as liquid and attribute them to the cryptotype «LIQUIDUS». *as an economic **recession** has ebbed and **flowed**, case loads have increased.*

A priori the idea of a Noun Cryptotype being identified by means of the Verb aptitude to act as a Noun classifier seems plausible enough. However it would be reassuring to have statistical evidence of English nouns cryptotype distribution in corpora as the most valid and efficient text collection resource. Thus, corpus analysis contributes to the formulation of cryptotypes.

III. Corpus Analysis of Verb-Noun Collocations

The research deals with a limited number (260) of abstract nouns of high frequency (*****), taken from (Collins COBUILD English Dictionary for Advanced Learners, 2001). Within the current project we have examined approximately 60000 possible noun-verb co-occurrences in BNC and Corpus of Contemporary American (COCA). Extraction of collocations from corpora requires each noun being tested on its occurrence in the abovementioned syntactical positions of each of 210 classifiers (lemmas) of six noun cryptotypes. The results of the corpus query have been stored in MS Word format for further generation and maintenance of the example subcorpus (Bank of *cryptotype-bound* V-N collocations). It is to be converted, annotated and lemmatised for processing purposes.

The data of the *realized cryptotype intention* of a noun have been tabulated in MS Excel format: each cryptotype is presented on a separate list plus in a cross-tabulation list. Figure 1 shows the cross-tabulation of corpus analysis of collocations. The right-hand side set of columns presents the numbers for <a Noun + a Classifier> co-occurrences. For example, we have come across the collocation *to give life* in **289** different contexts of the two corpora (which is regarded as a well-established metaphorical expression) while *to grasp life* have not been found at all (**0**, Fig.1). These data show preferences of a noun in collocating with selected cryptotype classifiers – *noun collocate preferences (CPs).*

Noun	Cryptotype	CA	CRI	V^C	$V^C/\sum V$	*noun collocate preferences (CPs)*		
135 Life	Homo Loquens	59	0,83	11	17,5%	74	2	3
	Homo Movens	281	0,55	26	45%	0	1	12
	Homo Tenens	316	0,47	33	53,2%	20	34	0
	Res Parva	**1736**	**0,28**	34	72,3%	739	**289**	**0**
	Liquidus	58	0,10	9	90,0%	28	13	1
136 Loss	Homo Loquens	3	0,97	2	3,2%	0	0	0
	Homo Movens	131	0,79	12	21%	0	0	2
	Homo Tenens	18	0,90	6	9,7%	0	0	0
	Liquidus	4	0,90	1	10,0%	1	0	0

Figure 1. The cross-tabulation data of corpus analysis of collocations (fragment)

We suggest that occasional (< 2) VS. frequent (> 2) collocations should be distinguished. All further processing is done on the basis of the data from this section of the table. The results of the corpus analysis of collocations are then converted into statistics through the use of MS Excel computational tools to be further used in cryptotype modelling.

IV. Noun Cryptotype Modelling

The processed data of corpus analysis reflect the properties of cryptotype-driven discourse behavior of nouns. Apart from *noun collocate preference (CP)* there are other two parameters of nouns intra-cryptotype distribution: *noun Cryptotype Activeness (CA)* and *noun Cryptotype Radius Index (CRI)*. Column *CA* in Figure 1 shows ($\sum$**V**) the overall frequency of <a Noun + all cryptotype Classifiers> co-occurrence which determines the functional significance of a noun. It signals how active the noun is in realizing its *cryptotype intention* to collocate with the classifiers of a certain cryptotype, or, in simpler words, how frequently the noun is used with classifiers of a certain cryptotype. Represented in relative ratio *a noun Cryptotype Activeness* is to tell us about the value of different cryptotype projections of a conceptual abstraction for English-speaking culture.

The other property, namely *noun Cryptotype Radius Index,* indicates a noun proximity to the Core of Cryptotype in terms of core–periphery proximity. For example,

$$CRI \text{ life in «Res Parva»} = 1 - \frac{V^C}{\sum V} = 1 - \frac{34}{47} = 0{,}28 \text{ (Figure 1)},$$

*where **1** stands for the distance from the core to the boundaries of a cryptotype, **V**^{C} (column in Figure 1) is the number of cryptotype classifiers the noun has co-occurred with in corpus, while $\sum$**V** stands for all classifiers of a certain cryptotype.*

Apparently, CRI defines the systemic significance of a noun.

The set of noun cryptotype properties enable us to model a simulation of a cryptotype, to draw and compare cryptotype profiles of nouns, to describe principles of cryptotype organization, to formulate hypotheses and test them, to forecast the occurrence of occasional metaphorical collocations, to study the noun combinatory dynamics in prognostic perspective and to compile a Bank of metaphorical collocations of the English language.

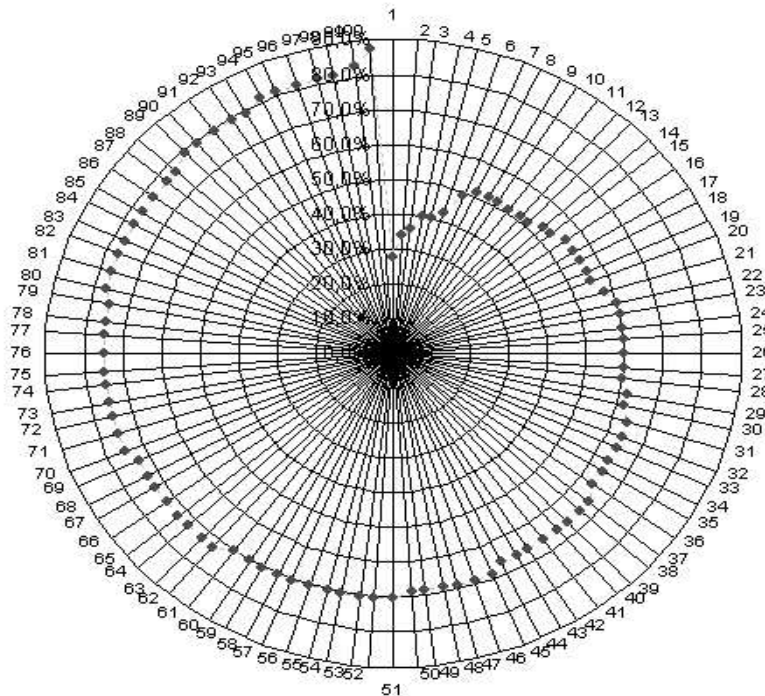Figure 2 shows the simulation of cryptotype «Res Parva».

Figure 2. Model of cryptotype «Res Parva»

The darker zone of the simulation is the Core with the names of objects which the prehistoric man could detach from the environment relatively easily and carry in hands such as *fruit, seeds, berries, rock, stone, grain, stick, log,* etc. The attribute of detachability of objects was cognitively and communicatively relevant to the man's survival; hence, the cognitive and communicative backgrounds of the Cryptotype. The lighter zone is the

Cryptotype Periphery. Nomina Abstracta presented by the red dots in Figure 2 are ranked according to their CRI. The abstract nouns closest to the Core in order of increasing CRI are: *Life 0,28; Information 0,34; Power 0,34; Data 0,38; Idea 0,40; Business 0,43; Sense 0,49.*

Vast research practice has enabled us to establish the general principles of cryptotype word-class organization. First, a cryptotype is organized on core-periphery basis. Second, the cryptotype peripheral and core nouns are homologous: they share identifiable cognitive and communicative background of mythological thinking but are different in terms of semantics or theme. Thus, the cryptotype incorporates nouns of diverse semantics and themes which bear combinatory resemblance.

Last, but not least, a noun can be attributed to more than one cryptotype. To understand why we should go back several millenniums. The origin of language is still disputable, but most scientists agree on «Tertium datum»: the law which operated in the languages of mythological or prelogical thinking (Y.Golosovker, 1987). According to it, one and the same phenomenon could be often associated with opposing categories. Cognitive experience of the man of those times allowed contradictory beliefs to be both or all true. For example, people simultaneously associated themselves with birds and humans; fire was believed to flow like water, to breathe like a living being, and to hiss, to roar, to lick like a wild beast. The «Tertium non datum» law has changed our way of thinking, but in contemporary languages of logical thinking the noun etymological memory of its evolutionary origin and past usage reveals itself in noun combinability, which can be traced and investigated.

V. Intra-cryptotype and cross-cryptotype profiles of abstract nouns

One of the project objectives is to discover how the interaction between noun combinatory potential and its cryptotype distribution can be characterized. To approach this goal we study the properties of nouns (presented in *profiles*, e.g. Figure 3) in their correlation with each other within a cryptotype and across cryptotypes.
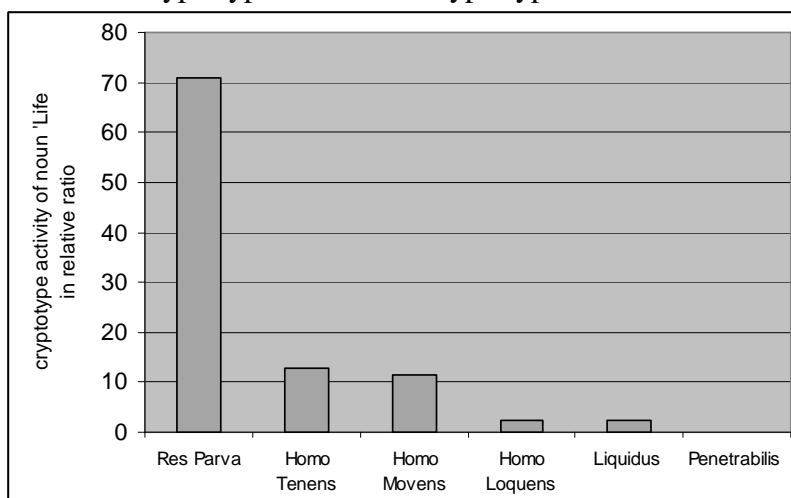

Figure 3. cross-cryptotype profile of noun *life* cryptotype activeness

Odd it could seem, but life (<*life*> being the closest to the Core among 260 abstract nouns under consideration; *CRI 0,28, Figure1,2*) seems to be rather often conceptualized and categorized in English as <a small object, which fits the hand>, you can *carry, capture, deliver, get, give, bring, handle, hold, keep, pick, place, take, throw,* etc. The statistical evidence from the corpus can also give insights into the communicative value of this cryptotype projection of a noun. The noun *life* is extremely active (*CA 71,6*) in the cryptotype «Res Parva» in contrast to the other cryptotypes it is attributed to (Figure 3). What is even more remarkable is that *CRI life* in «LIQUIDUS» is equal to *0,00*, since the noun tends to collocate with all ten cryptotype classifiers. Cf., *When everything is going fine for us, and God is blessing us, when our **life** is **flowing** smoothly, it's easy to have faith, it's easy then to trust... He wants to **pour** his **life** into our **life** so that our **life** can grow strong. Now I'm going*

*to **stream** Uncle Manfred's **life** for you, but before I do here are some questions. As **life** **flooded** back into their daughter, Linda and Junki went limp with relief. ... there are many other ways in which this technology could be used to **sprinkle life** into Chile's arid zones. ...'From his canvasses, life **spills** out'. ...Antonio's family had been mortified by the way his love **life** was **splattered** across the papers. ... Oakley's pale as a maiden, the **life's leaking** from him. ...global superstar Justin Timberlake, has led the low-key actress's private **life** so that it could be **splashed** onto the tabloids.*

So, like water and blood, life is categorized in English-speaking community, first and foremost, as prototype of liquid. In terms of Conceptual Metaphor Modelling it would be represented as <Life is Water>. Apparently, the etymological memory of the noun holds the remains of *water* and *life* gestalts resemblance. In fact, Linguistic Mapping is in consonance with the contemporary scientific theory about life originating in and from water. Indeed, the cumulative faculty of the human language might contribute to scientific advance.

When we compared the 260 cross-cryptotype profiles of nouns under consideration it turned out that there are no identical or similar profiles. Supposedly, the uniqueness of a noun cryptotype distribution can be overcome if we explore the general strategies of cryptotype-driven behaviour.

In our attempts to analyze the possible correspondence patterns between the properties of nouns a number of hypotheses have been put forward.

Let us focus on one of the hypotheses. The collocational arbitrariness of a noun is restricted to its *cryptotype intention realization*. Evidently, a noun is more likely to realize its *cryptotype intention* with classifiers of the cryptotype where it is represented within patterns 5, 4, or 2 (below).

Pattern 1: the noun is on the distant periphery (min. and max. limits of distant periphery vary) and its activeness is relatively low (cf., *life* in «Homo Loquens», Figure1, 3,).

Pattern 2: the noun is on the middle periphery and its activeness is average (cf., *life* in «Homo Movens», Figure1, 3,).

Pattern 3: the noun is on the near periphery but its activeness is relatively low (cf., *life* in «Liquidus», Figure1, 3,).

Pattern 4: the noun is on the distant or middle periphery but its activeness is relatively high (*crisis* in «Homo Movens», Figure 4).

Pattern 5: the noun is on the near periphery and its activeness is relatively high (*life* in «Res Parva»).

For example, consider the correspondences between *Cryptotype Radius Index* and *Cryptotype Activeness* of noun *life*. In Figure 1 you can match the properties of the noun in the cryptotypes of anthropological cycle. *CA* of *life 2,30* in the cryptotype «Liquidus» is the lowest with its *CRI (0,00),* in contrast to *CA* of *life 71,6* in the cryptotype «Res Parva» with its *CRI (0,28)* (Figure 3). Presumably, the correlation of *CRI* and *CA* of *life* in «Res Parva» can be described as the most auspicious for the noun combinatory potential realization purposes. In other words, if a noun is sufficiently active in a cryptotype, it tends to select new collocates, and thus, to widen its usage or to alter its collocation scope. Further elaboration of the correlation mechanism among *CRI, CA* and *collocate preferences* of a noun enable us to launch the prognosis of which cryptotype intentions of the noun is most likely to realize.

VI. Possible Applications of MoNACD

We argue that in languages with scarce morphology such as English, the lexis cryptotype distribution is of particular importance, as it has a considerable impact on the noun combinatory potential. It testifies, on the one hand, to the continuity of the vocabulary referred to as Nomina Abstracta; on the other, to stabilization and variation of metaphor.
In computational perspective MoNACD allows:
1 to formalize the metaphorical potential and communicative value of abstract nouns;
2 to study the cryptotype-driven syntactical behavior of nouns by comparing their intra-

cryptotype and cross-cryptotype profiles;

3   to model the noun combinatory dynamics in terms of the word tendency to alter its collocational scope;

4   to implement a computational model of *cryptotype-bound* V+N metaphorical collocations of the English language;

5   to develop non-native speakers' awareness of co-occurrence regularities, which are "sensed rather than comprehended" (Whorf, 1956) by native speakers;

6   to formalize co-occurrence regularities for NLP, namely corpora and database tagging purposes, as well as NLG.

The Method can be applied to the comparative study of languages (including Englishes). It would be interesting to trace the dynamics of noun combinatory potential in CIC VS. COCA VS. Australian National Corpus VS. Corpus of South African English VS. the Vienna-Oxford International Corpus of English as lingua franca (ELF) - (VOICE) 1.0.

Although MoNACD has not been used for semantic distinction or disambiguation purposes, it might be applicable to a case study of near synonyms or synsets to account for the stabilization and variability of metaphor in language use. We believe that the high cryptotype activeness and proximity to the cryptotype core indicates the stability of metaphorical representation of a noun. In-depth analysis of collocate preferences of a noun can elucidate the noun's tendency to collocation scope alteration.

For instance, let us consider how the collocational tendencies of the nouns *crisis* & *recession* are captured in their cryptotype distribution.

The noun *crisis* is almost uniformly distributed among five out of six noun cryptotypes of the EL. There is no corpus evidence of it being attributed to «PENETRABILIS», which means it is not categorized as sharp-pointed in English. It belongs to the distant periphery of the cryptotypes «Homo Loquens», «Liquidus» (Pattern 1) and «Homo Movens» (Pattern 4) and to the middle periphery of «Res Parva» and «Homo Tenens».
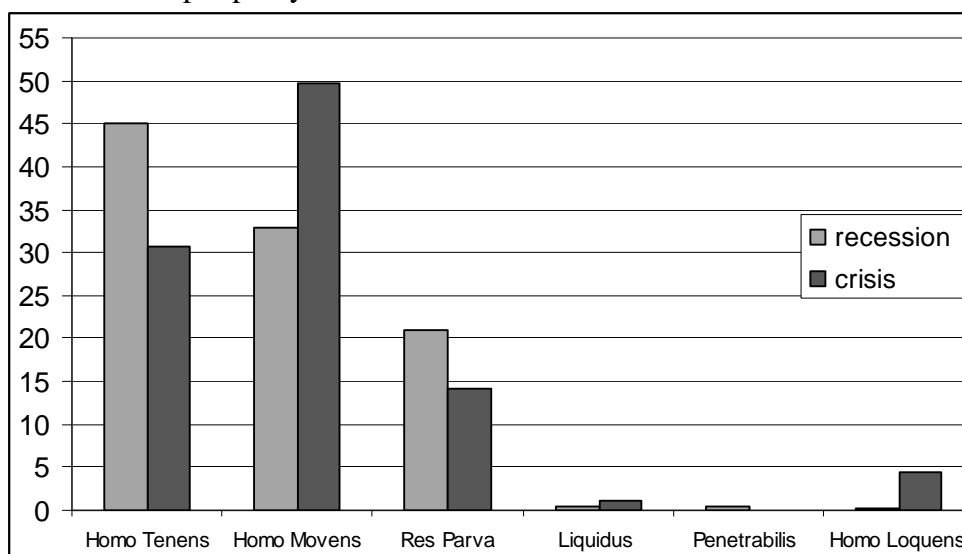

Figure 4 Cryptotype Activeness of the nouns *crisis* and *recession* in relative ratio

As for the noun *recession,* its distribution among all six cryptotypes is similar but less balanced. It is in max. proximity to the core of «Homo Tenens» (0,66) (Pattern 4), followed by «Res Parva» (0,72), in the distant periphery of «Liquidus», «Homo Movens» and «Penetrabilis», and in min. proximity to the Core of «Homo Loquens» (0,98).

Now consider the cryptotype activeness of the nouns and their collocate preferences in each cryptotype. Both nouns belong to the middle periphery of the cryptotype «Homo Tenens» and distant periphery of «Homo Movens» with relatively high activeness (Pattern 4). However, *recession* is more active in «Homo Tenens», while *crisis* in «Homo Movens» Fig.4. In «Homo Tenens» both demonstrate max. collocate preference for the verb *to hit (crisis 20*

instances, recession 114). Cf., *Then **the crisis hit** Latin America, where Brazil plunged 32.7%. But don't start clicking your heels together just yet. **Recession hits** the U.S.; more than 5.2 million are unemployed.*

In «Homo Movens» both demonstrate max. collocate preference for the verbs *to come (crisis 76), (recession 65); follow (crisis 28, recession 50); to go (crisis 15, recession 14) Crisis* selects the verb *to ensue (20),* whereas for *recession* this is occasional collocation. (Pattern 4). Cf., *…they are afraid of **a crisis** that will **ensue**. I told them **recession is coming**; we're going to target our marketing on the local area alone. The **recession** that **followed** dampened world oil demand.*

We argue the noun *recession* is most likely to keep realizing its cryptotype intention with the classifiers of the cryptotype «Homo Tenens»**:** **recession seizes captures, holds.* Actually, the noun's co-occurrence with <*to take hold*> is well-established. Cf., *Just as the **recession** was **taking hold,** Congress adopted the famous deficit reduction deal of 1990.*

The noun *crisis* should realize its cryptotype intentions primarily with classifiers of «Homo Movens»: **crisis marches, races, roams* and also «Homo Tenens: **crisis throws, touches.* Noteworthy, near synonyms seem to contribute to the stabilization of metaphor via variation in their selection of collocates. While **crisis throws, touches*, *takes, drags* are potential co-occurrences or unrealized noun intentions, *recession* has already realized its intentions with these classifiers either occasionally, cf., *the **recession** hadn't **touched** the companies represented in Houston. …the nation's four-year **recession** has **thrown** 500,000 people out of work*, or frequently *the **recession** has **taken** a much greater toll, …a deep **recession** in Japan would **drag** the rest of Asia down with it.*

Both nouns belong to the distant periphery of «Homo Loquens». Yet, the corpus-based statistics of *recession* membership in the cryptotype (1 instance) is not credible enough. Cf., *But now the **recession** may start **speaking** Japanese.* By contrast, *crisis* collocates with 5 out of 63 classifiers of the cryptotype. It is also fascinating that, against the background of occasional collocations with verbs *to call (*1 instance*), to promise (1), to speak (1), to suggest (2),* the noun demonstrates max. collocate preference for the verb *to demand (12). Cf. And with this, an avoidance of the intimacy the **crisis demands**.*

Both nouns belong to the middle periphery of «Res Parva» with average activeness (Pattern 2). While *recession* stably selects such classifiers as *to take, to give, to make, to shake, to bring* with max. collocate preference for the verb *to get (50 instances),* the noun *crisis* demonstrates max. collocate preference for the verb *to precipitate (29contexts)* against the background of occasional collocations with classifiers *to bring (3), to give (1), to hand(1), to put (2) to handle (9). Cf., Once the money stops, we'll **get** a big advertising **recession**; …**crisis was precipitated** by an event outside the AFPFL.*

On the whole, *Crisis* is categorized in English-speaking culture as something that is precipitated (thrown from up above with force) to follow and ensue a Man, to hit him and handle him with demanding ordeal, that is 'the divine scourge, theomastrix' – the meaning of the word in Ancient Greek. The noun *recession* which came into English much later than *crisis* in the meaning <the action of receding> seem to have inherited some of the collocate preferences of the noun *crisis* via its usage as the analogue of *crisis* in one of its meanings <a vitally important or decisive stage in the progress of anything> (OED CD. V.3.1).

All things considered it is possible to conclude that whatever the etymological memory of a noun, it tends to blend with their near synonyms in terms of collocational behaviour. Some of the cryptotype projections of the conceptual abstractions give evidence of interchangeability of the nouns *recession* and *crisis* in Contemporary English. Like snowflakes they are unique and similar at the same time.

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