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AUTOMATIC EXTRACTION
OF LEXICO-SEMANTIC INFORMATION
ON SHAPE WORDS

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<div align="right">Francesca Quattri</div>

Abstract

Background

Metaphors are complex linguistic forms that transcend their meanings from the original sense of the words they derive from. For instance, language users describe, in the expression "the political system is well-oiled", a political system with the same terminology for machinery.

This research analyzes metaphors by taking into account the Lakoffian approach, which foresees the distinction of two domains, a source (machinery, as for the example above) and a target (political system). The investigation proposes different interpretations of Lakoff's Embodiment Theory, and it expands from the research of the Taiwanese School (comprising the work of Ahrens, Chung and Huang on metaphors), which was able to identify source domain information from designated targets and corpora and to map sources and targets into the knowledge repository SUMO via upper concepts.

The following research is inspired by the work of the Taiwanese School, but it diverts from it in that sources were assumed to be SHAPE, words were analyzed by means of corpora as well as a lexico-semantic and frame-oriented analysis, and the retrieved metaphorical meanings were mapped to SUMO ontology via upper as well as mid-level concepts.

The goal of the investigation is to study: a) whether shape words have metaphorical meanings and b) whether the ontological representation of metaphor meanings is satisfactory through the use of only upper concepts. The shape words considered were circle, triangle, square, point, line and shape.

Method

The semi-automatic search followed different steps across the consulted sources. First, a lexico-semantic analysis of shape words as POS noun was conducted on the Princeton WordNet. The shape words were analyzed as mapped to and mapped as synsets. Their hyponymic-hypernymic structure was also studied through the introduction of semantic classes.

Shape words were then analyzed in the context of frames in FrameNet, an open source which also provides lexico-semantic information on shape words combined with ad hoc ontological concepts inscribed in the frames.

Finally, shape words were investigated within the context of tropes (including collocations, idioms, phrasal verbs), as retrieved from different corpora and dictionaries across several languages (Sino-Tibetan, Germanic and Romanic ones).

WordNet and FrameNet were accessed through the NLTK module in Python; the corpora and dictionaries were searched online and in paperback format.

Results

Each of the three adopted methodological approaches enabled the retrieval of metaphors of shape words. The targets were then mapped to SUMO by means of upper as well as mid-level concepts. Despite the evident difference of purpose of the repositories, the targets of the retrieved metaphors partially share upper and middle concepts among the three. In particular, the distinction between CONCRETEOB-

JECT, ABSTRACTOBJECT and CONCRETEEVENT, ABSTRACTEVENTS for the targets of SHAPE counted among the mostly shared mapping.

Conclusions

This investigation aims at laying the groundwork for an ontology of shape, i.e. for a representation of knowledge on and related to SHAPE based upon universally accepted concepts. It also aims at providing diverse approaches to the retrieval and disambiguation of metaphorical meanings.

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Chapter 1

Introduction

In the following research, an approach to automatic lexico-semantic information on shape words' metaphorical meanings is presented. Shape words' metaphorical meanings were retrieved from lexica and corpora, across different languages, and they were mapped to the Suggested Upper Merged Ontology SUMO.

Lexico-semantic information on shape words means that shape words (in particular: circle, triangle, square, line, point, shape) were taken into account as simple lemmas. With the use of WordNet, FrameNet and corpus-based studies, metaphorical information was retrieved from them.

An ontology is a knowledge repository or knowledge database, representing knowledge "that always holds" [Minsky, 1974] through concepts with different specificity (upper, middle and low level). Upper concepts are intentionally very vague (such as Event or Entity). They are "umbrella" terms and thus incorporate as many mid-level and lower levels as possible.

As stated, an ontology stands for a prototypical representation of reality, detached from cultural and language influence, representing things and facts in the world as they always are, in every language and culture. An upper ontology like SUMO was adopted in this study as a way to represent concepts derived from shape metaphors. These concepts represent culture- and language-independent knowledge

on shape.

This point should be made clear, since this work deals with a discreet variety of words and languages. Data were in fact retrieved in several languages: English, German, Chinese, French, Italian, Spanish. Different shapes were considered and comparisons were drawn.

Moreover, the way metaphors were retrieved from corpora also partially goes against main information retrieval techniques currently adopted for metaphor investigation.

Ontology is therefore used as knowledge representation that goes beyond inter-linguistic (i. e. between languages) and intra-linguistic (i. e. within one same language) variations.

The purpose of this work is to lay the ground for an ontology of shape, which derives its information from lexico-semantic and corpus-based approaches.

SUMO was chosen among other standard ontologies, mainly due to its big size, reliability and open source policy. Furthermore, its veracity has already been tested by other scholars in the course of previous investigation on metaphors.

At the current state, it includes more than twenty thousands terms and approximately eighty thousand axioms written in first-order logic. Although carrying the name "upper ontology", SUMO also partially contains mid-level concepts with the MILO ontology (also included in SUMO).

SUMO upper concepts can be searched as KB (Knowledge-Based) terms, or as English words. This is motivated by the fact that the English Princeton WordNet, a comprehensive thesaurus and dictionary for the English language, was mapped to SUMO. KB terms are differentiated from English words in the ontology by having their first letter capitalized.

In this research, on the contrary, upper and mid-level concepts were introduced as fully capitalized words, and they can include "new" concepts, that have not been

mapped to SUMO. This is justified by the fact that, while compiling the mapping, I felt the need to better clarify already existing SUMO concepts by introducing either new concepts or by providing a specification of the same. Concepts newly introduced in the research that do not exist in SUMO were specified along the research.

The major research questions this research wants to investigate are:

1. **Do shape words have metaphorical meaning/s?**

2. **Are metaphors sufficiently represented by only upper concepts?**

The motivation behind these research questions is mainly that, to the extent of the acquired knowledge on the topic, shape words have not been analyzed in literature in terms of a fully automatic extraction of metaphorical meaning yet.

As this research shows, an in-depth lexico-semantic analysis of words, in these case shape words (circle, triangle, square, line, point, shape), through corpus-based approaches, enables the retrieval of metaphorical information and thus the disambiguation of the target for each metaphor.

Chapter 2 (2, pag. 9) introduces a definition of metaphor according to Lakoff and Johnson ([Lakoff, 2009], [Lakoff, 2008], [Lakoff, 1993], [Lakoff et al., 1991], [Lakoff and Johnson, 1980a]).

For the authors, metaphors are figures of speech entailing two domains, a source and a target, as anticipated. The cardinality (i. e. the relationship) between these two is, according to the authors, fixed to one: each source corresponds to each target, and each target corresponds to each source. This piece of information is provided since it was challenged.

The metaphorical structure is therefore apparently very simple and it may be translated into the formula *X is Y*. According to Lakoff and Johnson and Lakoff, sources are mostly concrete, while targets are mostly abstract, a claim which can be easily be proved (but also discarded) through studies on corpora. For instance, the

expression "a modern working democracy" can be defined a metaphor. The political system is in fact the abstract target domain, while a machine/machinery ("working") is its concrete source.

The study on metaphors by Lakoff and Johnson was further extended by the Taiwanese School (I proposed the label), recurrently cited in this research. It describes the extensive investigation on metaphors conducted over the course of several years by authors in Taiwan and it includes the work of [Chung, 2009], [Ahrens, 2010], [Huang et al., 2007a].

Among the approaches adopted to retrieve metaphors, representatives of the Taiwanese School were also able to derive sources from targets through a five-step procedure (called the Conceptual Mapping Model or CMM) and to map both source and target to SUMO upper concepts (e. g. IDEA is a BUILDING, TIME is WATER). The work was tested in Chinese and English.

In my approach to metaphors, a random search of metaphors in corpora revealed some limitations in the *X is Y* formula, which may be able to identify some, yet not all kinds of metaphors. For instance, the metaphors used for this study were retrieved from other tropes or phrases (e. g. collocations, idioms, analogies) as well as simple words.

Regarding the latter case (metaphors from simple words), the word everybody is for example considered a metaphor. In fact, in order to talk about a PERSON/ PEOPLE (target), the physical BODY is taken into account (source). A simple expression like "she was caught in a vicious circle" contains multiple tropes: a) "to be *caught* in a vicious circle": collocation; b) "a *vicious* circle": collocation and metaphor (the 'vicious circle' stands for (NEGATIVE)EVENT and c) the idiom *"to be caught in a vicious circle"*.

The word brainwash is also considered a (multiple) metaphor, with the target being an EVENT and the source, BRAIN, being a BODYPART. BRAIN in brain-

wash is metaphor itself, since it is compared to something, such as a piece of cloth, that can be washed. Multiple metaphors in a same metaphor occur in the text and they were labeled "metaphor(s)-in-metaphor" expressions.

The second question in this research, "Are metaphors sufficiently represented by only upper concepts?" aims to understand whether the mapping of metaphorical concepts to only ontological upper concepts is sufficient to fully represent the meaning/s of the same metaphor.

This point can be explained by means of examples. In natural language, when a business is very successful, one can say in English: "Products are flying off the shelves". If the metaphor's domains would be mapped to upper concepts only, the metaphor would be translated into BUSINESS is RETAILSTORE or BUSINESS is PLACEOFCOMMERCE, yet the part of the shop which helps visualize the whole expression, the shelf, would get lost.

This loss of information through upper concepts can also be noticed in the case of "walking the streets" or "sit behind bars". Both streets and bars are representable as mid-level concepts *part_of* CITY and *part_of* PRISON respectively. In this research, it is argued that the introduction of mid-level concepts alongside upper concepts for metaphorical mapping enables better specification of the metaphor's sense/s.

In fact, the introduction of mid-level concepts in metaphorical ontological mapping is, in some cases, needed more than desired, in order to preserve the trope.

For instance, the Chinese equivalent for love triangle is 三角戀愛 sānjiǎo liàn'ài. Love triangle can be translated into (LOVE)RELATIONSHIP (target) is SHAPE (source, triangle), but this ontological mapping does not represent the Chinese trope. The focus in 三角戀愛 sānjiǎo liàn'ài is on the axes (角 jiǎo) of the triangle, since they represent the PEOPLE involved in the (LOVE)RELATIONSHIP. The trope therefore contains a double metaphor or a metaphor-in-metaphor. Hence, a concep-

tual mapping that can be applied would be (LOVE)RELASHIONSHIP is PARTOF-SHAPE.

Conceptual mapping as discussed in this research should be able to represent a conceptual structure applicable to as many tropes as possible across languages. The argument that the introduction of mid-level concepts in metaphor mapping may be redundant is clear to the author, yet we should bear in mind that it may be more functional in terms of interlingual approach to the same topic.

Another way to interpret metaphors, also proposed in chapter 2, is through the Generative Lexicon (GL) theory by [Pustejovsky, 1991], [Pustejovsky et al., 2013]. In fact, the *part_of* component, which happens to be a recurrent feature in the considered tropes, can also be explained via the qualia structure (and in particular the constitutive quale, which describes the part_of relationship).

The GL theory was mentioned in the research with the sole intention to suggest scholars another possible approach on how to investigate metaphors' structure. Extensive literature has been written on the GL theory, but it was not thoroughly explored for the sake of this study.

Hence, the part on the GL theory should be consulted as merely introductory.

For instance, a phrase like "to be put behind bars" can be described as a collocational, idiomatic, metaphorical and constitutive (meaning specifying the part_of component)-quale-laden trope.

As anticipated, one of the main research questions is whether shape words entail metaphors. In order to answer this question, shape words are searched in corpora, dictionaries and in relation to frames.

Chapter 3 (3, page 95), deals with techniques of lexico-semantic information retrieval from two main sources, the Princeton WordNet®(WN) and FrameNet (FN).

Both WN and FN can be accessed from the NTLK module developed for Python by [Bird et al., 2013]. Other corpora (appendix C, pag. 327) from the same module

were also used to extract lexico-semantic information on the selected shape words and for further experimentations with the approaches to adopt.

WN and FN were used over other sources because they both provide meanings for lemmas. In WN, meanings are called *senses*, in FN CoD ("Content of Definition"). Meanings in WN are not the same like meanings in FN and neither of them has been mapped to a standard ontology like SUMO.

Hence, once the information has been retrieved from FN and WN, the mapping was continued in SUMO.

The information retrieval from WN and FN was conducted for English shape words only. Also, in WN, the search was restricted to POS (part of speech) 'noun' and the lexico-semantic relations hypernymy / hyponymy.

This information collected from WN was deemed sufficient to allow an in-depth analysis of the considered lemmas and it was possible to retrieve metaphorical senses from shape words. Once metaphors were detected for all the shape words considered, it was also possible to determine source and target of the metaphorical senses and to map them ontologically.

The lexico-semantic analysis of shape words in English was further deepened, by taking into account not just WN synsets and senses, but also frames (FN). This decision was taken based on the information retrieved from WN, which also showed different ontological structure in the structure of the synsets related to shape words.

FN was used for its ontological implications, since the repository aims at providing rather detailed information on words as semantic units, by specifying all actors and conditions necessary for an EVENT to happen. These specifications are provided in FN in the form of *ad hoc* ontological concepts.

Through the FN analysis, targets of the retrieved metaphors showed an extended ontological spectrum behind simple shape words, with the possibility to make a distinction between abstraction and concreteness, immobility and dynamics of the

events and objects involved when shape words are used.

The use of WN and FN for retrieval of eventually ontological information on shape words also showed the applicability of these resources beyond their original intention (with WN being used as a thesaurus / dictionary and FN being used for frame analysis). It showed in fact their potential as *ontologies*, bearing ontological information on lemmas.

In **chapter 4** (4, pag. 181), metaphors with shape words as source SHAPE were searched in corpora. The search started with English corpora, and it extended to other corpora, showing that similar expressions (i. e. bearing same or similar meanings) exist in the other selected languages and that the expressions in these languages partially contain the same shape words as in English.

This analysis enabled further ontological specification of source and target domain, in line with observations and outcomes from chapter 3 and chapter 4, and it revealed the presence of ontological patterns or similar concepts for source and target of a metaphor across different languages.

Chapter 5 (5, pag. 249) concludes the research and provides suggestions for future investigation as well as snippets of parallel projects conducted during this investigation, which can also be further extended.

Figures and tables accompany the presentation.[1]

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[1]**Note on the table and figure numbering**: The figure numbering is consequent. The table numbering follows LaTeX default settings for better readability. The first Roman number in the table caption corresponds to the number of the chapter in which the table appears, followed by the section number.

Chapter 2

State of the art research and research questions

This chapter provides an introduction about metaphor's definitions and state of the art research on metaphors and metaphorical reasoning. It concludes with research questions, investigated in the course of the research.

The introduction on metaphors takes into consideration different ways of thinking, including research in linguistics, applied linguistics, cognitive linguistics and computational linguistics.

An hybrid approach to metaphors was chosen because a) metaphors are cognitively dense expressions and b) therefore their applicability crosses the line of linguistics and broadens into computer science, conceptual modeling and cognition.

This research focuses on metaphors of shape words, although it also provides plenty of examples on metaphors in general.

The shape words considered are: circle, square, triangle, point, line, dot and the word shape itself. These lemmas clearly do not exhaust all possible existing shape words, but they are essential components for other shapes and there exists a sort of compositionality among them (it takes points to make a line and lines to draw bi-dimensional shapes such as circles, triangles and squares).

Shape words were considered in English as well as in other languages: a Sino-Tibetan language like Chinese, two Germanic languages (English and German) and three Romanic languages (French, Italian and Spanish). Clearly, these languages do not exhaust all existing languages, and they do not represent all given language families, but this is not a relevant factor in this context. In fact, the goal of the research is to show ontological properties of shape words holding across different languages and detached from cultural influences or specific language/s. These ontological concepts are the concepts representing shape words when used with metaphorical meaning/s. Ontological concepts are by definition universal concepts.

2.1   On ontology and SUMO

An ontology is a knowledge database. It is the representation of knowledge "that always holds", and that is structured in a carefully set taxonomy-based structure of concepts with different levels of granularity. In this tree-alike structure, upper concepts, such as Event or Entity, include, below them, rather precise or very precise concepts (called mid-level and lower concepts).[2]

For this particular study, the SUMO ontology is adopted as the main ontology. SUMO is a Suggested Upper and partially Mid-Level ontology (fig. 1, pag. 11), developed over more than two decades and still growing. It was also largely used by Ahrens and colleagues in their research (hereby referred to as Taiwanese School). Its main developer, [Pease, 2011], [Pease and Niles, 2000] was inquired in person, and he provided training on first-order logic in SUMO and on how to use and interpret it.

SUMO was chosen over other existing upper ontologies (e. g. Cyc, DOLCE-Zero) given its successful use by other scholars in metaphor research and given the

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[2]Reference to upper and mid-level concepts can also be found at *A Basic Guide to Ontologies*, `opensemanticframework.org`.

wealth of knowledge it enables to access. It is an open-source ontology, i. e. freely available online. It is compiled in different formal languages, including SUO-KIF, TPTP or OWL. SUO-KIF is written in first-order logic (with axioms defined within the SIGMA system). SUMO can be searched in different languages as well, with English being its default language. It enables search of lemmas (this was made possible after the ©Princeton WordNet®was mapped to SUMO) and of KB (alias Knowledge-Based) terms (i. e. concepts). The latter are distinguished from simple words because they hold a capitalized first letter. The "Graph" option in SUMO allows the graphical representation of the upper and lower concepts. The user can move up and down in the ontological ladder. The Ontology's root concept is 'Entity' (fig. 2, pag. 12).
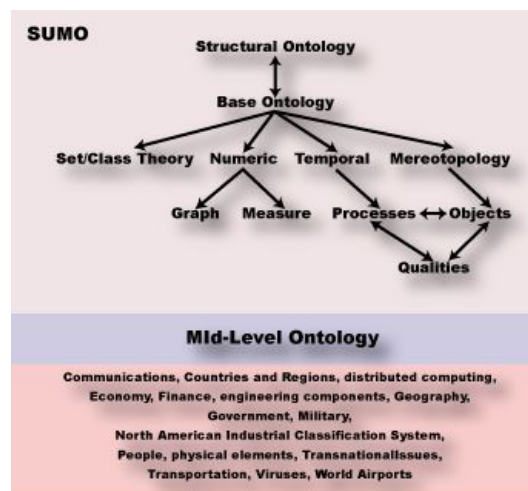
Figure 1: Structure of the SUMO ontology, taken from `http://www.adampease.org/OP/`

At for the year 2014, SUMO included twenty thousands terms and eighty thousand axioms stated in higher-order logic. It can be manipulated within the open source environment for the development of logical theories.

In this research, the terms referred to as ontologically-related ones (upper concepts, mid-level concepts) were either extracted from SUMO or they are self-proposed. They have been fully capitalized. For every newly introduced concept, a specifica-

tion was added. These include concepts that either did not exist as such in SUMO at the time of this research or concepts that do exist in SUMO, but that could be better specified or re-labeled.

Figure 2: Example of hierarchy of roles in SUMO (searched KB term: Object); from `http://www.adampease.org/OP/`

In this chapter, the adopted definition for metaphor was developed by [Lakoff and Johnson, 1980a]. Many scholars have applied it to their studies. Given the extensiveness of Lakoff's studies on metaphor, other Lakoffian theories were herewith considered, including The Conceptual Theory of Metaphor and the Embodiment Theory, with the latter being partially re-interpreted.

These interpretations are relevant for the scope of this research and were drawn upon metaphors at large, not exclusively metaphors containing shape words. Nevertheless, SHAPEs act as source domain for many metaphors.

In this research, metaphors were mainly extracted from other tropes as well as from single words. This aspect is new in the consulted metaphor research, where metaphors, as later explained, were either explored in isolation from other elements of figurative language, or they were paraphrased in plain language before being studied.

The study aims at considering comparing similar or same metaphors across different languages, as showed in chapter 3, pag. 95. Similar or same metaphors do

exist across languages, either in terms of the words that compose them or in terms of the metaphorical thinking underlying these forms.

In this chapter, self-coined terms related to metaphors, such as metaphor(s)-in-metaphor and an interpretation for paraphrasing and selective inference are also proposed, in an attempt to challenge the Invariance Principle of two domains, source and target, per metaphor, proposed by Lakoff and Johnson and accepted by several scholars.

The theoretical adopted approach in this chapter starts the discussion about the existence of metaphorical meaning/s for shape words as well as the adequacy of the use of upper concepts only in the ontological representation of the metaphorical concepts.

The ontological mapping from metaphors to concepts through SUMO should not be confused with the notion of ontological metaphors. All metaphors, not just ontological metaphors, are assumed in this research to be mappable to ontological concepts.

2.2   On metaphor

Metaphors are complex linguistic forms, bearing multiple definitions and interpretations.

[Hovy, 2014] processes all forms of figurative language, including metaphors, like "Multi-Word Expressions" (MWEs). The scholar adopted in his research the same measurements for all of them, from metonymies to collocations. [Boas, 2005] and [Fillmore et al., 2003] acknowledge metaphors as semantic frames; [Pinker, 2009a][Pinker, 2009b][Pinker, 1994] relegates metaphors to the poetic / rhetorical style and mainly analyzed them as stylistic "beautifier", a commonsense in linguistic theories. [Lakoff and Johnson, 1980a], [Lakoff, 1993] and [Reddy, 1979] define

metaphors conceptually-loaded forms of speech and use them as synonyms for concepts[3].

[Ahrens, 2005b][Ahrens, 2002][Ahrens and Say, 1999] and Ahrens and colleagues considered metaphors conceptual structures based on the inviolable binary relation of source-target domain and map them in a predictable and computable way. Clausner and colleagues ([Clausner and Croft, 1997]) define metaphors schema. A metaphor is, according to the authors, the product of *two* specific domains (as stated by Lakoff and Johnson). For [Ramachandran, 2011][Ramachandran and Hubbard, 2003][Ramachandran, 1990], metaphors are cognitive *processes*, pervasive in language and obscure in derivation; while for [Hobbs, 1992][Hobbs, 1981][Hobbs, 1979] metaphors are *schemata*, i. e. the process of selective inferencing.

According to my observations, metaphors are complex forms also mainly because they sometimes embed other metaphor/s, and they are entailed in other tropes or phrases. More than one target domain can therefor stand per metaphor.

According to Lakoff and Johnson [1980a], a metaphor is composed by a source and a target domain. The source of the metaphor is mostly concrete, while the target is mostly abstract. For instance, as for the case of 獵狐行動 lièhú xíngdòng ("Operation Hunting Fox"), an operation launched by Xi Jinping's administration to counteract corruption, the metaphor presents a concrete source (a fox, an animal), and it addresses an abstract target, such as corruption. The same applies to "beating tigers" (打老虎 dà lǎohǔ), "catching flies" (抓蒼蠅 zhuā cāngying) and "hunting foxes" (獵狐 lièhú), all metaphors used in the same context.

The idiom "I want to taste the sweet and the pain" justifies the Lakoffian Embodiment Theory as well, given the presence of the verb to taste, which implies a bodily action. The idiom contains a metaphor; the source is FOOD (to taste), but

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[3]Not surprisingly, the first chapter of [Lakoff and Johnson, 1980a]'s famous book "Metaphors We Live By" is entitled "*Concepts* We Live By". Already in the first pages of the book, metaphors are defined concepts-carriers or synonyms for concepts.

sweetness can be interpreted as either a concrete concept (sweet food), or as an abstraction. The other implied metaphor in this trope is source domain equal to BODY, as food cannot be tasted without an acting BODY. It follows that "I want to taste the sweet and the pain" is idiom, metaphor and metaphor.

For this and similar cases, I coined the term **metaphor(s)-in-metaphor** (in the last example, the metaphors in the metaphor are: PERCEPTION <> FOOD and PERCEPTION <> BODY).

Another example of metaphor-in-metaphor is the idiom "to walk the streets", which entails two metaphors: a) in order to talk about an EVENT we use MOTION and b) in order to talk about the PLACE where this EVENT happens (for instance a town), we use a PLACEPART, such as its streets (a constitutive quale, as later mentioned in the section on Generative Lexicon).

[Lakoff and Johnson, 1980a] differentiate among different kinds of metaphors, including ontological metaphors. These are forms in which "an abstraction, such as an activity, emotion or idea, is represented as something concrete, such an an object, substance, container or person".[4]

The following sentences express for instance an ACTIVITY-AS-CONTAINER metaphor: "How did Jerry *get out of* washing the windows?"; "*Outside* of washing windows, what else did he do?"; "How did he *get into* that profession?"; "I put a lot of effort *into* my job."

In ([Lakoff and Johnson, 1980a]:31), ontological metaphors are classified into:

- CONTAINER metaphors: metaphors dealing with an inside/outside; capable of holding something else (e. g. "I have a *full* life"; "life is *empty* for him")
- ENTITY metaphors: metaphors implying the existence of a physical object (e. g. "Her body is *fragile*", "My mind is not *working* today")

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[4]More under `http://www-01.sil.org/linguistics/glossaryoflinguistic terms/WhatIsAnOntologicalMetaphor.htm`

- SUBSTANCE metaphors: metaphors in which an abstraction, such as an event, activity or emotion, is represented as material (e. g. "there was *a lot* of good sprinting in the race"; "I could not do *much* walking in the end")

Other examples for ontological metaphors are provided by [Lakoff and Johnson, 1980b]: IDEAS are ENTITIES, WORDS are CONTAINERS, the MIND is a CONTAINER, the MIND is a MACHINE, the MIND is a BRITTLEOBJECT, VITALITY is a SUBSTANCE.

The concepts advanced in Lakoff's studies on metaphors (e. g. in [Lakoff and Johnson, 1980b], [Lakoff and Johnson, 1980a] and [Lakoff et al., 1991]) are nevertheless not ontological concepts in the strict sense, since they have not been tested and proved against a standardized ontology. They are instead *ad hoc* concepts created and proposed by the authors, but they do not bear ontological validity. This has been acknowledged by the same authors (in[Lakoff and Johnson, 1980b]:234), who define the proposed concepts "*representations* of concepts".

In literature, a distinction is drawn between different kinds of metaphors, including ontological ones. In this research, all metaphors are assumed to be mappable to a standardized ontology.

So far, it has been showed that many scholars agree in considering metaphors structures, schema or schemata, i. e. complex forms with a certain composition. In the course of the research, it was argued that the relationship between source and target in a metaphor is fluid, leaving space to more possible combinations. The difference between ontological metaphors versus ontological mapping of metaphorical concepts was also clarified.

In the extensive research on metaphors conducted by Lakoff and colleagues, three theories are herewith taken under the loop: **the Conceptual Metaphor Theory**, **the Conceptual Metaphor Mapping** and the **Embodiment Theory**. These

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theories represent the theoretical background this research originates from. The goal is to show strengths and challenges in all of these theories, with a particular focus on the Embodiment Theory.

2.3   Considered Theories on metaphors

2.3.1   The Conceptual Metaphor Theory

As the name says, according to the **Conceptual Metaphor Theory**, metaphors are *conceptual constructions*, or synonyms, for concepts [Lakoff and Johnson, 1980a], [Lakoff, 1993]. The Theory was adopted in different scholars' works, including [Ahrens et al., 2004]; [Chung, 2009][Chung et al., 2013]; [Chung et al., 2004b]; [Ahrens, 2011b]; [Ahrens, 2010]; [Grady, 2005]. Chung's, Ahrens' and Huang's and co-authors' works on metaphors were referred to as the Taiwanese School in the course of the investigation.

For the Conceptual Metaphor Theory, metaphors are built upon concepts, which label the metaphors' domains. These domain are called source and target. Sources are mostly concrete, targets are mostly abstract. An example of metaphorical structure is presented in fig. 3, pag. 18.

The relation between source and target is one-to-one: one source stands to one target and one target stands to one source (e. g. TIME is MONEY, LOVE is JOURNEY, GOOD is UP, BAD is DOWN).

This relationship between domains is often referred to as the Invariance Principle, which foresees "a *systematic* correspondence between source and target domain" ([Lakoff, 1993]:215).

This Principle (also addressed in this research with reference to selective inferencing, more below) also implicitly justifies the semantic choice and thus the semantic matching between source and target. It justifies why, for instance, for the

Metaphor = Complex Experiential Gestalt ('Gestalt' = 'Structure')

A (target)   is   B (source)

properties of B are super-imposed upon A

e.g.
CONVERSATION (target)   is   WAR (source)

properties of WAR are super-imposed upon CONVERSATION

TALKING (target)   is   FIGHTING (source)

properties of FIGHTING are super-imposed upon TALKING

e.g. *winning / losing* an argument
shooting down the opponent
gaining / losing ground
being *on the defensive*

Figure 3: Metaphor structure according to ([Lakoff and Johnson, 1980b]:203)

metaphor LIFE is a JOURNEY, we say in natural language time flies, but not "time sails".

This inviolable relation between domains was adopted by other scholars.

[Chung et al., 2003b] showed in their studies the existence of Chinese and English metaphors with ECONOMY as a target compared to, respectively, the source CAR, PERSON ([Chung et al., 2003a]) or WAR [Ahrens et al., 2004]. STOCK MARKETs (including more abstract financial transactions) are OCEANS in three different languages (English, Spanish, Chinese) [Chung and Ahrens, 2003]; LOVE is a PLANT ([Ahrens et al., 2004] and LOVE is FOOD ([Ahrens, 2002]) in English and Chinese, while TIME in Chinese is MOTION ([Ahrens and Huang, 2002]; [Huang, 1981]).

Political speeches are overloaded with metaphors. For instance, IDEAs / THEO-Ries are BUILDINGs metaphors ([Lu and Ahrens, 2008], [Ahrens, 2011b], [Ahrens,

2005c], [Ahrens, 2009], [Ahrens and Lee, 2009]), a concept also partially reiterated by [Gong and Ahrens, 2007], [Gong et al., 2008].

The semantic choice behind each domain can have a considerable impact on language users.

According to [Thibodeau and Boroditsky, 2011] and [Semino, 2014] (and the related research at Semino's research lab at CASS [ESRC Centre for Corpus Approaches to Social Science] in Lancaster)[5], the adoption of a source domain instead of another for a metaphor consistently changes the reaction of the person involved to deal with an issue, like crime or cancer. When CANCER is target domain, Semino's studies showed that the use of the word battle instead of journey (CANCER as a BATTLE; similar to CANCER as a WAR, or LIFE is a BATTLEFIELD [Bounegru and Forceville, 2011]), makes some patients feel powerless and weak, especially if they eventually succumb to the disease. On the other hand, CANCER as a JOURNEY subconsciously puts the interested parties in a more positive state of mind.[6]

2.3.2   The Conceptual Mapping Model

Lakoff and Johnson's approach to conceptual mapping for metaphor seems to adopt subjective decisions of what makes or does not make an expression a metaphor. As argued by Ahrens ([Ahrens, 2002]), it seems to follow *ad hoc* criteria, which define what is entailed within or excluded from the radius of a conceptual domain or frame. The subjective approach to metaphor determination leaves space to much ambiguity. Therefore, Ahrens introduced the **Conceptual Mapping Model (CMM)**,[Ahrens, 2010], a "*processing* account" to solve this theoretical weakness.

The Taiwanese School investigated the meaning of a metaphor as obtained through the semantic structure between the source and the target domain *via concepts*. In

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[5]http://cass.lancs.ac.uk/?author=6

[6]The implications of studies of these kinds are highly practical. For instance, Semino is currently working on a guideline (metaphor manuals, or, as the scholar defines them, "metaphor menus") with medical staff in the UK to help them and the patients.

comparison to Ahrens' conclusions, the schematicity solution proposed by [Clausner and Croft, 1997] is slightly more specific in terms of definition of the source and target domains, but it remains without support of empirical evidence.

Ahrens and colleagues' research attempted to justify *why* a particular domain matches with another domain, while highlighting the (language- and culture-oriented) peculiarities of the analyzed metaphors.

This new approach to metaphor study and research or CMM, allows, contrarily to the Conceptual Metaphor Theory, *empirical predictions* of novel and conventional metaphors.

Ahrens decided to integrate CMM with the Suggested Upper Merged Ontology SUMO ([Ahrens et al., 2003]), upstaging it to an automated process. For this study, the scholar used corpus-based data (Metabank by James J. Martin 1992),[7]. The defined rule was: If the source domain is instantiated in the Upper Ontology SUMO, it is possible to derive from there how the source domain is mapped and then to move from that mapping to automatically find the source's target.

The proportion of the mapping extension of a single source domain can give an hint about the frequency of a concept acting like source domain for a potential target domain. In fact, the number of times this concept is used, as well as the number of times its child concepts are used as source domain upper concept, defines its frequency of use as upper concept.

The whole procedure (corpus extraction of metaphors; identification of their source domains, manual matching between source domains and SUMO upper concepts and instantiations of relations between source domains and given or potential target domains) represents the core of the automatic informational retrieval in Ahrens' work.

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[7]Martin J. 1992. Metabank: A Knowledge Base of Metaphoric Language Conventions. *Computational Intelligence*, 10, pg. 134–149.

The approach adopted can be summarized as it follows:

1. First, a list of examples was proposed for a target domain, e. g. IDEA.

2. According to the retrieved metaphors (e. g. "an idea is built", "this idea was not digested", "you can recycle my idea", "a new idea was born", "her idea is cool"), source domains were defined (BUILDING, FOOD, COMMODITY, INFANT, FASHION).

3. Questions on the source domains and the knowledge of their use in real world were asked. For instance, if IDEA is BUILDING, does it need a foundation? Or wires? A model? Bricks? If IDEA is FOOD is it edible? Does it have a taste? Can it be smelled? And if IDEA is a COMMODITY, what is its function? What purpose does it serve?

4. It was questioned whether these expressions are conventional or novel and

5. Their usability in everyday language was checked through corpus-based studies

Following this path, Ahrens (ibidem) proves for instance that IDEA (in Chinese: 理論 lǐlùn theory，論點 lùndiǎn argument，想法 xiángfa idea) matches with 建構 jiàngòu to build，解構 jiěgòu to deconstruct，成形 chéngxíng to take shape，動搖 dòngyáo shake).

Based on the five-point approach to the identification of a schema in CMM, further observations were derived from the collected data. For instance, in the case of IDEA is BUILDING, IDEA is an *external* BUILDING. No specifications about building components (such as windows, doors, or wires) are in fact provided through the concept mapping, given the use of only generic or upper concepts.

It needs to be specified though that metaphors' targets in part of Ahrens' studies were selected prior the investigation. Source and targets domains were also mapped to SUMO upper concepts only.

Although the cardinality between source and target is one-to-one according to

the considered literature, 'the target domain must select different source domains for different reasons" ([Lakoff and Johnson, 1980a]), as showed in Ahrens' work (from [Ahrens, 2002]:290).

In fact, although one same target (IDEA) stands to different sources (FOOD, COMMODITY, INFANT) and although it chooses one or the other according to context, analogies between source and targets are limited. FOOD is processed and digested in the body; IDEAS are processed and digested in the mind. IDEAS are valuable and marketed; COMMODITies are valuable and marketed. IDEAS are born by the same mind; INFANTs come to the world through others [Ahrens, 2002].

Ahrens provided evidence for novel metaphors diverting from this implicitly selection rule between source and target. All forms diverting from this rule are novel metaphors.

The research findings of the Taiwanese School could be validated through psycholinguistic experiments, which showed high matching predictions among test persons defining the difference between conventional and novel metaphors [Ahrens, 2010].

Section conclusions

In this section, The Conceptual Metaphor Theory by Lakoff and Johnson and the Conceptual Mapping Model (CMM) by Ahrens and the Taiwanese School were presented. According to both theories, the binary relation between source and target is explicable and representable through concepts.

The first was introduced since it was adopted by the Taiwanese School. Its approach to metaphor study could be challenged in different ways:

- The CMM Theory does not question the one-to-one domain-target pairings. Therefore, it implicitly agrees on the Invariance Principle between metaphor's source and target, as asserted by Lakoff and Johnson. In this research, the

relation between source and target is fluid, and it accepts multiple sources to multiple targets, as showed in the metaphor-in-metaphor cases.

- CMM exclusively makes use of SUMO upper concepts for conceptual mapping. This may be an optimal solutions for many cases. Vague ontological terms like upper concepts are by definition "root" terms, collecting beneath them specific or very specific concepts. Upper concepts like EVENT or ENTITY may be defined "gray" and "green", because they are very generic ("gray"), and because they convey concise meanings ("green", condensing information).

  However, as also previously illustrated with examples, the use of upper concepts alone for metaphor mapping may not always represent an optimal solution overall. Upper concepts can in fact fail to represent the correct and/or full metaphorical meaning/s behind an expression.

  For instance, in one of Ahrens' examples, ECONOMY is a BUILDING, the scholar mapped the metaphor by means of upper concepts. In the same research, it was nevertheless clearly stated that not all the BUILDING, but just its façade or external walls are recalled when using the metaphor ECONOMY is a BUILDING. BUILDING, as upper concept, approximates the metaphor's meaning, but it does not fully represent it. A proposed re-mapping is therefore ECONOMY is PARTOFBUILDING.

- In CMM, little is said about the nature of the domains, whether sources are mostly concrete and target are mostly abstract, as postulated by Lakoff and Johnson. In this research, the rule is loosen and a new definition was searched against empirical results.

The ability of the human brain to focus on an OBJECT or EVENT and select just salient components of it is introduced in these pages with the term **selective inference**. As the term says, selective stands for a cognitive selection of information.

In fact, selective, in selective inference, implies selection: Only some *properties* of the retrieved concepts are considered (like the external façade of the building, rather than its wires and tubes; the stages and bumpiness of the journey, rather than luggages and tickets; economic gains and losses, rather than transactions). Inference, in selective inference, refers to information derived from metaphors. For instance, in the expressions "to cost an arm and a leg" or "to give someone a piggyback ride", language users create expressions that just focus on SHAPEATTRIBUTE or SHAPEPROPERTY, and they make sense out of them, instead of focusing on an entire SHAPE, an entire BODY or an entire OBJECT.

Some of the examples previously introduced in the case of metaphor-in-metaphor can also be re-discussed in light of selective inference.

As the reader may remember, one does not simply walk around the city, "one walks the streets"; when a business is working so good that it is almost self-governed and casual, it does not simply work, "it flies off the shelves", "the sales clear the shelves", "the product hits the shelves".

Selective inference is explicit in both: to talk about MOTION ("walking the streets"), one uses BODY; to talk about BUSINESS one uses ENTITIEs.

The introduction of mid-level concepts can further define the expressions. For instance, instead of BODY it can be BODYPART (legs or feet); instead of places, it can be PARTOFSPACE, such as towns or streets; instead of ENTITIEs, it can be one kind of ENTITIEs (shelves).

In this research, many of the analyzed metaphors derive from a process of selective inference. Selective inference provides a justification for Ahrens' metaphors IDEA is BUILDING, Lakoff's LOVE is a JOURNEY or many others (BUSINESS is a SHELF, TIME is MONEY). Selection also justifies the attempt, undergone in this investigation, to include mid-level concepts to metaphorical conceptual mapping. It was also assumed that selective inference only occurs through a process of

deep understanding of the context in which a metaphor is used.

Another theory by Lakoff and Johnson analyzed in this research is the **Embodiment Theory** ([Lakoff and Johnson, 1980a], [Lakoff and Johnson, 1980b], [Lakoff, 2015]).

The meaning of 'embodiment' has been thoroughly inquired, leading to a partial re-interpretation of the theory, supported by corpus-based qualitative analysis (see appendix B, page 323). Among the examples, there are also *shape* metaphors as well as the concept of SHAPE linked to SPACE.

Shapes are an intrinsic component of many of the presented metaphors. The concept of SHAPE can also be evoked by metaphors that do not contain shape words, as examples will show.

2.3.3   The Embodiment Theory

The Lakoffian Embodiment Theory ([Lakoff and Johnson, 1980a], [Lakoff, 1993]) asserts that the creation of abstract conceptual thinking is based upon and rekindled to concrete experiences, where possible *bodily* approaches happen or can happen. The claim in the Embodiment Metaphor Theory is that almost every aspect of the human cognition is played down at the physical level.

> We are neural beings. Our brains take their input from the rest of our bodies. What our bodies are like, and how they function in the world, thus structures the very concepts we can use to think. We cannot think just anything - only what our embodied brains permit.[8][Lakoff, 1993]

Through this citation, it becomes clear that physicality in human BODY (the concept of "embodied brain", also used by Lakoff), may be, according to Lakoff, a necessary condition for metaphors to exist and to be understood.

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[8]George Lakoff in `http://www.edge.org/3rd_culture/lakoff/lakoff_p1.html`

The Embodiment Theory was also originally triggered by [Reddy, 1979]'s work on the concept of *conduit metaphor*, as reported in [Lakoff, 1993]. Reddy was driven to his conclusions by observing the way people talk about successful communication.

In ([Reddy, 1979]:290)'s words: "language functions like a conduit, transferring thoughts *bodily* from one person to another".

The Lakoffian Embodiment Theory has been adopted by neuro-scientific studies (where it is also called "embodied cognition (EC) movement", [Flusberg et al., 2010]). According to scientists in the field, the human mind is embodied and embedded in the same physical structure as the rest of the body. Thus, everything that goes through it, from emotions, to perceptions, to actions and abstract thought, is processed and conceived in terms of *physical, tangible* objects.

Several scholars have adopted this theory in their research, including [Lakoff and Johnson, 1980a], [Ahrens, 2005a], [Ahrens and Say, 1999], [Huang et al., 1993], [Ahrens et al., 2003], [Huang et al., 2013].

Its name, *Embodiment* Theory, leads to think that the metaphorical experience steadily needs to be related to a body or containment, which is partially true. In many expressions in fact, the human component is explicit and specified through the use of verbs referring to physical actions, such as to catch, to grab, to envision, to face (e. g."I was *caught* by surprise"; "Mexican President Enrique Pena Nieto is *facing* his deepest crisis over his government's handling of the problem", "he visited the parent of the victim and reported to the media: "In his face a *screaming* silence"").

Many of these expressions can also be paraphrased[9] with other body parts. For instance, instead of saying "*to bring* life to something", we can say "*to breath* life into something", or instead of "I wanted to say something *to your face*", we can state "I wanted to say something looking at you *in the eyes*".

Simple statements and even simple words prove that 'embodiment', in the Lakof-

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[9]Later in the chapter a personal interpretation to the concept of paraphrasing is presented.

fian Embodiment Theory, has something to do with the physical (human) body. Take for example the word every*body* (e. g. "Obesity is a pandemic disease which can affect everybody"). Everybody represents every single interested person. By using this word, language users automatically imply that, in order to talk about a PERSON (the target), we can address it by exclusively referring to its BODY (source).

In many cases, 'embodiment' does not seem to refer to all bodies (animals, plants, people), but to *humans*, like in expressions with face (e. g. crater-face, duck-face, butter face, fungus-face, poker face, po-faced, show face, turd face[10]).

All these expressions are analogies (e. g. crater-faced means "to have a face like a crater given the signs left by acne"; wreck face means "a face that looks like a wreck"; fungus-face means "a bearded man [where the beard looks like a fungus"]).

Some forms can also be false-friend analogies (e. g. butter face does not mean "to have a [soft or smooth] face like butter", but it stands for "to be a very ugly woman"). Some are inferences (e. g. poker face, to show face, meaning "to have a face that shows no emotions or has no expression"; po-faced meaning "to look seriously and unfriendly"[11]; turd face for "a wretched obnoxious person").

All these expressions are also metaphors (in fact, we can address a PERSON by just using the BODYPART face, e. g. "she is just a butter face!"). And some are metaphor-in-metaphors (e. g. duck face, colloquially meaning to have a face which resembles the head of a duck, i. e. with pouting lips[12]). Ducks do not have *faces* in nature, they have *peaks*, yet in language human PERSON's faces are first attributed to ANIMALs , then to a single BODYPART (face), then to an whole PERSON("she is a duck face").

Finally, some of these analogical metaphors are also collocations (in fact, in English we can use the expression "*to do* the duckface" or "*to do* the poker face").

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[10]Expressions taken from the online Free Dictionary.

[11]About the origins of po-faced: `http://www.worldwidewords.org/qa/qa-pof1.htm`

[12]From `http://en.wiktionary.org/wiki/duckface`

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Many body parts, when involved in the creation of idiomatic figurative expressions and metaphors, prove the validity of the Lakoffian Embodiment Theory (e. g. "to *toe* the line", "to rule with an iron *fist*", "to *hand* something over first", "to *sit* on someone's papers", "*to nail* something or someone", "to be chilled to the *bone*", "to be frozen to the *marrow*").

The nature of these expressions (being *part_of* the human BODY) also justifies the introduction of Generative Lexicon Theory in metaphor's studies, as later explained in this chapter (section 2.5, page 65).

According to [Ziemke, 2003], the concept of embodiment in the tradition of Gibbs, Narayanan and Lakoff, does not necessary imply the existence of a *target* body. For Ziemke, there exists different forms of embodiment, including an *historical, structural coupling, organismoid, social* and *organismic* embodiment, which all presuppose the concept of embodiment to be concrete *and* abstract.

Ziemke's definition proves to be true in many cases in natural language (e. g. "to *break* the silence"; "to *taste* the sweetness"; "to *smell* trouble"). In these examples, all targets (silence, sweetness, trouble) are abstract, unless they are explained with the help of physics or other sciences (e. g. silence meaning "the lack of noise" or noise, being a measurable unit).

The intent behind the examples that follow below is to go beyond the Embodiment Theory as solely body-oriented, by showing that the definition of BODY and EMBODIMENT can imply definition/s for SHAPE in the sense of CONTAINMENT/CONTAINER, alias SHAPE as concrete EVENT or OBJECT, but also SHAPE as abstract EVENT.

Also, the targets can be abstract or concrete EVENTs.

For instance, in the metaphor "I hope that your charisma will spread across the room and will *touch* many souls", we are aware that the personality feature,

CHARISMA[13] is an abstract concept, yet we animate it in language into something that is *tangible*, stretchable, dividable, as if it were a limb (charisma that *touches* something).

The following examples will show that embodiment can stand for:

- BODY (and BODYPART / BODYPROPERTY / BODYACTION)
- CONTAINMENT / CONTAINER (with an implied SHAPE)
- CONTAINMENT / CONTAINER (and, more than that, the SPACE surrounding the implied SHAPE)

A fourth interpretation, embodiment as A-SHAPED or SHAPE-independent E-VENT, is proposed for future research in chapter 5 (5, page 249).

The proposed metaphors are taken from idioms, collocations, simple words. An instance for a metaphorical simple word is the German lemma Bevormundung (literally paternalism, or the act of patronizing). The term is composed by Mund (mouth), a prefix (bevor), literally meaning preceding or in advance and a meaningless suffix, -ung. The concept behind Bevormundung, expressed by a single word, recalls the graphical, visual image of someone standing in front of someone else's mouth so to lead the talking. Another correspondent (yet not identical in meaning) term for this concept can be the verb to belittle, which again implies the existence of a size (and thus, implicitly, of a shape). The person is therefore compared to an OBJECT or considered by his/her HEIGHT (BODYATTRIBUTE) and figuratively reduced in size. The verb also implies comparison among BODYs or SHAPEs or BODYATTRIBUTEs such as HEIGHT.

The following list of expression has been split into four groups: The first part contains tropes where embodiment stands for BODY / BODYPART (e. g. lips) /

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[13]Mapped as SubjectiveAssessmentAttribute in the SUMO ontology, the concept has been redefined. The class "SubjectiveAssessmentAttribute" in SUMO is considered insufficiently clarifying for concepts. It was originally introduced to define all concepts in SUMO that "lack an objective criterion for their attribution"; http://rocling.iis.sinica.edu.tw/kifb/en/concepts/_subjective_assessment_attribute.html

BODYPROPERTY (e. g. weight, an intrinsic property, or more extensively length) / BODYACTION (such as to grab), while the target is PERSON and / or EVENT. Cross-linguistic correspondence between English and other languages has also been marked in italics. In fact, the match between the two (English and the other foreign language) is rather consistent across the examples, leading to the assumption that there can exist *intra-lingual patters* (i. e. same or similar behaviors).

One important point to make, in regard to the cross-linguistic examples provided in this chapter and in the following chapters, particularly chapter 4 (4, pag. 181) concerns the translations of the expressions. These translations neither aim at representing all possible translations, nor at being the best possible available translations. They were extensively searched and double-checked in several dictionaries and thesauri (see appendix B, pag. 323), they were proof-read by Chinese native speakers and knowledgeable scholars and they are thus supposed to be validated, strong, possible solutions. Without further saying, the reader should keep in mind that language is fluid: a feasible translation in today's language knowledge can be discarded in the near future.

Embodiment is BODY / BODYACTION / BODYPROPERTY / BODYPART (source)

- GE: Bevor*mund*ung (lit. before + mouth + suffix); EN: paternalism, patronizing; CH: 聽寫 tīngxiě (lit. hear and write); IT paternalismo.
- Etwas kommt auf die *Lippen* (e. g. "Er brauchte sechsig Jahre bevor die Wahrheit auf die *Lippen* kam", lit. he needed 60 years before the truth came to the *lips*), something passes one's *lips*; FR: quelque chose a été *proféré* (something has been *told*"; SP: *decír* con la *voz* (lit. to *tell* with the *voice*).
- GE: Vor*mund*schaft (lit. before + mouth + suffix); EN: custody (of a child); CH: 監護權 / 監護職責 jiānhù quán / jiānhù zhízé (acting as a guardian, custody of a child); IT: tutela / custodia del minore.

- To throw one's *weight* around / behind something (e. g. "She has thrown her *weight* behind the efforts to raise money to help the victims of Ukrainian fighting"), GE: sich hinter etwas stellen (lit. to put oneself behind something); FR: *peser* de tout son *poids* dans quelque chose (lit. to put all one's *weight* into something); SP: deber *se incaminar* hacia al siguiente *paso* (lit. must walk along a given path).

- To get someone's *eyes* (e. g. "she had caught his *eyes*"); to be *eye-catching*, used when a person catches someone's attention; FR: taper dans l'*œil* de quelqun (lit. to beat / to bang into someone's *eye*); SP: *llamar* la atención de alguien (lit. to call somebody's attention); CH: 引人注目的人、的事 yǐnrénzhùmù de rén / de shì (lit. to attract attention of someone, i. e. someone or something who / that catches attention; CH: 注目 to gaze, to fix); (GE: interessant, beachtungswert).

- To turn a *blind eye* (e.g. "you can decide to either turn a *blind eye* to the situation of temporary jobs or decide to pro-actively do something"); CH: 視而不見 shì ér bù jiàn (lit. to *look* and not to *see*); 視若無睹 shì ruò wú dǔ (lit. to look to, to not have to observe); 坐視無睹 zuò shì wú dǔ (lit. to sit, to not have to observe). The expression is similar to the Chinese idiom "to *sit* and *watch*, while remaining indifferent", 坐視不理 zuòshì bù lǐ (lit. to sit refuse to acknowledge / ignore); IT: chiudere un *occhio* (lit. to close an *eye*), fare finta di non *vedere* (lit. to act as if one does not see); FR: fermer *les yeux* sur qc" (lit. to close *the eyes* on something), *regarded* sans voir (lit. to look without seeing, to remain indifferent); SP: hacer *la vista* gorda (a algo) (lit. to make *the sight* fat to something / someone); GE: *ein Auge* bei etwas zudrücken (lit. to close one *eye* to something); *die Augen* verschließen (lit. to close the *eyes*); über etwas *wegschauen*, über etwas *wegsehen* (lit. *to look over* something, away from something).

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The expression can also be "paraphrased" into "to look *the other way*", which presupposes spatiality (the "other way" versus the direction one should look at). **Spatiality** is hereby used as something "of or relating to space and the relationship of objects".[14] (more about spatiality in the other interpretations for Embodiment Theory that follows).

- To swear *blind*, to swear up and down, to swear black and blue, to swear to high heaven that (to say something completely true; e. g. "He swore *blind* that he was not involved in the massacre"); GE: Stein und *Bein* schwören (lit. to swear rock and *leg*); (SP: jurar y perjurar que, lit. to swear and to swear that; jurar por todos los santos, lit. to swear over all the saints); (FR: jurer ses grands dieux que, lit. to swear one's own great gods that"); (IT: giurare su tutti i santi, same as in Spanish).

With the collocation black and blue, there also exists the idiom to beat somebody black and blue, to be in a terrible *shape*, which means to beat someone with full force. IT: riempire di botte (lit. to beat someone *from head to toe*), dare una manica di botte (lit. to give someone a sleeve of beatings); FR: rouer quelqun des coups (lit. to thrash someone with beatings"); CH: 焦頭爛額 jiāo tóu làn é (lit. beaten *head* scorched *brow* / forehead).

- To get someone / something out of someone's *head*; GE: etwas aus dem *Kopf* bekommen (e. g. "Diese Bilder bekommt man nicht schnell aus dem *Kopf*") (lit. it is not easy for somebody to get these pictures out of his / her *mind* / these images remain in someone's mind; same as in Italian); IT: è difficile togliersi queste immagini dalla *testa* (same as in English).

- To bury / to stick / to put someone's *head* in the sand (e. g. "The Talibans are conquering more and more land and becoming bolder in their attacks. While we seem to bury our *head* in the sand at the moment, the failure of the war in

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[14]From Merriam Webster Online, `http://www.merriam-webster.com/dictionary/spatiality`.

Afghanistan becomes clearer every day and civilians are paying the price."), IT: fare come lo struzzo, (lit. to do like the ostrich), mettere la testa nella sabbia (lit. to hide / bury one's *head* in the sand); SP: hacer como el avestruz (same as in Italian); FR: pratiquer la politique de l'autruche (lit. to practice the ostrich policy); GE: den *Kopf* in den Sand stecken (same as in English), die Vogel-Strauß-Politik treiben / betreiben (same as in French); CH: 閉目塞聽 bì mù sè tīng (lit. stop *eye* stop *ear*); 漏脯充飢 lòu fǔ chōng jī; 鴕鳥政策 tuóniǎo zhèngcè (lit. ostrich policy), 掩耳盜鈴 yǎn ěr dào líng (lit. to cover *ear* steal bell, to cover one's *ear* while stealing the bell, sticking one's *head* in the sand). The expression can also be "paraphrased" into: to shut one's *eyes* and stop one's *ears*, to be out of *touch* with reality, to deceive oneself.

- To be *head and shoulders* above someone (e. g. he is head and shoulders above his classmates"); CH: 比某人強 bǐ mǒurén qiáng (lit. in comparison of someone strong); (e. g. 他的成績遠遠超過班上其他同學 tā de chéngjì yuǎnyuǎn chāoguò bān shang qítā tóngxué); IT: essere di una *spanna* sopra (lit. to be a *hand* above someone); SP: dar cien vueltas a alguien/algo (lit. to *kick* someone a hundred times); FR: avoir plus d'une *tête* d'avance sur qn. (lit. to have more than one *head* ahead of someone); GE: um Längen besser als jemanden sein (lit. to be of better length than someone), meilenweit vor jemandem liegen (lit. to be miles ahead of someone), jemanden um Haupteslänge überragen (lit. to surpass someone by main length).

- To jump out of one's *skin* (meaning to react strongly for shock, surprise or anger; also paraphrasable as to lose one's patience or to fly off the handle) (e. g. "You nearly scared me, I almost jumped out of my skin"); GE: aus der (eigenen) *Haut* fahren (lit. to drive out of one's *skin*); SP: llevarse un susto tremendo (lit. to be hugely scared); FR: sursauter (lit. to startle); IT: prendersi un *colpo* (lit. to get a *stroke*).

- To *grip* someone to the *marrow* (e. g. "The case of little Yannick has gripped the public opinion to the *marrow*", meaning that the case has taken hold of, has mobilized the public opinion); GE: Der Fall vom kleinen Yannick ist der Öffentlichkeit *in die Knochen gefahren* (lit. it has run up into the *bones*; same as in Italian: IT: "Il caso del piccolo Yannick ha colpito l'opinione pubblica, è entrato nelle *ossa*"); CH: 淪肌浹髓 lún jī jiā suǐ (lit. move to the core，to penetrate to the marrow, to be deeply affected), with 肌 jī meaning flesh, muscle and 髓 suǐ meaning marrow.

- Land *grab*bing (the buying or leasing of large portions of land in developing countries, often associated to water grabbing, which refers to the confiscation and re-distribution of water resources, a debated phenomenon which leads to benefits from one side, but also to exodi and immigration flows on the other).[15]; GE: land-grabbing, Land*nahme* (lit. taking of the land), Land*raub* (lit. robbing of the land); IT: land grabbing (or *appropriazione* illecita di terra; lit. illegal possession of land). The action is described by the use of the verb to grab, which refers to the act of catching an object with the hands (WN definition).

- Ein offenes *Ohr* haben (lit. to have an open *ear*); to have a sympathetic *ear* / to lend a friendly *ear*); SP: estar dispuesto a *escuchar* a alguien (lit. to be open to *talk* to someone); FR: prêter *une oreille* attentive à qn (lit. to lend an attentive *ear* to someone); IT: essere disposto ad *ascoltare* qualcuno (same as in Spanish).

- To be wet behind the *ears* (meaning to be immature and inexperienced); CH: 白面書生 báimiàn shūshēng (lit. pale-*faced* scholar), 乳臭味干 rǔ chòu wèi gān (lit. *smell* of mother's milk); IT: *puzzare* ancora di latte (lit. to smell again of mother's milk), avere ancora la *bocca* che sa di latte (lit. to still

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[15]Definition taken from Wikipedia; `http://en.wikipedia.org/wiki/Land_grabbin g`.

have the *breath smelling* of mother's milk); FR: être encore jeune, manquer d'expérience (lit. to be still young, inexperienced), être encore mouillé der-rière les oreilles (same like in English); SP: estar con la leche en los labios (lit. to be with milk on the *lips*); GE: noch nicht trocken hinter den *Ohren* sein, grün hinter den Ohren sein (lit. to be not dry / not wet behind *ears*; to be green behind the *ears*), ein Milchbart sein (lit. to be a milksop), noch die Eierschalen hinter den Ohren haben (lit. to still have eggshells behind the ears).

- To be fed up to the *back teeth* (meaning that someone is extremely annoyed by a situation); GE: mir *stinkt* es (lit. it *smells* to me), die *Schnauze* voll haben (to have a full snout / muzzle); FR: j'en ai/il en a sa *claque* (lit. someone has it up to the cheek); SP: estar hasta *la coronilla* de algo (lit. to be up to the *crown of the head* of someone), estar hasta *el moño* de algo (lit. to be up to the bun - hair- of someone); IT: averne fin sopra *i capelli* (lit. to have it up to someone's hair).

The expression to be fed up to the back teeth almost bears the same meaning of to be *sick and tired* of something (where sickness and tiredness still relates to the physiological domain) as well as to have it up to one's *ears* with someone or something, where once again we have the presence of a body limb, the ears.

- To put someone's *foot* down (e. g. "With more allegations coming forward ev-eryday of women claiming of being drugged and raped, his best friend seems to have put his foot down"; meaning to take distance from someone due to strong allegations); (FR: mettre la gomme, lit. to put the eraser, to erase); IT: puntare i *piedi* (lit. to dig one's *heels* in, to not move); GE: sich querstellen (lit. to put oneself in the middle); auf den Tisch hauen / mit der *Faust* auf den Tisch schlagen (lit. to bang on the table, to hit the table with the *fist*).

- To fall in someones' *footsteps* (e. g. "he is following in the footsteps of his

father", "he felt in his father's footsteps"); CH: 步人後塵 bù rén hòu chén (same as in English; e. g. 他正在步 (他) 父親的後塵 tā zhèngzài bù tā fūqin de hòuchén; he is following the footsteps of his father), with 步 meaning step, pace, walk; FR: suivre les *traces* de qn. (lit. to follow someone's traces), emboîter le pas de quelqu'un, suivre les pas de quelqu'un (lit. to follow someone's steps); IT: seguire le *orme* / le *impronte* di qualcuno (same as in English).

The first group of expressions show tropes and single words 1) often bearing the same or similar meaning across different languages and 2) containing BODYPARTs/ BODYACTIONs / BODYPROPERTY/es as source, again often similar or the same across languages. The target of these metaphors is EVENT or STATE / ATTITUDE (human BEHAVIOR).

This first batch of examples supports the argumentation behind the Embodiment Theory, namely the existence of human body-related metaphors. Nevertheless, the relationship BODY <> EVENT would be unable to fully represent the meaning behind the selected phrases. Hence the decision to introduce specifications of the concepts, in the form of mid-level concepts. EVENT is therefore better specified as human BEHAVIOR / ATTITUDE, while BODY is better specified in terms of BODYACTION/BODYPROPERTY/BODYPART.

Embodiment is CONTAINMENT/CONTAINER (source)

The following examples aim at providing evidence to the fact that a close interpretation of human BODY can include meanings for embodiment other than human component. In particular, embodiment can also be interpreted as CONTAINMENT/ CONTAINER.

BODY refers in this way to every SHAPEATTRIBUTE that owns physicality, boundaries, space (i. a. something delimited in a space and time; more in the next batch of examples) and dimensionality (more in the terms of [Boroditsky, 2000]

[Boroditsky, 2010]).

Although not directly cited in the original Embodiment Theory, the interpretation of embodiment as CONTAINMENT/CONTAINER can also be linked to another theory by Lakoff and Johnson, called the **Event Structure Metaphor**.

According to [Lakoff and Johnson, 1980a] as well as [Narayanan, 1997] and [Gibbs, 2006], the concept of embodiment in figurative use is triggered and sustained by perceptual, motor and affective systems or *event structures*. In other words, human beings tend to channel back to body or space what belongs to both the abstract and the concrete domains. According to the same authors, the Event Structure Metaphor Theory allegedly applies to many languages, but this statement is not supported by examples in literature.

A summary of the Theory by [Narayanan, 1997], acknowledges that[16]:

- STATEs are conceptualized as LOCATIONs

- CHANGEs are conceptualized as MOVEMENTs into and out of STATEs

- CAUSEs are conceptualized as FORCEs

- PURPOSEs are conceptualized as DESTINATIONs

- PLANs are conceptualized as PATHs

- ACTING is conceptualized as MOVING

- DIFFICULTies are conceptualized as obstacles to MOTION

- EXPECTEDPROGRESS is conceptualized as a TRAVELSCHEDULE and

- Goals-based POLICies are conceptualized as JOURNEYs

The categorization as presented shows *ad hoc* concepts, i. e. concepts that have not been double-checked with a standard ontology. This said, the proposed categorization is rather precise, with embodiment either referring to ENTITY (such

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[16]The domains in Narayanan's list have been capitalized. On his thesis, [Narayanan, 1997] further developed the *NTL Hypothesis*, which asserts that "basic concepts are directly embodied in perception, motor control, emotions and social cognition; [...] abstract concepts may also derive their meaning through metaphorical concepts". Narayanan suggests that the best approach to investigate the blurring lines between physicality and conceptuality is through Structured Connectionism.

as JOURNEY, PATH, LOCATION) or EVENT (such as STATE, MOVING, MO-TION), all upper concepts.

Narayanan's regroupment is cognitively selective, since it implies and specifies what does and does not constitute an ENTITY and / or EVENT.

The conceptualization as presented can also assume the existence of metaphors-in-metaphor. CONTAINER (often the source of the metaphor) is in fact a specification of ENTITY and CONTAINER always implies SHAPE. Finally SHAPE bears specific (implied) properties (e. g. WIDTH, LENGTH, HEIGHT).

The second batch of examples that follows here below takes into account SHA-PEATTRIBUTE as metaphorical concept.

The class of SHAPEATTRIBUTE in SUMO includes several, but not all possible Shape Properties. A complete list of these SHAPEATTRIBUTEs (with a set limit for the hierarchy at "10") can be found under the provided link.[17]

Although not in the list, SHAPEATTRIBUTEs like DEEP/DEPTH are also herewith considered.

Another difference to mark is the use of SHAPEATTRIBUTE over MEASURE-MENT/MEASURE. MeasureFn is in SUMO a KB term, meaning a concept. Its definition reads: "A BinaryFunction maps a RealNumber and UnitofMeasure to that Number of units. It is used to express "measured" instances of PhysicalQuantity".

The following examples show the implied existence of CONTAINMENT/CON-TAINER of a SHAPE. In order to contain something, the SHAPE needs to be a three-dimensional form.

- *Flat* hierarchy (e. g. "In my company, there is a *flat* hierarchy", same in Germany and Italian); GE: *flache* Hierarchie (e. g. "In unserem Unternehemen besteht eine flache Hierarchie"); IT: "struttura gerarchica *piatta*". Flat can

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[17]`http://54.183.42.206:8080/sigma/Graph.jsp?kb=SUMO&lang=EnglishL`
`anguage&relation=subclass&term=StructureAttribute&up=10&down=10&l`
`imit=&columns=direct-children&columns=documentation&columns=graph`
`&view=text&submit=submit`

also stand for something that is so leveled to the point of being absolute, such as in the expression "My apologies, but my answer is a flat no", which may be translated in Chinese with the adjective 斷然的 duànrán de ('absolute', 'categorical'), GE: ein glattes Nein (lit. a flat 'no'); IT: un no categorico (a categorical no). EVENT (target, in this case 'hierarchy') is CONTAINER, but only SHAPEPROPERTY FLATNESS is source of this "something having dimensionality".

A further interpretation of FLATNESS / FLAT, in regards to the context, is that FLATNESS stands for ABSOLUTENESS (e. g. a flat no, meaning an absolute no).

- *Deep down* (e. g. "*Deep down* he was getting lonelier and lonelier"; IT: *sotto sotto*, *in fondo* (same as in English); FR: *au fond*; GE: *tief* (e. g. "tief in mir", meaning "deep down in me"). EVENT (something / someone, target) is CONTAINER (source). The CONTAINER / CONTAINMENT of this STATEOFMIND has a certain DEPTH.

- FR: Avoir un bon / un mauvais *fond* (lit. to have a good *bottom*, meaning to be a good person deep down; ne pas avoir un mauvais fond, lit. to not have a bad bottom, meaning to not be a bad person deep down). PERSON (target) is CONTAINER (or something having SHAPEATTRIBUTE, such as DEPTH).

- To be thrown / to be plunged *at the deep end* (e. g. "Jono said that being thrown in at the deep end boosted his confidence levels"); GE: ins kalte Wasser geworfen werden, über Bord geworfen werden (lit. to be thrown in icy water, to be thrown over the edge, the bank). EVENT (target) is CONTAINER / SHAPEATTRIBUTE (DEPTH, source).

- To be an *outcast* (meaning to be rejected from society); GE: aus der Gesellschaft ausgestossen werden (same as in English); FR: être proscrit / e, exclu / e, banni / e, être un paria (same as in English, to be a paria); SP: ser un

marginado de la sociedad (lit. to be someone marginalized from society); IT: essere un outcast, un paria, marginalizzato (same as in English and French); CH: 被遺棄的人 bèi yíqì de rén (lit. a person who is abandoned), 無家可歸的人 wújiākěguī de rén (lit. homeless person). This expression resembles other similar words, such as outsider or in German Ausgrenzung (e. g. "soziale Ausgrenzung"), meaning exclusion, marginalization, ostracism. SOCIETY (and what makes a society, i. e. the single PERSONs, target) is a CONTAINER.

- To be border*line* (e. g. Borderline personality disorder or BDP); same in German and French (Borderline-Persönlichkeitsstörungen; le trouble de la personnalité limite or TPL); SP: trastorno límite de la personalidad o borderline; IT: disturbo borderline di personalità; CH: 邊緣性人格障礙 biānyuán xìng réngé zhàngài (lit. edge / personality block). A PERSON (target) showing this syndrome is virtually on the border of a society. It follows that SOCIETY (PERSON/PEOPLE) stands for CONTAINER with a border. From this metaphor, it can also be inferred that INSIDECONTAINER (i. e. what is insider this container, source) stands for something that is rational and socially accepted / acceptable; while everything OUTSIDECONTAINER is irrational / abnormal / unconventional (target).

- From the *bottom* of someone's hearth (e. g. "From the bottom of my hearth thank you"); GE: aus *tiefstem* Herzen (lit. from the very bottom, the deepest heart); FR: dire / faire quelque chose *au fond* du cœur (same as in English); IT: dal *profondo* del cuore (same as in English); SP: de todo corazón (lit. with all the heart); CH: 衷心的 zhōngxīn de (lit. wholehearted + of); 真誠的 zhēnchēng de (lit. true, sincere + of). In this case, BODYPART stands for CONTAINER (with DEPTH).

- *Ups and downs*, *highs and lows* (e. g. "life has ups and downs / highs and

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lows"); GE: Tiefen und Höhen (e. g. "das Leben hat Tiefen und Höhen") (lit. downs and highs); IT: *alti e bassi* (same as in German); FR: la vie a *ses hausses et ses baisses / des hauts et des bas* (same as in German and Italian); SP: *los altibajos* / avatareses / azares (de la vida) (same as in English); CH: 有沉有浮 yǒu chén yǒu fú (lit. to have + to submerge + to have + to float); 人生盛衰 rénshēng shèngshuāi (lit. life + to raise and fall). EVENT (something, in this case LIFE) is CONTAINER (it has ups and downs and / or it moves along ups and downs).

- GE: in *Erfüllung* gehen (lit. to go to completion, fulfillment; e. g. "ein Traum ist in Erfüllung gegangen, a dream has come to *fulfillment*); FR: accomplir, réaliser quelque chose (to realize something); IT: avverare, realizzare (same as in French).

  When something (an EVENT, target) comes to *fulfillment*, it is as if it were compared to a CONTAINER that gradually fills up (source).

Embodiment is CONTAINMENT/CONTAINER and its SPACE (source)

Another re-interpretation of the Lakoffian Embodiment Theory focuses on the SPACE of the CONTAINMENT/CONTAINER as metaphor source.

In language, in fact, SPACE can be a source domain with directions, dimensions and sides involved.

- This applies for instance to the trope to know *the scene* (GE: sich in der Szene auskennen [lit. to know oneself's in the scene, e. g. "Ich bin schon seit langem in der Szene, um draußen zu gehen", meaning "I have been knowing the scene since long that I can come out with the truth"]; FR: connaître *la scène* (same as in English and German); SP: conoscer *la scena* / ese mundo (lit. to know the scene, to know the world).

  In this collocational trope, an EVENT (an happening, an episode, target) is compared to a scene (mapped to LOCATED and REGION among others

in SUMO). Nevertheless, the image of any scene comes with its surroundings, alias a SPACE, in time and place (source). Scene also defines / implies SPACE.

SPACE can be undefined abstract and concrete term. From the given expression, the language user can in fact further infer perspective, point of view, properties and attributes of SPACE.

This applies for instance to the German (and English) collocation

- (schwer) *vor* einer Lage / Situation ausstehen (lit. to endure with difficulty *in front of* a situation); to cope with a situation, to *face* a situation, or *unter* einer Situation leiden (lit. to suffer *under* a situation); to suffer (from a situation). An EVENT (target) is an EVENT / PERSON (source) (e. g. "Roger weiß noch nicht wie er mit der Situation umgehen kann. Er steht vor einer schwierigen Lage.", lit. Roger does not know how to cope with the situation yet. He stands *in front of* a difficult situation). The standing-in-front of something, entailed in the expression, is a clear specification that SPACE is seen from the perspective of the EVENT / PERSON (source). In other words and by citing the examples, SPACE is here acknowledged by the phrasal verb to stand in front of (GE: 'bevorstehen', 'vor etwas ausstehen').

- A similar inference can be drawn from the phrase to be put *under* fire. The LOCATION in SPACE is clearly showed from the perspective of the source, i. e. the PERSON/PEOPLE being put under fire (e. g. "many have been put under fire in Ukraine"); GE: angegriffen werden / *unter* Beschuss liegen (lit. to be attacked, to be put *under* shelling / fire); IT: essere *sotto* tiro (lit. to be *under* shooting), essere *sotto* fuoco nemico (lit. to be *under* the enemy's fire); FR: être attaqué pour qc. (lit. to be attacked by someone); SP: estar *en la línea* de fuego (lit. to be *on the line* of fire); 遭射擊，遭攻擊，遭批評 zāo shèjī, zāo gōngjī, zāo pīpíng (classifier for events + to shoot / to attack / to

criticize).

- Another example is to put someone *behind* bars, to be *behind* bars (GE: *hinter* Gittern liegen / sein, same as in English; IT: stare *dietro* le sbarre [same as in English]; FR: passer du temps *derrière* les barreaux [same as in English]; SP: estar *entre* rejas [lit. to be *between* bars], *entre* barrotes [lit. *between* bars]; 坐 牢 zuòláo (to be imprisoned, lit. to be / to sit + prison); (他被關進了監獄 tā bèi guānjìnle jiānyù (he was put behind bars, lit. he + passive voice + shut + *go into* + le past form + prison). The word prison, which conceptually refers to PUNISHING rather than BUILDING is visualized in terms of ENTITY and, more than that, the SPACE behind it (the cell's bars, target). The perspective from which the scene is mentally visualized is clearly from the point of view of the PERSON involved.

Examples like these not only provide information on SPACE, but also on SPACE from a defined agent's perspective. All three tropes show the experience from the eyes of who faces a situation taking place in SPACE.

Similar examples denote the existence of an "experiential perspective" (self-coined term) in language. For instance, the simple act of revenge as VIOLENT-CONTEXT can be described from the eyes of the perpetrator of the revenging act (e. g. "Revenge is bitter sweet") as well as from the perspective of the person against whom revenge is taken (e. g. "Revenge is a plate better served cold"). Nobody likes cold plates, but everyone or most people feel a sense of relief (hence the sweetness) once revenge is done.

In other phrases in natural language, SPACE as source domain is not explicit, such as in the case of the expression

- to get one's meaning across (e. g. "You should make new words to get more attention and get your meaning across"[18]).

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[18]Taken from `http://www.ted.com/talks/erin_mckean_go_ahead_make_up_n ew_words#t-368461`

The word across literally means "from one side to another".[19] The nature and location of the SIDEs are unspecified, yet SIDEs need SPACE to be defined. Hence SPACE is an implied component of SIDEs.

In the last paragraphs, a series of examples have been provided, showing EN-TITY as CONTAINMENT/CONTAINER with specified dimensionality and EN-TITY as SPACE of CONTAINMENT/CONTAINER. SPACE can be implicit. CON-TAINMENT/CONTAINER can be abstract and / or concrete.

In the expressions, EVENT (target) of a metaphor is rendered via implicit or explicit use of SHAPE (in the sense of CONTAINMENT/CONTAINER), or SPACE.

When being a physical (in the sense of non-abstract, perceivable) OBJECT, SHAPE owns distinct SHAPEATTRIBUTEs, such as LENGTH, WIDTH, HEIGHT.

When SPACE is the main feature of CONTAINMENT/CONTAINER and its implied SHAPE, SPACE can be described from the distinct perspective of one of the agents involved in the EVENT as a target (for these cases, the term "experiential perspective" has been introduced). For instance, sitting *behind* bars is clearly an EVENT described from the perspective of the crime perpetrator. Someone being the power *behind* the throne refers to the person exercising that power, no to the person upon which power is exercised; while someone cracking under the strain of an EVENT is a person suffering because of the event, not the person causing it.

A further interpretation of the Embodiment Theory by Lakoff and Johnson may focus on the absence of all embodiment and space in the target EVENT. This may be for instance the case of colors used in tropes to convey a particular meaning. An expression like black Monday does not have reference to any sort of SHAPE, SPACE and EMBODIMENT, yet it is fully understood by language speakers (e. g. "the economic down-turn was a black Monday for the international markets"), who know that black Monday describes a negative situation or predicts negative outcomes.

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[19]From Merriam-Webster English dictionary online.

This part has been added to possible extensions of this research, as presented in chapter 5 (5, page 249).

2.3.4   Preliminary conclusions

In this research, metaphors are defined as structural notions and as semantic terms.

For the first, metaphors were defined according to Lakoffian approach. [Lakoff and Johnson, 1980a] describe a metaphor as a conceptual construction composed by two domains, a source and a target, the first being mostly concrete, the latter mostly abstract.

The Conceptual Metaphor Theory is further investigated and extended by Ahrens and the Taiwanese School, who propose a Conceptual Mapping Model (CMM) based on a Mapping Principle. According to this Model, a systematic approach can be adopted to define a metaphor from its target and its salient components. This model proved its validity in at least two languages (Chinese and English).

Ahrens and the Taiwanese School adopted in their research the Upper Ontology SUMO and mapped in it (Mapping Principle) targets and sources of the analyzed metaphors.

The theory is a reliable tool for retrieval and disambiguation of metaphor. Psycholinguistic experiments conducted by the same School showed that test people were able to differentiate through CMM between novel and conventional metaphors with high scores in matching predictions.

Ahrens and colleagues' theory and the Lakoffian approach to metaphors can be challenged in different ways.

First, the CMM approach implies, for parts of the conducted experiments, that metaphors' targets are introduced *a priori* in the research, to derive from them their metaphors' sources. Once the sources have been determined, the model also enables to quantify how much the targets are used in natural language. Both targets and

sources are mapped to SUMO.

In this research, the approach to metaphors' domains is initially done via lemmas. Shape words are searched as words from which metaphorical information can be retrieved.

The ontological mapping of source and target domains by Ahrens and colleagues was theoretically grounded on the Invariance Principle advanced by Lakoff and Johnson, which imposes a cardinality one (one source to one target and one target to one source) for metaphors. Nevertheless, the containment of multiple forms under one same trope, as showed in several examples so far, doubts this Principle.

In light of these observations, one research question worth asking is: **Are metaphors contained in shape words**? In order to answer this question, shape words were analyzed in their lexico-semantic structure as well as in corpora across languages, as it is presented in the following chapters.

The studies conducted by the Taiwanese School showed a successful and systematic mapping of one target and one source to the general ontology SUMO and in particular to its upper concepts.

Examples presented so far have nevertheless revealed another possible approach to metaphor mapping through SUMO, namely by introducing mapping to mid-level concepts. The next research question we will try to answer is therefore: **Are upper concepts sufficient to comprehensively represent the meaning of metaphors** (and in particular the meaning of metaphors of shape)?

Although SUMO officially carries the title of Upper Merged Ontology, it already partially contains mid-level and lower concepts. For the cases in which lower or mid-concepts are not enlisted in SUMO, or for the cases in which these concepts do exist in SUMO, but a re-labeling of the same is desired, new alternative concepts have been proposed and specified in the text.

Up until this point in chapter 2, interpretations of the Embodiment Theory by

[Lakoff and Johnson, 1980a] were presented, analyzed and supported with the help of qualitative evidence.

The analysis of the Embodiment Theory shows that 'embodiment' can stand for a) BODY / BODYPART / BODYPROPERTY / BODYACTION; b) CONTAIN-MENT / CONTAINER and c) (CONTAINMENT/CONTAINER) and SPACE. For b) and c) to happen, SHAPE needs to be an OBJECT, graspable to the human imag-ination. Sometimes the metaphor information is not explicit about the existence of this OBJECT, which can therefore be assumed; while sometimes the information is very specific, to the point that it can be stated whether the OBJECT is three- or two-dimensional.

Examples also showed that, instead of SHAPE, SHAPEATTRIBUTE, such as FLATNESS, DEPTH or LENGTH, may better define the source of the metaphor.

Whether SHAPE or SHAPEATTRIBUTE, the use of both or one of them as metaphor source also implies the existence of a (physical) OBJECT, i. e. SHAPE, bearing properties of BODY/ies.

Finally, it was shown that SHAPE can also be out-casted in language by the SPACE surrounding it, which is the most important element in an expression in order to grasp the metaphorical meaning. SPACE can also be observed and experienced by a particular agent in a particular EVENT, a phenomenon defined "experiential perspective".

These observations led to re-articulate the use of upper concepts such as BODY as sources for metaphors, and they prompted the introduction of mid-level concepts in metaphorical mapping alongside the use of upper concepts.

Metaphors' sources can be abstract (such as in the case of a BODYACTION or CONTAINMENT) as well as concrete (e. g. BODYPART). Targets like EVENTs can also be abstract and concrete. EVENT, the upper concept to which most of the retrieved targets are linked to, can also be further specified as ATTITUDE /

STATEOFMIND / BEHAVIOR.

The existence of metaphor/s-in-metaphor (self-coined term referring to the existence of one than a metaphor under the same trope) was also acknowledged in the proposed examples, as in the expression: "The case of the little Yannick has *gripped* the public opinion to the *marrow*" (in German translatable with in die *Knochen* fahren, in die *Knochen* sitzen [literally, to sit in the bones, to move in the bones]).

The existence of these embedded metaphors put into question the inviolable cardinality assumed by Lakoff and Johnson while describing the relationship between source and target. In the example just mentioned (and represented in fig.4, pag. 49), the EVENT (target, the killing of the little child) is described by means of a BODY-PART (the marrow, the same in English and German). There are two BODYPARTs involved, which makes the form a metaphor-in-metaphor: the verb to grip, which implies the use of a hand to accomplish the killing and the BODYPART marrow.

Also, the BODYACTION to grip acts upon a BODYPART marrow, in the form of a collocation (*to grip* someone's *marrow* is a conventional expression; "to squeeze someone's marrow" is, on the contrary, a novel form. Other conventional collocations with marrow are to be chilled to the marrow, or to be frozen to the marrow).

An alternative way to look at the 1-to-1 mapping of source and target in metaphors is to think about this match as the final resolution of a cognitive process of information processing. In other words, a metaphor with a source and a target is the ultimate product of a series of cognitive steps leading to one source and one target, but not excluding the existence of multiple sources and of multiple targets in the midst of the cognitive process.

The investigation of methods for metaphor retrieval and metaphor disambiguation requires a deep understanding of metaphors in comparison to other forms of figurative language. Scholars have written about them (including collocations, idioms, analogies, similes, metonimies, synecdoches), often in isolation from other
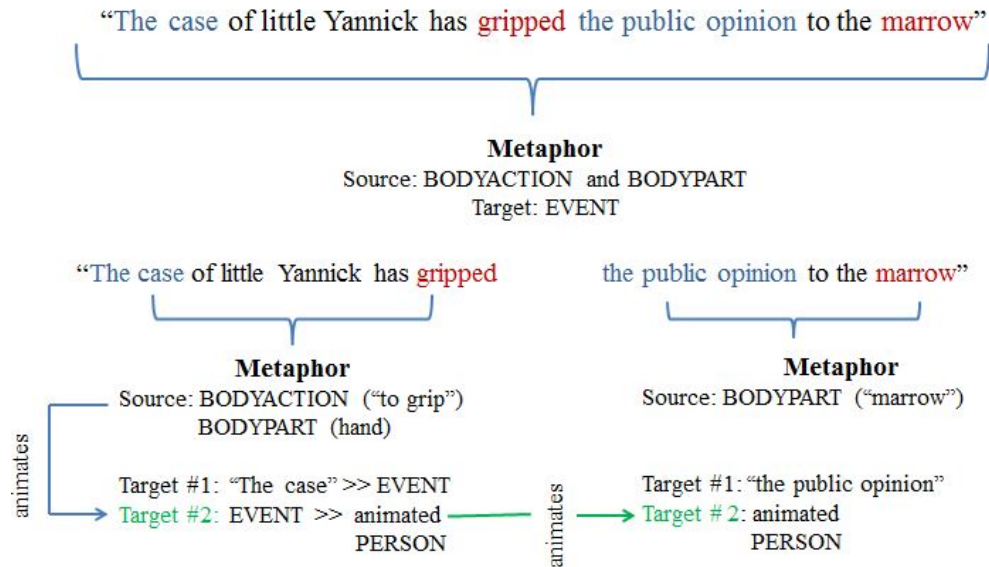
Figure 4: Representation of metaphors-in-metaphor

tropes, and they only seldom drew comparisons. A random search of metaphors in corpora, as proposed in this chapter, showed nevertheless fuzzy boundaries between the forms, with metaphors being embedded and embedding phrases. All examples of metaphors provided so far show expressions retrieved from other tropes and from simple words. It is by now clear that metaphors can be retrieved from other elements of figurative language.

The next part of chapter 2 deals with elements of figurative language. In the following chapter's section, metaphors as semantic terms, as tropes, are put in relations to other tropes.

2.4 On metaphors and some figurative forms

Natural language is overwhelmed by salient (i. e. meaningful) idiomatic and figurative expressions, including idioms, metaphors, metonomies, synecdoches, analo-

gies.

Although the selection of the forms described in the following section is limited, if compared to all possible existing figurative forms, the considered tropes sufficiently show that they all are metaphor *carriers*.

All other figurative forms excluded from the brief introduction that follows are not deemed less important or less influential in language.[20]

In my opinion (this will become clear with the examples that follow as well), it makes little sense to push apart the boundaries between one trope and the other. There are expressions that contain one or even more metaphors; even simple words do.

For example: the well-documented Korean education fever goes with the name "ch'ima param", literally "skirt wind".[21] The expression does not highlight fashion trends, but it describes instead mothers on the move. The female PERSON, skimmed to the image of a skirt (a constitutive quale, as mentioned later in the chapter) and target of the discourse, is visualized in terms of CLOTHING (source). But PERSON, in the same expression, is also source to the target EDUCATIONALPROCESS. It follows that "ch'ima param" arguably is a figurative (given the entailment

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[20]Talking about influential expressions and saliency of idiomatic language, it might be worth mentioning the power that puns, among other figurative forms, can have. For instance, the Chinese government has allegedly (`http://qz.com/304268/why-china-is-now-banning-puns/`) started a campaign to prevent the usage of offensive puns in language. Puns can be very ambiguous, like for instance the Chinese expression 大媽 dàmā, which literally means "Dad(dy)Mam(my)". The term was coined as a sign of affection for Xi Jinping and the first lady Peng at Xi's nomination as President of the People's Republic of China. Critics to the party have managed to interpret the saying into the pun 大麻 dàmá, which is pronounced almost the same as 大媽 dàmǎ. The latter means nevertheless marijuana, so that some say Xi's period is the "marijuana era". Further banned puns in similar satirical tones can be found under `http://chinadigitaltimes.net/space/Introduction_to_the_Grass-Mud_Horse_Lexicon`.

[21]According to Michael J. Seth's book, "skirt wind" means: "In a nation where marriages were still commonly arranged, a well-educated daughter-in-law made a proper "education mother" or "ch'ima param" (*Education Fever: The Society, Politics and the Pursue of Schooling in South Korea*, Michael J. Seth, Hawai'i Studies on Korea, 2002:246. Citing a more recent article by the Washington Post (`http://www.washingtonpost.com/world/asia_pacific/in-education-crazy-south-korea-top-teachers-become-multimillionaires/2014/12/29/1bf7e7ae-849b-11e4-abcf-5a3d7b3b20b8_story.html`), the same expression refers instead to the noise of a mother's skirt rushing into a classroom to revenge the first row for her child.

of tropes), metonymic (given the part, skirt, for the whole), constitutive-laden quale (given the expected part skirt in the dress-code of a woman, as later showed in the section on the Generative Lexicon Theory, 2.5, page 65), metaphor-in-a-metaphor phrase.

Collocations are "preferential" links between words that are widely accepted by standard language users (e. g. zebras have *stripes* and not "lines"; leopards have *dots*, not "points"; the weather is *rainy*, but not "thunderstormy"; edges are *sharp* and not "cutting"). Collocations are standardized forms. Nevertheless, given the fluidity in language, there exists many expressions that behave like collocations (i. e. that do show a preferential match between words), but that have not entered dictionaries yet. The following examples highlight in italics the collocations they entail. As the reader will notice, if the original semantic choice of a collocation is changed, its meaning will be either altered or destroyed: the *hard times* generation; the *hidden* poverty; the American *dream*; *day*dreaming; *plastic* surgery; *body* shopping[22]; *brain*washing; *cancer* villages[23]; the *death* row, the *stash house*.

Hanks (in [Stefanowitch and Gries, 2006]: 21) argues that collocations are a good parameter for defining metaphors, although no further specifications are provided for the statement. [Fellbaum, 2009], [Fellbaum, 2007] and the Berlin Brandenburg Academy of Sciences, with which the scholar collaborated in the past, present a comprehensive research on collocations (like for instance take a risk) and idioms, defined as "semantically fully compositionally phrases" (e. g. "kick the bucket"), which has eventually resulted in the compilation of a comprehensive list of German expressions.[24], without, to the author's extent, a detailed description of the peculiarities found for both.

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[22]Body shopping refers to the million-making market of plastic surgery

[23]A common name in Mainland China for many cities and villages, e. g. "Toxic Linfen", that have been and still are heavily polluted.

[24]Retrievable online under `http://kollokationen.bbaw.de/htm/talk_de.html`, also mentioned in appendix (B, pag. 323).

Other scholars that consider collocations in their studies include: [Huang et al., 2007b], who adopts SketchEngine, a text-corpus query system for different languages[25] to retrieve *grammatical* collocations out of corpora; [Zhu, 2014], who presents an automatic way to retrieve and identify Chinese collocations and idioms from corpora. [Tianqi, 2011] analyzes one particular kind of Chinese idioms, namely the non-literal use of 玉 or jade in Chinese, while Siepmann and others (e. g. [Feilke, 1996]) highlight in a series of papers ([Siepmann, 2007][Siepmann, 2004][Siepmann, 2003]) the linguistic creativity and variety that surround and motivate collocations.

Idioms are linguistic forms. Their meaning is different from the one of the single words that compose them. In this sense, idioms behave like metaphors, but they are not like metaphors. In fact, the conceptualization process behind idioms' composition does not foresee mental "domains", like in the case of metaphors (i. e. the distinction between source and target). Idioms are "stiff" expressions, meaning that it is very hard to change the elements that compose them.

In natural language and as explained, metaphors are generated by joining two random words for domains and new sense/s are assigned to each of them. In the case of idioms, on the contrary, changing the meaning of their words would lead to a completely different expression, or to a meaningless trope.

For instance, in the case of the idiom to cost an arm and a leg (meaning that something is highly expensive), the expression is the product of a mental process: something concrete (the trade of human limbs), is compared to something more abstract (a material / moral value). One may even argue that the analogy money <> body parts in to cost and arm and a leg *makes* sense, since losing a limb is comparable to a great loss, which can be quantified in terms of a great money loss or of an invaluable loss, but these rational interpretations are not always easy to make, or

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[25]www.sketchengine.co.uk

simply not always possible.

For instance, it is hard to find the rational motivation behind expressions such as to kick the bucket, or it is raining cats and dogs. As also later argued for the case of metaphors, etymology in these cases cannot always lend a helping hand.

Back to the compositional stiffness of idioms, if we would take the same expression (to cost an arm and a leg) and change it into to cost a dollar and a penny or to cost a dollar and a leg, the result would be a vacuum in meaning, and the reasons for this would be partly because of irrationality and partly because of commonsense knowledge ("we don't say so in English", "it sounds unnatural").

Many (conventional) metaphors *are* idioms ([Lakoff, 1993]). Lakoff argues that idioms arise "automatically by productive rules" and "fit one or more patterns present in the conceptual system". Although the author use just one example to prove its point in the provided reference (by means of the idiom to spin one's wheel), the conceptual and linguistic closeness that *de facto* exists between metaphors and idioms suggest that (a) both can be simultaneously retrieved by means of the same concept and (b) both can be used in the same context (such as "we are spinning our wheels" to describe a love relationship, where JOURNEY [source] refers to LOVE [target]).

Similes are different from metaphors given a "like" or "as" in the expression as terms of comparison between two entities. Hence, the trope "Frank is a lion" is a metaphor, while the phrase "Frank is like a lion" is a simile. One may argue that, while in the first case the comparison of the two domains (PERSON as the target and ANIMAL as the source) is certain (the use of the verb to be is in fact very assertive), in the case of the simile ("Frank is *like* a lion" or "Frank is *as strong as* a lion"), the comparison approximates the assertion and may be read like "Frank has *something* that makes him comparable to a lion". In the case of the simile "Frank is *as strong as* a lion", the comparison focuses on just one aspect of the source (in this case the

lion's strength). For this reason, one can argue that similes are more ambiguous than metaphors, because they allow interpretation ("Frank is a rock" versus "Frank is like a rock"). As a rule of thumb, we can argue that comparisons in similes are more tentative and not as clearly settled as in the case of metaphors.

On the other hand though, similes are transparent terms of comparison. In the moment language users produce them, they are explicitly creating a comparison, revealed by the use of like or as. In the case of metaphors, on the contrary, such as to break the silence, to swallow the bitterness, eye-catching or bullet train, the comparison between terms is shallower or even not perceived in the first place, so that further reasoning is necessary to acknowledge it.

Similes represent a sort of proto-form of metaphors and may involve less reasoning (hence a quicker cognitive reaction) than metaphors.

Metonymies are language expressions that consist in substituting the name of an attribute or adjunct with that of the thing or person meant, as for instance in the case of suit for business executive. [Dowling, 2012] is one author that argues about the relationship between metonymies and metaphors, pointing out for instance that White House in "The White House states that" is not a metonymy, but a metaphor.

Metonymies display different kinds of relationships, including:[26]

1. the author instead of the work (e. g. "I like to read *Dante*"; "Do as the Bible tells us to do")

2. the cause instead of the effect (e. g. "he has a good *taste*")

3. the abstract component rather than the concrete one ("I believe in *trust*")

4. the substance rather than the object ("*the Golden Arches* are conquering the world")

5. the place rather than the institution ("*the White House* has just released a communique")

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[26]Examples and kinds are partly taken from Wikipedia, `http://it.wikipedia.org/wiki/Metonimia`

The terms of comparison in a metonymy are often bound through a dependency relation: there cannot exist a cause without an effect; something concrete without an abstract idea of it; a work without a mastermind; an object without substance. The tie between the terms is also explicable in terms of qualia (as later introduced in the section on the Generative Lexicon Theory, 2.5, page 65).

For instance, the relation 2, (cause instead of the effect) reminds of the agentive (causal chain) and telic functions (purpose and function of an object), while the relation 5. (place rather than institution) may also be described in terms of the constitutive quale (parts and elements).

Synecdoches are also tropes which can be described in terms of a constitutive quale. A synecdoche is a trope (i. e. rhetorical form) that uses the part of a thing to describe the whole object, such as:[27]

6. the part for the whole (e. g. *England* rather than the United Kingdom)

7. the whole for the part (e. g. *America* rather than The United States of America)

8. the genre rather than the species (*the feline* rather than a cat) - this is also a case of hypernymy.

One visible difference was noticed when investigating synecdoches and qualia. Synecdoches allow, as the kinds showed above, a *bilateral* movement: The language user can move from the part to the whole and vice versa and still understand the topic of discussion. Referring to the United Kingdom as England may upset someone, but it is still comprehensible; a feline rather than a cat still gives an idea about the animal family one is talking about. Qualia always describe the whole. The cognitive movement is primarily monodirectional. One can derive the whole from the quale, yet there normally needs to be a whole for the quale to act upon it.

Analogies are hereby considered the *conditio sine qua non* for metaphors to exist.

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[27]Examples are partly taken from Wikipedia, `http://it.wikipedia.org/wiki/Sine ddoche`

In literature, analogies are a selected and motivated process of *transfer* of meaning from one element to another. Analogies justify metaphors such as ECONOMY is a WAR, where not all elements of WAR are needed to describe ECONOMY, and where only certain aspects of ECONOMY are used to generate the metaphor.

Analogies slightly differ from metaphors, given the introduction of like, as, or if forms (e. g. "Water stands to ocean like / as wood stands to fire", "dry stands to wet like tall stands to short", "he is as quick as a lizard", "if Paul is a lion, then I am a gorilla"). An attentive reader might complain that there does not seem to exist any distinction between analogies and similes. Nevertheless, the author of this research[28] believes that the difference between similes, analogies and metaphors is *incremental*.

There seems to exist in fact a subtle yet clear difference between analogies, similes and metaphors. For both metaphor and similes to exist and to make sense, the human mind needs to be able to draw analogies. Without them, other figurative forms are unthinkable as well, since analogies lay the very groundwork of thinking. In fact, in order for language speakers to think figuratively, an analogical mechanism needs to be activated, such that the human brain is ready to compare an EVENT to another. This comparison is an act of intuition or an act of creation (more on metaphors as synonyms of ideas below).

Examples of analogies might be: the snowball effect, the perfect avalanche, an eye-opener. These analogies exist in other languages as well with the same meaning of the English form (GE: der Schneeball-Effekt, die perfekte Lawine; IT: effetto valanga, FR: effet boule de neige; SP: efecto de bola de nieve; GE: ein Augenöffner, FR: (une) révélation, (quelque chose qui ouvre les yeux); IT: rivelazione; SP: (una) revelación). The analogy and metaphor financial meltdown compares CORPORATION / ORGANIZATION, target of the metaphor, to an OBJECT with a propensity

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[28]Subjective argument purely based on qualitative and quantitative observations on analogies, metaphors and other figurative forms.

to melt (like ice, butter, plastic, glaciers, popsicles, snow).

The effect of a snowball (paraphrased in CH: 迅速增長，迅速擴大 xùnsù zēnzhǎng, xùnsù kuòdà, lit. rapid / speedy to grow; rapid to expand) represents *a whole* EVENT, an avalanche, from the first movement to the whole fall and it implies the unfortunate consequences that this fall often bears. As noticeable, the comparison between two EVENTs often implies one or more EVENTs (e. g. "[...] During the bubble [financial crisis, n. a.], there is *a snowballing effect*, and prices of the stock get detached from the actual value"[29]).

Eventually, analogies, like other idiomatic forms, can be translated by means of other idiomatic phrases, without being translated into plain words. This applies for instance to the case of the trope (to be) a domino effect, which counts among its potential synonyms vicious circle or spiral of decline.[30]

As [Levy, 2011] states, it is therefore true that, as for analogies, two terms, a *source* or *analog* and the *target* are compared. The links between analog and target are called *mappings*, and mappings can be *positive* or *negative*, according to whether a fruitful exchange of attributes and properties is possible between the source and the target.

Analogies can also be approximations of concepts, describing entire EVENTs. For instance, if someone says "let's give a big shout out to [name of the person] for giving an ace end to the night", language users know that the connotation of the trope is positive and that 'ace' stands for WON (SUMO term) or WINNING, describing an entire positive EVENT. By using the word ace, it is as if the person who receives the round of applause has played a round of cards (or a tennis match) and has won. The expression *to give* an ace end to the night can therefore be defined as positively connoted, metaphorical, collocational and idiomatic at the same time. It is also time-related, since one cannot get an ace until the very end of a sports

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[29]Extract from *Behavioural Finance*, Sulphey M. M., 2014.
[30]http://en.wikipedia.org/wiki/Snowball_effect

event.

Analogies, like metaphors and other forms of figurative language, can also go wrong. In other words, negative mappings can lead to misconceptions and misunderstandings and thus false beliefs.

An example of wrong analogy is someone's belief in science that Darwin compared evolution to a tree. This, as pointed out by [Levy, 2011], "has led to the widespread misconception that evolution is a progressive force, implying a natural hierarchy or "ladder" of life". Although apparently harmless, the introduction of trees, hierarchies and natural selection in explaining evolution generated and vamped racist and homophobic statements on the human species throughout history. The tangible (even sometimes tragic) effect of wrong analogies and what they can foment is the clear proof of their effectiveness as communication carriers.

There is another reason why analogies are important for metaphors. Analogies may help *justify* the mapping / matching principle / process behind metaphors. According to ([Lakoff and Johnson, 1980a]: 197–198), the conceptual mapping behind source and target of a metaphor often corresponds to conceptual bounding, with the two being related through concepts. Nevertheless, the pairing of two concepts indiscriminately does not always generate metaphors. Hence, the bounding principle does not always apply. Figure5, pag. 59 shows two example, one portraying a working conceptual bounding, the other showing conceptual randomness. In the case of time is money, bounding across different domain pairings is possible.

On the contrary, in the case of the many sources that can be bound to IDEA, it seems impossible to find any analogical binding among them. All sources work well with the target IDEA individually, but the matching is only binary. For similar cases, Lakoff and Johnson introduce the term "inconsistency". Inconsistencies arise when the conceptual mapping behind source and target domain does not allow communication between the two and with other pairings, resulting therefore in a random

conceptual combination.
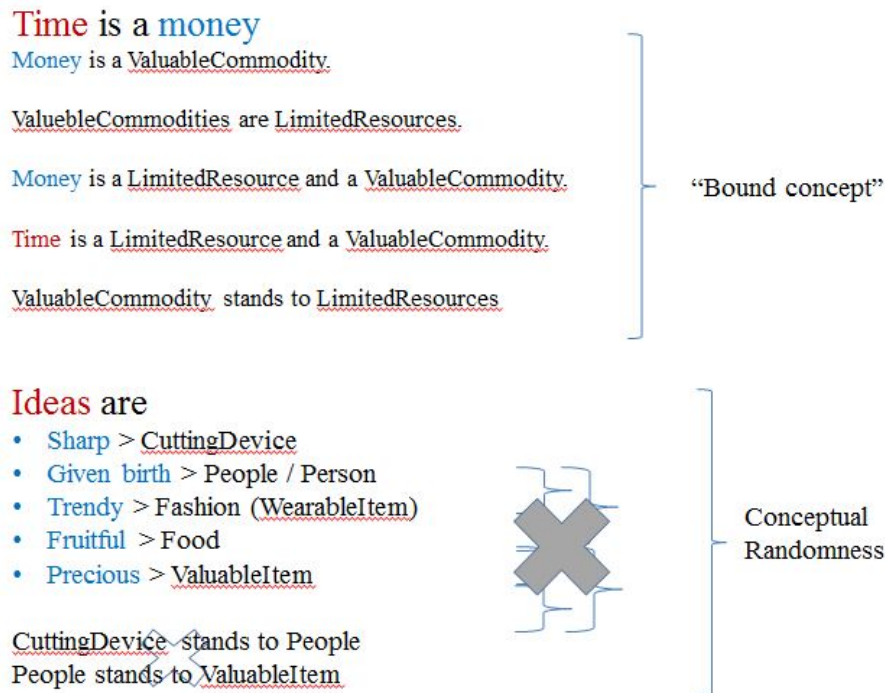
Figure 5: Example of conceptual bounding (as taken from [Lakoff and Johnson, 1980a]: 197–198)

One possible and for the moment just speculated reason behind this problem may be a "cognitive leap" (self-coined term) or "analogical distance" between the two metaphorical domains. The lack of any possible plausible analogy between source and target may lead to their incommunicability. Analogical impairment may be just one of the many possible reasons behind the motivation of a metaphor's rationale. Among these other causes, there might well be cultural influence as well as interpretability of one same trope. As ([Lakoff and Johnson, 1980a]:206) state:

> The structure of experience [behind each metaphor] is infinitely richer
> [than the experience itself]. To focus on the structure of the experience
> is to downplay the infinite richness beyond the structure.

This quotation leads to two further notes worth making and that apply to this

research. The investigation of the rationale behind tropes is not in the focus of this investigation. In other words, the author has no intention to justify why a metaphor source and target match. The example provided was advanced with the intention to show a possible link between analogies and metaphors, with the first being a tool to understand the latter.

Lakoff and Johnson claim in the cited work that, in order to complete the experiential gestalt or structure behind metaphors, experiential bases should be specified each time for each considered metaphor. In fact, the authors neglect the ontological precision of their conceptual mapping for the sake of the investigation of the experiential basis behind it, as showed in 6, pag. 60
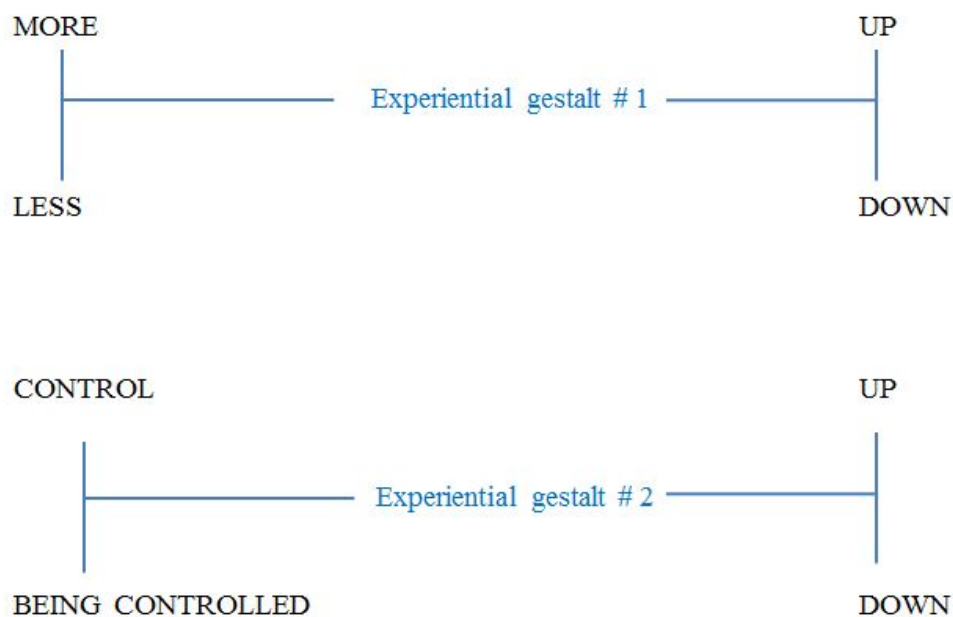
Figure 6: Experiential gestalt as research focus over ontological approach (for and from [Lakoff and Johnson, 1980a]: 204)

The focus in this research is put elsewhere, namely on the ontological mapping which occurs while the experience or EVENT takes place, as showed in 7, pag. 61

Figure 7: Research focus on ontology rather than on experiential gestalt

The influence of analogy over metaphors and other idiomatic forms is not new in neuro- and cognitive studies, where metaphors have been largely studied.

[Ramachandran, 2011] (also known for being the creator of phantom limbs, [Ramachandran, 2008]) and other scholars ([Cytowic, 2002][Cytowic, 1993] [Cytowic and Wood, 1982], [Hanson-Vaux et al., 2013]) have for instance extensively researched synesthesia, metaphor and analogy and their influence on the human brain.

Synesthesia is officially classified as a pathology or disease. Patients affected by it tend to switch the senses with which they acknowledge reality. Synesthetes end up describing music with colors, or people and events with music notes. People affected by synesthesia confuse the boundaries between language classes and emotions and keep these lines blurred in the definition of things.

While "normal" or "standard" language users only unconsciously and occasionally adopt synesthesia in real life, synesthetes perpetually switch senses. For example, we are synesthetes every time that we describe WINE as a BODY or wine as a COLOR or MATERIAL (e. g. "a full-bodied wine", "a strong wine", "an angular WINE" or a "a leathery wine")[31]. We are also synesthetes every time idiomaticity

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[31]https://www.finedininglovers.com/blog/food-drinks/how-to-describe-wine/ Michael Pollan, author of *Cooked*, wrote on this matter in his book: "Just as we take pleasure in enriching our language with layers of metaphor and allusion, we apparently like to trope what we eat and drink, too, extracting from it not only more nourishment but more meaning as well

2.4. Metaphors and figurative forms 2. State of the art research, research questions

is involved (e. g. "bittersweet love", "a robust spirit").

Cognitive scientists like Ramachandran ([Ramachandran, 2008][Ramachandran, 2011]
[Ramachandran, 1990]) believe that the reason of synesthesia is to be found in the physiology of the human brain. The lobes responsible for color and emotions are namely very close to each other and sometimes "short circuits" happen, apparently leading to the generation of a synesthetic happening.

Ramachandran and colleagues shown that idiomatic linguistic forms (such as metaphors and the ones shortly described above) are generated and produced in different brain lobes and hemispheres. They are also produced in the Non-Dominant Hemisphere, also called the Right Brain, but they still remain integral part of language production. In fact, they are considered problem solvers, since they help understand complex situations (idiomatic/conventional forms as problem-solving strategy).[32]

Non-highly verbal skills, like facial and contours recognition, sizes and sounds are mostly elaborated in the right-brain hemisphere. Verbal processing, analogical skills, as well as the ability to sequence information, are located in the dominant, left-brain hemisphere.[33]

Average language speakers can still tell the difference between an idiomatic and a literal form if equipped in their brain with the *corpus callosum*, a bunch of nerves between the two main brain hemispheres that regulates, among others, short-term memory and mental imagery.[34]

- more psychic nourishment."

[32]http://www.paulnussbaum.com/gettoknow.html

[33]"Although 95% of right-handed people have left-hemisphere dominance for language, 18.8% of left-handed people have right-hemisphere dominance for language function", from Wikipedia article, http://en.wikipedia.org/wiki/Lateralization_of_brain_function

[34]People born without the *corpus callosum* are very rare, and they are gifted with extreme memory. Interestingly though, they are unable to grasp the meaning of any idiomatic phrase. This was the case for instance of the real Rain Man, Kim Peek (1951-2009), affected by different patologies, including a form of autism which made him inapt to face average social interactions and also unable

Although analogy is commonly cited among scholars (i. a. [Hobbs, 1992] [Lakoff and Johnson, 1980a][Kövecses, 2010]) in close relation to metaphors, **synesthesia** is comparatively a relatively new explanation for metaphorical thinking, mainly triggered by Ramachandran and [Cytowic, 1993], [Cytowic, 2002]. In particular, [Ramachandran and Hubbard, 2003][Ramachandran and Hubbard, 2005] defend the thesis that synesthesia (from the Greek roots *syn*, meaning "together" and *aisthesis*, or "perception") might help detect in the brain the location where metaphorical thinking originates. Scholars are namely still debating about the neurological location for abstract thinking. [Cytowic, 1993] defends on the contrary the thesis that metaphors and synesthesia are unrelated. The approach the scholar adopts to study the symptom is more traditionalist and relates synesthesia to experiential past and childhood knowledge revisited and reinterpreted in an adult's mind.

More recent studies on synesthesia include Dan Jurafsky's latest book on the language of food[35] and Veale's research on metaphors and creativity (*inter alia* [Veale, 2012]).

A final form of figurative language that I would like to briefly introduce can be regrouped under the generic term of **colloquialisms or slang** language.

Previously in the chapter, the example to be / to sit behind bars was proposed. This expression means to sit in a prison for a detention period. As already explained, the trope is also an example of "experiential perspective", since the EVENT (imprisonment) is clearly perceived from the point of the view of the PERSON liv-

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to understand idioms. The Ramachandran's team ([Ramachandran, 2011]) tested Peek in this regard and acknowledged what just stated. When told for instance to take a grip of himself, Keem started to hug himself.

[35]Jurafsky, Dan. *The Language of Food. A Linguist Reads the Menu.* W. W. Norton & Company. Some excerpts can be found here: `http://www.slate.com/articles/health_and_science/the_good_word/2014/09/food_sounds_like_it_tastes_linguistic_studies_show_a_synesthetic_association.single.html` and here: `http://www.huffingtonpost.com/2014/09/16/food-review-language_n_5824730.html?utm_hp_ref=tw`

ing through it (the perpetrator). A further inference (metaphor-in-metaphor) is that prison, in the concept of PUNISHING, is visualized by means of bars, alias ENTI-TIes, alias constitutive components of a prison's cell. Hence, the expression to sit / to be behind bars can be defined an idiomatic, metaphor-in-metaphor, constitutive-quale-laden trope defining a certain experiential perspective.

If a language user were confronted on the contrary with the expression "to sit at the Gray Bar Hotel", which is an American-English colloquialism for prison, inferences may considerably change. Slang language happens to be extremely rich in metaphorical and idiomatic expressions. Prison, for example, is also called the big house [Am.], custardy [Irish], joint [Am.], pokey [Am.], nick [Br.], can [Am.], tank [Am.], bucket [Br.]; to be in the bucket, to be in the can, to sit in the nick; FR: la taule, faire de la taule (ou être en taule), to do (to be doing) time (in prison); SP: el trullo, GE: im Knast sitzen, IT: sedere in cella, prigione, topaia, tugurio.

Although very productive within its own language, slang is also quite inaccessible. It is in fact almost always impossible to draw comparison between slang across different languages. Being very sensitive to neologisms, slang is also difficult to catch up with in the same language, as it changes and grows constantly according to social trends and needs.

Colloquialisms were particularly studied in their relation to the Lakoffian Embodiment Theory, metaphors and SPACE / spatial settings within the frame of a previous research [Quattri, 2014b], which can be further extended and that has therefore been briefly presented in chapter 5 under the section Future Research (5, page 249).

Section conclusions

In this section of chapter 2, metaphors were compared to other forms of figurative language. In particular, a brief definition and examples was provided for collocations, similes, metonymies, idioms, analogies and colloquialisms or slang lan-

guage. The intent in the comparison among the forms between them and with metaphors was to show their fuzziness. While similes are commonly viewed as "proto-metaphors", metaphors are less ambiguous, but also more intuitive. Idioms and collocations are often given forms, hardly changeable, but they also entail metaphors. It was also argued that analogies are necessary to grasp the figurative meaning of all other forms. The differentiation from one form into other (from analogy to simile and metaphor, from simile to metaphor, from metaphor to idiom and so on) can be seen as incremental. Current research on analogical thinking and synesthesia conducted by cognitive scientists was also briefly addressed.

2.5   WN senses and GL implications

Another possible way to explain the complex structure of metaphors is by means of the Generative Lexicon (GL) Theory by [Pustejovsky, 1991], [Pustejovsky et al., 2013], also known as qualia structure.

According to ([Pustejovsky, 1991]:267) "the study of metaphors has been largely ignored in major works on qualia". The qualia model is "a system of relations that characterizes the semantics of a lexical item or phrase" [Pustejovsky et al., 2013]. Qualia or quales roles "are the major blocks for constructing word and phrasal meaning in a language compositionally" (ibidem). ([Jackendoff, 2002]:369–373) states that the qualia structure represents an innovation in the analysis of the compositonal semantics of nouns, largely neglected in comparison to the semantic investigation of verbs.

The model of the qualia structure was used as a layout for lexical knowledge bases, as in Busa, Calzolari and Lenci's SIMPLE-GL model.[36]

The qualia structure as contemplated in this research is based upon the interpre-

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[36]Federica Busa, Nicoletta Calzolari and Alessandro Lenci. Generative Lexicon and the SIMPLE Model: Developing Semantic Resources for NLP, in [Bouillon and Busa, 2001]:333–348.

tations and definitions given by Pustejovsky. [Jackendoff, 2002] slightly changes Pustejovsky's GL model and introduces further specifications to Pustejovsky's four main identified quales.

In the following, a brief description of the four quales according to the two authors is presented. The use of the term object (mappable as OBJECT / ENTITY) is referred to both animate and inanimate entities:

- *Formal quale*. The basic category that distinguishes the meaning of a word within a larger domain. It includes features such as shape, dimensionality, orientation, magnitude, color, position ([Pustejovsky, 1991]:86–87). For Jackendoff, this is the quale with taxonomic reference (e. g,. "a dog is a kind of animal"; "a puddle is a kind of dog", "a man is a kind of person", "a person is a kind of human being").

- *Constitutive quale*. It describes the relation between the object and its constituent (e. g. material, weight, parts and element components; [Pustejovsky, 1991]:426–427). For Jackendoff, the constitutive quale includes information about an entity's structural attributes. The author notices that, when the entity is a physical object, its structure also interfaces with the Spatial Structure (Jackendoff 1987 - 1996 in [Jackendoff, 2002]).

- *Agentive quale*. It describes factors involved in an object coming into being (e. g. causal chain, natural kind, artifact, creator). Pustejovsky primarily focuses on the object's "past" (how the object came into being, its life cycle). Jackendoff, on the contrary, also argues about the future of the object (for instance by making the example that an embryo owns agentive quale since it will become an animal). The development of the object into being is apt to changes (e g. a girlfriend may or may not become a wife); modulation is thus an important element to include within this quale.

- *Telic quale*. It describes purpose and function of the object; it is a "built-

in function or aim that specifies certain activities" (Pustejovsky). Jackend-
off inquires whether the telic quale is owned by all objects indiscriminately
(from a pencil, whose purpose is to enable writing, to the moon, which moves
waves). Given though that there can be many (indirect) functions associated
to the same object, the author trims Pustejovksy's definition of the quale, by
specifying that it "describes the purpose or "proper" function of an object".
It follows that, even if a mail is neither sent nor delivered, its main functions
remain the purpose to be sent and delivered, thus enabling communication. In
the same way, the proper function of a violinist is to play, even if the artist is
a father, a faithful husband and a R-addict.

Quales may well be behind almost every word, like metaphors. Like for instance
in the case of the word sandcastle. For grammarians, the lemma is a compound.
Lexicographer Erin McKean compares compounding to legos: "Words in English
are like legos; if you use enough force you can put any two of them together"[37].
Sandcastle squeezes the definition "a castle made of sand". Sand is the constitutive
quale, specifying the material a castle is also built with, while castle is a telic quale,
specifying a function or state_of the object.

It is not always easy to determine quales behind compounded tropes (e. g. the
qualia in the word heartbroken or in bookworm), yet, as anticipated in the discus-
sion about metaphors' rationale, it is not in the focus of this research to provide an
explanation for their being this way.

The qualia theory has also attracted the attention of cognitive scientists like [Ra-
machandran and Hubbard, 2003], who defined, based on the linguistic qualia theory,
further qualia laws applicable to neuroscience, including:

- Qualia are irrevocable and beyond dispute (e. g. the redness of red or the
  painfulness of pain are intrinsic chronic properties of these states; [Ramachan-

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[37]From: `http://www.ted.com/talks/erin_mckean_go_ahead_make_up_new`
`_words#t-220343`

dran and Hirstein, 1997])

- Qualia have potentially unlimited applications (e. g. 'yellow' and its properties applies to, among others, teeth, yolks, flowers, sun).

The application of a single quale to different objects with different properties suggests the existence of qualia-laden percepts (alias perceptions) in the human brain. In other words, the properties of the quale strongly depend upon the perception of the person who processes these properties in the brain. This fairly subjective note on the qualia structure has proven to be a major hindering factor in the applicability of the same in more formal models, such as computational schemas and settings. Several computer scientists[38] are reluctant to adopt the qualia structure in computational studies. They claim that the goodness of the Theory is limited by the lack of precise quantifiable criteria to distinguish quales, which may vary according to user interpretation and language. Qualia structure is in fact particularly language- and culture-dependent (for instance, redness might be an intrinsic and undeniable property of 'red', but the concept COLOR is strongly culture-driven).

Nonetheless, the GL Theory proves to be a valuable resource in the research on metaphors.

In light of the qualia structure presented so far, the presented examples and the examples that follow may be better specified by introducing quales in the description of the metaphor/s, as also showed in the examples that follow here below. Part of them have been already discussed by [Huang et al., 2013]. Not all expressions that follow are shape-related. All terms in capital letters are KB concepts as extracted from SUMO. In italics in the expressions are the words that stay the same across different languages. Some expressions contain more than one quale at a time.

- To know *the scene* (GE: *die Szene* kennen, IT: conoscere *la scena* / lo scenario;

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[38]Private conversations with different computer scientists and programmers.

FR: connaître *la scène*; SP: conocer *la escena*, all same as in English): When we want to talk about an EVENT (target) and we use SPACE as in this case (REGION as one of the ENTITY subsuming KB terms in SUMO). SPACE can be, on the other side, visualized as a series of different "scenes", hence 'scene' is constitutive component of SPACE.

- To open *fire*; CH: 開火 kāihuǒ (lit. to open + *fire*); FR: ouvrir *le feu* (same as in English and Chinese); IT: aprire *il fuoco* (same as in English), fare *fuoco* (lit. to make fire); SP: romper *el fuego* (lit. to break fire), abrir *fuego* contra alguien (same as in English); *das Feuer* eröffnen (same as in English), losschießen (lit. to shoot away). The action of SHOOTING (source) is visualized in terms of what generates the shooting, namely fire, ignition, the fire coming from the gun barrel that launches the bullet. It follows that fire is an agentive (i. e. causal chain), constitutive (i. e. parts and components) and telic (i. e. the purpose of the SHOOTING is to launch a bullet through an ignition reaction) component of SHOOTING.

- To shoot *a gun*; SP: servirse de *un fucil* (lit. to use oneself's a gun); GE: *eine Kanone* abfeuern (same as in English); FR: tirer l'arme de quelqun (lit. to pull someone's weapon); IT: sparare (to shoot). The expression resembles the one above. The GUN (target) stands for SHOOTING (source), but there would not be the latter without the first. Hence GUN is a constitutive, agentive and telic quale for SHOOTING.

Many other expressions fall under the conceptual radius of SHOOTING and are interpretable in terms of Generative Lexicon, for instance to cease fire meaning an armistice, la mort au bout du fusil (FR, meaning literally the death at the end of the barrel)", to light fire. The examples hereby reported do not aim at exhausting the cases, but at being representative for the theory presented.

- To be put behind bars (meaning to go to prison, to be thrown into prison); GE: hinter Gittern sein (lit. same as in English), eingelocht werden (lit. to be put inside a hole), hinter schwedischen Gardinen sitzen (lit. to sit behind Swedish curtains); IT: essere messo dentro (lit. to be put inside), finire dietro le sbarre (lit. to end up behind bars); FR: passer du temps / finir derrière les barreaux (same as in English and Italian), SP: estar entre rejas (lit. to be among bars); CH: 身陷囹圄 shēn xiàn língyǔ (lit. to be trapped / to be imprisoned + prison). PRISON is here described in its constitutive component. The purpose of IMPRISONING (telic quale) is to isolate someone from the outside.

- To square the circle; CH: 杆格不入 gǎngé bù rù (lit. to force a big object into a lattice), 横材入灶 héng cái rù zào (lit. to push firewood into the stove side-wise); DE: die Quadratur des Kreises versuchen (same as in English), das Unmögliche anstreben (to try the impossible); FR: (chercher a résoudre) la quadrature du cercle (same as in English); SP: buscar la cuadratura del círculo (lit. to look for the squareness of the circle); IT: quadrare il cerchio (same as in French, German, Spanish and English). When talking about an impossible EVENT and in particular a PROBLEM[39], we also use the expression to square the circle, which reminds of an unsolved geometric problem that goes back to the Babylonians.[40] The impossible combination of two SHAPEs is in other words used to describe an abstract source such as problem, or EVENT. Yet, if it would be possible to square a circle in reality, the problem (and the idiom) would not exist. Hence, circle and square own in this expression a telic function (i. e. purpose and function) and are constitutive elements (parts) of the EVENT in abstract terms.

- The love triangle; CH: 三角戀愛 sān jiǎo liàn' ài (lit. three apexes of love/romance), GE: Dreieckbeziehung (lit. triangle relation), Dreieckgeschichte (lit.

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[39] At the moment, there exists no KB suitable term for problem. The closest concept to which it may be mapped is SubjectiveAssessmentAttribute.

[40] Wikipedia note; `http://en.wikipedia.org/wiki/Squaring_the_circle`.

triangle story); FR: ménage à trois, triangle amouroux (lit. loving triangle), triangle d᾽amour (lit. triangle of love); IT: triangolo dell'amore (lit. triangle of love), ménage à trois (taken from French); SP: un triángulo amoroso (same as in English, Italian, German and French). The RELATION or SOCIAL-INTERACTION (source) that goes on between three people is described by means of a triangle or SHAPE (target). The double implicit metaphor in this expression is represented by PERSON (source) and REGION (in this case each apex of a triangle, target). The qualia that can be identified in this simple expressions are: formal quale (the use of the SHAPE as a way to talk about a RELATION), constitutive (the use of a part of the shape, the REGION axe, to describe a PERSON) and telic (the purpose and function of the SHAPE triangle, over all other possible shapes, is that the form is the most suitable to fit in the mental image).

- Clearly, not all expressions containing shapes are so dense in meaning and so prone to interpretation, both as tropes and as qualia. For instance, the colloquial form "the triangle girl" is a rather simple form to explain. It is a colloquialism (source: The Urban Dictionary online) used to indicate a female who takes selfies of her face using a certain perspective, so that the face shape is strongly trimmed and resembles a triangle. Considered to be a form of attractiveness in the contemporary society, the word triangle in the expression has no metaphorical implications, but it can nevertheless be considered a formal quale, given the shape, dimensionality, orientation and position involved.

Section conclusions

In this section, the Generative Lexicon theory by Pustejovsky was briefly illustrated, with the intent to present another possible way to define the complexity of metaphors. The introduction of qualia to metaphors' studies also justifies the introduction

of mid-level concepts in metaphorical conceptual mapping, since quales specify an EVENT or OBJECT, rather than defining it in generic terms. The GL theory as herewith presented is very introductory, compared to the extensive literature written about the topic. Readers are therefore encouraged to enlarge their knowledge in this field (appendix A, page 317). The few proposed examples show the presence of multiple quales behind the same metaphorical expression.

Qualia act as selective inference (already previously introduced in chapter 2) over the OBJECT or EVENT they describe, meaning that they decompose the EVENT or OBJECT in questions by analyzing it. While doing so, some of its features are elected to define the meaning of the metaphor, while other features are discarded.

Finally, the term generative in the GL theory can also be interpreted in the sense of generational, i. e. able to generate new forms. Metaphors, as well as other figurative forms, can in fact be translated into other tropes and not necessarily into just plain language. For instance, the expression (to be) in line with something or someone bears almost the same meaning of the phrase to behave squarely, or to be at the right angles, which also bears the same meaning as to be in line with something or to show/have a rightful, straightforward behavior.

The difference between this generational (in the sense of chain-triggered, domino-alike) approach to language and *metalepsis*, a figure of speech in which a word or phrase of an existing idiomatic expression is used to generate novel or new expression (e. g. "*to go* social", "to buzz a friend")[41] is that these forms are not generated *ad hoc* to fit the meaning of a given shape-related expression, but they already exist in language.

The generational potential across idiomatic forms enables to introduce the last

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[41] The expression "to go social" can be considered a metalepsis and a linguistic blending at the same time, given the combination of two actions, to be social and to go online to get social. It is almost the same process that hides behind blendings such as electrocute (electricity and execute) or motel (motor and hotel). Another example of metalepsis that can be found in Wikipedia (`http://en.wikipedia.org/wiki/Metalepsis`) is for instance "I've got to catch the worm tomorrow", from the maxim the early bird catches the worm.

theoretical part of chapter 2 that deals with paraphrases.

In the paragraph on quales, it was also observed that many tropes can be "paraphrased" by means of other tropes or figurative expressions in one same language and cross-linguistically. By cross-lingustically, it is simply meant here across languages. This implies in other words that (a) an expression can exists in another language as a sort of linguistic calque, by keeping the same or very similar words of the original English expression as well as the same definition. It can also be the case that (b) tropes are the same or similar across languages in terms of their definition/s (meaning that, while their definition is the same / similar, their semantic choice differs). Finally, (c) tropes can also simply not be translatable from language to language, like for instance the phrase to have a beef with someone (used when someone is in trouble with another person).

There is a way in other languages to paraphrase the form, but no trope (GE: angenervt mit jemandem sein, FR: râler à cause de qc; SP: refunfuñar por algo; CH: 抱怨 bàoyuàn; all expressions literally meaning to grumble, to complain). To beef can be considered an implicit metaphor, given that it reminds of the unceremonious ways a beef or rind moves around with cows and other animals. This form does not exist in other languages and is mostly used in American English. The verb also belongs to a colloquial register (in American slang, beef is also synonym for muscles).

2.6   On paraphrases of tropes

The word paraphrase in this research does not bear the same encyclopedic meaning. The provided definition in the following paragraph has been adopted throughout the research (which explains why the word has been sometimes included in inverted commas).

The term paraphrase, from the Greek παράφρασις ("additional manner of ex-

pression"), has two meanings (from Wordnet Search 3.1)[42].

As a noun, it means paraphrasis, alias "rewording for the purpose of clarification". As a verb, (to) paraphrase, rephrase, reword means "(to) express the same message in different words". A paraphrase stands for an approximation of meaning. Usually, we use to think that paraphrase resembles a *translation* of some figurative thinking into plain words. In fact, the word is adopted in these vestiges by many scholars (references follow in the paragraph).

In practical terms, paraphrases are nevertheless more complex than the provided definitions. During the conducted qualitative analysis, I have encountered at least three different kinds of paraphrases, both mono- and cross-lingually.

1. A paraphrase is a rewording of a concept where the use of words is different from a given expression *because the words are semantically different* (e. g. a bird in the given phrase becomes a box in another phrase in the same language, but the two expressions, both with box and with bird, can still paraphrase each other). Take for instance the expression to stir up a hornet's nest, paraphrasable with to open Pandora's box. Another difference should be drawn on the definition of "semantically different", with regards this time to multilingualism. In fact, as showed in the example below,

    (a) sometimes two or more sentences have the same words and meaning, but when translated into other languages, the words conceptually change, but the meaning stays the same (what previewed in point (b) for cross-linguistic above).

    (b) The opposite case is also true, namely one same expression, translated into other languages and other expressions holds the same meanings and the same term (previewed in point (a) for 'cross-linguistic' above).[43]

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[42]`http://wordnetweb.princeton.edu`

[43]The implications of this observation in terms of ontological analysis are quite straightforward: whenever in language there appears a new word to express a sense, a or many concept / s show /s up. Hence, the linking of figurative tropes to ontologies greatly depends on the language and on how many languages one wants to represent in them.

2. A paraphrase is a rewording of a concept where the words used are different from the original expression, *but they belong to the same and / or very close conceptual aura* (e. g. a given phrase contains "bird A" and another trope which can paraphrase this same phrase contains "bird B", yet both tropes build around the upper concept BIRD / FLYING(ANIMAL)).

3. Finally, there seems to exist a sort of hierarchy between sentences in language, such that one phrase cannot paraphrase another, but can be paraphrased by another. If you take for instance the idiomatic, metaphorical, metonymyc, hyponymic and generative-lexicon readable trope to *shoot* a gun (also discussed in chapter 2, [4, pag. 181], in the subsection of Generative Lexicon [2.5, pag. 65]), we can notice that *to shoot* a gun holds a different meaning from, for instance, *to fire* a gun, although the two phrases look very similar. The latter, to fire a gun is a polysemic trope (translatable in Chinese as 打槍 dǎ qiāng). It literally means to substitute for somebody sitting in an examination.[44] It also bears the same meaning of the expression to shoot a gun. To shoot a gun, however, only has one meaning, namely to hit, wound or kill somebody or something. Hence, it follows that to shoot a gun cannot be paraphrased with to fire a gun, but the latter can paraphrase the first.

Let's consider the English idiom to do in Rome as the *Romans* do.

The trope bears the same meaning of the proverb when in Rome, do as the *Romans* do, slightly different from the idiom, but still containing "the Romans". In French, we have the same idiom, same meaning, same semantic choice: à Rome faites comme les Romains. In the other considered languages, we start to see a difference. To do in Rome as the Romans do is translated into German as, literally, to howl with the *wolves* (mit den *Wölfen* heulen). A conceptual mismatch between the English and the German phrases occurs (ANIMAL versus PERSON). In Ital-

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[44]Source: MDBG dictionary.

ian, the proverb uses the word *custom* (paese che vai *usanza* che trovi, literally: for each country that one visits, there exists a new custom). In Spanish one says allí donde fueres haz *lo* que vieres, (literally: there where you come face *what* you see). In Chinese, we can translate the form in several ways, all basically resembling the Italian proverb (when you enter a country / village, follow / enquire about the local customs): 入境隨俗，入鄉隨俗，入境問俗 rù jìng suí sú, rù xiāng suí sú, rù jìng wèn sú.

A way (one over many evidently) to paraphrase the English idiom with another English expression is to go with *the flow* (suggested by the Urban Dictionary online), meaning to adapt to customs and peoples' moods. As you can notice, the meaning between the two forms is quite the same, the semantic choices to make them up are completely different.

Both to do in Rome as the Romans do and to go with the flow are figurative expressions (the latter is idiomatic and collocational), but they are differently constructed. Yet they bear *almost* the same meaning.

Another example to back up the given definitions for paraphrase, as used in the research, is the expression to stir up *a hornet's nest* (e. g. "The CIA whistleblowers have stirred up a lot of hornet's nests by unraveling many CIA secrets"). Stirring up birds' nests usually generate troubles, especially if the birds are around. The expression exists in other languages as well, only the flying creatures change, but they *all* remain BIRDs and / or FLYINSECTs. In German someone literally hides in *a wasps' nest* (and in *a hornet's nest* as well) [GE: in ein Wespennest stechen; in ein Hornissennest stechen]; in Italian someone literally generates *a wasps' nest* [IT: suscitare un vespaio]; in French one literally touches *a bee's nest* [FR: toucher un nid d'abeilles]; while in Spanish someone literally shakes *a wasps' nest* [SP: agitar un avispero]. Finally, in Chinese you poke *a hornet's nest* (a verb which is by the way also accepted in English, to poke / to stir a hornet's nest [CH: 捅馬蜂

窩 tǒng mǎfēngwō, e. g. 他的批評捅了馬蜂窩 tā de pīpíng tǒngle mǎfēngwō, "his criticism stirred up a hornet's nest"]). This example prove the validity of definition (2) of paraphrase presented above, and it is not the only case encountered during the generic data analysis.

The similarity of meaning across different shape-related expressions, when existent and provable, stresses the hypothesis that paraphrasing metaphors in the given terms does not always and not necessarily implies downgrading the language from figurative to plain by the use of literal paraphrases, given that figurative expressions are numerous enough in every of the considered languages to allow substitution with other *phrases*, without hindering the meaning preservation.

Although this concept is simple in meaning and may certainly have been meanwhile observed by other scholars, this tends to be hidden in literature (to the power of my accumulated knowledge). In fact, it is rather the case (as research by Shutova and colleagues shows, [Shutova and Veale, 2014], [Shutova, 2010]) that, for experiments on metaphors, *literal* paraphrases, in the sense of simple sentences with no figurative hints, are used, which nevertheless clearly do neither preserve nor convey the figurative load of the original expression. [Bollegala and Shutova, 2013] for instance translated the expression to *kill* a process with to *terminate* a process and build their research around that simplification; [Shutova and Veale, 2014] also "interpret" (in their word) the metaphorical language by deriving its literal paraphrase (e. g. "to *mend* the policy" is translated as "to improve the policy"; "to address the downsides of the policy").

Also Tsvetkov uses paraphrases in her corpus-based studies (Steen et al. 2010, Thibodeau and Boroditsky 2011, in [Tsevetkov et al., 2014]) to show that the proportion of words in language used metaphorically ranged from 5% to 20%, so to prove the point that metaphors influence decision making [Tsevetkov et al., 2014].

Metaphors are treated by the authors as **a task of binary classification of sentences**, thus implying that the invariance of the binary domain source-target.

Although the translation of tropes by means of other tropes preserves language integrity, there clearly exists a side effect by approaching idiomatic expressions with more idiomaticity, namely that the color in language is preserved, but the figurative cycle is also endless.[45]

It is also often the case that literal paraphrases of idiomatic expressions end up being longer and more prolific in word number than the idiomatic expressions themselves, or that the author of the paraphrase eventually acts on the literal choices made through selectional inference (e. g. [Shutova, 2010] develops a series of possible paraphrases for *"brushed aside"* (*rejected, ignored, disregarded, dismissed, overlooked, discarded*]).

Another salient note should be kept in mind when pondering the use of literal paraphrase in general.

Figurative expressions, metaphors included, activate brain lobes that literal paraphrase shuts down. Recent neuroscientific studies by Citron and Goldberg ([Citron and Goldberg, 2014b] and [Citron and Goldberg, 2014a]) showed that taste-related metaphors containing words such as sweet or bitter"engage the emotional centers of the brain more than literal words that have the same meaning" (for example the word kind).[46] The physical act of tasting that is activated by simply uttering or hearing a metaphor containing food adjectives also further validates the Lakoffian Embodiment theory explained below.

To conclude, the term paraphrase adopted in this research is therefore meant

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[45]In the case of the definition for 'to mend' for instance ("to improve the policy"; "to address the *downsides* of policy"), [Shutova and Veale, 2014] save for the purpose of their studies just the first part of the meaning and leave undiscussed the very metaphorical definition of *downsides* in the second definition of the term. Research at this fine-grained level would give justice to language, but can also be objectively difficult to follow.

[46]From   `http://www.princeton.edu/main/news/archive/S40/32/95S45/index.xml?section=topstories`

to be a synonym of *translation* from one idiomatic figurative expression to another. Although the paraphrase rule so described proves to be true for many cases in natural language, and it applies across many languages as well, it does not lack exceptions.

Let's make an example.

As mentioned above, sometimes metaphors exist in many different languages indistinctively. For instance, the expression to share the pain exists in several languages with the same meaning (GE: den Schmerz teilen; IT: condividere il dolore / la pena; FR: partager la douleur; SP: compartir el dolor, all meaning the same as in English).

All these languages share the same expression, the same word choice and the same concept. In Chinese and Cantonese, the phrase exists as well, the concept is the same, but the *conceptual aura* which makes the word usable changes.

The Cantonese verb for to share can be used for both pain and sorrow. In Chinese, the verb 分享 fēn xiǎng is used for joy, while 分擔 fēn dān is used to express sorrow / responsabilities / expenses (e. g. in Chinese: 分擔痛苦 fēndān tòngkǔ; e. g. 我們應該與朋友門一起分享幸福，共同分擔痛苦 wǒmen yīnggāi yú péngyoumen yīqǐ fēnxiǎng xìngfú, gòngtóng fēndān tòngkǔ, "good friends should share happiness and sorrow").

This slight difference, pointed out by Shi,[47] stresses the idea that translation is not linguistic calque, but mere transmission of concepts, with some inevitable loss.

In summa: In this paragraph, a more complex definition for 'paraphrase' was proposed than the one reported in dictionaries. This specification is necessary for the reader to disambiguate the term paraphrase every time it is encountered in this text. Examples were provided in support of the statements made.

In the following section, the focus is brought back to metaphors exclusively and to some debatable observations that I resumed from the qualitative and quantitative

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[47]http://www.cbs.polyu.edu.hk/news-pdf/30%20Oct%202012.pdf

analysis of the collected data for this research. In particular, I partly introduced the research approach, which does not foresee a rational justification of the form of the considered metaphors.

According to Jackendoff, "we don't talk in words, we talk in phrasemes". Metaphors are pervasive in every kind of communication, in all domains and in all forms of language. They are the preferred tool to use when discourse is dense and needs to be simplified and when discourse is highly visual and needs to be represented.

In the metaphorical discourse, it also remains highly debatable whether metaphors can be logical (as sustained for instance by [Hobbs, 2005] [Hobbs, 1992] [Hobbs et al., 1987] [Hobbs, 1985] [Hobbs, 1981] [Hobbs, 1979]), or whether they are paradoxical and nonsensical by nature (as motivated for instance by [Hirshfield, 2012]). Citing [Brook, 1983] again, the author states: "The true route of metaphor is through discovery, not through inference [alias logical thinking, n. a.]."

In English common language, the word metaphor addresses the linguistic form, but it also refers to something that is *false a priori*. Atheists, for example, state that "God is a metaphor"; after a marathon one is out of air and "that is definitely not a metaphor". Also a metaphorical meaning is disputable in language. For instance, when addressing a person as cold as ice, we can either refer to the insensitivity of the one addressed, or to one's body temperature. So I would conclude that the term metaphor can, but does not have to, be necessarily untrue, or illogical, or irrational. It depends on the use that you make of it.

Another aspect that makes metaphors (and other forms of figurative language) hard to memorize or to understand is the semantic choice that make them, in the sense of the choice of the words that composes them and helps disclose a certain meaning. The use of the same word (let it be a planet, an animal, an inanimate thing) for different figurative expressions can sometimes be understandable and sometimes not.

For instance, one can understand / deduct the meaning of words such as ghost-writer (which either remains ghostwriter in other languages or is paraphrased, e. g. CH: 代人寫作的人 dài rén xiēzuò de rén [lit. the one that substitutes someone in writing]). If one person substitutes the originally supposed to-be writer by editing something for that person, it makes sense to associate to that substitute the image of a ghost and to project to this single author all the properties proper of a ghost (someone that remains in shadows, who does not claim property rights over the work, who does not reveal the own name).

In other cases though, the use of certain words in figurative expressions remains on the contrary shallow, cryptic or even impossible to decipher and justify.

For instance the term elephant. Elephant is used in expressions like "there is a white elephant in the room" (meaning a gross mistake or something clearly inappropriate). Why should an albino ANIMAL and, in particular, an albino elephant represent the concept of FALSE[48]? Endless interpretations can be made (from the size of an elephant to the awkwardness of the image of an elephant in a room). In the end, we still cannot answer the question.

The attempt to justify the use of a certain word in a certain figurative form becomes even harder when one tries to connect all other figurative forms containing that same word and try to make sense out of them (and thus justify their use). So, given the expression a white elephant is in the room, one can find whether there exists any logical connection or cause-effect relation between this form and another (English and Chinese) idiom such as "to touch an elephant with closed eyes" (合眼摸象 hé yǎn mō xiàng), meaning to proceed blindly.

It also appears in language that, although two or more tropes share similar semantic composition, they hold completely different meanings.

Take for instance the expression to connect dots. The phrase is used when someone wants to understand different ideas and concepts. Etymologically, the trope de-

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[48]SUMO KB term for mistake.

rives from the physical experience of matching images by connecting sparse dots (from The Free Dictionary online[49]). The expression to connect dots does not have the same meaning of to meet ends (e. g. "Phil was working multiple jobs to make ends meet"), which means to financially stay afloat, although the two expressions can resemble (they both involve a connection process; dots and ends might be used synonymously).

Clearly, for the sake of this research, it is not the author's intent to further investigate the causes of such lexical choice, but the remark has hopefully made the reader aware of the apparent *randomness* in metaphors' *domain matching*. Eventually, although the conceptual link between domains might be unclear as just portrayed, this behavior does not affect the chain-alike proliferation of similar metaphors built upon a certain trope. Let's take for instance the classical Lakoffian example LOVE is a JOURNEY. It might result hard to logically understand what can connect the one concept to the other, but this given, we have to acknowledge in language a *consistent* number of metaphors adopting the same conceptual matching ("we are spinning our wheels"; "our love has come to a dead end"; "look at how far we have come"; "we have just have to go our way").

No matter how illogical or irrational the domain matching of a metaphor is, the form *productively* shapes other figurative forms and provides the language speaker with a *mental imprint*.

A striking observation though, whether a metaphor makes literal sense or not, which will become clear in the following examples with shapes (and assumingly with other forms too) is that, even if the reason for the choice of a source may not be clear, there often (qualitative analysis) exist patterns in metaphors domains and meanings across different languages.

In other words, it is as if there would be a sort of "channeled / privileged com-

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[49]http://idioms.thefreedictionary.com/connect+the+dots

munication" between different phrases composed upon different shapes.

In fact, it has often been observed the following: One phrase in one language uses a shape word to define meaning. The same meaning happens to exist in another, or in many other different languages, and it is transmitted by means of other phrases which happen to be built around a shape word. It might not be the same shape word as the one in the originally considered sentence (which is usually in English), but it is nevertheless a shape word, thus it belongs to the same conceptual domain.

Clearly, there exists exceptions to this rule of thumb, represented by shape-related expressions that differ or make no sense *exactly because* the shape word has changed. For instance, the trope to connect dots (previously mentioned) is commonly used in English, while to connect spots is an unknown / unused / unnatural English form. To be on the spot means to be *in loco*, to be in a place, while to be on the dot means to arrive at an exact time.

Also, the same shape-related expression in one language can often be paraphrased in the same language (and / or in other language) by means of other idiomatic phrases *also* containing shapes.

Cases like these are reported in chapter 4 (4, pag. 181).

Every time we utter a metaphor, the form contains a source and a target, which often seem to have little, if nothing, in common. Mentally, the two need to be matched or fitted, so to be able to understand the metaphor. Cognitively, this represents a sort of leap, bridging what seems to be irreconcilable.

The examples proposed so far showed this case clearly. Something or someone is compared to a PLANET ("he is radiating"), or to an ANIMAL ("she is a wolf in a pack"), or to a CITY ("I am so full of work to be congested") and to PEOPLE ("we are the Pope"; "Je suis Charlie").[50]

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[50]"Wir sind Papst" appeared as a headline on the German daily *Bild Zeitung*, "Wir sind Papst", at the time when former Pope Benedict XVI was elected; "Je suis Charlie", "I am Charlie", "Sono Charlie", "我是查理", "Ich bin Charlie", "Soy Charlie", is an international social movement of soli-

All these metaphors are virtually the sum of one domain with another (in fact, in the case of "we are the Pope", the collective 'we' [PERSON, source] is used to focus attention on one (target) PERSON, the Pope. The expression also contains a metaphor-in-the-metaphor: the PERSON is also meant to be *something else* than PERSON, such as an whole ideology (or PROPOSITION, KB term) (as in the case of "Je suis Charlie"), so that the analogy eventually is "PERSON stands for PROPOSITION".

As the word domain itself well describes, there often exists little communication or overlap between source and target. If we take for instance the metaphor "SOCIALPOLITICS is a MACHINE" extracted from expressions like "The engine of social health care in the States is roll-starting", we can notice that the two domains that make up the metaphor share little in common in terms of conceptual overlapping.

Another example, taken from the later paragraph on selective inference, may be the trope revenge is sweet.

Despite the possible inferences that can be drawn from the expression, it still remains unclear and maybe inexplicable why, in order to talk about a VIOLENT-CONTEST such as revenge, language users use FOOD and in particular TASTE.

Despite the presence of an analogy, an underlining association between the two concepts cannot be found. The same behavior is to be noticed for other figurative forms, such as metonymies. Sometimes metonymies are justifiable (e. g. "the Pentagon said" rather than "the people working at the Pentagon"; "to drink the glass" rather than drinking the liquid it contains – in both case the inference we have to draw from the given expression is minimal [the Pentagon is the name of the build-

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darity against islamophobia created in the aftermath of the violent death of French cartoonist Charlie Hebdo and several other colleagues in January 2015 in Paris. It has been accused of supporting blasphemy and it has been counterattacked by other similar hashtags, such as #Je suis Rahif or #Je suis Ahmed. The overwhelming majority of social media users has come to an implicit vote by adopting the hashtag "#je" (meaning I) rather than "#we" because considered "more powerful" (from a Twitter user).

ing where these people work and glasses are usually preferred containers used to drink]).

And even if etymology can solve the mystery on a linguistic expression, the analogy behind it is still unsolvable.

Take for instance the expression to eat the apple at the core. When Iraq veteran Jon Michael Turner pronounced it in front of the microphones and the cameras of the American nation and stripped the stars and ribbons from his jacket that made him a soldier, he was deserting, but he was clearly not thinking about food. The synecdoche to eat the apple at the core foresees that the apple stands for the biblical Tree of the knowledge of good and evil (in Hebrew: וְרַע טוֹב הַדַּעַת עֵץ) and thus stands for wisdom and truth. Eating the apple to the core means therefore saying things as they are, telling the truth, avoid hiding behind lies.

Nevertheless, even if the image is ancient and well-known, it is not exactly clear why it should be an apple to represent knowledge (a mystery partially solved on the contrary for the metonymy 'Big Apple' for the city of New York[51]).

The analogical distance between domains in metaphors is a recurrent theme, but there exist exceptions to this behavior as well (the just cited PERSON is a PERSON metaphor is not the only example).

Sometimes the metaphor is created by *adding* properties to one single entity, or by "inserting" one domain into a more complex image, where the given original subject or target is not completely forgotten. Let's take the example "on the road to happiness" (as for instance in the example "Jill is really satisfied these days. She is finally on her road to happiness"). The expression exists in other languages as well; GE: "auf dem Weg zum Glück"; CH: （在）幸福路上 zài xìng fú lùshang; IT: "sulla strada per la felicità".

The speaker wants to talk about the STATE (happiness) a PERSON is in (target)

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[51]http://en.wikipedia.org/wiki/Big_Apple

and implies in this way the existence of the person. In fact, if someone is "on the road to happiness", it needs to be animated (either an ANIMAL or a PERSON). It follows that some of the connotations of the target *cannot* get lost.

On the other hand, if we compare a PERSON to a TRANSPORTATIONDEVICE such as wreck (e. g. "Jill is a wreck these days"), it becomes harder to conceptually reconcile the two domains, source and target.

A similar case to "to walk down the path to happiness" can be found for instance in the expression "to walk down the aisle", used to address SOCIALROLEs (i. e. 結婚 jiéhūn, to get married). The aisle, a corridor or gangway, is part of the scenario experienced by the PERSON (target) to walk down. Hence it is almost implied that the person stays PERSON and physically moves towards a place.

Section conclusions

In this introductory paragraph on metaphors, a brief introduction was given on figurative forms such as metonymies, collocations, similes, analogies and idioms. These forms were not just presented, but they were put in a relation with metaphors, given the assertion that metaphors can be found in them, and that they can be found in metaphors as well. They were also put in relation among each other, assuming a certain granularity in meaning retrieval (from analogies, to similes, to metaphors, to idioms). Their difference lies on how transparent / intuitive the information they carry is conveyed in the language they are produced. For instance, "a great edge" and "I have lost a dear wine" are obscure expressions, if their context of use is put aside the expressions respectively refer to a successful person, "a great edge" and a dear one, "a dear wine"). On the other side, the subject or object of reference in forms such as "If I would you, I would not fit in those shoes", or "yes, there are a couple of rotten apples in our office too" is obvious.

In the second part of the paragraph, preliminary remarks on metaphors were

drawn, as derived from literature review and the study of these forms across different languages.

Several new reinterpretations of known concepts within or in relation to the metaphorical domain were proposed, such as the concept of "metaphor(s)-in-metaphor(s)", how to interpret the word paraphrase in this text, what is the relation between source and target domain of a metaphor, and what multilingualism teaches us about these forms. Further remarks include the hot debate in literature of whether metaphors are the product of logics, or rather of irrationality. Etymology may partially offer an answer to the unusual and apparently random word and conceptual choice that make up a metaphor, [52]. In most cases though, language composition remains obscure (e. g. why do we say in English for instance "young people seem all to be so banal and vanilla these days"? The expression is hard to motivate).

Finally, three major remarks on metaphors in general were made:

- Although in literature the communication process between target and source domain is often defined "*cross*-domain knowledge projection and inference" (i. a. [Shutova and Veale, 2014], slide 4/51), there often seems to exist a lot of inference, but little (conceptual) crossing in the sense of similarity between domains (i. e. intuitively, it results hard to easily compare a POLITICAL-SYSTEM to a MECHANISM, or an ARGUMENT to WAR). This means that there exists *de facto* one or more conceptual mapping for the source and one or more conceptual mapping for the target domain of a metaphor in a language, with apparently little blurring between the two.

  In other cases though a *continuum* in the cognitive thinking between the two domains can be detected (as in the case of to walk down the road, to walk down the aisle presented above), so that the figurative / iconic representation of one

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[52]For instance, the webpage `http://www.phrases.org.uk` run by writer Gary Martin is an excellent phrase thesaurus which explains in details the story and origin *behind* many phrases. It contains numerous expressions, including rather exotic ones such as to peter out.

domain necessarily leads to the other or inherit some of the other domain's features.

- Despite the fact that conceptual randomness seems to surround many figurative forms, it is nevertheless also the fact, observed in many examples, that a certain word or semantic choice appear over and over again in different metaphors, and / or in different forms of figurative expressions, which may imply the presence of patterns or recurrent behaviors in language, and in particular, for idiomatic forms.

  In other words, we might not be able to justify why there needs to be the name of an animal, or a shape to create a metaphor, but we know at least that shape words, often very similar, conceptually closed, or even the same shape words, are involved in the creation of idiomatic meanings.

- It is also often the case (also showed in the examples presented and that will follow) that this *theme*, the shape word, appears in other different idiomatic expressions which happen to be linked or not to the original metaphor and it appears across different languages as well. This applies not just to shape words, but also to body parts, and colors, or many other words, as examples in the following chapters will show.

2.7 Chapter conclusions

This research deals with the multilingual analysis of metaphors including metaphor identification and metaphor retrieval, with a particular emphasis on metaphor of shape, also called shape metaphors. The final goal of this investigation is to lay the ground for an ontology of shape. Once the shape metaphors were defined, they were mapped to a current well-known upper and middle ontology called SUMO.

The ontological approach adopted in the investigation thus implies that cross-cultural differences are overlooked, in the attempt to define ontological patterns and

differences across similar or same metaphors as retrieved from other tropes.

The shape considered in this investigation do not foresee to be comprehensive, but they are related to each other in a generational effort (e. g. it needs a point to create a line, and it needs a line to create a triangle).

The chapter conclusions are structured as it follows:

- definition of the term metaphor
- presentation of the adopted theories for this research and state of the art analysis on metaphors
- ontological mapping of metaphorical meaning and adopted sources
- research questions and further defined aspects

Metaphors are highly frequent in languages and they can be derived from other idiomatic forms. For instance, the language of the Internet is saturated with metaphors (we tweet like birds, click bait like fishes, buzz like bees and if we want to save documents on the cloud, we drop them online).

Metaphors are also vastly used in the legal jargon [Quattri and Delaney, 2013], [Quattri, 2012c]; in the visual language of billboard and advertisement [Yu, 2007], [Quattri, 2013a], brands and messages for consumers [Golçaves, 2008], [Colleen et al., 2009], [Wallington et al., 2011], [Lundmark, 2005], icons and signs [Hiraga, 2005], [Barnden, 2008], [Sangoi, 2012], [Schmidt, 2010], [Sternberg, 2007]; up to poetry, literature and music [Chao, 1976], [Chao, 1968], [Quattri, 2012a].

Also rigorous sciences, like physics and mathematics, are filled with metaphors (any online lecture of Michio Kaku or Walter Lewin proves it).

The fascination of metaphors is dictated by the fact that they are heavily predominant in discourse, yet very camouflaged or hardly perceived ([Geary, 2009]: "We utter almost six metaphors a minute and we don't even know that").

Lakoff and Turner (1989:80, in [Clausner and Croft, 1997]) describe metaphor

use as "conventional, unconscious, automatic and typically unnoticed"; Lakoff and Johnson ([Lakoff and Johnson, 1980a]) state that human reason "is made up by 98% of subconscious metaphors and cultural narratives".

The overabundance of metaphors in language would lead to think that these forms are hard to categorize and even less probable to be classified. Nevertheless, Lakoff and Johnson ([Lakoff and Johnson, 1980a]) show us that metaphors can be categorized (for instance as novel, standard, dead, ontological) according to their frequency in use, or according to their conceptual structure.

The definition of metaphors adopted in this research follows the theoretical approach to metaphors' studies mainly started by Lakoff and Johnson [1980a]. In their research, Lakoff and Johnson state that metaphors stand for figurative forms composed by two domains, a source and a target. The authors implicitly suggest a simple formula to enable language users to detect metaphors in discourse, which corresponds to *X is Y*. They also suggest an inviolable relationship between the source and the target, so that the cardinality between the two is fixed to 1:1.

The Taiwanese school (including the work of Ahrens, Chung and Huang, as presented) also adopted the Lakoffian approach by extending it. The CMM or Conceptual Mapping Principle states in fact that it is possible, given a set of defined targets, to derive their respective sources through the use of corpora and consequent mapping to an upper ontology, which happens to be SUMO.

Once the sources are derived, they and the targets are then mapped to the upper concepts, with reported successful matches.

The methodological approach adopted in this research partially follows the steps of the Taiwanese School. SUMO is also exploited as reference ontology, but it is used more comprehensively, by taking into account not only its upper, but also its middle concepts, which are partially mapped into it.

Corpora (appendix B, page 323 and appendix C, page 327), were also used during the process of metaphor retrieval, but metaphors were derived from other figurative expressions or tropes, including idioms, collocations, metonymies, similies, analogies, colloqualisms and phrasal verbs.

Metaphors were retrieved starting from shape words explored as simple terms, with lexico-semantic properties.

It was also shown, through various examples, that metaphors can include other metaphors within their structures, a phenomenon that was called metaphor(s)-in-metaphor. This observation destabilizes, to the extent of the provided evidence, the one-to-mapping postulated above.

Another diversion from previous research on metaphors and ontological mapping conducted by the Taiwanese School results in the attempt to map metaphors to not just upper, but middle concepts, sustained by the argumentation that this approach may be beneficial for a more precise, or simply correct mapping of metaphors across different languages. For instance it was shown that the expression love triangle in Chinese may be not be rightly represented if mapped to upper concepts, but that it needs to be defined with mid-level ones.

The suggested extended approach to ontological mapping of metaphorical meanings also validates another observation drawn during a first qualitative approach to metaphors in corpora, namely the presence of a sort of selective inference (self-coined term) in the case of some tropes. This cognitive trick seems to lead language users to gradually develop and accept expressions using only part of an EVENT or OBJECT to define the whole cognitive steps that lead to them. In this regard, we discussed cases of selective inference such as to shoot a gun or the ontological mapping ECONOMY is a BUILDING.

An alternative way to interpret metaphors was also suggested with a brief introduction of the GL or Generative Lexicon theory by [Pustejovsky, 1991], where

qualia may be integrated as possible lenses to define metaphorical meanings. The approach was nevertheless solely anticipated. It was destined to this chapter and not to future research since it has been a lengthy topic of discussion with other scholars during the compilation of this research and was extended, until the decision to trim it for the sake of this investigation.

Since metaphors were successfully been derived from other tropes, a brief introduction was also given on metaphors and other idiomatic forms. Again, only the forms from which metaphors have been mostly derived in the course of the inquiry were described. In particular, it was argued that analogies may be the *conditio sine qua non*, or the necessary cognitive trigger, which enables language users to come up with new metaphors and new tropes.

Further observations were made, such as the discussion on whether to rationally motivate or not the biased link between source and target of a same metaphor as well as considerations on the meaning of paraphrase as adopted in these pages.

In the light of the presented evidence, the advanced observations and challenges, two major research questions were therefore been formulated.

- Do shape words contain metaphorical meaning/s?
- Are metaphors sufficiently represented by only upper concepts?

Qualitative evidence provided in chapter 2 already partially shows that upper concepts, as well as middle or mid-level concepts, may be needed to comprehensively and/or rightly represent metaphorical meaning. Both research questions will be further investigated in the upcoming chapters.

The literature review provided in Chapter 1 mirrors a small amount of information in comparison to the wealth of knowledge on metaphors in linguistics and neighboring disciplines. While the citations and quotes in this chapter aim at providing a direct link to the discussed topics, the reader might find it useful to further evolve the topic through more readings. For this purpose, an appendix (appendix

A, pag. 317) was provided at the end of this volume. It collects consulted work, already subdivided into the main research domain. In square brackets, keywords of the respective research studies are also offered.

Shape words were considered, in the upcoming chapter 3 (3, pag. 95), as words, to find out whether they contain metaphorical reference. Their lexico-semantic structures (i. e. their senses, lexical relations, such as hypernyms and hyponyms and their relation to frames) were studied, after being semi-automatically extracted.

The information was retrieved from the Princeton Wordnet 3.1 and FrameNet[53], and it was extracted by means of the NTLK module developed by [Bird et al., 2013] in Python.

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[53]`https://framenet.icsi.berkeley.edu/fndrupal/about`

Chapter 3

Semi-automatic lexico-semantic analysis of shape words

In chapter 2 (2, pag. 9), an introduction of the research topic, an overview of the research field as well as a definition of the research questions were proposed.

In this chapter, shape words in English are analyzed as single and simple lemmas. They were searched with the intent to find out whether they entail metaphorical meanings. The shape words considered are: circle, triangle, square, point, line and the word shape itself.

The automatic analysis consisted in extracting lexico-semantic information about the forms and manual filtering of the information load. Hence, the analysis may be defined semi-automated, because it derived from information filtering and screening in the query process. The search was accomplished by taking into consideration the NLTK Python module by [Bird et al., 2013], which enables the exploration of the Princeton WordNet (WN), other collected corpora, and of FrameNet (FN). A comprehensive list of these corpora can be found in appendix (appendix B, pag. 323).

The decision to consider different -net resources and corpora in the module was driven by the intention to uncover as much information as possible on shape words

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as lemmas.

It was started with the supposition that these words may entail metaphorical meanings other than the original prescribed meaning of shape.

A WN investigation enabled to find out that concepts of metaphors' targets, as derived from the shape words, are multiple and shared across shapes, and that they can be ontologically tagged with upper and mid-level concepts.

The extension of the search to hypernyms and hyponyms in WN revealed in particular the synset structure behind the considered shape words, which seems to be the same for circle, triangle and square, but different for line, point and shape. This structure enabled further thinking on ontological mapping of shape words.

The search for lexico-semantic information was therefore continued on a knowledge source which entails both an implied ontological structure and linguistic knowledge, such as FrameNet.

The investigation on WN and FN was conducted on English shape words only. Moreover, for the case of WN, it only considered some of the possible semantic relations of shape words, particularly shape words as POS 'noun', their hypernyms and hyponyms.

Clearly, the analysis could have been further extended to include comparative approaches of lexico-semantic variations across languages, through for instance the examination of multilingual resources[54] or through a comprehensive analysis of all possible semantic information. This idea was aborted over the decision to focus on two robust databases in NLTK. It was also taken based on the estimation that a selective information retrieval would still enable the formulation of a satisfactory outcome.

Nevertheless, it is highly desirable, in the course of future studies, to extend

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[54]`http://compling.hss.ntu.edu.sg/omw/`; `https://framenet.icsi.berkeley.edu/fndrupal/node/5434`

the lexico-semantic exploration of shape words longitudinally, i. e. by taking into account more resources (such as VerbNet or SentiNet) as well as latitudinally, by deepening the inquiry of POS (all points presented under the Future Research section in chapter 5, 5, page 249).

As previewed, the research exploits the wealth of information contained in the NLTK module for NLP analysis developed by [Bird et al., 2013][55]. It also partially followed search queries suggested in [Perkins, 2012]'s book on NLTK and NLP, and [Jurafksy and Martin, 2009]'s chapter 19 on lexical semantics. Other consulted and used sources have been enlisted under appendix (appendix D, pag. 329) and the bibliography.

Throughout the investigation, particularly for the case of FN, it was noticed that a comprehensive analysis of the repositories also implies good master in the programming language. For instance, white spaces in code lines are extremely important, especially when it comes to the recovery of NLP information from data[56].

For this reason, and as the reader will notice, different approaches to information extraction were taken, to make sure to collect exhaustive information from a particular query with and without white spaces in the coding.

This approach also shows that Python, as a user-friendly, manageable and agnostic language, can provide different solutions to the same problem with different levels of granularity in the acquired answers.

This work is positioned at the crossroad between linguistics and computational linguistics. Most importantly, its author is an advocate for open source knowledge. Therefore, snippets of code may appear along the chapter, with the intention to show the reader the process leading to a certain information as well as to enable reproducible research.

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[55]`https://github.com/stevenbird`

[56]A suggestion also advanced by Jeff Leek in his lectures on reading NLP data with R,, week 4, *Editing Text Variables*; `https://www.coursera.org/course/rprog`

Technicalities on Python include:

- Python 2.7. Despite knowing that Python 3.2 would be much easier to handle in terms of Unicode (one big issue when working with multilingual data), the 2.7 version of the language is the most translated among the Python models. Using Python 3.0 would have meant dealing with lack of compatible modules and thus lack of reliable data retrieval.

- The solutions proposed were elaborated using both a basic Python shell and the iPython editor. All the commands were eventually re-run just on iPython, given that it enables more options than a basic Python shell (e.g. save the documents in different formats, edit [merge, delete, duplicate] cells) and that it provides a better interface in general.

- NLTK 3.0. A version lastly released in late August 2014. Among the major contributions are the uniform Unicode encoding of the corpora and some major changes in the commands.[57] The research was originally carried on using the NLTK version 2.0 and later upgraded to NLTK 3.0. If changes in similar queries are noticed, they are also attributed to this reason.

- The adopted version of WordNet is Princeton WordNet [WN] 3.0 (as retrieved from the NLTK downloader for Python users). The decision to retrieve data from this older version of WordNet rather than using the currently available WordNet 3.1[58] was motivated by the fact that this is the version which is aligned to all currently available versions of wordnets in NLTK 'omw' (Open Multilingual WordNet). According to an open Google discussion[59], version 3.1 is the same of version 3.0 with the exception of one data file omitted, "lexnames".

  The WordNet 3.0 has been released in 2006, while the 3.1 version is freely

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[57]More under `https://github.com/nltk/nltk/wiki/Porting-your-code-to-NLTK-3.0` and `http://www.nltk.org/nltk3-alpha/`

[58]`http://wordnet.princeton.edu/wordnet/download/current-version/`

[59]Francis Bond in: `https://groups.google.com/forum/!topic/nltk-dev/rLhXQFIt2Xk`, last checked on September 2014.

available since 2011/12.

3.1 Shape words and WN synsets

3.1.1 Lexical analysis

Once the preliminary technical notes to the semi-automatic approach for WN are given, this chapter's section focuses on further methodological approaches, collected results as well as first observations of the data. This part has been called "sense analysis" since it focuses on the WN senses of the shape words.

The shape words considered were:

- circle
- triangle
- square
- line
- point
- shape

The words hereby analyzed are the same of the corpus-based analysis and the ones in our case study. Each of this word holds one or several POS status / ses at a time in WN. They were exclusively analyzed as POS 'n.' carriers.

A search of shape words' POS in WN gave the following results:
WN builds around three major definitions.

The term **lemma** stands for a distinct word form. **Synset** stands for a group of lemmas sharing the same meaning/s, and these meanings are called **senses**.

WN synsets can be queried according to POS or p̲art o̲f s̲peech forms, such as "n." for nouns, "adv." for adverbs, "adj." for adjectives or "v." for verbs.

All words considered as polysemous words and they can hold different POS (e. g. 'square' can be POS n., v., adj., adv.), as shown in table III.2, pag. 100.

Shape word	no. of synsets	POS noun	POS verb	POS adj.	POS adv.	syn.lemmas
'circle'	11	8	3			
'triangle'	5	5				'trigon', 'trilateral'
'square'	25	8	8	6	3	'foursquare'
'line'	36	30	6			
'point'	40	26	14			
'shape'	11	8	3			'form'

Table III.2: Shape words as POS in WN and their lemmas

Acronyms and proper nouns (e. g. The White House) have been excluded from the search, leading to the exclusion from the tables III.3, pag. 104 and III.5, pag. 110 of two further terms.[60]

The data were collected into two separate tables: table III.3, pag. 104 and table III.5, pag. 110.

Synsets' senses of the shape words were categorized into two different tables because they are the results of different approaches during the information retrieval process.

- Table III.3, pag. 104 collects the results of **shape nouns and their direct senses**, i. e. the senses that are associated to them when the shape words are used as direct WN synsets. It provides information on synsets called with shape names and collecting meanings on shape words.

- Table III.5, pag. 110 shows on the contrary the outcome of a search on **shape nouns and their indirect senses**, as collected from synsets and shape words' compounds that are indirectly linked or that entail shape words.

  This table collects therefore information on synsets that do not carry shape

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[60]These terms are: shape in the sense of 'supreme_headquarters_allied_powers_europe.n.01', and 'SHAPE' and 'dot' as acronym in the sense attributed to 'department_of_transportation.n.01' ("The United States federal department that institutes and coordinates national transportat ion programs; created in 1966").

names, but that do still entail information (senses) of shape words.

The intent behind this differentiation is:

- to highlight the fact that shape words (like any other word in WN) are directly and indirectly linked to WN synsets, as they retrieve their senses from synsets that either carry their names or from synsets mapped to other words, but which still entail information on shape words.

  The latter senses of the shape words, as contained in III.5, pag. 110, are re-ferred to as "mapped under synset", since the respective shape words were not directly mapped as a synset bearing the same name as the shape word, but they were linked as one of the lemmas belonging to another synset. In fact, by computing for instance `circle_synsets = wn.synsets(`cir-cle', `n')`, the NLTK search not only returned the synset `circle.n.<number of the synset>)`, but other synsets, such as `set.n.05` or `r-2.n.01`. The word circle was also included as sense for 'set' in `set.n.05.circle, set.n.05.band, set.n.05.lot`. Cir-cle is therefore one of the many different meanings that set can have in context (along with, for instance, other senses of set such as traffic, production line, public square).

The lexico-semantic quest on shape words was started with the assumption that shape words may mostly refer to geometrical forms.

A first overview of the results enabled to assess that these words are highly polysemous, with senses that do not only refer to shapes.

In fact, metaphorical senses for each shape words as interpreted by the author were colored in both tables (tab. III.3, pag. 104 and tab. III.5, pag. 110). They were considered metaphorical because they transcend the expected meaning of the shape as a form.

Metaphorical senses include for instance definitions for shape as a form even if

it resembles or approximates it; meronymies (such as line standing for a personal letter) or shapes referring to people (such as circle, square, shape), spaces rather than shapes (such as a definition for point), conditions and attitudes (as in a sense for shape).

These senses were called metaphorical because the sense entails a piece of information that is in contrast with the expected commonsense definition of the term. If for instance the word line, which is expected to be a shape, is adopted in language to describe a process in life, communication or credit transfer, it implies the existence of abstract or concrete objects as well as abstract or concrete events that make these definitions acceptable. OBJECT or EVENT become therefore the target in the shape words' sense/s, while the shape word itself is defined the metaphor's source.

The abbreviations reported in both tables should be read as it follows:

- **Synset**: A group of lemmas carrying the name of the shape word (circle, triangle, square, line, point, shape).

- **Synset Inst. No.**: Synset Instance Number. The number of a particular synset to which the shape word has been assigned. The number has been defined by WN annotators.

- **Synset Inst. Sense**: Synset Instance Sense. The definition or sense of the respective lemmas grouped under a synset.

- **Synset Inst. Ex.**: Synset Instance Example. The use (examples) of the synset instance in context.

Table III.5, pag. 110 shows the shape word in inverted commas, followed by square brackets containing cardinal numbers. In the case of, for instance, 'circle'[2], this sign should be read as: the second instance for circle was mapped to the synset `set.n.05`. In other words, the word circle with the meaning or sense "an unofficial association of people or groups" corresponds to the fifth sense of the above mentioned synset 'set'.

The only senses that have been excluded from the list of the retrieved shape nouns are: synset `triangulum.n.01`, proper noun, referring to "a small constellation near Perseus between Andromeda and Aries" and the acronyms and abbreviations mentioned above for shape.

Table III.3: Shape nouns and their senses

Synset	Synset Inst. No.	Synset Inst. Sense	Synset Inst. Ex.
'Circle'			
	'circle.n.01'	'ellipse in which the two axes are of equal length'	'he calculated the circumference of the circle'
	'circle.n.03.'	'something approximating the shape of a circle'	'the chairs were arranged in a circle'
	'circle.n.07'	'a curved section or tier of seats in a hall or theater or opera house. [...]'	'they had excellent seats in the dress circle'
	'circle.n.08'	'any circular or rotating mechanism'	'the machine punches out metal circles'
'Triangle'			
	'triangle.n.01'	'a three-sided polygon'	[]
	'triangle.n.02'	'something approximating the shape of a triangle'	'the coastline of Chile and Argentina and Brazil forms two legs of a triangle'
	'triangle.n.04'	'any of various triangular drafting instruments [...]'	[]
	'triangle.n.05'	'a percussion instrument [...]'	[]

'Square'			
	'square.n.01'	'[...] a four-sided regular polygon'	'you can compute the area of a square if you know the length of the sides'
	'square.n.02'	'the product of two equal terms'	'[...]. gravity is inversely proportional to the square of the distance'
	'square.n.04'	'something approximating the shape of a square'	[]
	'square.n.05'	'someone who doesn't understand what is going on'	[]
	'square.n.06'	'a formal and conservative person with old-fashioned views'	[]
	'square.n.07'	'any artifact having a shape similar to a plane geometric figure with four equal sides and four right angles'	'a checkerboard has 64 squares'
	'square.n.08'	'a hand tool [...] used to construct or test right angles'	'the carpenter who built this room must have lost his square'
'Line'			

	'line.n. 01'; 'line.n.03'	'a formation of people or things one beside other'	'the line of soldiers advanced with their bayonets fixed', 'they were arrayed in line of battle', 'the cast stood in line for the curtain call'
	'line.n.02'	'a mark that is long relative to its width'	'he drew a line on the chart'
	'line.n.04'	'a length (straight or curved) without breadth or thickness; the trace of a moving point	[]
	'line.n.05'	'text consisting of a row of words [...]'	'the letter consisted of short three lines', 'there are six lines in every stanza'
	'line.n.06'	'a single frequency (or very narrow band) of radiation in a spectrum'	[]
	'line.n.07'	'a fortified position (especially one marking the most forward position of troops')	'they attacked the enemy's line'
	'line.n.11'	'a spatial location defined by a concrete or imaginary uni-dimensional extent'	[]
	'line.n.14'	'the road consisting of railroad track and roadbed'	[]
	'line.n.16'	'acting of conformity'	'in line with', 'he got out of line', 'toe the line'
	'line.n.18'	'something (as a cord or a rope) that is long and thin and flexible'	'a washing line'

	'line.n.20'	'in games or sports; a mark indicating positions or bounds of the playing area'	[]
	'line.n.22'	'a particular kind of product or merchandise'	'a nice line of shoes'
	'line.n.23'	'a commercial organization serving as a common carrier'	[]
	'line.n.27'	'persuasive, but insincere talk that is usually intended to deceive or impress'	'let me show my etchings' is a rather worn line', 'he has a smooth line, but I didn't fall for it', 'that salesman must have practised his fast line of talk'
	'line.n.29'	'a conceptual separation or distinction'	'there is a narrow line between sanity and insanity'
'Point'			
	'point.n.01'	'a geometric element that has position, but no extension'	'a point is defined by its coordinates'
	'point.n.02'	'the precise location of something; a spatially limited location'	'she walked to a point where she could survey the whole street'
	'point.n.03'	'a brief version of the essential meaning of something'	'get to the point', 'he missed the point of the joke', 'life has lost its point'
	'point.n.06'	'an instant of time'	'at that point I had to leave'
	'point.n.07'	'the object of an activity'	'what is the point of discussing it?'
	'point.n.08'	'a V shape'	'the cannibal teeth were filed to sharp points'

'point.n.09'	'a very small circular shape'	'a row of points', 'draw lines between the dots'
'point.n.10'	'the unit of counting in scoring a game or contest'	'he scored 20 points in the first half', 'a touchdown counts a point'
'point.n.11'	'a promontory extending out into a large body of water'	'they sailed south around the point'
'point.n.13'	'a style in speech or writing that arrests attention and has a perpetrating or convincing quality or effect'	[]
'point.n.14'	'an outstanding characteristic'	'his acting was one of the high points of the movie'
'point.n.15'	'sharp end'	'he stuck the point of the knife into a tree', 'he broke the point of his pencil'
'point.n.17'	'a linear unit used to measure the size of type [...]'	[]
'point.n.18'	'one percent of the total principal of a loan; it is paid at the end the loan is made and is independent of the interest of the loan'	[]
'point.n.20'	'a V-shaped mark at the end of an arrow pointer'	'the point of the arrow was due north'
'point.n.22'	'the property of a shape that tapers to a sharp tip'	[]
'point.n.23'	'a distinguishing or individuating characteristic'	'he knows my bad points as well as my good points'
'point.n.24'	'the gun muzzle's direction'	'he held me up at the point of a gun'

	'point.n.25'	'a wall socket'	[]
'Shape'			
	'shape.n.01'	'any spatial attribute (especially as defined by outline')'	'he could bravely make out their shapes'
	'shape.n.02'	'the spatial arrangement of something as distinct from its substance'	'geometry is the mathematical science of shape'
	'shape.n.04'	'a concrete representation of an otherwise nebulous concept'	'a circle was the embodiment of his concept of life'

Table III.5: Shape words' compounds and synsets under which they have been mapped

Synset	Synset Inst. No.		Synset Inst. Ex.
'Circle'			
'circle' [2]	'set.n.05'	'an unofficial association of people or groups'	'the smart set goes there', 'they were an angry lot'
'circle' [3]	'lap.n.05'	'movement once around a course'	'he drove an extra lap just for insurance'
'circle' [4]	'traffic_circle.n.01'	'a road junction [..]'	'the accident blocked all traffic at the rotary'
'circle' [5]	'r-2.n.01'	'street name for flunitrazepan'	[]
Triangle	[]	[]	[]
Square			
'square' [2]	'public_square.n.01'	'an open area [...]'	[]
Line			

'line' [7]	'argumentation.n.02'	'a course of reasoning aimed at demonstrating a truth or falsehood; the methodical process of logical reasoning'	'I can't follow your line of reasoning'
'line' [8]	'cable.n.02'	'a conductor for transmitting electrical or optical signals or electric power'	[]
'line' [9]	'course.n.02'	'a connection series of events or actions or developments'	'the governement took a firm course', 'historians can only point out those lines for which evidence is available'
'line' [11]	'wrinkle.n.01'	'a slight depression in the smoothness of a surface'	'his face has many lines', 'ironing gets rid of most wrinkles'
'line' [12]	'pipeline.n.02'	'a pipe used to transport liquids or gases'	'a pipeline runs from the wells to the seaport'
'line' [14]	'telephone_line.n.02'	'a telephone connection'	[]
'line' [16]	'lineage.n.01'	'the descendant of one individual'	'his entire lineage has been warriors'
'line' [18]	'occupation.n.01'	'the principal activity in your life that you do to earn money'	'he is not in my line of business'
'line' [20]	'channel.n.05'	'(often plural) a means of communication or access'	'it must go through official channels', 'lines of communication were set up between the firms'
'line' [23]	'agate_line'	'space for one line of print [...]'	[]

'line' [24]	'credit_line'	'the maximum credit that a customer is allowed'	[]
'line' [25]	'tune.n.01'	'a succession of notes forming a distinctive sequence'	'she was humming an air from Beethoven'
'line' [27]	'note.n.02'	'a short personal letter'	'drop me a line when you get there'
'line' [29]	'production_line.n.01'	'mechanical system in a factory whereby an article is conveyed through sites at which successive operations are performed on it'	[]
'Point'			
'point' [2]	'detail.n.01'	'an isolated fact that is considered separately from the whole'	'several of the details are similar', 'a point of information'
'point' [3]	'degree.n.02'	'a specific identification position in a continuum or series or especially in a process'	'a remarkable degree of frankness', 'at what stage are the social sciences?'
'point' [11]	'item.n.01'	'a distinct part that can be specified separately in a group of things that could be enumerated in a list'	'he noticed an item in the New York Times', 'she had several items on her shopping list', 'the main point on the agenda was taken up first'
'point' [15]	'compass_point.n.01'	'any of 32 horizontal directions indicated on the card of a compass'	'he checked the point on his compass'

'point' [17]	'period.n.07'	'a punctuation mark [...]'	'in England they call a period a stop'
'point' [20]	'decimal_point.n.01'	'the dot at the left of a decimal fraction'	[]
'point' [25]	'distributor_point.n.01'	'a contact in the distributor [...]'	[]
'Shape'			
'shape' [2]	'human_body.n.01'	'alternative names for the body of a human being'	'Leonardo studied the human body', 'he has a strong physique', 'the spirit is willing, but the flesh is weak'
'shape' [4]	'form.n.07'	'the visual appearance of something or someone'	'the delicate cast of his features'
'shape' [5]	'condition.n.05'	'the state of (good) health (especially in the phrases 'in condition' or 'in shape' or 'out of condition' or 'out of shape')'	[]
'shape' [6]	'form.n.03'	'a perceptual structure'	'the composition presents problems for students of musical form', 'a visual pattern must include not only objects, but the spaces between them'

The following figures (figures 8, pag. 115; 9, pag. 115, 10, pag. 116; 11, pag. 117; 12, pag. 118 and 12, pag. 118) try to condense the results (metaphorical meanings) observed in both approaches into one visual representation per shape.

These approaches are: senses of shape words own as derived from the synsets that carry their same name in WN, and senses of shape words as derived from synsets to which shape words have been mapped.

These figures are in other words a visual summary of the data presented in table III.3, pag. 104 and table III.5, pag. 110.[61]

The drawn line that separate the graphical images (the circle, the triangle, the square, the line and the cloud for a shape) is purely graphical. It should not be interpreted as something which shows for instance that half of the senses retrieved are from direct synsets, while half are from other synsets.

Another detail worth consideration is the use of capitalized words in the figures. These words do not represent ontological concepts. They were capitalized (only exception in all the research) with the intent to represent the relevant information that may lead to the attribution of one ontological conceptual label or concept to the respective shape word. Some of them happens, already at this stage, to be ontological upper concepts.

It is the chapter section that follows ("Attribution of ontological concepts") that shows the ontological concepts advanced for - and shared by - the shape words.

Considering the shape words individually by looking at their respective figures, it could be derived that:

- shape words as geometric forms or structures can be attributed to OBJECT, tangible as well as in abstract thinking
- the definition of "sth. approximating" can also be attributed to the existence

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[61] The senses, as reported in the figures, have been sometimes paraphrased; for the original senses, please refer again to the tables.

A / the circle is ...
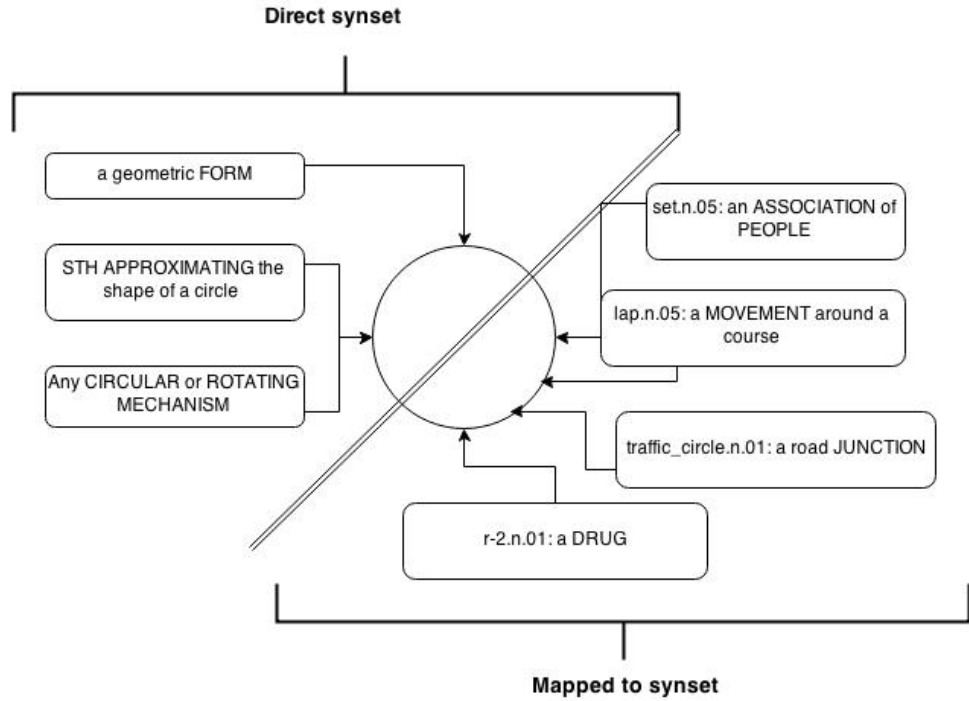
Figure 8: 'Circle' in WN as POS noun: Senses

A / the triangle is ...
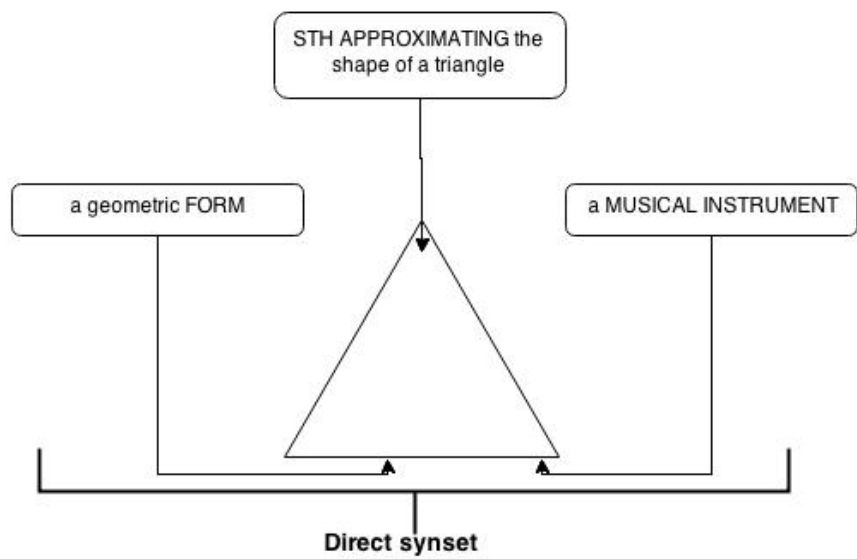
Figure 9: 'Triangle' in WN as POS noun: Senses

A / the square is ...
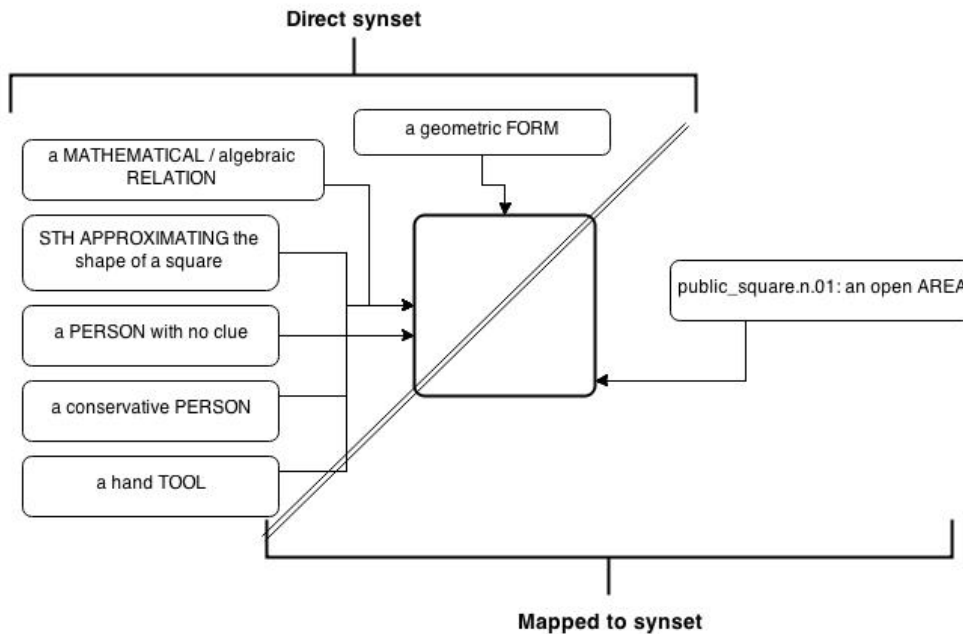
Figure 10: 'Square' in WN as POS noun: Senses

of an OBJECT, abstract or concrete, which does not need to be complete in form or space in order to be grasped as a certain shape.

• OBJECT can also be attributed, as ontological concept, to everything that defines tangible things, such as drugs, road junctions, a musical instrument, products. In this form, the concept can be attributed to many senses for all shape words.

• EVENT is deemed a suitable upper concept to map senses of shape words that evoke real or abstract processes and situations. For instance, "a movement around a course" (one sense of circle) can be defined as event as well as "a production system" (one sense of line).

• PERSON is the generic ontological term that can be used to describe all senses dealing with human interaction and human beings, such as "an association of people" (another sense of circle) or "a person with no clue" (a definition of square).

A / the line is ...

Direct synset	Mapped to synset
a formation of PEOPLE	argumentation.n.02: a course of REASONING
a POSITION (troops)	cable.n.02: a CONDUCTOR
a geometric MARK	course.n.02: a connection of EVENTS / ACTIONS
a LENGTH (of a moving point)	wrinkle.n.01: a SKIN depression
a ROW of TEXT	
a BAND of RADIATION	pipeline.n.02: a PIPE
a SPATIAL (abstr./concr.) LOCATION	telephone_line.n.02: a TELEPHONE CONNECTION
a ROAD	argumentation.n.02: a course of REASONING
ACTING of conformity	lineage.n.01: one's DESCENDANT
STH long, thin and flexible	occupation.n.01: one's PROFESSION
a MARK (in sports)	channel.n.05: a means of COMMUNICATION
a PRODUCT / MERCHANDISE	agate_line: a line of PRINT
a commercial ORGANIZATION	credit_line: CREDIT
a kind of TALK	tune.n.01: NOTES in succession
a conceptual SEPARATION	note.n.02: short LETTER
	production_line.n.01: production SYSTEM

Figure 11: 'Line' in WN as POS noun: Senses

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A / the point is ...

Direct synset	Mapped to synset
a geometric ELEMENT	detail.n.01: an isolated FACT
a spatial LOCATION	degree.n.02: a specific POSITION
a MEANING	item.n.01: a distinct THING / PART of a list
an instant of TIME	compass_point.n.01: a DIRECTION
an OBJECT	period.n.07: a punctuation MARK
a V-SHAPE	decimal_point.n.01: an algebraic MARK
a sharp END	distributor_point.n.01: a contact in the DISTRIBUTOR
a v-shaped MARK at the end of an arrow	a geometric ELEMENT
the PROPERTY of a SHAPE	
a rhetoric STYLE	
an outstanding CHARACTERISTIC	
a circular SHAPE	
a geographic LOCATION	
one percentage of LOAN	
a unit of COUNTING (games)	
a unit of COUNTING (size meas.)	
the GUN muzzle's DIRECTION	
a WALL SOCKET	

Figure 12: 'Point' in WN as POS noun: Senses

A / the shape is ...

Direct synset	Mapped to synset
any spatial ATTRIBUTE especially defined by outline	human_body.n.01: HUMAN BODY
STH SPATIAL distinct from its substance	form.n.07: VISUAL APPEARANCE of sth
a concrete REPRESENTATION of a concept	condition.n.05: state of HEALTH
	form.n.05: a perceptual STRUCTURE
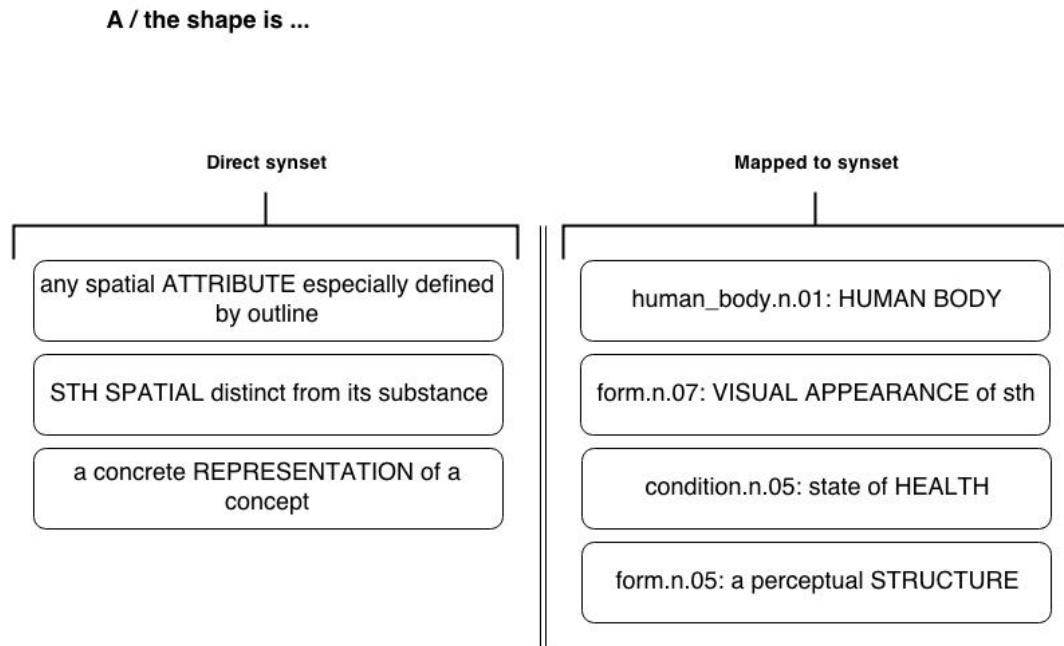
Figure 13: 'Shape' in WN as POS noun: Senses

As described, the represented figures shown above attempt to synthesize in one visual input the information attributed to shape words in WN as directly mapped as synsets as well as mapped to synsets.

From the drawn pictures, preliminary observations were made on potential upper concepts that the considered shape words shared across their senses.

Looking across senses, it could in fact be assessed that all shape words can refer to both concrete and abstract representations of PERSON/s, things or OBJECT/s and EVENT/s. Only triangle seems to be attributable to only the upper concept OBJECT.

The most polysemous words among the ones considered seemed to be line and point.

The automatic information retrieval from WN proved valuable, by revealing the existence of metaphorical meanings among other senses of the considered shape words.

When used metaphorically, shape words could mostly be attributed to three upper concepts: OBJECT, EVENT and PERSON. In other words, when the language user wants to address one of these concepts in language, he/she does so by using a given shape word.

The upper concept, hence the synthesized information extracted from the metaphorical sense or meaning of the shape word, thus becomes the *target* of information, while the shape word itself acts as a *source*.

The conducted query has therefore revealed a) the presence of metaphorical senses for shape words as well as b) the semi-automatic attribution of targets in the same metaphorical senses.

Attribution of ontological concepts

Once the mostly commonly shared upper concepts for the considered shape words were retrieved, an investigation of whether these concepts can be better specified in terms of mid-level concepts was worth the attempt. This step was also taken to make sure that no relevant information has been overlooked during the analysis of the shape words' senses.

Hence, the lemmas and their senses, as reported in table III.3, pag. 104 and table III.5, pag. 110 were explored in terms of *semantic classes*.

This time, all information retrieved from WN, not just the metaphorical senses highlighted in the tables, was examined.

The outcome resulted in the compilation of table III.8, pag. 125 and the analysis that follows.

The proposed semantic classes were inspired by the work of [Tsevtkov et al., 2013] and [Tsevetkov et al., 2014]. In her papers, Tsvetkov developed 26 semantic categories, including *noun.animal, noun.artefact, noun.body, noun.cognition, noun.food, noun.location*.

Semantic classes are, as the reader may notice, very similar to middle concepts. Their introduction in the research can be regarded as a way to validate the proposed mid-level concepts.

The classes introduced in III.8, pag. 125 are (where "n." stands for noun):

1. *n.physical_object*[62]: the class includes the synsets as proper nouns for *tangible* concrete OBJECTs or set of OBJECTs. This class excluded senses that describe shape words as geometric forms, like `circle.n.01` or `square.n.02`.

   It referred on the contrary to senses containing OBJECTs (such as the direct sense of triangle as "a percussion instrument", `triangle.n.05`).

   Since triangle appeared once in the five senses as a proper noun for an object, the corresponding attributed value is 1/5. Values were consequently added for every other synset's sense which contained the same middle concepts for instance, `triangle.n.04` (triangle meaning "any of various triangular drifting instrument"). Hence, the ultimate value attributed to triangle as *noun.physical_shape* in table III.8, pag. 125 is 2/5, i. e. triangle in WN is defined twice as PHYSICALOBJECT.

   Apart from this example, which shows two cases of direct senses, all assigned values reported in the table were the sum of the same ontological mid-level concepts as retrieved from direct as well as indirect senses of shape words.

   It was observed that the boundaries of the selected semantic classes can be fuzzy, in the sense that that one same sense can be applied to more than one class.

   This was for instance the case in two synsets, which were consequently mapped

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[62]Looking under 'physical' in WN, the definitions reported there for the synset as an adjective are seven: 1) "involving the body as distinguished from the mind or spirit"; 2) "relating to the sciences dealing with matter and energy; especially physics"; 3) "having substance or material existence; perceptible to the senses"; 4) "having substance or material existence; perceptible to the senses"; 5) "characterized by energetic bodily activity"; 6) "impelled by physical force especially against resistance"; 7) "concerned with material things".

to different classes. "Line' [14]' ("a telephone connection") was enlisted both under *n.physical_object* and *n.abstract_process*; `line.n.01` ("a formation of people or things one beside the other", was added under both *n.physical_object* and *n.human*.

2. *n.artifact*: ARTIFACTs are listed in SUMO as subclasses of the upper concepts OBJECT, as derived from PHYSICAL and ENTITY (with ENTITY being the root of all concepts).[63]

   For sake of comparison, the following are the definitions for artifact, object and physical as reported in SUMO:

   (a) Artifact: "An object that is the product of a Making"

   (b) Object: "[It] corresponds roughly to the class of ordinary objects. Examples include normal physical objects, geographical regions, and locations of Processes, the complement of Objects in the Physical class. [...]"

   (c) Physical: "An entity that has a location in space-time. Note that locations are themselves understood to have a location in space-time."

   The semantic class *n.artifact*, which was attributed to synset senses, such as "something approximating the shape of.." (a sense shared by both `circle.n.03` and `square.n.04'`) may apply to senses that are vaguer than the SUMO definition. The concept of approximation can in fact apply or not to the process of a product-into-being. It follows that ARTIFACT can be used as synonym for OBJECT.

   The specification of the semantic class *n.artifact* was moved by the attempt to define OBJECTs when not clearly stated as physical or abstract. For instance, `square.n.04` means "something *approximating* the shape of a square",

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[63]SUMO taxonomical ladder, `http://sigma-01.cim3.net:8080/sigma/Graph.jsp?kb=SUMO&lang=EnglishLanguage&relation=subclass&term=Artifact&up=10&down=10&limit=&columns=direct-children&columns=documentation&columns=graph&view=text&submit=submit`

while `square.n.07` means "any *artifact* having a shape *similar to* the plane geometric figure with four equal sides and four right angles." As also mentioned above prior to this chapter's section, an approximation of form was still considered ARTIFACT and/or OBJECT.

3. *n.concrete_process*: The semantic class which describes the synset when used to indicate a mechanism or process, *either describing the motion and development of concrete tangible objects*, or *the process initiated by tangible objects*. (This class has been further specified in this chapter).

   As for the case of OBJECT, the question was raised whether process in the sense of EVENT should be ABSTRACTEVENT or CONCRETEEVENT, and it showed once again the ambiguity and fuzziness encountered while trying to categorize the senses.

   Sometimes, a throughout reading of the shape's sense helps disambiguate opinions. For instance, in the case of the synset `circle.n.08` and of its corresponding definition ("any circular or rotating mechanism"), it may be argued that the process can be a) concrete b) abstract or c) both, depending on the context. Thanks to the WN example though, "the machine punches out metal circle", it becomes clear that the kinetic movement of a machine and its components to produce circular object cannot but be concrete EVENTS rather than abstractions. Hence, `circle.n.08` was labeled as *n.concrete_process*. `Point.n.24` bears the meaning of "the gun muzzle's direction". Again, it may be argued that this "direction" can be such of either an abstract entity (such as the end of a projected trajectory) or of a concrete one. The case is disambiguated with the reported WN example, "he held me up at the point of a gun", which clearly shows the existence of a concrete OBJECT.

   Senses enlisted under the semantic class *concrete_process* were interpreted as events occurring through physical agents and objects.

4. *n.abstract_process* This semantic class collects senses of the shape when interpreted in abstract terms. The definition of `line.n.04` is for instance one of this kind. 'Line' stands for "a length without breadth or thickness", and it can also mean "the trace of a moving point". The absence of any size, volume and dimensionality leads to the conclusion that this process should be abstract (contrarily, for instance, to telephone line or communication line, which can also be concrete).

Vice versa, the sense for `line.n.02`, "a mark that is long relative to its width", combined to the provided example in WN, "he drew a line on the chart", makes one think that this mark or line is concrete and that it can be therefore described as *n.concrete_process*.

5. The class *n.location* defines senses involving space and dimensions, includes set of objects, sharing the same conformation, disposition, location. For instance, circle, in its WN sense number 7 ("a curved section or tier of seats in a hall or theater or opera house"), is classified as *n.location*, given the assumption that both the section and the tear of chairs share the same features. Also line[11] ("a spatial location defined by a concrete or imaginary unidimensional extent") has been added to this class.

6. Finally, the class *n.human* reports senses pertaining to human interactions and human beings.

Table (III.8, pag. 125) reports the semantic classes, followed by the number of times, also calculated as ratio, that a particular noun appear as belonging to a class in comparison to the total number of noun synsets under the same synset. The ratio was normalized to 100.

Legend of table (III.8, pag. 125):

- **Sem. Prop.** = Semantic Properties
- **(1)** = *n.physical_object*

- **(2)** = *n.artifact*

- **(3)** = *n.concrete_process*

- **(4)** = *n.abstract_process*

- **(5)** = *n.location*

- **(6)** = *n.human*

Sem. Prop.	'Circle'	'Triangle'	'Square'	'Line'	'Point'	'Shape'
(1)	3/8, 0.37	2/5, 0.4	1/8, 0.12	8/30, 0.26	5/26, 0.19	1/4, 0.25
(2)	1/8, 0.12	1/5, 0.2	2/8, 0.25	[]	1/26, 0.04	1/4, 0.25
(3)	2/8, 0.25	[]	[]	14/30, 0.47	10/26, 0.38	1/4, 0.25
(4)	[]	[]	[]	4/30, 0.13	6/26, 0.23	[]
(5)	[]	[]	1/8, 0.12	3/30, 0.1	2/26, 0.08	[]
(6)	1/8, 0.12	[]	2/8, 0.25	2/30, 0.07	[]	[]

Table III.8: Semantic classifications of shape-related synsets as retrieved from (III.3, pag. 104) and (III.5, pag. 110)

The following list (list 3.1.1, pag. 125) is a comprehensive collection of all the entries reported under table III.8, pag. 125.

This list includes:

- The name of the semantic class for each shape synset

- The cardinal increasing number of appearances of the same synset when used as a specified semantic class and

- The examples from WN, when considered useful to justify the choice to classify a certain synset as a certain semantic class

- **Circle**:

  – *n.physical_object*

    1. `circle.n.07`, "a curved section or tier of seats in a hall or theater or opera house"

    2. circle [4], "a road junction"

    3. circle [5], "street name for fluunitrazepan"

– *n.artifact*

    1. `circle.n.03`, "something approximating the shape of a circle"

– *n.concrete_process*

    1. `circle.n.08`, "any circular or rotating mechanism", "the machine punches out metal circles"

    2. circle [3], "movement once around a course", "he drove an extra lap just for insurance"

– *n.abstract_process* []

– *n.location* []

– *n.human*

    1. circle [2], "an unofficial association of people or groups"

• **Triangle**:

– *n.physical_object*

    1. `triangle.n.04`, "any of various triangular drafting instrument"

    2. `triangle.n.05`, "a percussion instrument [...]"

– *n.artifact*

    1. `triangle.n.02`, "something approximating the shape of a triangle"

– *n.concrete_process* []

– *n.abstract_process* []

– *n.location* []

– *n.human* []

• **Square**:

– *n.physical_object*

    1. `square.n.08`, "a hand tool [...]"

– *n.artifact*

    1. `square.n.04`, "something approximating the shape of a square"

    2. `square.n.07`, "any artifact having a shape similar to a plane geometric figure with four equal sizes and four right angles"

– *n.concrete_process* []

– *n.abstract_process* []

– *n.location*

    1. square [2], "an open area [...]"

– *n.human*

    1. `square.n.05`, "someone who does not understand what is going on"

    2. `square.n.06`, "a formal and conservative person [...]"

• **Line**:

– *n.physical_object*

    1. `line.n.01` / `line.n.03`, "a formation of people or things one beside other"

    2. `line.n.14`, "the road consisting of railroad track and roadbed"

    3. `line.n.18`, "something (as a cord or a rope) that is long and thin and flexible"

    4. `line.n.20`, "in games or sports; a mark indicating positions or bounds [...]"

    5. line [8], "a conductor [...]"

    6. line [12], "a pipe used to transport liquids or gases [...]"

    7. line [14], "a telephone connection"

    8. line [27], "a short personal letter"

– *n.artifact* []

– *n.concrete_process*

    1. `line.n.02`, "a mark that is long relative to its width"

    2. `line.n.05`, "text consisting of a row of words [...]", "the letter

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consisted of short three lines"

3. `line.n.06`, "a single frequency (or very narrow band) of radiation in a spectrum"

4. `line.n.22`, "a particular kind of product or merchandise"

5. `line.n.23`, "a commercial organization serving as a common carrier"

6. `line.n.27`, "persuasive, but insincere talk that is usually intended to deceive or impress", "the salesman must have practised his fast line of talk"

7. line [9], "a connection series of events or actions or developments"

8. line [14], "a telephone connection"

9. line [16], "the descendant of one individual"

10. line [18], "the principal activity in your life that you do to earn money", "he is not in my line of business"

11. line [20], "(often plural) a means of communication or access", "it must go through official lines"

12. line [24], "the maximum credit that a customer is allowed"

13. line [25], "a succession of notes forming a distinctive sequence"

14. line [29], "mechanical system in a factory [...]"

– *n.abstract_process*

1. `line.n.04`, "a length (straight or curved) without breadth or thickness; the trace of a moving point"

2. `line.n.16`, "acting of conformity"

3. `line.n.29`, "a conceptual separation or distinction", "there is a narrow line between sanity and insanity"

4. 'line' [7], "a course of reasoning aimed at demonstrating a truth or falsehood", "I cannot follow your line of reasoning"

- *n.location*

    1. `line.n.11`, "a spatial location defined by a concrete or imaginary unidimensional extent"

    2. line [11], "a slight depression in the smoothness of a surface", "his face has many lines"

    3. line [23], "space of one line of print [...]"

- *n.human*

    1. `line.n.01` / `line.n.03`, "a formation of people or things one beside other"

    2. `line.n.07`, "a fortified position (especially one marking the most forward position of troops')", "they attacked the enemy's line"

- **Point**:

    - *n.physical_object*

        1. `point.n.08`, "a V shape", "the cannibal teeth were filed to sharp points"

        2. `point.n.11`, "a promontory extending out into a large body of water"

        3. `point.n.15`, "sharp end", "he stuck the point of the knife into a tree"

        4. `point.n.20`, "a V-shape mark at the end of an arrow pointer", "the point of the arrow was due north"

        5. `point.n.25`, "a wall socket"

    - *n.artifact*

        1. `point.n.09`, "a very small circular shape"

    - *n.concrete_process*

        1. `point.n.10`, "the unit of counting in scoring a game or contest", "a touchdown counts a point"

2. `point.n.17`, "a linear unit used to measure the size of type [...]"

3. `point.n.18`, "one percentage of the total principal of a loan [...]"

4. `point.n.22`, "the property of a shape that tapers to a sharp tip"

5. `point.n.24`, "the gun muzzle's direction", "he held me up at the point of a gun"

6. point [2], "an isolated fact that is considered separately from the whole", "a point of information"

7. point [11], "a distinct part that can be specified separately in a group of things that could be enumerated in a list"

8. point [15], "any of the 32 horizontal directions indicated on the card of a compass"

9. point [17], "a punctuation mark [...]"

10. point [25], "a contact in the distribution"

– *n.abstract_process*

1. `point.n.03`, "a brief version of the essential meaning of something", "get to the point"

2. `point.n.06`, "an instant of time", "at that point I had to leave"

3. `point.n.07`, "the object of an activity", "what is the point of discussing it"

4. `point.n.13`, "a style in speech or writing that arrests attention [...]"

5. `point.n.14`, "an outstanding characteristic", "his acting was one of the high points of the movie"

6. `point.n.23`, "a distinguishing or individuating characteristic", "he knows my bad points as well as my good points"

– *n.location*

1. `point.n.02`, "a precise location of something, a spatially limited

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location"

2. point [3], "a specific identification position in a continuum or series
   or especially in a process"

– *n.human* []

• **Shape**:

– *n.physical_object*

1. shape [2], "alternative names for the body of a human being"

– *n.artifact*

1. `shape.n.01`, "any spatial attribute (especially as defined by 'out-
   line')", "he could bravely make out their shapes"

– *n.concrete_process*

1. `shape.n.04`, "a concrete representation of an otherwise nebulous
   concept", "a circle was the embodiment of his concept of life"

2. shape [4], "the visual appearance of something or someone"

3. shape [5], "the state of (good) health [...]"

4. shape [6], "a perceptual structure", "a visual pattern must include
   not only objects but also the spaces between them"

– *n.abstract_process* []

– *n.location*

1. `shape.n.02`, "the spatial arrangement of something as distinct
   from its substance", "geometry is the mathematical science of shape"

– *n.human* []

While compiling the list of *n.process*, it has been noticed that the class *n.physi-
cal_object* and *n.process* can be further disambiguated. This was possible through
the analysis of the synsets' senses as well as through the examples provided by WN.

In particular, different kinds of processes or EVENTs were detected. It needs to
be specified that these did not apply for all the synsets. The ones that could fit into

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these categories (explained below), were specified.

Figure14 should be read as following:

- *n.process* stands for the semantic class already described as sub-divided into *n.concrete_process* or *.n.abstract_process*. For each of these categories, we are able to distinguish:

    - *n.part_of.p.*: The synset stands for a part of a process. The *part_of* relation between the synset and the *process* is expressed in WN terms in different terms (e. g. "a distinct part", "an instance of", "the descendant of"). It follows that the shape-related synset is not only a *concrete* or *abstract process*, but a part of it, and this specification is provided by WN through senses and examples, as already explained.

        In the case that this specification is not provided, it is assumed that the shape synset stands for the whole *process*, as described in the next point.

    - *n.generated_by.p.*, when the synset *is generated* through *a process*

    - *n.complete.p*: The synset *represents* the (whole) process, or the process in its overall.
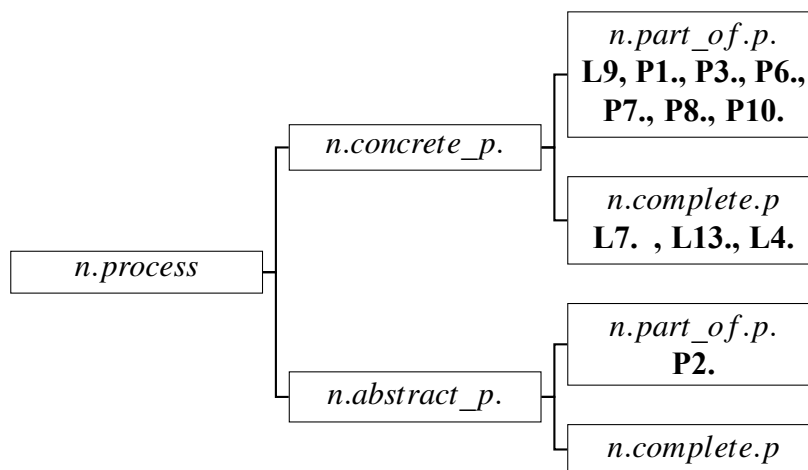
Figure 14: Information retrieval from the semantic class *n.process* with supported evidence

The abbreviations in table 14 correspond to the individual senses retrieved once again from the list and from the table III.8, page 125.

The acronyms (alphabetic letter plus number; e. g. *n.complete.p* **L7.**, **L13.**), mean that the reader can go back to the list of semantic classes compiled for the explanation of (III.8, pag. 125), look under the semantic class *n.concrete_process*, under "Line" (abbreviated as **L**) and search example no. **7**.

To enable a clearer understanding of table 14, here in the following the respective definitions:

- **L9**: "the descendant of one individual"
- **P1**: "the unit of counting a scoring game"
- **P3**: "one percent of the total loan"
- **P6**: "an isolated fact from the whole"
- **P7**: "a distinct part in a group"
- **P8**: "any direction of the 32"
- **P10**: "a contact in the distribution"
- **L7**: "a connection series"
- **L13**: "a succession of notes"
- **L4**: "a kind of product"
- **P2**: "an instant in time"
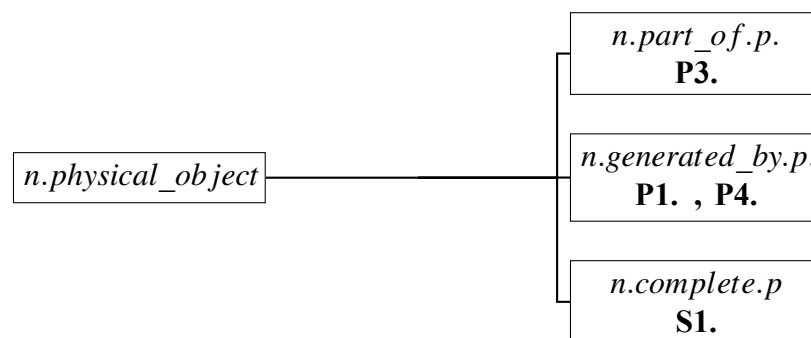
Figure 15: Information retrieval from the semantic class *n.physical_object* with supported evidence

Again, a list of the examples upon which this classification was drawn, is provided here below:

- **P3**: "sharp end"

- **P1**: "a v-shape"

- **P4**: "a v-shaped mark"

- **S1**: "alternative names for the body of a human being"

A first reading of the collected WN data revealed the existence of three upper concepts shared by most of the considered shape words: EVENT, OBJECT and PERSON.

Semantic classes were introduced in the attempt to define the presence of mid-level concepts within all the data retrieved from WN. These classes were used given their level of specificity, and since they resemble mid-level concepts.

In a first attempt of categorization, six different semantic classes were identified. They include *n. physical object*; *n.artifact*; *n.concrete_process*; *n.abstract_process*; *n.location* and *n.human*.

This approach revealed that it is possible to define, for both OBJECT and EVENT (corresponding to the semantic class *n.process*), whether shape words are referring to an abstract (*n.artifact*, *n.abstract_process*) or concrete (*n.physical_object, n.concrete_process*) OBJECT or EVENT.

All data collected in WN for each shape words, not just the metaphorical senses highlighted in the tables III.3, pag. 104 and III.5, pag. 110, were then re-analyzed in light of the semantic categories, to also make sure that all metaphorical references had been included. In this way, it has been found that:

- circle has senses mappable to *n.physical_object, n.artifact, n.concrete_process, n.human*

- triangle has senses mappable to *n.physical_object, n.artifact*

- square has senses mappable to *n.physical_object, n.artifact, n.location, n.human*

- line has senses mappable to *n.physical object, n.concrete_process, n.abstract_-*

process, n.location, n.human

- point has senses mappable to *n.physical_object, n.artifact, n.concrete_process, n.abstract_process, n.location*

- shape has senses mappable to *n.phyisical_object, n.artifact, n.concrete_process, n.location*

The semantic classification approach was then further specified in the cases of highly polysemous shape words, such as point.

In fact, it was assessed that, when point is a *n.physical_object*, the information in its sense/s and the word contextual use enables the language user to understand point as not only a concrete object, but particularly as either *part_of* a process or as *generated by* a process.

In the case of shape as physical object, it could also be determined that shape, again when used in context and when bearing a certain sense, acts as *n.complete_process*, and in particular as *complete process*.

Finally, the conducted semantic classification validates the introduction of mid-level concepts for shape words (where middle concepts replace semantic classes), such as ABSTRACTOBJECT (or ARTIFACT), CONCRETEOBJECT, ABSTRA-CTEEVENT, CONCRETEEVENT. It can be therefore stated that, according to information found in WN for shape words as POS noun:

- circle can be ontologically mapped to CONCRETEOBJECT, ABSTRACTO-BJECT, CONCRETEEVENT, PERSON

- triangle can be ontologically mapped to CONCRETEOBJECT, ABSTRAC-TOBJECT

- square can be ontologically mapped to CONCRETEOBJECT, ABSTRAC-TOBJECT, SPACE, PERSON

- line can be ontologically mapped to CONCRETEOBJECT, CONCRETEEV-ENT, ABSTRACTEVENT, SPACE, PERSON

- point can be ontologically mapped to CONCRETEOBJECT, ABSTRACTO-BJECT, CONCRETEEVENT, ABSTRACTEVENT, SPACE
- shape can be ontologically mapped to CONCRETEOBJECT, ABSTRACTO-BJECT, CONCRETEEVENT, SPACE

Section Conclusions

In chapter 2, 2, pag. 9, two major research questions were introduced, and partially answered: (1) Do shape words have metaphorical meaning/s? and (2) Are metaphors sufficiently represented by only upper concepts?

Preliminary qualitative investigation on metaphors in general revealed the need as well as the possibility to introduce mid-level concepts, together with upper concepts, to define metaphors.

Semi-automatic queries on lexical information of shape words on WN shown that all shape words own senses that can be defined as metaphorical. These include the use of shape words to refer to something that is not just or not even a geometric form.

In particular, the lexical approach revealed that most shape words entail three main upper level concepts in their senses, namely OBJECT, EVENT and PERSON, which can be considered the target of the detected metaphorical presence, with the shape word being the metaphor's source.

In the attempt to refine, if possible, the retrieved upper concepts by means of middle concepts, semantic classes, as inspired by the work of [Tsevetkov et al., 2014], [Tsevetkov et al., 2014], have been introduced as reading key to the collected WN data.

This approach highlighted the presence of another level of definition, namely concreteness versus abstraction, applicable to all considered shape words. In par-

ticular, the upper concept OBJECT has been re-defined as either CONCRETEOB-JECT or ABSTRACTOBJECT, while EVENT has been re-defined as CONCRETEEVENT or ABSTRACTEVENT.

The semantic classification also enabled the detection of the upper concept SPACE for the shape words square, line, point and shape.

The following section represents another level of investigation of shape words in WN, by studying their semantic configuration, and in particular their hypernyms and hyponyms.

3.1.2   Semantic analysis

In the previous paragraph, a lexical investigation of shape words revealed the presence of semantic meanings which can be identified as targets of the respective shape source. These have been mapped to upper as well as mid-level concepts.

The research on shape words and synsets in Princeton WN continued with a semantic analysis of the same lemmas. In fact, the lexical resource contains a wealth of information on words, and their linguistic neighbors.

Hypernyms and hyponyms

The query focused on hypernyms and hyponyms. WN entails many more semantic relations (synonyms, similes, antonyms, holonyms, meronyms). Nevertheless, for the sake of this research, I decided to focus on the first two. Observations on findings and coding challenges with regards to the other semantic forms are presented under the Future Research section in chapter 5, (5, page 249).

The snippets of code herewith presented for each shape word represent the annotation path in WN between ENTITY (marked as synset `n.entity.1`), the upper concept root of all words, down to the respective synsets. Hypernyms and hyponyms

have been derived from both lexical approaches previously taken, namely by look-
ing at the shape word as direct synset as well as by searching the shape word as
mapped to a synset.

As query criteria, I decided that the information in the snippets shows the first
hypernym of the respective shape word, followed by the shape word's hyponyms.
These include all synsets that stand in between the shape word and the higher upper
concept ENTITY.

```
'circle.n.01'
+++ synset hypernyms +++
[Synset('ellipse.n.01')]
+++ synset hyponyms +++
[Synset('circle.n.01')]
[...]
[[Synset('entity.n.01'), Synset('abstraction.n.06'),
   Synset('attribute.n.02'), Synset('shape.n.02'),
   Synset('figure.n.06'), Synset('plane_figure.n.01'),
   Synset('conic_section.n.01'), Synset('ellipse.n.01'),
   Synset('circle.n.01')]]
```

The WN synsets between the direct synset `circle.n.01` and `n.entity.n.`
`01` (as well as `entity.n.01` and the shape words triangle, and square, as shown
in the following snippets) are not randomly distributed, but they should be read in
sequential order (bottom-up and / or top-down approach), since they represent the
direct synsets in WN that go from a shape word to ENTITY and vice versa.

Synsets can be interpreted as properties. Under their label, they in fact include all
lemmas that share distinct and similar properties, a property which motivates their
being under one same synset. It is therefore worth mentioning that the synset `en-`
`tity.n.01` is followed by the synsets `abstraction.n.06`, `attribute.n.`
`02`, `shape.n.02`, `figure.n.06` and `plane_figure.n.01`. These synsets
lead to or derive from ENTITY, which means that they describe the properties that
ENTITY is supposed to entail.

If upper concepts were attributed to synsets' labels, as already done in the case of

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ENTITY, it could thus be stated that the closest upper concepts following ENTITY, or leading to it, are ABSTRACTION, ATTRIBUTE, SHAPE.

ABSTRACTION in particular reminds of the level of specificity which could be introduced at the level of the metaphorical targets during the lexical analysis, namely the distinction between ABSTRACTOBJECT or CONCRETEOBJECT, or ABSTRACTEVENT and CONCRETEEVENT. It also partially justifies senses of shape words such as "something approximating the shape of", that the reader may recall from tables III.3, pag. 104 and III.5, pag. 110.

WN also shows that the synset `figure.n.06` is directly followed by the synset `plane_figure.n.01` (with 'plane' meaning 'flat'), seemingly implying that shape as figure or form can also exist in one dimension.

```
'triangle.n.01'
 +++ synset hypernyms +++
[Synset('polygon.n.01')]
+++ synset hyponyms +++
[Synset('spherical_polygon.n.01'), Synset('quadrilateral.n.01'),
   Synset('triangle.n.01'), Synset('heptagon.n.01'),
   Synset('convex_polygon.n.01'), Synset('pentagon.n.03'),
   Synset('undecagon.n.01'), Synset('octagon.n.01'),
   Synset('decagon.n.01'), Synset('concave_polygon.n.01'),
   Synset('dodecagon.n.01'), Synset('hexagon.n.01'),
   Synset('isogon.n.01'), Synset('nonagon.n.01')]
[...]
[[Synset('entity.n.01'), Synset('abstraction.n.06'),
   Synset('attribute.n.02'), Synset('shape.n.02'),
   Synset('figure.n.06'), Synset('plane_figure.n.01'),
   Synset('polygon.n.01'), Synset('triangle.n.01')]]
```

```
'square.n.01'
+++ synset hypernyms+++
[Synset('regular_polygon.n.01'), Synset('rectangle.n.01')]
+++ synset hyponyms +++
[Synset('equilateral_triangle.n.01'), Synset('square.n.01')]
[...]
[Synset('entity.n.01'), Synset('abstraction.n.06'),
   Synset('attribute.n.02'), Synset('shape.n.02'),
   Synset('figure.n.06'), Synset('plane_figure.n.01'),
```

```
    Synset('polygon.n.01'), Synset('quadrilateral.n.01'),
    Synset('parallelogram.n.01'), Synset('rectangle.n.01'),
    Synset('square.n.01')]]
```

```
'line.n.01'
+++ synset hypernyms +++
[Synset('formation.n.01')]
+++ synset hyponyms +++
[Synset('rear.n.01'), Synset('line.n.03'), Synset('flight.n.01'),
    Synset('military_formation.n.01'), Synset('head.n.05'),
    Synset('flank.n.01'), Synset('secondary.n.01'),
    Synset('line.n.01'), Synset('center.n.08'),
    Synset('backfield.n.01')]
[...]
[[Synset('entity.n.01'), Synset('abstraction.n.06'),
    Synset('group.n.01'), Synset('arrangement.n.02'),
    Synset('formation.n.01'), Synset('line.n.01')]]
```

```
'point.n.01'
+++ synset hypernyms +++
[Synset('component.n.01')]
+++ synset hyponyms +++
[Synset('plot_element.n.01'), Synset('be-all_and_end-all.n.01'),
    Synset('point.n.01')]
[...]
[[Synset('entity.n.01'), Synset('abstraction.n.06'),
    Synset('psychological_feature.n.01'),
    Synset('cognition.n.01'), Synset('content.n.05'),
    Synset('idea.n.01'), Synset('concept.n.01'),
    Synset('part.n.09'), Synset('component.n.01'),
    Synset('point.n.01')]]
```

```
'shape.n.01'
>>> syn.definition
'any spatial attributes (especially as defined by outline)'
+++ synset hypernyms +++
[Synset('spatial_property.n.01')]
+++ synset hyponyms +++
[Synset('symmetry.n.01'), Synset('directionality.n.02'),
    Synset('asymmetry.n.01'), Synset('obliqueness.n.01'),
    Synset('shape.n.01'), Synset('dimensionality.n.01')]
[...]
[[Synset('entity.n.01'), Synset('abstraction.n.06'),
    Synset('attribute.n.02'), Synset('property.n.02'),
```

```
    Synset('spatial_property.n.01'), Synset('shape.n.01')]]
```

As already previewed, the shape words circle, triangle and square as synsets share the same annotation structure that leads to their representation as ENTITY. If attributed to ontological mapping, some of the synsets that lead to `entity.n.01` are in fact: ENTITY - ABSTRACTION - ATTRIBUTE - SHAPE - [...] - CIRCLE / - TRIANGLE / - SQUARE.

This is useful information for at least two reasons: First, it gives indication of the fact that there exists a close correlation between ENTITY and ABSTRACTION, according to WN.[64] In other words, ENTITY and ABSTRACTION are related by default in WN.

Another point worth mentioning is the relation between ATTRIBUTE and SHAPE. WN seems to acknowledge this bound by its own hypernymic/hyponymic structure.

In chapter 2, 2, page 9, observations on random metaphors and the Embodiment Theory showed that, for some cases, metaphor sources may be better defined through the middle concept SHAPEATTRIBUTE rather than the upper concept SHAPE. Data from WN seem to reiterate it.

The sequential synset distribution from circle, triangle and square to ENTITY could be interpreted as a sequel of properties or attributes that the respective shape should entail in order to be ultimately defined ENTITY. It could also be interpreted as a cognitive process of gradual definition of and from ENTITY. In other words, the annotation structure as just presented may represent the cognitive effort as well as the selective inference (with reference to chapter 2, 2, page 9) that binds the shape word to ENTITY.

The hyponymic structure of the shape words line, point and shape is different. It should be remembered that these words, particularly point and line, are very polyse-

---

[64]'Abstraction' according to Princeton WN means: "a general concept formed by exchanging some common features from specific examples."

mous, and that they their senses have enabled a deeper reading of their ontological features than the other shape words' senses during the lexical analysis.

Line, point and shape follow the respective synsets' order (translated again into ontological upper concepts):

ENTITY - ABSTRACTION - GROUP - ARRANGEMENT - FORMATION - LINE

ENTITY - ABSTRACTION - PSYCHOLOGICAL_FEATURE - COGNITION - CON-TENT - IDEA - CONCEPT - POINT

ENTITY - ABSTRACTION - ATTRIBUTE - PROPERTY - SPATIAL_PROPERTY - SHAPE

Further observations that can be drawn from the hyponymic/hypernymic structure of shape words allowed to justify the composition issue mentioned in the introduction and in chapter 2, in relation to the choice of circle, triangle, square, line, point and shape.

In fact, it was stated that the considered shape words do not intend being exhaustive, but that there might be a motivation in terms of composition between them (it takes a point to make a line, a line to make a circle or any other shape). The found evidence in WN seems to support this approach. It shows for instance that:

- the synset `polygon` is a upper shape shared by both triangle and square
- the synset `equilateral_triangle` is a hyponym of square
- the synset `rectangle` is an hypernym of square
- the synset `parallelogram` is an hypernym of rectangle and square

Finally, the query also revealed that point is not a perfect synonym for dot. In fact, the synset `dot` is directly mapped to the ninth sense of the synset `point`, carrying the sense "a very small circular shape". Hence, point is conceptually higher than dot, as the position of the synset reveals. Finally, while the lemma or synonym marked for dot is point, point itself does not have any lemmas which express the same senses of dot.

The semantic analysis of shape words in WN focused on hypernyms and hyponyms, with further experimentation on other semantic forms as later presented in chapter 3 5, page 249.

This added information on the ontological structure of the shape words as derived from synsets. It shows that circle, triangle and square follow a similar synset path (ENTITY - ABSTRACTION - ATTRIBUTE - SHAPE); while point, line and shape follow the same synset track up to ENTITY - ABSTRACTION, to then divert from it and connect to other synsets. The finding adds to the previous outcome from WN, which enabled the description of all shape words by means of upper as well as mid-level concepts.

The synset relation behind shape words may motivate the ontological / taxonomic structure behind the same words, including when they are used metaphorically.

This observation thus motivated the next step in the investigation, which consists in taking into account resources and repositories in NLTK with an explicit ontological reference, while also providing lexico-semantic information on words, such as FrameNet (FN). The repository annotates in fact words as semantic units, but contrarily to WN, it also provides rather specific definitions of the agents and conditions that need to be there in order for an EVENT or ENTITY to exist. These prerequisites, which are different for each frame, are presented in FN with capitalized first letter and they remind of *ad hoc* ontological concepts introduced by FN annotators.

FN was therefore adopted to derive lexico-semantic and frame-related information on shape words and compare / translate it into standard ontological mapping.

Hence the following paragraph deals with the investigation of shape words as semantic frames.

3.2   Shape words and frames

FrameNet (FN) was mainly developed for a more sophisticated approach to lexicographic studies. Its main creator, Charles J. Fillmore, explains that the intent behind FN is to show "lexical units as related to each other by virtue of belonging to the same frame, and through frame-to-frame relations identified in the database, belonging to words in related frames" ([Fillmore et al., 2003]).

FN aims at documenting the **valences**, or "semantic and syntactic combinatorial possibilities of English vocabulary" [Petruck and de Melo, 2012].

As reiterated on the introductory web page of the FrameNet Project, the main goal of the virtual resource is to try to understand word meanings by considering the word a *semantic frame*, i. e. "a description of a type of event, relation, or entity and the participants in it."[65]

For instance, and by citing the example proposed under the same page, the concept of cooking can be described in terms of the person doing the cooking or Cook, the food that is cooked or Food, the thing that contains or hold the food or Container, and the Heating_instrument to heat food.

Another motivation behind the choice to use FN as linguistic tool is the fact that it is well-suited with the main ontological idea that is behind this research.

Frames are chosen in fact over other possible ways to explore the lexico-semantic nature of shape words (e. g. through the extension of the query in WN) because of their implied / embedded ontological nature. As the example of Cook presented shows, in order for that frame to exist, some prototypical truths or facts need to be postulated *ante facto* (i. e. in the first place). Frames imply in other words the use of prescriptive knowledge, an implication which happens to be the same behind the structure of every ontology in the linguistic domain.

---

[65]`https://framenet.icsi.berkeley.edu/fndrupal/about`

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The difference between ontological representation in FN and in another ontology is nevertheless the fact that the ontological entries in FN have not been checked against a standardized knowledge repository, but they have been introduced as *ad hoc* concepts (information acquired from the online FrameNet documentation).

Frames hold to a certain universality, which makes them similar across languages, as also pointed out by FN developers: "Because frames are basically semantic, they are all similar across languages. For example, frames about buying and selling involve the [frame elements] Buyer, Seller, Good and Money, regardless of the language in which they are expressed."[66]

The ontological nature of frames is reiterated by Minsky, who defines them in AI as it follows:

> A *frame* is a data-structure for representing a stereotyped situation. [...] Attached to each frames are several kinds of information. Some of this information is about how to use the frame. Some is about what one can expect to happen next. Some is about what to do if these expectations are not confirmed. [...] We can think of a frame as a network of nodes and relations. The "top levels" of frames are fixed, and represent things that are always true about the supposed situation. The lower levels have many *terminals* - "slots", that must be filled by specific instances or data [...] [Minsky, 1974]

Similarly to WN, FN also uses its own terminology :

- The term **semantic frame** evokes all possible words and events that appear and occur in the same or similar context of the searched word

---

- the elements of the frames (for instance, Container, Cooking, Cook, Food, in the previous example) are called **frame elements**

- The evoked events (e. g. fry, bake, boil) are called **lexical units**.

FN terminology also includes some frame-to-frame relations such as:[67]

- **Inheritance**: variation of specificity among frames

- **Subframe**: frames of a super frame (e. g. `Trial` and `Arrest` as sub-frames of the super or upper frame `Criminal_process`

- **Using**: a use-based rather than inheritance-based relation between frames (e. g. `Judgment_communication` uses both the frames `Judgment` and `Communication`, but it does not derive from them)

- **Inchoactive_of**, meaning change (e. g. the frame `Change_position_on-_a_scale`; "her salary increased")

- **Causative_of**: the frame `Cause_change_of_scalar_positions` (e. g. "she raised his salary")

- **Perspective_on**: a frame that takes considers the perspective/s of the different agents involved in an event (e. g. `Commerce_sell` versus `Commerce_buy`)

- **Precedes** (a temporal order in the events)

- **Semantic type**: all semantic facts about individual frames that occur in FN, but which are not included into the hierarchy of frames

FN also defines three categories of frame elements (definitions taken from [Petruck and de Melo, 2012]), namely:

- **core frame**: "The frame elements are specific and uniquely define a frame"

- **peripheral frame**: "the frame elements define characteristics of situations and events more generally" (including time, place, manner of an event, note

---

[67]Examples taken from `http://en.wikipedia.org/wiki/FrameNet`. For more information on the semantic relations and types in FrameNet, see under: `https://framenet2.ics i.berkeley.edu/frameSQL/book/6_Semantic_Relations_and_Types.html`

of the author)

- **extra-thematic frame**: the frame element is compared to "another event or state of affairs, such as the frequency with which an event occurs, or a description of a participant in an event in terms unrelated to the event"

As for the state of this research, the NLTK library entails a FrameNet corpus of 1019 frames.

During the information retrieval process in Python, it was noticed that code syntax plays a relevant role in the frame information acquisition.

In fact, the absence or presence of a white space in the command line can determine new results that add value to the meaning of a frame.

The case is shown with two examples of code line here below. The first code line contains a white space between `lemma(r'(?i)` and `circle` and does not generate results. The second code line (2) does not contain the white space at the same place, and retrieves some kind of information.

```
(1) fn.frames\_by\_lemma(r'(?i) circle') >> []
(2) fn.frames\_by\_lemma(r'(?i)circle') >> [<frame ID=7
    name=Motion>, <frame ID=76 name=Adorning>, ...]
```

It should be mentioned that this peculiarity in coding is only partially notified online.[68]

In light of this observation, and in the attempt to retrieve as much lexico-semantic knowledge as possible about shape words and frames, three different approaches were therefore adopted during the query:

1. The bottom-up (or lexical unit-to-frame) approach, implying information retrieval for the shape word as lexical unit entailed in frames (alias queries of shape words mapped to frame)

2. The top-down (or word-to-frame) approach. Information has been retrieved from shape words as directly linked to frames (alias shape words as frames).

---

[68]The NLTK Cookbook shows examples with a white space in the coding line; `http://www.nltk.org/howto/framenet.html`

The search has proved to be successful for the shape words line, point and shape.

3. Leveled approach (or frame-to-frame approach). Information on the shape word has been retrieved from different frames simultaneously. This exploration "returns a list of all the frames that contain lexical units in which the "name" attribute of the lexical units matches the given regular expression "pat".[69] This means that the same shape word appears as noun attribute in multiple frames.

3.2.1 Bottom-up or lexical unit-to-frame approach

Shape words in FN are not always mapped as frames, but they can also be lexical units of frames or across frames.

This piece of information hints that frame information can be located by looking at shape words as lexical units while trying to climb the semantic ladder to the upper frame/s. As the reader might recall from the information on the FN terminology provided earlier in the text, FN lexical units are defined as "evoked events".

The information extraction process was run at least twice for each shape word as lexical unit, to make sure to consider code sensible spaces. Information in the following code snippets shows the case.

Information retrieved through the `lus()` function *with* a white space before the shape word in the command line:

```
pprint(fn.lus(r'(?i) <shape word>'))
CIRCLE:  []
SQUARE: []
TRIANGLE: : []
LINE: [<lu ID=14632 name=(in/out) line.n>]
POINT: [<lu ID=12492 name=high point.n>, <lu ID=12493 name=low
   point.n>]
```

---

[69]From the NLTK Corpus Reader, section on FrameNet: `http://www.nltk.org/_modul es/nltk/corpus/reader/framenet.html`

```
SHAPE: [<lu ID=5754 name=take shape.v>]
```

Information retrieved through the `lus()` function *without* a white space before the shape word in the command line:

```
pprint(fn.lus(r'(?i)<shape word>'))
CIRCLE : [<lu ID=1638 name=encircle.v>, <lu ID=2662
    name=circle.n>, ...]
SQUARE: [<lu ID=6232 name=square.v>, <lu ID=5836 name=square.n>,
    ...]
TRIANGLE: [<lu ID=15367 name=triangle.n>]
LINE: [<lu ID=15365 name=line.n>, <lu ID=13958 name=Dubliner.n>,
    ...]
POINT: [<lu ID=802 name=disappoint.v>, <lu ID=14307
    name=appoint.v>, ...]
SHAPE: [<lu ID=11417 name=shape.n>, <lu ID=5754 name=take
    shape.v>, ...]
```

Although the first run of the query did not generate results for all shape words, tropes were automatically linked to the respective shape word, such as in the case of the collocations high point and low point for point, in and out of line for line and take shape for the word shape.

This outcome revealed several aspects of the frame annotation in FN: (a) frame results retrieve all kinds of POS (nouns, verbs, adjectives, adverbs) as well as proper nouns (as evident in the second run of coding) (b) the frame annotation includes tropes (which can also be investigated separately with a discreet margin of success, as discussed in future research).

Since the first query did not provide successful results, another search was carried without a white space in the command line. The outcome was more detailed than the previous one and it reported information for all the considered shape words. FN adds specific ID to each frame, to allow further investigation.

Circle is mapped to two frames, `lu ID=1638 name=encircle.v` and `lu ID=2662 name=circle.n`

```
fn.lu(1638)

lexical unit (1638): encircle.v

[definition] COD:  form a circle around; surround.

[frame] Adorning(76)

[POS] V

[status] FN1_Sent

[lexemes] encircle/V

[semTypes] 0 semantic types


fn.lu(2662)

lexical unit (2662): circle.n

[definition] COD: a group of people with a shared profession,
    interests, or acquaintance

[frame] Aggregate(103)

[POS] N

[status] Finished_Initial

[lexemes] circle/N

[semTypes] 0 semantic types
```

The acronym COD stands for Content Of Definition, which corresponds to sense in WN. It has nevertheless to be mentioned, and this applies to all frames, that the definitions in FN do not correspond to senses in WN. They might recall some of the meanings already contemplated in WN, but the two are different.

The [status] "Finished_Initial", such as in the form of "FN1.1", "FN1.2", "FN1.3", means that the definition of COD will be followed by links to HTML files for the lexical entry and the annotated sentences.[70]

When mapped to the frame Adorning, the word **circle** retains the physical form and properties of a circle ("form a circle around", "surround"). The cardinal number following Adorning, 76, refers to the total number of lemmas mapped to this frame.

---

[70]From `http://framenet.icsi.berkeley.com`

The second retrieved lexical unit for circle bears a metaphorical meaning, standing for "a group of people' sharing something", which reminds of a similar definition for the shape word found under WN. Circle is mapped to the frame 'Aggregate'.

The metaphor in circle as group of people sharing something has to be intended as the word circle being the source or carrier of information, with the target being its own definition. The expected definition for circle, a geometric figure or SHAPE, is namely overlooked to the benefits of the upper concept PERSON.

Square was annotated as both a verb (`lu ID=6232 name=square.v`) and a noun (`lu ID=5836 name=square.n`). The first frame mapping (square as a verb) reminds of the WN sense number 5 and WN sense number 3 of the 8 senses of the word square as POS verb, namely "to be compatible with" and "to cause to match, as of ideas or acts".

Hence, it is implied that the shape word is not considered as physical object, but as an abstract process of (aggregation) and matching / compatibility.

Square as a noun is mapped to the frame Shapes, which again refers to tangible, physical objects.

Also **triangle** (`lu ID=15367 name=triangle.n`: "a three-sided geometric shape") and **line** ("a one-dimensional shape of some substance") are mapped to the same frame.

```
lexical unit (6232): square.v
[definition] COD: be compatible
[frame] Compatibility(360)
[POS] V
[status] Finished_Initial
[lexemes] square/V
[semTypes] 0 semantic types


===========================

lexical unit (5836): square.n
```

```
[definition] COD: a plane figure with four equal straight sides
   and four right  angles.
[frame] Shapes(328)
[POS] N
[status] Finished_Initial
[lexemes] square/N
[semTypes] 0 semantic types
```

Point is mapped to the frames `lu ID=12492 name=high point.n` and `lu ID=12493 name=low point.n` and it stands for the abbreviated form of the collocations high and low point.

```
lexical unit (12492): high point.n
[definition] FN: a point of high development or power
[frame] Extreme_point(1573)
[POS] N
[status] Needs_SCs
[lexemes] high/A point/N
[semTypes] 0 semantic types

lexical unit (12493): low point.n
[definition] FN: a point of low development or power
[frame] Extreme_point(1573)
[POS] N
[status] Created
[lexemes] low/A point/N
[semTypes] 0 semantic types
```

When used within the context of a collocation, point is matched to the frame Extreme_Point, which does not refer to a Dimension, but to "development or power". Therefore, the attributes high and low should be detached from any spatial definition in literal meaning. The lexical unit high point is similar in meaning to specific WN point's senses, particularly `wn.synset(`point.n.14'` ("an outstanding characteristic") and `wn.synset(`point.n.23')` ("a distinguishing and individuating characteristic").

A full definition of the frame Extreme_point is provided in the following:

```
frame (1573): Extreme_point
```

```
[definition]  An Entity that has characteristics which change
   over time is at a point or in a phase of its development in
   which, compared to other actual or expected stages of
   development, it possesses extremely high or low powers or
   intensity.  The high or low level of development correlates
   with the occurrence of a Marker, a product produced by the
   Entity or an event in which it participates, which is
   indicative of the Entity's abilities or intensity.  'The Tang
   Dynasty was the high point of the Silk Road's importance.'
   'Meeting Fiona Bennett was the low point of my summer.'  'It
   must be remembered that this man was born at the zenith of
   the Victorian age and witnessed the glory of Britain at her
   greatest.'  'But Lubitsch was at the high point of his
   genius, and he has made a masterpiece not to be missed.'

[semTypes] 0 semantic types

[frameRelations] 1 frame relations
  <Parent=Gradable_attributes -- Using -> Child=Extreme_point>

[lexUnit] 5 lexical units
  high point.n (12492), high-water mark.n (12491), low point.n
     (12493), nadir.n (12495), zenith.n (12494)

[FE] 2 frame elements
          Core: Entity (8609), Marker (8610)

[FEcoreSets] 0 frame element core sets
```

Shape as a lexical unit is linked to two frames, namely `lu ID=11417 name=shape.n` and `lu ID=5754 name=take shape.v`. In the first case, shape is a noun specifying "the outline of an area or figure", which is supposedly concrete, since it owns "an external form or appearance". In the second case, shape is considered as the phrasal verb to take shape. The frame it corresponds to, Coming_to_be, is active, meaning "(an abstract entity) starts to be". The information that can be retrieved from this definition is that an approximated or coming to being shape can still be defined a shape.

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```
lexical unit (11417): shape.n
[definition] COD: the external form or appearance of someone or
    something; the outline of an area or figure.
[frame] Shapes(328)
[POS] N
[status] Finished_Initial
[lexemes] shape/N
[semTypes] 0 semantic types

lexical unit (5754): take shape.v
[definition] FN: {an abstract entity) starts to be actualized
[frame] Coming_to_be(316)
[POS] V
[status] Created
[lexemes] take/V shape/N
[semTypes] 0 semantic types
```

Conclusions on the bottom-up approach

The search for shape words in frames was conducted through different runs of coding, by paying attention to the presence or absence of white spaces. In this way, it was possible to retrieve information for all the considered words in the form of lexical units.

- Circle is mapped as a noun and as a verb (to encircle), to the frame Adorning. The shape word in the same POS is also mapped in FN to the frames Filling and Abounding_with, also shared by line as POS verb. The frame "involves a static (primarily spatial) relation between a Location and a Theme" (definition extracted from FN). The implication behind this mapping is therefore that to circle, as well as to line, are used to describe static processes, i. e. a state-of-being or concluded processes.

  When used as a noun, circle is mapped to the frame Aggregate. This does not refer to physical Entities, but to "a group of people with a shared profession,

interests or acquaintance".

- The shape word square is also mapped as a verb and as a noun in FN. To square is a lexical unit linked to the frame Compatibility, which means "Item-1 and Item-2 are compatible with each other if they can exist or function together in some context without problems, conflict or other undesirable situation". The frame elements that need to exist for this frame to be complete are therefore an Item_1, an Item_2, or Items as well as a Parameter.

- Square, triangle and line as nouns are all mapped to the frame Shapes.

- Finally, shape is also mapped as a noun and as a verb to frames. As the latter, it is to be found under the frame Coming_to_be, which describes the active process of something turning into something else, hence implying the acknowledgment that an approximation of shape is still a shape. Shape as POS noun is matched to the frames Shapes.

A complete definition of the frame Shapes follows here below. It is worth noticing that the FN annotators clearly stated that the words contained under this frame should not refer to a part-whole relation, thus pointing out that there may be little sense in trying to find meronymic or constitutive quale-laden components in it (with reference to the GL theory presented in chapter 2, 2, page 9).

```
frame (328): Shapes

[definition]
  This frame contains words which describe the dimensional extent
      and Shape of a Substance.  These words do not make
      reference to a Part-whole relationship. There can also be a
      descriptor of the Shape, Shape_prop.  'She held a square of
      cloth.'

[semTypes] 0 semantic types

[frameRelations] 2 frame relations
  <Parent=Bounded_entity -- Using -> Child=Shapes>
  <Inchoative=Go_into_shape -- Inchoative_of -> Stative=Shapes>
```

```
[lexUnit] 23 lexical units
  ball.n (5866), circle.n (5847), circular.a (14583), coil.n
     (5838), cube.n (5840), curve.n (13820), ellipse.n (15372),
     expanse.n (5846), length.n (5867), line.n (15365), oval.n
     (15370), ribbon.n (5844), round.a (15371), row.n (15366),
     shape.n (11417), sheet.n (5837), square.n (5836), stick.n
     (5841), stretch.n (5843), strip.n (5842), triangle.n
     (15367), v.n (15369), wedge.n (15368)



[FE] 4 frame elements
          Core: Shape (2861), Substance (2860)
     Peripheral: Count (2974), Shape_prop (2862)

[FEcoreSets] 0 frame element core sets
```

3.2.2   Top-down or word-to-frame approach

FN queries in the bottom-up fashion revealed that information on shape words and frames could be retrieved through several runs of coding and with the shape words considered as lexical units mapped to frames.

In the attempt to fully grasp the wealth of information contained in FN, another approach was taken, which was defined top-down or (shape) word-to-frame. It implies the search for shape lemmas as directly linked as frames.

Information retrieved through the `pprint(fn.frames(r'(?i)` function with a white space before the shape word:

```
pprint(fn.frames(r'(?i) <shape word>'))
CIRCLE: []
TRIANGLE: []
SQUARE: []
POINT: []
LINE: []
SHAPE: []
```

Information retrieved through the `pprint(fn.frames(r'(?i)` function without a white space before the shape word:

```
pprint(fn.frames(r'(?i)<shape word>'))
CIRCLE: []
TRIANGLE: []
SQUARE: []
POINT: [<frame ID=1608 name=Point_of_dispute>, <frame ID=1573
   name=Extreme_point>, ...]
LINE: [<frame ID=154 name=Measure_linear_extent>]
SHAPE: [<frame ID=328 name=Shapes>, <frame ID=2137
   name=Go_into_shape>, ...]
```

In both cases, information was retrieved only for the shape words point, line and shape.

Point is marked in FN as two kinds of frames, Point_of_dispute and Extreme_point. The latter has been previously discussed.

Point_of_dispute is metaphorical in meaning, with point being the source and MATTER (suggested upper concept) being the target, with Question as core frame. The adoption of point as this particular frame reminds similar senses of point POS noun in WN, collected under `wn.synset(`point.n.03')` ("a brief version of the essential meaning of something") and `wn.synset(`point.n.07')` ("the object of an activity"), as described in the information grid of the frame here below:

```
pprint(fn.frames(r'(?i)point'))
[<frame ID=1608 name=Point_of_dispute> ]

point 1 = fn.frame(1608)

[definition]
  The answer to a Question is under discussion in a Group, which
     still  has a difference of opinion among its members. The
     prominence of the Question relative to others can be
     indicated by a Status expression. 'Firstly, it is quite
     clear the issue in this context was not so much apostasy as
     much as it was treason.' 'The question in Finucane's case
```

```
      is this: will an inquiry bring out the truth?'  'It remains
      an issue of central importance to women.'  'Democracy in
      Serbia was blocked by the unresolved national question.'


[semTypes] 0 semantic types


[frameRelations] 2 frame relations
  <Parent=Be_in_agreement_on_assessment -- Using ->
     Child=Point_of_dispute>
  <Parent=Discussion -- Using -> Child=Point_of_dispute>


[lexUnit] 3 lexical units
  concern.n (13234), issue.n (12630), question.n (12632)


[FE] 8 frame elements
            Core: Question (8847)
      Peripheral: Context (8855), Domain (8854), Group (8849),
         Status (8852), Time (8856)
  Extra-Thematic: Descriptor (8853), Point_of_view (8857)
```

Line as frame is mapped as Measure_Linear_Extent, and it is annotated with the semantic type transparent noun, as it can be read in the full description of the frame:

```
frame (154): Measure_linear_extent

[definition]
  This frame is concerned with nouns that denote Units of
     measurement for linear extent. The Frame Elements are Unit,
     Count, and Stuff. 'The shirt is made from 12 miles of pure
     cotton.' '81 miles of dyke are still visible from this
     point.'


[semTypes] 1 semantic types
  Transparent Noun(9)


[frameRelations] 1 frame relations
  <Parent=Measures -- Inheritance -> Child=Measure_linear_extent>


[lexUnit] 11 lexical units
  block.n (14502), centimeter.n (2818), foot.n (2815), furlong.n
     (13486), inch.n (2812), kilometer.n (2817), light-year.n
```

```
      (13487), meter.n (2816), mile.n (2813), millimeter.n
      (2819), yard.n (2814)


[FE] 4 frame elements
         Core: Count (1193), Stuff (1194), Unit (1195)
      Peripheral: Dimension (13036)


[FEcoreSets] 0 frame element core sets
```

According to [Fillmore et al., 2003], transparent nouns appear in the syntactic construction N1-of-N2, such as "a glass of water", "a sheet of paper", "a piece of bread", and include (examples taken from [Fillmore et al., 2003]):

- aggregates (like *bunch, group*)

- quantities (like *gaggle, flood*)

- types (like *kind, ilk*)

- portions and parts (*top, piece*)

- unitizers (*container, flask*)

- evaluations (*gem, idiot*)

These nouns play a supportive role to the main verb. They act as syntactic head (N1) supporting the semantic head (N2), as in the example "Maria [sipped] [a *glass of wine*]" ('glass' is the transparent word; 'wine' is the semantic head).

Because of their supportive role, transparent nouns may be omitted in discourse.

Transparent words have been also encountered during the WN analysis, specifically in the tables III.3, pag. 104 and III.5, pag. 110.

Some of the original examples as taken from WN and as reported in table III. 10, page 160 are provided here below. As the reader may notice, the omission of the respective shape words does not alter the meaning of the sentence (the versions with the omitted shape word are under the column "Other way of saying").

Back to the analysis of shape words as frames in the top-down approach, line

---

[71]Examples of transparent words as taken from the examples in WN, (III.3, pag. 104; III.5, pag. 110).

Original Example[71]	Other way of saying
'a *line* of depressed skin	'depressed skin'
'a *line* of notes	'(some) notes'
'a production *line*'	'the production'
'a *point* of time'	'time'
'a *point* of loan'	'the loan'
'the *shape* of the human body'	'the human body'

Table III.10: Examples of transparent words

is matched to the frame Measure_linear_extent, which either invokes units of measurement, the act of measuring, the stuff measured or, more generically, the dimensionality that is involved in the process.

From the information provided about the frame, the word line seems therefore to be linked to tangible, concrete objects, with no implications of abstraction.

Finally, the word **shape** is mapped to two different frames, Shapes and Go_into_shape. While the first has already been discussed, information about the latter follows:

Lemmas mapped under the frame Go_into_shape do not need to have "a default shape or configuration". In fact, Place, Time and Manner are only peripheral frame elements of this frame. Its parent frame is the frame relation Event - Inheritance, meaning that shape acquires from it the features proper of an Event.

```
shape2 = fn.frame(2137)

frame (2137): Go_into_shape

[definition]
  A Theme, which may or may not have a default shape or
     configuration, goes into a particular shape. Depending on
     the type of shape, there may be a Locus about which the
     Theme changes shape.
```

```
[semTypes] 0 semantic types

[frameRelations] 2 frame relations
  <Parent=Event -- Inheritance -> Child=Go_into_shape>
  <Inchoative=Go_into_shape -- Inchoative_of -> Stative=Shapes>

[lexUnit] 3 lexical units
  coil.v (15618), curl.v (15619), twist.v (15620)

[FE] 7 frame elements
            Core: Theme (13248)
      Peripheral: Manner (13246), Place (13242), Time (13244)
  Extra-Thematic: Duration (13245), Frequency (13247), Reason
      (13243)

[FEcoreSets] 0 frame element core sets
```

Conclusions of the top-down approach

After a first investigation of shape words linked as lexical units to frames (bottom-up or lexical unit-to-frame approach), the presented section dealt with the analysis of the same words as mapped in FN as direct frames (word-to-frame approach). Information was retrieved for the words point, line and shape.

- Point is mapped as frame Point_of_dispute and Extreme_point. Both frames can be interpreted as metaphors. In the case of Point_of_dispute, in fact, point stands as the source of the target Question or MATTER (suggested upper concept). In the case of Extreme_point, point stands as the source or Marker of the target Entity.

- Line is mapped as frame Measure_Linear_Extent, meaning that line as Measure regroups all nouns that are needed to define and calculate a Linear_Extent. It follows that the Entities related to line with this meaning may be tangible and concrete, so to able to measure them.

- Shape corresponds to the frames Shapes and Go_into_shape. In the case of the first frame, shape is an Entity owning Dimension and Substance. In the case of Go_into_shape, shape corresponds to a Theme, and hints to the fact that an approximation of shape may still be validated in language as a shape.

3.2.3   Leveled Approach or Frame-to-Frame Approach

The last and third part of the frame analysis for shape words dealt with the search for information on shape words by following a frame-to-frame approach.

The `fn.frames_by_lemma` function in NLTK returns in fact a "a list of all the frames containing lexical units in which "the 'name' attribute of the lexical unit matches the given regular expression".[72]

Information retrieved through the `fn.frames_by_lemma(r'(?i)` function with a white space before the shape word:

```
fn.frames_by_lemma(r'(?i) circle') : []
fn.frames_by_lemma(r'(?i) square'): []
fn.frames_by_lemma(r'(?i) triangle'): []
fn.frames_by_lemma(r'(?i) line'): [<frame ID=117 name=Compliance>]
fn.frames_by_lemma(r'(?i) point'): [<frame ID=1573
   name=Extreme_point>]
fn.frames_by_lemma(r'(?i) shape'): [<frame ID=316
   name=Coming_to_be>]
```

Information retrieved with the `fn.frames_by_lemma(r'(?i)` function without a white space before the shape word:

```
fn.frames_by_lemma(r'(?i)circle') : [<frame ID=7 name=Motion>,
   <frame ID=76 name=Adorning>...]
fn.frames_by_lemma(r'(?i)square'): <frame ID=328 name=Shapes>,
   <frame ID=360 name=Compatibility>
fn.frames_by_lemma(r'(?i)triangle'): [<frame ID=328 name=Shapes>]
fn.frames_by_lemma(r'(?i)line'): [<frame ID=64 name=Self_motion>,
   <frame ID=76 name=Adorning>, ...]
```

---

[72]http://www.nltk.org/howto/framenet.html

```
fn.frames_by_lemma(r'(?i)point'): [<frame ID=25 name=Evidence>
fn.frames_by_lemma(r'(?i)shape'): [<frame ID=316
   name=Coming_to_be>, <frame ID=328 name=Shapes>, ...]
```

The results of the `frame_by_lemma` search obtained without adding a white space in the command line partially corresponded to the results obtained through the bottom-up and the top-down approaches.

The outcome of the level-to-level approach was therefore proposed again here below, this time together with the specification about overlapping information as obtained through the two previous approaches to the data.

- CIRCLE: mapped to the `frame ID=76 name=Adorning`; same outcome obtained through a bottom-up and a frame-to-frame approach

- SQUARE: mapped to `frame ID=360 name=Compatibility` and `frame ID=328 name=Shapes`; same outcome obtained through the bottom-up and the level-to-level approach

- TRIANGLE: mapped to `frame ID=(328) name=Shapes`

- POINT: mapped to `frame ID=1573 name= Extreme_point`; same outcome obtained through both the bottom-up and the top-down approaches

- LINE: mapped to `frame ID=76, name=Adorning`

- SHAPE: mapped to `frame ID=328, name=Shapes`

All frames contained in this list have already been discussed.

On the contrary, information retrieved from the frame-to-frame approach obtained by adding a white space in the coding line, revealed new results, particularly: line as name attribute matching the frames Compliance and Self_Motion; point as name attribute matching the frames Evidence, and shape as linked to the frame Coming_to_be (also already discussed).

Line is linked to Compliance, which vaguely resembles the Compatibility frame associated to square. The frame carries a highly abstract meaning, as its following full description shows. As a side note, the term compliance in WN is mapped to three

synsets: `conformity.n.02`, `complaisance.n.01` and `submission.n.`
`02`.

```
fn.frames_by_lemma(r' (?i)line')
[<frame ID=117 name=Compliance>]

line = fn.frame(117)
line

[definition]
  This frame concerns Acts and State_of_Affairs for which
     Protagonists are responsible and which either follow or
     violate some set of rules or Norms

[lexUnit] 34 lexical units (IN/OUT) LINE.n (14632),
   abide_((by)).v (12695), adhere.v (2331), adherence.n (2334),
   breach.n (2345), breach.v (2342), break.v  (2339),
   circumvent.v (12776), compliance.n (2336), compliant.a
   (2730), comply.v (2332), conform.v (2420), conformity.n
   (12689),  contrary.a (12167), contravene.v (2341),
   contravention.n (2344),  disobey.v (14652), flout.v (2346),
   follow.v (2337), honor.v (12694), in accordance.a (14712),
   keep.v (12693), lawless.a (11423), noncompliance.n (13321),
   obedient.a (12696), obey.v (2464), observance.n (2338),
   observant.a (12697), observe.v  (2333), play by the rules.v
   (12698), transgress.v (10491), transgression.n (10492),
   violate.v (2340), violation.n (2343)

[FE] 12 frame elements
          Core: Act (613), Norm (640), Protagonist (612),
             State_of_Affairs (614)
     Peripheral: Degree (1114), Judge (10260), Manner (1117),
        Means (1118), Reason (4754), Time (3608)
  Extra-Thematic: Depictive (1115), Result (1119)

[FEcoreSets] 1 frame element core sets
  State_of_Affairs, Protagonist, Act
```

Moreover, the noun attribute line as mapped to the frame Compliance in FN
evokes the WN sense "acting as conformity" (e. g. "[to be] in line with", "he goes out
of line", "toe the line"; examples and definitions retrieved from `wn.synset(li-`

`ne.n.16)` in table III.3, pag. 104).

In the frame-to-frame approach, line is also matched to the frame Self_motion, whose description follows:

```
frame (64): Self_motion

[definition]
  The Self_mover, a living being, moves under its own power in a
     directed fashion, i.e. along what could be described as a
     Path, with no separate vehicle.

[lexUnit] 145 lexical units
[...] hike.v (1178), hitchhike.v (1179), hobble.v (1180), hop.v
   (1181), hurry.v (1182), jaunt.n (1183), jog.v (1184), jump.v
   (1185), leap.v (1186), limp.v (1187), lope.v (1188), lumber.v
   (1189), lunge.v (1190), lurch.v (1191), MAKE A BEELINE.v
   (8221), make.v (6404), march.n (1192), [...]

  [FE] 23 frame elements
          Core: Area (291), Direction (9348), Goal (288), Path
             (287), Self_mover (285), Source (286)
     Peripheral: Distance (290), Duration (3164), Manner (289),
         Means (1983), Path_shape (9871), Place (4890), Purpose
         (3165), Speed (1979), Time (1977)
      Extra-Thematic: Concessive (14071), Coordinated_event
          (9475), Cotheme (1978), Depictive (1982),
          External_cause (6505), Internal_cause (1987), Reason
          (5054), Result (1984)

[FEcoreSets] 1 frame element core sets
  Goal, Direction, Path, Source
```

The frame Self_motion implies the presence of core elements Goal, Direction, Path and Source.

Finally, line as noun attribute in the frame-to-frame approach is mapped to the frame Adorning, which "involves a static (primarily spatial) relationship between a location and a theme", as it may be recalled from previous description.

The frame Extreme point, to which **point** happens to be mapped, makes point

stand as a Marker of the intensity of an Entity. The collocations high point and low

point thus do not refer to the Direction or position of the Entity, but to its intensity.

In the leveled approach, point is also mapped to the frames Evidence. A full

description of the frame follows:

```
frame (25): Evidence

[definition]
  The Support, a phenomenon or fact,  lends support to a claim or
     proposed course of action, the Proposition, where the
     Domain_of_Relevance may also be expressed.  Some of the
     words in this frame (e.g. argue) are communication words
     used in a non- communicative, epistemic sense.  'The latest
     poll results show that support of the president is at an
     all-time low.'

[semTypes] 0 semantic types

[frameRelations] 2 frame relations
  <Parent=Evidence -- Using -> Child=Explaining_the_facts>
  <Parent=Evidence -- Using -> Child=Sign>

[lexUnit] 28 lexical units
  argue.v (8340), argument.n (240), attest.v (241), confirm.v
     (242), contradict.v (7800), corroborate.v (243),
     credence_((lend)).n (13551), demonstrate.v (244),
     disprove.v (7799), evidence.n (10843), evidence.v (245),
     evince.v (246), from.prep (10878), illustrate.v (12782),
     imply.v (11449), indicate.v (11448), mean.v (8690), point
     to.v (13329), proof.n (11738), prove.v (247), reveal.v
     (248), show.v (249), substantiate.v (250), suggest.v
     (11414), support.v (14741), tell.v (15307), testify.v
     (251), verify.v (252)

[FE] 9 frame elements
          Core: Proposition (108), Support (107)
     Peripheral: Cognizer (7423), Degree (1016), Manner (1020),
        Means (1021)
  Extra-Thematic: Depictive (1023), Domain_of_Relevance (1543),
     Result (1028)
```

Shape, in the frame-to-frame approach, is mapped to both the frames Shapes and Coming_to_be. The first, as already learned, describes Dimension and Shape (or Shape properties) of a Substance, implying that Substance is something tangible that can measured and positioned in Space.

```
fn.frames_by_lemma(r'(?i)shape')
[<frame ID=316 name=Coming_to_be>, <frame ID=328 name=Shapes>,
    ...]
```

The definition of the frame Coming_to_be follows:

```
frame (316): Coming_to_be

[definition]
  An Entity comes into existence at a particular Place and Time
     which may take a certain Duration_of_endstate, have a
     Cause, or be formed from Components. 'Mountains sometimes
     form in as little  as a million years.' 'A new paradigm
     emerged from the discussion of nuclear weapons.' 'New
     Plants form from the cut veins in two weeks.'

[semTypes] 0 semantic types

[frameRelations] 4 frame relations
  <Parent=Coming_to_be -- Inheritance -> Child=Being_born>
  <Complex=Cycle_of_existence_scenario -- Subframe ->
     Component=Coming_to_be>
  <Inchoative=Coming_to_be -- Inchoative_of -> Stative=Existence>
  <Earlier=Coming_to_be -- Precedes -> Later=Existence>

[lexUnit] 12 lexical units
  appear.v (5751), arise.v (5752), coalesce.v (5758), come into
     existence.v (7346), come to be.v (5750), develop.v (5756),
     emerge.v (5753), evolve.v (13978), form.v (5749),
     materialize.v (5818), spring up.v (6246), take shape.v
     (5754)

[FE] 9 frame elements
           Core: Entity (2743)
      Peripheral: Manner (11943), Place (2744), Time (2745)
  Extra-Thematic: Cause (2746), Components (2760),
```

```
    Duration_of_endstate (2853), Period_of_Iterations (3040),
    Role (2972)
```

```
[FEcoreSets] 0 frame element core sets
```

Shape as an Entity is specified in the frame Coming_to_be as long as this entity exists in a particular Place and Time, has a Cause or has Components. The process of an Entity coming into being suggests that shape is subject to changes and involved in a dynamic development.

Conclusions of the Leveled Approach

The information extracted through the leveled or frame-to-frame approach partially validated findings retrieved through the bottom-up and the top-down approaches. In this query, shape words act as noun attributes of the frames. The search revealed new information about shape words in FN, particularly:

- line is mapped to the frames Compliance and Self_motion. The first frame, Compliance, concerns Norm and State_of_Affairs, and it requires the presence of Protagonists who either follow or break Rules. When matched to this frame, the shape word line thus holds metaphorical validity, standing for a certain kind of behavior and attitude. The second frame for line, Self_motion, implies the existence of core elements such as Goal, Direction, Path and Source for an event to exist.

- point is mapped to the frame Evidence, where a claim or fact called the Support sustains the argumentation or Proposition made and where a Domain_-of_Relevance may also be expressed.

- shape is mapped to the frame Coming_to_be, describing an Entity coming into existence at a particular Time and Place.The latter components of the frame are the only specification for an Entity such as a shape to be created, since the frame does not provide further information about other features or prerequisites. The nature of the process is dynamic.

3.2.4   Section conclusions

The lexical analysis conducted on WN on shape words as POS noun and on different levels of granularity showed the presence of metaphorical meanings for all considered words, with the respective shape being the source and its sense / s being the target of a metaphor. In particular, targets were mapped to ontological mid-level concepts (CONCRETE/ABSTRACTOBJECT, CONCRETE/ABSTRACTEVENT, PERSON). The semantic analysis of the shape words conducted on their hypernyms and hyponyms revealed that circle, triangle and square all share the same structure, being ENTITIes with inherited features of ATTRIBUTE and ABSTRACTION. Line, point and shape follow another composition, although they are also ENTITIes that entail ABSTRACTION as feature.

The lexico-semantic analysis was deepened through the investigation of shape words and frames. Frames imply some prescriptive knowledge, i. e. some universal truth of reality that always holds. Differently from synsets, where the only contextual information provided is in the examples, frames present a COD or Content of Description which describes rather in details the conditions or prescriptive truths that need to exist for a frame to be defined as such. Hence, frames remind of the structure of an ontology in linguistic terms, although it needs to be reminded that the frames' labels have been developed *ad hoc* by FN annotators, and they have not been taken from any ontology. Therefore, although the first letter of frames in FN is capitalized like in SUMO, the two should not be confused.

The queries were conducted on three different levels, and with different coding approaches for each level. They include:

- A bottom-up or lexical unit-to-frame approach: Shape words are searched as lexical units or events entailed in frames
- A top-down or word-to-frame approach: Shape words are searched as direct

frames

- A leveled or frame-to-frame approach: Shape words are searched as attributes of frames

The outcome of the investigation was summarized in table III.12, page 170, which follows.

Shape word	Bottom-up Appr.	Top Down Appr.	Leveled Appr.
Circle	Adorning (encircle.n); Aggregate (circle.n); Shapes (circle.n)		Motion; Adorning
Triangle	Shapes (triangle.n)		Shapes
Square	Compatibility (square.v); Shapes (square.n)		Shapes; Compatibility
Line	Shapes (line.n)	Measure_Linear_Extent	Self_motion; Adorning
Point	Extreme_Point (high point.n; low point.n)	Point_of_Dispute; Extreme_Point	Evidence
Shape	Shapes (shape.n); Coming_to_be (take shape.v)	Shapes; Go_into_shape	Coming_to_be; Shapes

Table III.12: Summary of information on shape words and frames

Three major observations could be drawn from the FN queries:

1. Shape words can, when studied in frames (as well as to synsets), be ambivalently classified as either concrete or abstract entities or events, which can be consequently ontologically mapped as CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT. [73]

   This evidence restates the major finding in the previous WN search, which has pointed out the need and ability to introduce a level of concreteness versus abstraction in the ontological mapping of shape words when used metaphori-

---

[73] The use of the upper concept OBJECT is used here interchangeably with the upper concept ENTITY.

cally.

2. The study of frames and shape words also enabled the introduction of another level of specificity, namely the differentiation, retrieved from the frame descriptions, between dynamic or static event. This piece of information is often provided in the frame meaning. For instance, circle as linked to the frame Aggregate is a dynamic process, while when mapped to Adorning it "involves a static (primarily spatial) relationship. Line, as mapped to Measure_linear_extent or measurement of a linear extension, is also a static fact. This condition may result useful in the attempt to further identity concreteness as a property, whether it is the outcome of a dynamic process of changes and development or whether it is a given fact with no specification about its origins.

3. Shape words entail metaphorical meanings.

Further observations, which have also been facilitated by the specification, provided by FN, of core, peripheral and extra-thematic frames, include:

The mostly shared frame across all shape words is Shapes. The frame, whose full description has been previously presented in the conclusions of the bottom-up approach, "contains words which describe the dimensional extent and Shape of a Substance" that can have specific properties. It follows that circle, triangle, square, line and shape all share the core frames Shape and Substance as well as the peripheral frames Shape_prop. and Count.

As specified in the COD of the frame, Shapes is stative, while it is bound to to the frame Go_into_shape through the inchoactive (meaning change) property.

The frame description enables therefore to assume that, when the shape words considered are matched to Shapes, they act like CONCRETEOBJECT.

Metaphorical meanings could be retrieved from shapes and frames, particularly for the shape words circle, square and point.

Circle, as lexical unit mapped to the frame Aggregate, bears the meaning of "a group of people sharing something". A similar expression had been retrieved in WN for circle, and it had been mapped to PERSON. The frame Aggregate though specifies a whole event, whose status is dynamic, as defined in Finished_Initial, meaning that it may be reductive to describe the dynamics of Aggregate with PERSON alone. SHARINGPERSON could be therefore a suggested alternative middle concept.

Square is linked to the frame Compatibility, which is also linked to the status Finished_Initial, hinting the presence of a whole event. In SUMO / WN, the lemma 'compatibility' has been matched to the concepts SubjectiveAssessmentAttribute and EmotionalState. The proposed middle concept for square when used in the Compatibility event is instead ATTITUDE or STATEOFMIND, since it implies a certain state of mind and emotional state to comply to a certain situation or to rules.

Point, in the form of high and low point (two collocations), is matched to the frame Extreme_point, which "correlates with the occurrence of a Marker, a product produced by the Entity or an event in which it participates".[74] Point should therefore be treated as ABSTRACTEVENT or CONCRETEEVENT, not as OBJECT defined in spatial and dimensional settings.

Point is also linked to the frame Point_of_dispute, which is also metaphorical in meaning, and for which it could be ontologically mapped to QUESTION / MATTER / ISSUE.

Shape is mapped to the frames Coming_to_be and Go_into_shape, with the latter being inchoactive of Shape. This definition shows that, although shape is OBJECT, an approximation of shape still holds as shape. A proposed middle concept could therefore be ALMOSTOBJECT. No examples are provided for this frame, whose description appears under the top-down approach section. It is therefore impossible to assess whether the should be treated as an ALMOSTCONCRETE or

---

[74]Definition cited from the whole description of the frame presented under the bottom-up approach.

ALMOSTABSTRACTOBJECT.

```
pprint(fn.frames(r'(?i)entity'))
[<frame ID=1600 name=State_of_entity>, <frame ID=251
    name=Entity>, ...]
frame (1600): State_of_entity

[definition]
  An Entity is in a specified State. When not explicitly
     specified, the State usually concerns the Entity's health,
     repair of functioning. The State is also often assessed
     with an Evaluation and it may be specified to apply only to
     a particular  Parameter of the Entity.  'Some of the
     classics  were in excellent condition.'  'She was taken
     home , where her condition worsened.' 'They soon reduced
     the Indians to a CONDITION of abject slavery.'  'They had
     regressed beyond any help and could never be cured of their
     "bestial" STATE of utter dependency on poor relief.' 'Evil
     is the outer result of a mental condition of fear,
     ignorance, doubt, unbelief.'

[semTypes] 0 semantic types

[frameRelations] 2 frame relations
  <Parent=State -- Inheritance -> Child=State_of_entity>
  <Parent=State_of_entity -- Inheritance -> Child=Predicament>

[lexUnit] 2 lexical units
  condition.n (12597), state.n (12596)

[FE] 4 frame elements
          Core: Entity (8787)
Core-Unexpressed: State (8789)
  Extra-Thematic: Evaluation (8788), Parameter (8790)

[FEcoreSets] 0 frame element core sets


frame (316): Coming_to_be

[definition]
  An Entity comes into existence at a particular Place and Time
```

```
      which may take a certain Duration_of_endstate, have a
      Cause, or
 be formed from Components.  'Problems may arise whenever an S1
      sophont enters the game.' 'Mountains sometimes form in as
      little as a million years.' 'A new paradigm emerged from
      the discussion of nuclear weapons.' 'New Plants form from
      the cut veins in two weeks.'

[semTypes] 0 semantic types

[frameRelations] 4 frame relations
  <Parent=Coming_to_be -- Inheritance -> Child=Being_born>
  <Complex=Cycle_of_existence_scenario -- Subframe ->
      Component=Coming_to_be>
  <Inchoative=Coming_to_be -- Inchoative_of -> Stative=Existence>
  <Earlier=Coming_to_be -- Precedes -> Later=Existence>

[lexUnit] 12 lexical units
  appear.v (5751), arise.v (5752), coalesce.v (5758), come into
      existence.v (7346), come to be.v (5750), develop.v (5756),
  emerge.v (5753), evolve.v (13978), form.v (5749), materialize.v
      (5818), spring up.v (6246), take shape.v (5754)

[FE] 9 frame elements
          Core: Entity (2743)
    Peripheral: Manner (11943), Place (2744), Time (2745)
  Extra-Thematic: Cause (2746), Components (2760),
      Duration_of_endstate (2853), Period_of_Iterations (3040),
      Role (2972)

[FEcoreSets] 0 frame element core sets
```

3.3   Chapter conclusions

The third chapter of this investigation dealt with the semi-automatic extraction of lexico-semantic information from corpora, Princeton WN and FN.

The approach was undertaken in the attempt to answer the two research ques-

tions: (1) Do shape words have metaphorical meaning/s? and (2) Are metaphors sufficiently represented by only upper concepts?

The qualitative preliminary analysis on metaphors in corpora conducted in chapter 2 (2, page 9) was therefore continued in this chapter by focusing on shape words only.

The inquiry started by taking into account shape words in WN labeled as POS noun (circle, triangle, square, point, line, shape). WN entails a clear differentiation between lemmas, synsets and senses. Lemmas stand for single words; synsets are defined as groups of words sharing same or similar meaning / s, while senses correspond to meanings.

Preliminary investigation of shape words in WN showed that they are entailed in this resource as either direct synsets or related to synsets. Therefore, the lexical analysis proceeded by looking at shape words as directly mapped as synsets in WN as well as linked to synsets, with results being shown in table III.3, pag. 104 and table III.5, pag. 110.

The retrieved senses enabled to find out that all shape words entail metaphorical meanings. They show that the language user adopts the respective shape word to address something which transcends its designated original meaning of geometric form. Hence, the shape word acts like the source of the metaphor, while its sense acts like the target.

This observation is worth mentioning, since the approach to shape words in WN was conducted without defining in advance whether a shape word should be target or source domain of a metaphor, but with the sole interest to find out whether it contains metaphorical meanings.

The targets entailed in the lemmas' senses can be then mapped to ontological concepts. It was found that all shape words share three main upper concepts, namely

OBJECT, EVENT and PERSON, while the source can be mapped to SHAPE.

In line with the original observation, also advanced in chapter 2, that metaphorical meanings may be mappable to upper as well as mid-level concepts, the research was thus continued through the introduction of semantic classes. These classes were used given their similarity to mid-level concepts. For this part of the research, all senses, and not only the metaphorical senses of the shape words, were re-analyzed in light of the semantic classification.

In this way, it was shown that all the considered shape words partially share the same semantic classes. In particular, the semantic query enabled the introduction of the distinction between abstraction and concreteness for OBJECT and EVENT, and, for some shapes (point, line and shape), the definition of whether a shape is supposed to be interpreted as *part_of_* or *generated_by_process* an EVENT or whether it is the outcome of a *complete_process* or EVENT.

Finally these classes were translated into ontological middle concepts, which have been then assigned to the respective targets. In this way, it has been determined that:

- the targets for circle can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT, PERSON
- the targets for triangle can be CONCRETEOBJECT and ABSTRACTOBJECT
- the targets for square can be CONCRETEOBJECT, ABSTRACTOBJECT, SPACE and PERSON
- the targets for line can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT, SPACE and PERSON
- the targets for point can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT and SPACE
- the targets for shape can be CONCRETEOBJECT, ABSTRACTOBJECT,

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CONCRETEEVENT and SPACE

The semi-automatic approach to the lexico-semantic investigation of shape words was continued by taking into account FrameNet, another resource available under the NLTK module.

FN defines words in terms of semantic units and builds upon prescriptive or ontological knowledge. The labeling of frames has been developed by FN annotators and it does not correspond to concepts as found in standard ontologies.

In FN, different properties are specified as well as a three-fold level of granularity: core, peripheral and extra-thematic frames.

Queries in FN of shape words have shown that the words can be retrieved through different approaches. To exploit the wealth of information contained in the resource, three main lines were therefore been followed: a bottom-up or lexical unit-to-frame approach, where shape words act like lexical units of the frame; a top-down or word-to-frame approach, with words directly linked to frames, and a leveled or frame-to-frame approach, which foresees the search of shape words as noun attributes mapped in the frames.

FN does not borrow definitions from WN. In fact, FN developers have also proposed personalized definitions (or COD, Content of Description) for each mapped frame. These descriptions differ from WN senses since they focus on narrating the properties or interactions of the agents and conditions necessary for a frame to exist. For a frame like Cooking, for instance, these conditions would be Cook, Heat, Food, Container and the event Cooking itself. All this information is provided in the frame's COD, but it should not be confused with an ontological annotation either, since the frames in FN have not been compared to standard ontologies. They act like *ad hoc* concepts.

Information retrieval from frames showed that shape words reveal their meta-

phorical behavior also when mapped to frames. In both WN and FN, the shape word in question acts like the source, while the target of the metaphor is specified in the sense for WN, and in the description in the case of FN.

Moreover, the differentiated perspective taken in the search revealed that a specification between abstraction and concreteness as well as between static and dynamics involved in the frame are explicit and / or derivable from the frame.

In particular, it was assessed that:

- the targets for circle can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT (assumingly static) and SHARINGPERSON

- the target for triangle can be CONCRETEOBJECT and ABSTRACTOBJECT

- the targets for square can be ATTITUDE, CONCRETEOBJECT, ABTRACTOBJECT

- the targets for line can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT

- the targets for point can be MATTER, CONCRETEEVENT, ABSTRACTEVENT

- the targets for shape can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT

The results of the lexico-semantic analysis conducted in WN can eventually be compared to the outcome of the queries run in FN.

In WN, shape words were solely studied as POS noun, whereas in FN, different POS of shape words (mainly as used as nouns and verbs) have been retrieved simultaneously. Moreover, both FN and WN were developed upon different goals, and although they both provide lexico-semantic information on words, they should be approached in different ways.

Hence the comparison was driven with the sole intent to show overall similarities

across shape words; only the overlapping results are reported below.

- Targets for the source circle can be CONCRETEOBJECT, ABSTRACTOB-JECT, CONCRETEEVENT, ABSTRACTEVENT and SHARINGPERSON

- Targets for the source triangle can be CONCRETEOBJECT and ABSTRAC-TOBJECT

- Targets for the source square can be CONCRETEOBJECT and ABSTRAC-TOBJECT (in WN, other targets found for square include PERSON and SPA-CE; in FN ATTITUDE)

- Targets for the source line can be CONCRETEOBJECT, ABSTRACTOB-JECT, ABSTRACTEVENT, CONCRETEEVENT (additional targets found in WN include PERSON and SPACE)

- Targets for the source point can be CONCRETEEVENT, ABSTRACTEVENT (other targets found in WN include CONCRETEOBJECT, ABSTRACTOB-JECT, SPACE; another target found in FN includes MATTER)

- Targets for the source shape can be CONCRETEOBJECT, ABSTRACTOB-JECT, CONCRETEEVENT (another target found in WN for shape is SPACE; in FN it is ABSTRACTEVENT)

As mentioned above, the merging of the outcome retrieved from WN and FN wanted to be indicative and not absolute, given the different nature of the sources.

It also needs to be specified that the upper and middle concepts derived from the WN analysis have been accompanied by a fair share of intuition, mainly due to the fact that WN provides minimal context for the words, in the form of examples. In the case of FN, on the contrary, it was been easier to identify the nature of an OBJECT or EVENT as abstract or concrete, thanks to explicit information included in the frames' descriptions.

The lexico-semantic analysis conducted in chapter 3 enables to partially answer the research questions behind this research. It was namely possible to both define

the presence of metaphorical meanings in the case of shape words, and it has been showed that the introduction of upper as well as mid-level concepts is feasible and suggested.

The following chapter 4 takes into account metaphors as retrieved from different corpora (listed under appendix B, page 323). The final attempt in the research was namely to verify whether similar or same shape metaphors exist in different languages, and whether their ontological mapping mirrors some of the results obtained through the semi-automatic approach.

The investigated languages were Chinese (CH), English (EN), French (FR), German (GE), Spanish (SP) and Italian (IT) and the metaphors have been retrieved from other tropes, including phrasal verbs, collocations and idioms.

Chapter 4

Cross-linguistic analysis of shape-related tropes

In chapter 3, information on shape words when used metaphorically was retrieved through a semi-automatic approach to their lexico-semantic and frame-related behavior.

The query allowed to define similar ontological upper and mid-level structures across the considered shape words. In particular it revealed that the considered shapes share the following ontological concepts both when the information has been retrieved from WN and from FN (table IV.2, page 182):

The analysis of the shape words proceeds in chapter 4 by taking into account metaphors as retrieved from shape words across different corpora (appendix B, page 323), with the attempt to define whether similar or same shape metaphors exist in different languages, and if their ontological mapping reflects or diverges from the results and observations advanced in chapter 2 and chapter 3.

The cross-linguistic analysis as presented in the following pages was carried on in dictionaries and corpora, to find whether they own metaphorical meanings. Shape words were searched as single words, but rather than focusing on their definitions, as already done in the quest with WN (chapter 3, 3, page 95), they were searched in

Shape word	CONCRETE-OBJECT	ABSTRACT-OBJECT	CONCRETE-EVENT	ABSTRACT-EVENT
Circle	✓	✓	✓	✓
Triangle	✓	✓		
Square	✓	✓		
Line	✓	✓	✓	✓
Point			✓	✓
Shape	✓	✓	✓	

Table IV.2: Summary of overlapping ontological mapping of shape words retrieved from WN and FN

complex linguistic formations, such as idioms, collocations and phrasal verbs.

They were also searched in English corpora, to study the context of use, and they have been translated into other languages (Chinese, German, Italian, French and Spanish). Examples of use were retrieved from corpora. The enlisted expressions were not selected over others by frequency, but because of their metaphorical meaning/s.

The motivation behind the choice of the languages was mainly driven by the ability of the author to understand them. Clearly, the search could have been further widened to other languages, but it has been assumed that a comparative approach between a Sino-Tibetan, two Germanic and three Romanic languages would suffice to the purpose of this investigation.

As mentioned, the query was started with English words, followed by their respective translations into other languages. For the proposed translations, the attempt was made to prioritize expressions that contain the same shape word as used in an English expression and that convey the same meaning like the English form, with modest results.

The quest in chapter 4 was conducted by keeping in mind the main research questions, namely a) Do shape words have metaphorical meanings? b) Is the representa-

tion of the same by means of upper ontological concepts sufficiently representative of their metaphorical sense/s?

As in the case of the lexico-semantic analysis, the study was approached by looking at shape words as bare words. Also, it was not assumed that metaphors would be contained in other tropes, although observations from chapter 2 reveal otherwise.

The original assumption was in fact that the shape words would stand for geometric figures.The collected data showed nevertheless that shape words hold meanings that are greatly different from them being forms. These new senses, as retrieved from the shape words used in tropes or used as single words, have thus been identified as metaphorical.

The process of extraction of metaphorical content was done by taking into account the whole figurative expression, not the single shape word in it. For instance, the conceptual mapping behind "a charmed circle" (circle stands as GROUP-OFPEOPLE, RESTRICTEDGROUP) was derived by analyzing the whole collocation (charmed circle) as well as the context of use, without studying the word circle in isolation. As the examples show, observations on the attributes or the prepositions that accompany a certain shape word also enabled the retrieval of further ontological information, such as the polarity of an EVENT (i. e. POSITIVEEVENT, NEGATIVEEVENT).

The attempt was made to group expressions according to shared metaphorical concepts, which happen to be upper as well as mid-level ones.

Middle concepts were assigned in the case the context of use of the expression has enabled a better specification, or for the case in which the SUMO ontology suggests a concept (such as SubjectiveAssessmentAttribute) that the author of this research proposes for possible revision.

Specific groups were created in the case a shape word stands for CONCRE-

TEEVENT or ABSTRACTEVENT. Nevertheless, these groups of expressions entail uses of the shape words in which the word as target could not be better defined apart from being either an ABSTRACT- or CONCRETEEVENT.

As the reader will notice though, targets mappable to EVENT can be retrieved from the majority of the other tropes in the other groups.

When this is the case, the decision was thus be made to try to better specify these targets apart from being EVENTs, pointing out instead the properties, or ontological attributes that characterize them.

For instance, the expression to go straight to the point implies an EVENT, but even more a STATEOFMIND or PREDISPOSITION from the side of allegedly one or more agents to reach that abstract goal of clarity and conciseness (which can stand for a mental process, hence a PREDISPOSITION).

Finally, the ontological grouping as presented is tentative, since it has been noticed that some expressions may well fit into several groups simultaneously, with a target being for instance an EVENT and a STATEOFMIND at the same time.

4.1   Circle

Circle means SHAPE, CONCRETEOBJECT, ABSTRACTOBJECT

1. **circle** (**CH**: 圓形 yuánxíng; **GE**: Kreis, Runde; **IT**: cerchio; **FR**; circle; **SP**: circulo, vuelta).

   Circle means CONCRETEPLACE, ABSTRACTPLACE

2. **a crop circle** (also called corn circle): an area in a field of crop where the crop has become flat; **GE**: Getreidekreis, Kornkreis; **IT**: cerchio nel grano (same as in English); **SP**: círculos en los cultivos; **FR**: cercle de culture.

   Circle means CONCRETEEVENT, ABSTRACTEVENT

3. **turning circle** (the smallest circle that a vehicle can turn around in; **CH**: 最

小轉向圓 zuì xiǎo zhuǎngxiàng yuán (lit. the smallest + change direction / steering + circle); **GE**: Wendekreis, Wendekreis*radius* (same as in English, turning radius); **IT**: sterzata, raggio di sterzata (same as in German); **FR**: espace de virage, braquage; **SP**: círculo de giro, *radio* de giro (same as in German, French, Italian)

4. **to circle around** (to move around in the shape of circles) (e. g. "we circled around and could not find a solution", "we circled around until we could find a parking lot"); **CH**: 盤旋 pán xuán (to *spiral*, to circle), 轉圈 zhuàn quān (to *rotate*, to twirl), e. g. 地球繞著太陽轉 dìqiú rào zhe tàiyáng zhuǎn ("the Earth moves / revolves around the sun"); **GE**: umkreisen (same as in English); **FR**: encercler, faire un cercle autour (same as in English); **SP**: trazar un círculo alrededor de, rodear (lit. to trace a circle around, to go round); **IT**: circondare, girare intorno (same as in English). Circle in the other considered languages is more a shape coming-into-being or something that resembles the space of a circle rather than being a full form.

5. **the circle of life**. Circle can be either abstract or concrete SHAPE; **GE**: der Lebenskreislauf, **IT**: il cerchio della vita; **FR**: le cercle de la vie, **SP**: el círculo de la vida; **CH**: 生命圈 shēnmìng quān (在生命圈中，在這個龐大的生命圈裏 zài shēnmìng quān zhōng, zài zhe ge páng dà shēmìng quān lǐ; to be in the / in the middle of the circle of life). The circle of life also implies growth without end (生生不息 shēng shēng bù xī (meaning to grow and multiply without end)

Circle means GROUPOFPEOPLE, RESTRICTEDGROUP

6. **the circle** (e. g. "surround yourself with interesting people you want to be around, and put yourself in different circles"; "a large circle of friends"); **CH**: 朋友圈 péngyǒu quān, 圈子 quānzi (lit. friend circle, clique), 一大群朋友 yī dà qún péngyou (lit. a large group of friends); **GE**: das Freundenkreis

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(e. g. "ich versuche das im Freundenkreis zu verarbeiten", meaning "I try to elaborate / overcome it by sticking to my circle of friends"); **SP**: circulo de amistades (same as in English); **IT**: *cerchia*, *circolo* di amici; **FR**: cercle d'amis (same as in English)

7. **a family circle**; **CH**: 家庭圈子 jiātíng quānzi; **GE**: Familienkreis; **IT**: cerchio / cerchia familiare; **SP**: círculo / *nucleo* familiar; **FR**: *milieau* familier, cercle familial

8. **a charmed circle** (referring to a group of people who have much influence); **CH**: 有特別影響力的一群人 yǒu tèbié yǐngxiǎnglì de yī qún rén (lit. it is a group of particularly influencial people); **FR** cercle privilégié, le cercle des élites (lit. the privileged circle, the circle of the elites); **SP**: un círculo de elegidos (lit. a circle of the elected ones); **IT**: *cerchia* degli eletti / dei privilegiati (same as in French and in Spanish); **GE**: der erlauchte Kreis (lit. the illustrious / noble / august circle)

9. **to move in exalted circles**; **FR**: fréquenter *la haute société, les gens* bien placés (lit. to hang out with the high society, the well-placed people); **IT**: frequentare circoli ristretti (lit. to hang out with narrow circles); **SP**: andar con la alta *sociedad* (to hang out with the high society). Circle here stands for a (narrow) group of wealthy people. In German (**GE**), one also refers to this group as to the 'robust' society (die robuste *Gesellschaft*); **CH**: 顯貴要人的圈子 (xiǎnguì yàorén de quānzi) (e. g. 你這是出於顯貴要人的圈子呀! nǐ zhè shì chūyú xiǎnguì yàorén de quānzi ya!, lit. you are moving in and out very important influential people, "you are moving in and out exalted circles!". The metaphor in this form is double. In order to talk about an EVENT (target), the speaker chooses a SHAPE (source). But the particular focus of these event (PEOPLE, target) is also compared to SHAPE ('circles')

10. **an inner circle** (meaning a small group of *people* that control an organization,

who have power, an oligarchy); **CH**: 小圈子 xiǎo quānzi (lit. small circle);
GE: *Führung*szirkel (lit. governance's / leadership's circle), jemand und seine
/ ihre *Vertraute* (lit. someone and the people that he / she trusts); **FR**: cercle
fermé (lit. close circle), un (petit) cercle; **IT**: cerchia *ristretta* (lit. the narrow
circle); la *casta* (the caste); **SP**: *círculo* íntimo (lit. intimate / close / private
circle). In this metaphor, not all kind of PEOPLE is the target of the form,
but very RESTRICTEDGROUP, hence the decision to introduce this upper
concept

Circle means ATTITUDE, STATEOFMIND, PREDISPOSITION, BEHAVIOR

11. **to circle the wagons** (to join a group of people who think the same, by avoiding those who think differently, e. g. "Martin decided to circle the wagons". Originally, the phrase referred to a military tactic to protect food / weaponry wagons from assaults); **CH**: 你必須與結盟保護自己 nǐ bìxū yú jiéméng bǎo hù zìjǐ (lit. you have to + people same as you + form an alliance + protect oneself) "you have to circle the wagons and protect yourself"; **GE**: dem richtigen Personenkreis zugerechnet werden (lit. to be addressed to the right group of people); **FR**: prendre une position défensive (lit. to take a defensive position); **SP**: defenderse (to defend oneself); **IT**: fare quadrato (lit. to do *square*)

12. **to be caught / to be trapped in a vicious circle** (the circle can be a psychological STATE, a physical DISEASE, any EVENT that puts the person in an unconfortable state); **CH**: 惡性循環 è xìng xúnhuán; **GE**: in einem Teufelskreis geraten (lit. to end up in a devil's circle); **FR**: cercle vicieux (e. g. ""le dessin peut relancer un cercle vicieux de terrorisme", a-t-elle ajouté", "she added: "the comics can relaunched a vicious circle of terrorism""); **SP**: círculo vicioso (same as in English); **IT**: circolo vizioso.

13. **(to be a) virtuous circle** (a series of positive EVENTs that put the person in

a positive state of mind / situation); **CH**: 良性循環 liángxìng xúnhuán (e. g. "a virtuous circle in the national economy", 國民經濟的良性循環 guómín jīngjì de liángxìng xúnhuán); **SP**: "círculo virtuoso" (same as in English); **IT**: circolo virtuoso (same as in English); **FR**: cercle vertueux (same as in English); **GE**: Engelskreis (lit. circle of the angel), Aufwärtsdynamik (lit. progressive dynamics); positiver Kreislauf (lit. positive circle).

14. **to come / to turn full circle** (to return to a situation which was started by the same person); **GE**: zum Ausgangs*punkt* zurückkehren (lit. to turn back to exit / starting point); **IT**: chiudere il cerchio (lit. to close the circle), ritornare al *punto* di partenza; **FR**: revenir au *point* de départ (same as in German); **SP**: volver al *punto* de partida (same as in French and German); **CH**: In Chinese the expression to come / to turn full circle is explained, e. g. 他们绕了一大圈从富有到贫穷又到富有 tāmen rào le yī dà quān cóng fùyǒu dào pínqióng yòu dào fù yǒu (lit. they have circled from rich to poor to rich again, "they have come the full circle from wealth to poverty to wealthy again")

15. **to go round / to run / to spin around in circles**, [a] meaning to work hard without any progress, [b] to be busy (more colloquial) or [c] to move around (in reality or in abstract terms (e. g. "my memories turn around in circles"); **CH**: 在原地繞圈子 zài yuándì rào quānzi (lit. to be at the former circle), 徒勞無功 túláo wú gōng (make a futile effort, to work to no avail), 瞎忙 xiāmáng (lit. to make a fuss, e. g. 這些日子你幹什麼呢？瞎忙 Zhèxiē rìzi nǐ gàn shénme ne? Xiā máng, "What have you been doing in the last few days? Not much), 團團轉 tuán tuán zhuàn (lit. to go round and round); 繞來繞去 rào lái rào qù (lit. the wind comes and goes, "to go around in circles without going anywhere"); **SP**: dar *vueltas* (lit. to give rounds), dar vueltas (alrededor del mismo punto) (turn around and around the same point), dar vueltas y más vueltas a algo (lit. to go around, to go around and around something); **IT**: *gi-*

rare in tondo (lit. to turn in circle), impantanarsi (to get stuck in a situation), girarci intorno (lit. to turn around); *girare* a vanvera (lit. to turn around without a meaning); **FR**: *tourner* en rond (lit. to turn in circle); **GE**: sich im Kreis drehen / bewegen, zu keinem Ergebnis kommen (lit. to turn / move around; to come to no conclusion), (e. g. "Meine Erinnerungen drehen sich im Kreis") (lit. to turn in circle, my memories turn around in circle). In German there also exists the expression *von Pontius zu Pilatus rennen* (lit. to run from Pontius to Pilatus) [Pontius Pilatus was an historical political figure in ancient Rome]. The expression to go round in circles can also be paraphrased with to square the circle (under 'square'), zu keinem Ergebnis kommen (lit. to come to no result)

4.2   Triangle

Triangle means CONCRETEEVENT, ABSTRACTEVENT

16. **the eternal triangle** (a situation where two people have sexual intercourse with the same person or where a third person is involved in a relation); CH: 三角戀愛 sānjiǎo liàn'ài (lit. triangle + romantic affair / love affair), 三角關係 sānjiǎo guānxì, lit. triangle relationship, love triangle, 三角板 sānjiǎobǎn, triangle (for drawing right angles), set square.

4.3   Square

Square means SHAPE, CONCRETEOBJECT, ABSTRACTOBJECT

17. **square**; **CH**: 平方 píngfāng (square, both noun and adjective), 正方形的 zhèngfāngxíng de, 四方形的 sìfāngxíng de (lit. the four directions + shape), e. g., 正方形的房間 zhèngfāngxíng de fǎngjiān (a square room); **GE**: Viereck; **FR**: carré; **SP**: cuadrado; **IT**: quadrato

Square means BODY, BODYIMAGE

18. **a man of square build** (meaning a robust man), 骨格魁梧的男子 gǔgé kuíwú de nánzǐ (lit. bone + square + tall and sturdy man); **GE**: breit gebaut (lit. large built); **FR**: carré(e) (lit. squared); **SP**: ancho (lit. large; e. g. "Físicamente, se distinguía por sus hombros anchos, su alta estatura y su paso un poco pesado pero sólido", "he was physically impressive with his broad shoulders, his square build and his somewhat ungainly yet solid walk"); **IT**: quadrato (lit. squared)

Square means ABSTRACTMEASURE, CONCRETEMEASURE

19. **the square** (e. g. the square meter); **CH**: 平方 píngfāng (used after a noun), e. g. "an area of 36 square meters" 36 平方米的面積 36 píngfāngmǐ de miànjì (36 square meters + de + area); **GE**: Quadrat(meter); **FR**: mètre/kilomètre carré; **IT**: metro quadrato; **SP**: metro cuadrado

20. **to be all square** (e. g. "the teams were all square at half-time"); **CH**: 打平的 dǎ píng de (to have the same level of points / scores); **GE**: ausgeglichen sein (lit. balanced; e. g. "to be square with all the world", mit der Welt in Einklang sein (lit. to be in unison / accord / harmony with the world); **SP**: franco(s) ser (lit. to be free / clear, e. g. "I don't think that we are all square", "no creo que seamos todos tan francos"); **FR**: être quitte (lit. to be clear); **IT**: essere a posto (lit. to be done, to be square with someone)

21. **to square**, **CH**: 使成直角或正方形 shǐchéng zhíjiǎo huò zhèngfāngxíng (lit. to cause + a right *angle* + maybe + square), "to measure something in the right way"; **GE**: ausgleichen, in Ordnung bringen (lit. to balance something, to put something back in place); **FR**: régler (lit. to regulate, to rule); **SP**: cuadrar, acomodar; **IT**: far quadrare i conti, quadrare (lit. to regulate, to rule)

Square means ATTITUDE, STATEOFMIND, PREDISPOSITION, BEHAVIOR

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22. **to think outside of the square** (meaning to generate new ideas, to be uncon-
    ventional), (to think from another perspective, to think from another point of
    view / viewpoint; also paraphrasable as "to think outside of the box"); **GE**:
    über den eigenen Tellerrand hinaus*schauen*, über den Tellerrand schauen (lit.
    to look over the edge of the plate), quer *denken* (lit. to think lateral); **FR**: aller
    chercher plus loin (lit. to look for something in the distance); **IT**: *pensare*
    fuori dagli schemi (lit. to think outside the frames); **SP**: (Argentina) *pensar*
    afuera de la burbuja (lit. to think outside the bubble); pensar fuera de la caja
    (lit. to think outside the cage); (Catalan) pensar fora de la caixa (lit. to think
    outside the box/the chest); **CH**: 跳出框框想問題 tiàochū kuàng kuàng xiǎng
    wèntí (lit. to jump out + pattern + to think + question, to think out of the box),
    另闢蹊徑 lìngpìxījìng (take an alternative route, "to blaze a new trail", to find
    an alternative)

23. **to not think outside of the square** (same as to not think outside of the box,
    to be *narrow-minded*, to not look over one's *nose*); **GE**: über den Tellerrand
    nicht hinausschauen (lit. to not look over the edge of the plate), einen engen /
    begrenzten / beschränkten / kleinen Horizont / *Blick*feld haben (lit. to have a
    narrow / limited / small horizon / field of view / vision), nicht über die eigene
    Nase hinausschauen, nicht weiter als seine Nase sehen (lit. to not look over
    the own nose); **CH**: 坐井觀天 zuòjǐnguāntiān (lit. to view the sky from the
    bottom of a well [idiom], to be ignorant and narrow-minded; to have tunnel
    vision), 心胸狹窄 xīnxiōng xiázhǎide (constrained, narrow-minded)；偏執的
    piānzhí de (bigoted); **FR**: ne voir plus loin que le bout de son *nez* (lit. to not
    look farer than the end of the own nose), être enfermè dans un *cercle* magique
    (lit. to be trapped in a magique circle); **IT**: non vedere / guardare al di là del
    proprio naso (lit. to not look over the own nose), **SP**: no ver alguien más allá
    de sus *narices*, ver nada além do próprio umbigo (lit. ""to not look over the

own belly button)

24. **to *square* the *circle*** (meaning to use a lot of time and effort trying to do something, without making any progress), similar to "to square the circle" (slightly different meaning: try to make something impossible); **GE**: das Quadrat kreisen (lit. to square the circle), weiter im Kreis gehen/laufen (lit. to keep on going / to run in the circle / ring / round); **IT**: la quadratura del cerchio (same as in English); **FR**: chercher la quadrature du cercle, arrondir les angles (lit. to try to square the circle, to round the *edges*); **SP**: buscar la cuadratura del círculo (lit. to look for the square of the circle); **CH**: 做辦不到的事 zuò bànbudào de shì (lit. to do an impossible thing), 這就好比要把圓的變成方的 zhè jiù hǎobǐ yào bǎ yuán de biànchéng fāng de (this is just comparable to grabbing the shape of a circle and change it into the shape of a square). The expression resembles the meaning of "a square peg in a round hole", which follows below

25. **a square peg in a round hole** (meaning somebody who is *uncomfortable* with a situation [i. e. NEGATIVEEVENT] and does not belong to it; trying to combine two things that do not belong together; to feel like a square peg in a round hole; to be like a square peg in a round hole; trying to fit a square peg in a round hole; to want to put a square peg in a round hole); **IT**: non essere tagliato per (lit. to not be in the same shape; to not be cut for something; **GE**: (ungeeignete Maßnahme) (lit. an unsuitable measure), etwas Unmögliches machen wollen (lit. to want to do something impossible), die Quadratur des Kreises suchen (lit. to look for the squaring of the circle); **CH**: 方枘圓鑿 fāngruì yuánzáo ("like a square tenon for a round mortise", meaning incompatible, at variance with each other); **SP**: resolver la cuadratura del círculo (same as in English); **FR**: tenter d'enfoncer une cheville / une clé carrée dans un trou rond (lit. try to put a square peg / a square key inside a round hole)

26. **to look / see somebody / something square in the eye** (meaning to accept the consequence of a fact or event); **IT**: guardare dritto negli occhi (lit. to look somebody straight in the eyes); **GE**: jemanden streng in die Augen sehen (lit. to look somebody seriously/stern in the eyes); **CH**: 他直瞪著她的眼睛 tā zhí dèng zhe tā de yǎn jing (lit. he stared at her in the eyes), 他直盯著她的眼睛 tā zhí dīng zhe tā de yǎnjing (lit. he watched attentively into her eyes); **SP**: observar directamente a los ojos (lit. to look directly in the eyes), mirar (los problemas) de hito en hito (lit. to stare at the problems); **FR**: regarder droit dans les yeux (same as in Italian)

27. **to square something with *someone*** (meaning [a] to make sure that something is approved by a particular person; to agree with someone, e. g. "I can square this matter with Sally"; [b] to settle a disagreement, e. g. "I will try to square with him before the end of the year" and [c] to agree with something (usually used in the negative form), e. g. "I don't square with your early statement"); **CH**: (similar to to have a clear *conscience* with, 問心無愧 wèn xīn wú kuì), e. g. "How can you square this with your conscience?" 做這樣的事你怎麼能問心無愧呢？ zuò zhèyàng de shì nǐ zěnme néng wèn xīn wú kuì ne?; **SP**: ser conciliable con (same as in English); **FR**: cadrer avec (same as in English); **IT**: quadrare con (same as in English); **GE**: in Einklang bringen (lit. to bring something to balance); in Übereinstimmung bringen / sein (lit. to be in accordance, compliance, consensus with)

28. **(be / go) back to square one** (meaning to return to the starting point); **CH**: 回到起點 huídào qǐdiǎn (lit. return / to go back to the starting *point*), 被迫重新開始 bèipò chóngxīn kāishǐ (lit. to be compelled / to be forced to go restart) "to be forced to go back to square one"; **GE**: "der *Kreis* schließt sich, man steht wieder am Anfang" (lit. the circle closes itself, one is back to the beginning); wieder am Null*punkt* angelangt sein (lit. to end back at

point zero), wieder genau so weit sein wie zuvor (lit. to be again back to the previous point); **IT**: ritrovarsi al *punto* di partenza (lit. to find oneself at the departure point); **FR**: revenir à la case départ (same as in Italian); **SP**: volver al *punto* de partida (same as in Italian and French)

29. **to square off** (to be well-prepared, especially for a fighting stance, a fight), to assume a fighting stance; **CH**: 打鬥 dǎdòu to fight, **GE**: Angriffsposition an- nehmen (lit. to assume an attacking position); **FR**: quadriller; **IT**: schierarsi; **SP**: enfrentarse, confrontarse (lit. to bring face to face, to confront)

30. **To hit the *nail* square on the *head***, to hit the nail right on the head (e. g. "once again you have hit the nail square on the head and reported with accuracy and zeal"); **GE**: den Nagel genau auf den *Kopf* treffen (same as in English), den Kern der Sache treffen (lit. to hit the center / the core of a thing / issue); **CH**: 正中要害 zhèng zhōng yàohài (e. g. 你的話正中要害 nǐ de huà zhèng zhōng yàohài, "your talk hit the nail square on the head"); **IT**: colpire nel segno (lit. to hit the target), centrare il *punto* (lit. to hit the middle point, the core), **FR**: taper / mettre dans le mille (lit. to beat on the thousand", e. g. "Je pense que le Commissaire a tapé / a mis dans le mille en disant cela" "I believe that the Commissioner hit the nail on the head when he said that", "*mettre le doit* sur un problème", "viser (quelque chose / quelq'un) juste" (lit. to face something / someone right, e. g. "Il a *visé* juste et il n'a laissé personne indifférent" "he really hit the nail on the head and he got quite a good raise out of everybody") **SP**: dar en el clavo (same as in English), ser muy acertada / o (lit. to be very precise, e. g. "Su referencia a las notorias prisas de diciembre es muy acertada", meaning "his reference to the notorious December rush hit the nail on the head")

31. **square and fair** (also in the form [to be] fair and square, [to be] on the square, to be square). (To be) square and fair can mean: [a] completely fair, justly,

within the rules, following the rules e. g. "she won the game fair and square", "our dealings with them have always been on the square"; [b] if someone is hit "fair and square" on a body part, that person is hit really hard and exactly at the point where one is supposed to be hit, e. g. "she hit me fair and square on the nose" and [c] in a very direct way. In this last definition, "to be square and fair" may be translated with "a point-blank" [something, example follows], or "to come / to go straight to the point"; **GE**: anständig und ehrlich, offen und ehrlich (lit. reputable and honest, open-minded and honest); **SP**: con todas las de la ley (lit. in compliance with the rules of law); de lleno (lit. in full, meaning directly); **FR**: dans les règles (lit. within the rules), en plein dans le mille (lit. directly in the centre), battre quelqu'un, quelque chose loyalement (lit. to defeat someone / something loyally); **IT**: lealmente, in pieno; **CH**: 公平交易 gōngpíngjiāoyì (lit. fair dealing), 誠實 chéngshí (lit. honest), e. g. 誠實可靠 chéngshí kěkào (lit. honest and dependable), 光明正大 guāngmíng zhèngdà (lit. just and honorable), 這件事我認為光明正大 zhē jiàn shì wǒ rènwéi guāngmíng zhèngdà (lit. this matter + I believe + is just and honorable, "this business is fair and square / square and fair to me"), 我們光明正大地競選獲勝 wǒmen guāngmíng zhèngdà de jìngxuǎn huòshèng (lit. our just and honorable + de + take part in an election + victorious / to win / to triumph, "we won the election fair and square"), 直截了當 zhíjié liǎodàng, straightforward, blunt, *point-blank*, e. g. 直截了當地回答 zhíjiéliǎodàng de huídá (lit. a point-blank / a direct answer), 直截了當地說吧 zhíjíeliǎodàng de shuō ba ("let's put it bluntly" / "come straight to the *point*"), 我直截了當讓他收拾好行李走人 wǒ zhíjíeliǎodàng ràng tā shōushi hǎo xíngli zǒurén (lit. I yielded him to pack [his] luggage and leave, "I told him fair and square to pack his bags / to leave"). It was not possible to retrieve similar expressions for *all* three definitions of "fair and square" in Chinese; for all other languages, only

partial translations could be found

32. **to be square with *somebody***; to square up with somebody meaning [a] to treat somebody equally and [b] to have no debts with someone. The expression can also be translated into: to be even, *to be Steven*, *to be stephens*, to pay off, to square up, to make square; **GE**: quitt sein (lit. to be square; to be even); **CH**: 打成平局 dà chéng píng jú, e. g. 我們倆都得了十分，因此大成平局 wǒmen liǎ dōu déliǎo shífēn, yīncì dà chéng píngjú ("we've both scored ten points, so we are stephens"), 這是我的 10 英鎊– 這下我們兩清了 zhè shì wǒ de 10 yīngbàng – zhèxià wǒmen liǎng qīng le (lit. this time + we settled the loan), "Here is the 10 pounds I owe you – now we are square"; 還清欠賬 huán qīng qiàn zhàng (lit. to pay back the deficient account), e. g. 欠賬還清，明天會繼續爆發 qiàn zhàng huán qīng, míngtiān huì jìxù bàofā (lit. pay the deficient account, tomorrow it will continue to grow) "be square to avoid the worse"; **SP**: ajustar cuentas con alguien (lit. to adjust debts with someone); **FR**: arranger, régler (lit. to arrange / settle debts); **IT**: far quadrare, far quadrare i conti (lit. to square debts)

33. **to get square with someone**, meaning to take revenge; **CH**: 報仇 bàochóu, meaning to take revenge, to avenge，報仇雪恥 bàochóu xuě chǐ (idiom, meaning to take revenge and erase humiliation), 報仇雪恨 bàochóu xuě hèn (idiom, meaning to take revenge and wipe out a grudge); e. g. 她說她要向湯姆報仇 tā shuō tā yāo xiàng tāng mǔ bàochóu (lit. she said she wants + towards + Tom + take revenge); "she said she wants to get square with Tom"; **IT**: "essere pari" (lit. to draw level); **GE**: mit jemandem quitt sein (lit. to be even with someone); sich rächen (lit. to avenge oneself, to revenge oneself); **FR**: régler, régler un différend (lit. to resolve, to resolve a difference), se venger (to take revenge); **SP**: vengar, vengarse de alguien (to revenge, to revenge oneself on somebody)

34. **to be there or be square** (colloquial, meaning to be at one place at all costs, same meaning of to be there or else); **GE**: dabei sein müssen, "Das darfst du dir nicht entgehen lassen" (lit. to have to be there, don't let this escape from you); **CH**: 不見不散 bù jiàn bù sàn (similar to "be sure to wait", "see you there", don't give up and leave), 一言為定 yī yán wéi dìng ("deal's done", "that's a deal"). I could not find the expression in the other languages

35. **to be a square** (meaning [a] to be a conservative, ordinary, almost boring person, a demeanour; [b] (coll.) to be a jerk, a nerd; **CH**: 平凡 píngfán, meaning ordinary, common, mediocre, e. g. 我只是一個平凡的公務員 wǒ zhǐ shì yī ge píngfánde gōngwùyuán ("I am just a square / ordinary functionary"), 古板 gǔ bǎn (lit. out-moded, old-fashioned, e. g. "he is a bit of a square", 他有點兒古板 tā yǒu diǎnr gǔbǎn). The expression "to be a square person" does not bear the same meaning of to be a square-head, an offensive way to call certain foreigners like German or Scandinavian or people with the same origin, or someone who is not able to do something; CH: 北歐佬 Běi ōu lǎo (derogatory, guy from Northern Europe), 北歐裔人 Běi ōu yì rén (person with descendants from Northern Europe); **IT**: essere squadrato (lit. to be foursquare, for people who are conservative, narrow-minded). I could not find the expression for German, French and Spanish

36. **(to be) out of square** (also paraphrasable as to not be at the right angles), meaning that something is not in agreement, it is irregular, e. g. "the report is out of square with the rest of the data"; **GE**: nicht im rechten Winkel, nicht im Lot, windschief, schief (lit. to not be on the right *angle*, not in the plumb / plummet, crooked, warped / skew). I could not find the expression in the other languages. One could say essere obliquo in Italian (lit. to be crooked, diagonal) or estar doblado in Spanish (lit. to be dubbed), but I could not find suitable examples for this.

4.4   Point

Point means SHAPE, CONCRETEOBJECT, ABSTRACTOBJECT, PARTO-FOBJECT

37. **point**, dot, spot; **CH**: 點 diǎn; **SP**: el punto / la punta (e. g. " la punta de un lápiz", "the pencil point", "la punta de un cuchillo", "a knife point"); **FR**: point; **IT**: punto; **GE**: der Punkt (physical SHAPE). Chinese offers a detailed specification of the kind of points that exist: 尖 jiān is the point of a needle; 鋒 fēng is the point of a spear, the edge of a tool; 穎 yǐng is the head of a grain; 錭 chǎng is a keen edge or a sharp point ; 鋩 guǎng is the point of a sword; 鐵 jiān stands for a sharp iron point or awl; 鋩 máng is also the sharp point of a sword.

Point stands for CONCRETEMEASURE, ABSTRACTMEASURE

38. **freezing point**; **CH**: 凝固點 nínggùdiǎn; **GE**: Erstarrungspunkt (torpor point), Gefrierpunkt (fridge point); **SP**: el punto de congelación; **IT**: punto di conge-lamento; **FR**: le point de congélation

39. **melting point**; **CH**: 熔化點 rónghuàdiǎn; **GE**: Schmelzpunkt (same as in English); **SP**: el punto de fusión; **FR**: le point de fusion; **IT**: punto di fusione

40. **tipping point**; **CH**: 引爆點 yīnbàodiǎn, point of detonation; **GE**: Kipp-punkt, Umkipppunkt, Umkehrpunkt (lit. tilt point, upset point, reverse point), entscheidende Wende (lit. decisive change), **SP**: un punto decisivo; **FR**: un point tournant (lit. a turning point), un point de bascule, un point charnière (turning point, e. g. "être au point charnière de deux époques" "to be at the turning point of two eras"), **IT**: punto decisivo, punto di svolta (lit. funda-mental point, point of change)

41. **up to a (certain) point**; **GE**: bis zu einem gewissen Punkt (same as in English) (e. g. "the camera will continue putting images into the alarm buffer up to a

certain point and then it will stop"); **CH**: 某種程度上 mǒu zhǒng chéngdù shàng (lit. up to a certain / some kind of *degree*); e. g. 在一定程度上我同意 zài yī dìng chéngdù shàng wǒ tóngyì ("up to a certain point, I agree") 是的, 從一定程度上說是的，但金錢買不到一切 shì de, cóng yī dìng chéngdù shàng shuō shì zhè yàng de, dàn jīnqián mǎi bù dào yīqiě "yes, up to a certain point [it is so], but money cannot buy anything", **IT**: fino a un certo punto (same as in English); **FR**: jusqu'à un certain degré / point (lit. up to a certain degree / point); **SP**: hasta cierta medida, hasta cierto punto (lit. up to a certain measurement, up to a certain point)

Point means CONCRETEPLACE, ABSTRACTPLACE

42. **point**, location, bureau, spot, in other words PLACE; **CH**: 處 chù, 景點 jǐngdiǎn (lit. view point), scenic spot, place of interest; 靜區 jing qū (lit. quiet spot), blind spot, dead space; **GE**: Standpunkt, Stelle; **SP**: el punto (meaning a particular place); **FR**: le point; **IT**: il punto, il posto

43. **point of sale**; **CH**: 銷售點 xiāoshòudiǎn, 售貨點 shòuhuò diǎn (place which sells goods); **GE**: Verkauafsort, Verkaufsplatz (lit. to sell + place); **IT**: punto vendita; **SP**: punto de venta; **FR**: point de vente

44. **point of use** (the place where a product is used); **CH**: 使用的地點 shǐyòng de dìdiǎn (lit. use + de + place), （服務的）提供的地點 (fúwù de) tígōng de dìdiān (supply + de + use + place) (e. g. "medical care is still free at the point of use", 醫療保健在實際提供點仍然是免費的 yīliáobǎojiàn zài shíjì tígōngdiǎn réngrán shì miǎnfèi de, lit. health care + exist / be at + practice + place of providing goods + still + to be [place] + free of charge + de); **GE**: Verwendungsstelle (lit. use + place); **SP**: el punto de utilización, el punto de consumo; **FR**: le point d'utilisation

45. **to reach a *dead* point** (same as to reach a dead end); **GE**: am toten Punkt angelangt sein (lit. to end up being at the dead point); **IT**: raggiungere un

punto *morto* (same as in English); **FR**: être dans l'impasse (lit. to be at the
dead end); **SP**: ser un punto *muerto* o final de etapa (lit. to be a dead point,
the final point of the stage / phase); **CH**: 陷入絕境 xiànrù jué jìng (lit. to fall
into impasse, e. g. 我們的研究已陷入絕境 wǒmen de yánjiū yǐ xiàn rù jué
jìng (lit. our research stopped + fell into impasse, "we have come to a dead
end / to a dead point in our research")

46. **the high point** (also the high spot); **GE**: 'der Höhepunkt' (lit. the height +
point); **IT**: il culmine (same as in English); **CH**: 最有意思的部份 zuì yǒuyìsi
de bùfen (most important part, e. g. 那是晚會最精彩的部份 nà shì wǎnhuì
zuì jīngcǎi de bùfen (lit. that is + evening + the most + brilliant + part) "it was
the high point / the highlight of the evening"); **SP**: el clímax, el punto álgido
(the climax, the high point); **FR**: le point culminant (lit. the highest point, the
peak); **IT**: il culmine, l'apogeo (lit. the peak, the zenith)

47. **the low point**, the lowest point (e. g. in a relationship), **GE**: der Tiefpunkt,
ein sehr schlechter Zustand (lit. the low point, a very bad situation); **CH**: 最
無趣的部份 zuì wúqù de bùfen (lit. the most + dull / colorless / vapid + part),
最差的部份 zuìchā de bùfen (lit. the least + clear + part), 最低潮, 最低點
zuìdīcháo, zuìdīdiǎn (lit. minimal, lowest point); **SP**: el punto más bajo, el
bajo nivel de (lit. the low point, the low level); **FR**: un niveau [très] bas, un
faible niveau (lit. a very low level, a weak level); **IT**: punto basso, punto di
minimo (lit. the low, lowest point)

48. **starting point** (出發點 chūfādiǎn); **GE**: Ausgangspunkt (lit. point of exit);
IT: punto di partenza (same as in English); **FR**: point de départ (same as in
English), degré zéro (d'une civilisation/culture) (lit. zero degree [of a civi-
lization, society]); **SP**: punto de partida (same as in English)

49. **point of no return**, meaning a point in time when one needs to continue with
what he / she has been done, because it is not possible to get back.[75]; **CH**:

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[75]The origins of the expression are traceble, as showed in this Wiki page: `http://en.wikip`

欲罷不能的時刻 yùbàbùnéng de shìkè (lit. unable to stop + de + point in time), 已無退路 yǐwú tuìlù (lit. stop + -less + leeway / a way out), 不可能回頭 bù kěnéng huítóu (lit. not possible + turn), 不歸點 bù guī diǎn (lit. point of no return, e. g. "we have reached the point of no return", 我們越過了不歸點 wǒmen yuèguò le bù guī diǎn; **FR**: le point de non retour (same as in English); **IT**: punto di non ritorno (same as in English); **SP**: entrar / ser en un callejón sin salida (lit. to enter / to be in an alley without way out); **GE**: (der Punkt erreichen, an dem es kein Zurück mehr gibt, der Punkt erreichen, von dem an es kein Zurück mehr gibt), e. g. "jetzt gibt es kein Zurück mehr" (lit. to reach the point, from where there is no return anymore", now there is no return anymore)

50. **welding / soldering point**[76]; **FR**: point de soudure; **IT**: brasatura, punto di saldatura; **SP**: soldatura, punto de soldatura (welded / soldered point); **CH**: 焊料 hànliào (lit. weld + material; soldering)

51. **point of suture**, suture; **FR**: point de suture, suture, point of suture, **GE**: Vernähpunkt; **IT**: punto di sutura; **CH**: 縫線 féngxiàn (lit. to sew / to stitch + line); **SP**: punto de sutura (same as in English, Italian, German and French)

Point means CONCRETEEVENT, ABSTRACTEVENT

52. **to point the finger against / towards someone / something**. The expression can [a] mean that someone shows something by means of the finger or [b] that someone or something is accused; **SP**: señalar con el dedo (lit. to show with the finger), acusar (to accuse), tirar la primera piedra (lit. to throw the first stone [against someone], meaning to accuse somebody of something); **IT**: puntare il dito verso / contro (same as in English); scagliare la prima pietra (lit. to throw the first stone); **GE**: mit dem Zeigefinger nach etwas zeigen

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edia.org/wiki/Point_of_no_return

[76]Soldering and brazing are processes for joining metallic components in the solid state; from *centroinox.it*; www.linguee.com

(lit. to show something with the forefinger), den Zeigefinger über etwas erheben (lit. to lift the forefinger against / over something, e. g. "wir Europäer wollen den Zeigefinger über Menschenrechtsverletzungen außerhalb Europe erheben", "we Europeans want to raise the finger / point the finger against violations of human rights outside Europe"); **FR**: blâmer, accuser (to blame, to accuse); **CH**: 譴責 qiǎnzé (lit. to criticize, to condemn, to denounce, e. g. 那篇文章譴責了當局 nà piān wénzhāng qiǎnzé liǎo dàngjú (lit. that article condemns the situation / offices outspokenly / frankly, "the article points an accusing finger at the authorities")

53. **to point** (e. g. "to point a gun", "to point the finger"). We may be able, by inference or assumption, to guess the meaning of point, when it literally stands for the physical part of something or extremity, e. g. the point of a finger (telic / constitutive quale); **SP**: apuntar (e. g. "apuntar la pistola", "apuntar el arma", lit. to point the gun; **FR**: diriger le pistolet vers / contre quelqu'un (lit. to bring the gun towards / against someone); **IT**: puntare l'arma, puntare la pistola (same as in English); **CH**: 指 zhǐ, to *finger*, to point at or to, to refer to (e. g. "she pointed the finger in my direction" 她指著我這個方向 tā zhǐ zhe wǒ zhège fāngxiàng), 對準 duìzhǔn, 瞄準 miáo zhǔn (lit. to aim at, to target, to point, e. g. "he pointed / aimed the gun at her head", 他用槍對準瞄準他的頭 tā yòng qiāng duìzhǔn / miáozhǔn le tā de tóu); **GE**: mit vorgehaltener Pistole (lit, holding a gun), eine Pistole auf jemanden richten (lit. to point the gun to someone), mit einer Pistole auf jemanden zielen (lit. to aim at someone with the gun), jemanden zeigen (lit. to show someone)

54. **to be at knife point / knife-point / knifepoint**; **GE**: "mit vorgehaltenem Messer" (lit. with brandished knife, at the point of the knife); **CH**: 在刀子威脅下 zài dāozi wēixié xià (lit. to be / to exist + small knife, pocketknife + threaten / menace + xià [used to complement the verb]) (e. g. "she was raped

at knife-point" 她遭持刀強姦 tā zāo chídāo qiángjiān [lit. she + by chance -misfortune + hold a knife + to rape]); **SP**: (robar a una persona) a punta de navaja, (ser sacada) a punto de arma bianca (lit. to be robbed at the point of razor, to be abducted at point of white weapon); **FR**: sous la menace d'un couteau (lit. under the menace of a weapon), aggreser quelqu'un au couteau (lit. to attack someone with a knife); **IT**: essere armato di coltello, aggredire qualcuno, coltello alla mano (lit. to be armed with a knife, to attack someone with a knife in the hand)

The expression to be at knife point does not hold the same definition of to be on a knife-edge (see below), which means "finely balanced between success and failure"

Point means ATTITUDE, STATEOFMIND, BEHAVIOR, PREDISPOSI-TION

55. **point** (e. g. to have a weak point, meaning to lack / to fault); **CH**: 短 duǎn (短處 duǎnchù, lit. short + point), weak point, to lack, fault; **GE**: Punkt, Argument (lit. point, topic); **SP**: cuestión, caso (e. g. "this is exactly the point!", "¡eso es lo importante!"); **IT**: punto, question (same as in German); **FR**: le point, la question (same as in Italian and German)

56. **to be a point man** (meaning [a] to be the leader / spokesperson of a situation, [b] a soldier who goes before the others in the troop to check for danger); **CH**: 尖兵 jiānbīng [lit. 'point'], (e. g. "he was a pioneer in developing the oil industry", 他是開拓石油工業的尖兵 tā shì kāituò shíyóu gōngyè de jiānbīng); 先遣兵 xiānqiǎn bīng (lit. early dispatch / sent in advance + soldiers); 特派員 tèpài yuán (special correspondent, special commissioner) (e. g. "the President's point man on education" 總統在教育方面的特派員 zǒngtǒng zài jiàoyù fāngmiàn de tèpàiyuán [lit. president + to be + education side / education field + de + correspondent]); **GE**: Vorreiter (definition [b]), 'We-

ichensteller' (lit. the one that puts the trails, definition [a]), Späher (lit. the one who scouts, peeps); **IT**: apripista (lit.the one that breaks the rows), 'portavoce' (spokesperson), 'esperto' (expert); **FR**: personne-ressource (lit. person-resource, meaning reference person), expert (expert); **SP**: experto (expert)

57. **to be / come / go / get *to* the point** (where the point is a topic or an argument, i. e. REASONING). The expression can mean [a] with relevance to the matter at hand (e. g. "these remarks were made to the point", "your statement is to the point"), or [b] short and dealing with the core of an issue (e. g. "he would not speak to the point"). When to be / to go to the point means [a] to be appropriate and relevant, it can be translated with to be on point. In colloquial American, there also exists to cut to the chase. **CH**: 簡明恰當 jiānmíng qiàdàng (lit. to be simple and clear, concise and appropriate, e. g. 請簡明扼要一點 qǐngjiǎn míng èyào yī diǎn,"please be concise and to the point"), 簡潔中肯 jiǎnjié zhòngkěn (lit. succint + pertinent), 鋒利 fēnglì (to the point), 適合的 shìhé de (lit. suit, fit + de), 相關的 xiāngguān de (lit. relevant + de), 相符的 xiāngfú de (lit. conform + de) (e. g. "this quotation is on point" 這段話引 用的得恰到好處 zhè duàn huà yǐnyòng de děi qià dào hǎochù (this + CL + word + quotation + de + has to / must + just right / just perfect). 鋒利 also means 'sharp' (for tongue or knife, e. g. 刀片很鋒利 dāopiàn hěn fēnglì the knife is very sharp); **GE**: auf den Punkt / auf dem Punkt kommen (same as in English), auf der Sache (lit. on the topic), treffend (lit. appropriate); **SP**: ir al grano, ir al asunto (lit. to go to the seed, to go to the core), ¡déjese de preámbulos (lit. leave the premises); **IT**: essere succinto, andare (dritto) al punto (lit. to be brief and direct, to go [straight] to the point), essere coerente (to be coherent), andare alla sostanza (lit. to go where the stuff is); **FR**: venir au fait, aller à l'essentiel (lit. to come to the facts, to go to the essential part), 'saisir' (lit. to catch), aller droit au but (lit. to go straight to the point)

58. **to (not) get one's point** (point alias REASONING). The whole expression stands for understanding someone's thinking; **CH**: （不）開竅 bù kāiqiào (to not) get the point, to not understand, 明白 míng bai (lit. to understand, e. g. "do you get the point of what I am saying?", 你明白我在說什麼嗎？nǐ míngbai zài shuō shén me ma?, 聽懂 tīng dǒng (lit. to understand), 那個笑話 是什麼意思我沒聽懂 nà ge xiàohuà shì shénme yìsi wǒ méi tīng dǒng, "I did not get the point of that joke"; **GE**: *verstehen*; **IT**: *capire* (lit. to understand); **FR**: comprendre (to understand); **SP**: comprender, entender (to understand)

59. **to not go / come/ be to the point**, to go around in *circles*, to beat around the bush (also see the entry to go around / to spin around in circles above); **CH**: 繞圈子 ràoquānzi (e. g. 別跟我繞圈子 bié gēn wǒ ràoquānzi, "don't beat around the bush with me"), (不要) 轉彎抹角 zhuǎn wān mò jiǎo (lit. [don't] speak in a roundabout way, beat around the bush, of road winding and turning). 你必須明確回答這個問題，想繞是繞不過去的 nǐ bìxū míngquè huídá zhège wèntí, xiǎng rào shì rào bù guòqu de "you must give a definite answer to this question, there is no getting around it", 絮叨 xùdao ("to talk without getting to the point", long-winded); **GE**: drumherum *reden*, um den heißen *Brei* herumreden (lit. to talk all around, to talk about hot porridge), schwatzen, quasseln (and as an adjective wortreich, redselig) (lit. to chitchat nonsense, rich of words, but not of content); **IT**: girare in tondo (lit. to go around), non andare al punto (same as in English); **SP**: dar vueltas, dar vueltas y más vueltas a algo (lit. to go around, to go around and around something); **FR**: faire des cercles, tourner en rond (lit. to do circles, turn around)

60. **to go straight to the point**, **GE**: etwas direkt auf den Punkt bringen, direkt zu dem Punkt kommen (lit. to bring something to the point, to arrive directly to the point); **CH**: 直截了當 zhí jiē liǎo dàng, also zhí jié liǎo dàng, direct and plain speaking (idiom) (e. g. 如果你得到了壞消息，不要轉彎抹角，直

截了當地對我說 rúguǒ nǐ dédào le huài xiāoxi, bùyào zhuǎn wān mò jiǎo, zhí jié liǎodàng de duì wǒ shuō, "in case you have got bad news, do not beat about the bush, come straight to the point"); **SP**: ir directo al *grano* (lit. to go directly / straight to the core); **FR**: aller à l'essentiel, aller droit au fait (lit. to go to the core, to go directly to the fact); **IT**: andare dritto al punto (same as in English)

61. **to be beside the point** (meaning to be irrelevant); **CH**: (這) 無關緊要 (zhè) wú guān jǐn yào (this is irrelevant, beside the point); **GE**: nicht zur Sache gehörig, irrelevant (lit. not belonging to the topic, irrelevant); **FR**: être hors sujet (lit. to be outside the subject), n'avoir rien à voir (lit. to have nothing to do with); **SP**: no venir a cuento, no venir al caso (lit. to not belong to the story, to the case); **IT**: non avere niente a che *vedere* con, essere irrilevante (lit. to have nothing to do with, to be irrelevant)

62. **to answer beside the point** (meaning something that is irrelevant); **GE**: nicht zum Thema gehörig, nebensachlich, unerheblich; aneinander vorbeireden, irrelevant (lit. not belonging to the topic, aside a topic, to talk to each other aside); **CH**: 答非所問 dáfēisuǒwèn; **IT**: rispondere in modo irrilevante, non attinente (lit. to provide an irrelevant, misleading answer), non avere nulla a che vedere con (lit. to have nothing to do with); **FR**: n'avoir rien à *voir* (lit. to have nothing to do with), être hors sujet (lit. to be beyond the subject). I could not find a suitable translation for Spanish

63. **to go beyond the point**, **to reach the point of no return**; **FR**: avoir atteint le point de non-retour; **SP**: entrar [or encontrarse] en un callejón sin salida (lit. to enter a cul-de-sac, an alley without exit); **IT**: raggiungere il punto di non ritorno (same as in English); **GE**: den Punkt erreichen, an dem es kein Zurück mehr gibt (lit. to reach a point from where there is no return), einen unumkehrbarer Prozess (lit. a process for which there is no turning back);

IT: superare il punto di non ritorno (lit. to go past the point of no return), non riuscire ad andare oltre (lit. to not be able to go beyond); **FR**: dépasser le point de non-retour (lit. to go beyond / go past the point of no return); **SP**: superar el punto límite (lit. to go beyond the last point / the most extreme point)

64. **(to discuss something / to go through) point by point**; **GE**: jedes Detail besprechen / prüfen (to discuss / test every detail); **IT**: punto per punto, minuziosamente (lit. point by point, in a very detailed way); **FR**: point par point (same as in English); **SP**: punto par punto (same as in English); **CH**: 逐步 zhú bù (progressively, step by step, e. g. we should develop our argument point by point, 我們應該逐步展開論點 wǒmen yīnggāi zhúbù zhǎnkāi lùndiǎn (lit. we should progressively unfold the argument)

65. **to make a point**. The expression can either mean [a] to clarify something [b] to bring something to an end (e. g. "Could you please finally make a point"), [c] to pledge doing something which is deem important; to act purposefully and intentionally, or [d] to be in favor or against something (e. g. "she made a point in favour of your idea"); **GE**: (mit etwas) aufhören (lit. to stop with something), ein Argument vortragen / anbringen (lit. to explain a topic, to bring over a topic); eine Aussage treffen (lit. to make a statement), Wert darauf legen (lit. to put value into something, definition [c]), e. g. "Wir legen Wert darauf, dass unsere Investoren das Kapital, das sie uns anvertrauen, nur in Solarprojekte einlegen" "we make a point of investing the capital entrusted to us by our investors only in solar projects", "sich etwas zur Aufgabe machen", sich etwas zum Prinzip machen (lit. to make something to oneself's task, principle); **SP**: enfatizar un punto, hacer notar (lit. to stress / to highlight a point, to remark, definition [a]) procurar de hacer algo (lit. to try to make something), esforzarse (lit. to make an effort doing something), intentar (to try), definition [c], e. g. "Debemos intentar llegar a un agenda política

común que trate pobreza, violencia, derecho e igualdad" "we should make a point of bringing up a common political agenda that addresses poverty, violence, rights and equality"; **FR**: tenir absolument à faire quelque chose (lit. to pledge to do something), prendre la peine de faire quelque chose (lit. to make an effort doing something), faire la mise au point de quelque chose (lit. to focus on something), faire un devoir de fair quelque chose (lit. to transform the realisation of something into a pledge), e. g. "Les participantes ont été invitées à venir avec quelque chose pour la mise au point ou pour ouvrir les discussions" "the participants had been invited to bring something with them to use to make a point or to open up a discussion" [definition c], s'astreindre à qc/à (to compel oneself to something / to); faire une remarque en faveur de / contre quelqu'un / quelque chose, marquer un point (lit. to make a remark in favor / against someone / something, to mark a point) [definition d]; **IT**: mettere un punto (lit. to put a point, definition [b]), farsi un dovere di fare qualcosa, sforzarsi (lit. to pledge oneself to do something, to make an effort doing something, definition [c]); **CH**: 特別重視 tébié zhòngshì (lit. to attach particular value, e. g. 中國人特別重視個人榮譽 Zhōngguó rén tèbié zhòng-shì gèrén róngyù, lit. Chinese people attach especial importance to individual honor, "Chinese people make a point of their personal honor") (definition [c]), 保證做 bǎozhèng zuò (lit. to pledge + to do), 必定做 bìdìng zuò (must / have to + to do) (e. g. "she made a point of closing all the windows before leaving the house", 她離家前必定要把所有的窗子都關好 tā lí jiā qián bìdìng yào bǎ suǒyǒu de chuāngzi dōu guān hǎo

66. **[to bring somebody] to the point**; GE: jemanden auf den *Punkt* bringen (also paraphrasable as to put in a nutshell, to *get the heart* of something, to come straight to the point, to cut right to the chase of the matter, to put it straight (e. g. "the report should bring us to the point that the employment problem is

not just about macroeconomic aspects").

67. **to point out something**, to make the point. The expression to point out something can either mean [a] to highlight / to stress a particular aspect or [b] to criticize something; **CH**: 指正 zhǐzhèng (to point out mistakes or criticisms), 指出 zhǐchū "to point out"; 指摘 zhǐzhāi. 指 zhǐ in Chinese stands for 'finger' (一個手指，一只手指 yī ge shǒuzhǐ, yī zhī shǒuzhǐ), 指指點點 zhǐzhǐdiǎndiǎn (lit. finger finger point point), meaning to gesticulate, to point the finger of blame; **GE**: verdeutlichen, tadeln (lit. to make clearer, to blame / to condemn); **IT**: indicare, fare notare, criticare (both meanings same as in English); **FR**: montrer, faire remarquer que (lit. to show, to remark); **SP**: indicar, señalar (lit. to show, to denounce)

68. **to be pointless**. To be pointless can either mean [a] in vain, or [b] without a purpose, meaningless (e. g. "these meetings are absolutely pointless"); **CH**: 枉然 wǎngrán (in vain; e. g. "we searched until we knew it would be pointless to continue" 我們搜索又搜索，知道繼賣下去也枉然時才罷手 wǒmen sōusuǒ yòu sōusuǒ zhīdào juéde jì xiàqù yě wǎng rán shí cáibà shǒu), "the war is pointless" 戰爭的無意義 zhànzhēng de wúyìyì (lit. the accidental / inadvertent justice / meaning of the war, "the pointlessness of war"); **GE**: zwecklos, sinnlos (lit. without goal, without meaning) (e. g. "wir sollten junge Männer - Afghanen und Bürger anderer Nationalitäten vor einem sinnlosen Tod schützen" "we should protect young men, Afghan and men from other nationalities, from a pointless death"), aussichtslos (lit. without a prospect); **IT**: inutile (e. g. "non serve a niente discutere con lui" "it's pointless arguing with him"); **FR**: n'avoir pas de sens (lit. meaningless), ne servir a rien (lit. useless), e. g. it's pointless to go now, e. g. "ça ne sert à rien d'y aller maintenant" ("it's useless to go now"); **SP**: inútil, ne servir de nada (same as in French)

69. **to touch on a sore point** (same meaning of to touch on a sore spot, to strike a nerve); **GE**: einen wunden Punkt berühren; **IT**: mettere il *dito* sulla *piaga* (lit. put the finger on the wound), toccare un tasto / una nota dolente (lit. to touch a weeping key / note); **SP**: poner el *dedo* en la *llaga* (almost the same as in Italian, to put the finger in the wound); **FR**: mettre le *doit* sur un *point* sensible, toucher un point sensible (lit. to put the finger on a sensitive point, to touch a sensitive point); **CH**: 觸及要害 chùjí yàohài (lit. to touch crucial part; e. g. "he does not dare to hit the nerve [meaning to touch the vital part of the problem]")

70. **to stretch a point** (meaning to be generous, tolerant; to take a more relaxed view of things); **GE**: alle Fünfe gerade mal lassen (lit. to relax all fives); **IT**: fare un'eccezione (lit. to make an exception); **FR**: exagérer (to exaggerate, to go too far); **SP**: hacer una excepción (same as in Italian); point is RULE / EXCEPTION; **CH**: 破例 pòlì (make an exception, break a rule, e. g. "we are going to stretch a point tonight", 今晚我們打算破例 jīnwǎn wǒmen dǎsuàn pòlì), 通融 tōngróng (stretch rules, get around regulations) (e. g. 這是可以通融 zhè shì kěyǐ tōngróng, "we can make an exception in this case")

71. **the zero point**, to hit rock bottom (meaning to reach the lowest point possible; e. g. "she hit rock bottom when none of her relatives came to visit her at the hospital"). The expression can either [a] refer to prices or something physical that deteriorates or [b] refer to a very bad / detrimental psychological state (humor, behavior). **GE**: der Nullpunkt (lit. the zero point); e. g. "die Stimmung sank auf den Nullpunkt" (lit. the atmosphere hit the rock bottom), am absoluten Tiefpunkt ankommen (lit. to reach the deepest point), ins Bodenlose fallen (lit. to fall into something with no bottom); **CH**: 最低的部份 zuìdī de bùfen (the lowest point), 最低的水平 zuìdī de shuǐpíng (the lowest level) (e. g. 價格降到了最低點 jiàgé jiàng dàoliǎo zuìdīdiǎn (lit. prices have

fallen at last to the lowest point), "prices hit rock bottom", "bedrock prices"; "the marriage had reached rock bottom" 婚姻已經走到了盡頭 hūnyīn yǐjīng zǒudào le jìntóu lit. the marriage + already + move to + le [past] + end); **SP**: tocar fondo (lit. to reach the bottom); **FR**: tomber au plus bas (lit. to fall down to the bottom), avoir le moral à zéro (lit. to feel really down, to zero); **IT**: toccare il fondo (lit. to reach the bottom), essere / avere raggiunto il livello più basso (lit. to have reached the lowest level)

72. **the point of view** (synonym for ANGLE) (e. g. "the point of view of the media"); **IT**: "punto di vista" (same as in English); **GE**: Anschauungsweise (lit. outlook + way), Ansicht (lit. view), Betrachtungsweise (lit. regard + way), Blickpunkt (lit. glimpse / sight + point), Blickwinkel (lit. glimpse / sight + angle), Gesichtspunkt (lit. face + point), Erzählperspektive (lit. to tell + perspective), Sicht (lit. view), Sichtweise (lit. view + way), Standpunkt (lit. to stall + point); **FR**: point de vue (same as in English); **SP**: punto de vista, perspectiva (same as in English); **CH**: (一個) 觀點 yī ge guāndiǎn (standpoint, lit. to look + point), 態度 tàidù (manner, bearing), 意見 yìjiàn (idea, perspective), 看法 kànfǎ (a way of looking) (e. g. "why can't you ever see my point of view?" 你怎麼老不明白我的觀點呢? nǐ zěnme lǎo bù míngbái wǒ de guāndiǎn ne?), "there are different point of views on this issue, 在這個問題上意見紛紜 zài zhège wèntí shàng yìjiàn fēnyún (lit. to be + this + idea + on (after a noun) + opinion + different); "this book was written from the point of view of the father" 這本書是從父親的角度寫的 zhè běn shū shì cóng fùqīn de jiǎodù xiě de (lit. this + CL+ book + to be + from + father + angle + write + de)

4.5   Line

Line means SHAPE, CONCRETEOBJECT, ABSTRACTOBJECT

73. **a straight / dotted / diagonal / horizontal / vertical / parallel line**; **CH**: 直對角線 zhí duìjiǎoxiàn (straight line), 波狀對角線 bōzhuàng duìjiǎox-iàn (wavy), 垂直水平線 chuízhí shuǐpíngxiàn (lit. vertical level), 平行線 píngxíngxiàn (lit. parallel lines); **IT**: linea (linea; linea retta / orizzontale / a puntini / verticale/ parallela); **FR**: ligne; **SP** línea; **GE**: Linie

74. **to go over the line**. The expression can mean [a] to pass over a real or abstract line, [b] to reach a goal or target or [c] (colloquial) to be beyond what is acceptable (often used in the expression "to step over the line") (e. g. "the ball went over the line") or [d] (colloquial) repeat / re-read written lines; **SP**: pasarse de la raya (lit. to go over the line), saltarse los límites (lit. to overcome the boundaries, e. g. "El gran delito de mi padre como cantaor fue saltarse los límites y escribir sus propias canciones" "my father's great crime as a vocalist was to go over the line and start to write his own songs"); **CH**: 她反復練習那台詞 tā fǎnfù liànxí nà táicí (lit. she repeatedly practiced the actor's line, "she went over the line time and again"); **FR**: aller trop loin (lit. to go way over, e. g. "Je pense que le gouvernement est allé trop loin dans le cas" "I think the government went over the line"); **IT**: sorpassare, andare oltre. Line here can also stand for CONCRETEPLACE, ABSTRACTPLACE.

75. **the starting line**; **CH**: 起跑線 qǐpǎoxiàn (the starting line, of a race); **IT**: la linea di partenza (same as in English); **GE**: Startlinie (same as in English); **FR**: ligne de départ; **SP**: línea de salida (lit. departing line). Notice that the expression starting line can also be translated with scratch line in the phrase to stand at the scratch line (also usable in a business domain)

76. **to stand at / outside the scratch line**. The term scratch line is taken from sports; **CH**: 在起點 zài qǐdiǎn (lit. to stand at the starting point). I could not find the expression in the other languages

77. **the finish / finishing line**; **CH**: 終點線 zhōngdiǎnxiàn (the finishing line, of

a race); **FR**: ligne d'arrivée; **SP**: línea de meta (lit. line of the goal); **IT**: meta, linea di arrivo (lit. target, goal); **GE**: Zieldurchfahrt (lit. path across the goal), Ziellinie (lit. line of the goal)

78. **the goal line** (in sports, the line at the end of a field where goals have to be scored) (same as 'touchdown'); **CH**: 球門口 qiúménkǒu (goalmouth, goal-mouth); **GE**: Torlinie (lit. gate line); **IT**: linea di porta (same as in German); **FR**: ligne de but; **SP**: línea de la portería (lit. line of the goal)

79. **the touchline, the sideline** (in sports, a line that marks the end of a playing field, in soccer and rugby); **IT**: linea laterale (lit. lateral line); **FR**: la touche (lit. the place where you touch); **SP**: línea de banda (lit. line of the side); **GE**: Seitenlinie (same as in Spanish); **CH**: 邊線 biānxiàn

80. **the yellow line** (meaning a painted line which defines a certain space; it could also be the thread stretched in crime scenes); **GE**: die gelbe Linie, der gelber Strich (lit. the yellow line, the yellow thread); **CH**:, 黃色安全綫 huángsè ānquánxiàn (lit. yellow protection line, e. g. "please stand behind the yellow train (while waiting for the train" 請您站在黃色安全綫以內候車 qǐng nín zhàn zài huángsè ānquán yǐnèi hòuchē); **IT**: linea gialla; **FR**: la ligne jaune; **SP**: la línea amarilla

81. **a line**; **CH**: 一段繩 yī duàn shéng, 一條線 yī tiáo xiàn, 管道 guǎndào 'pipeline' (e. g. 煤氣管道 méiqì guǎndào "gas pipeline"), 線路 xiànlù "electricity line"; **IT**: filo, tubo, -dotto (e. g. oleodotto [pipeline for oil], gas-dotto [pipeline for natural gas], metanodotto [pipeline for methane]; **FR**: tube, pipeline, fil, -duc (e. g. oléoduc [oil pipeline]); tubería, -ducto (e. g. oleo-ducto), alambre, cable; **GE**: Pipeline, Leitung, Rohrleitung, Draht, Kabel

82. **a power line** (meaning a rope or wire that carries electricity); **CH**: 電線 diànx-iàn (electric wire, power cord); **GE**: Potenzstrom, Potenzlinie, Stromleitung, Starkstromleitung; **IT**: linea elettrica; **FR**: ligne électrique, ligne (à) haute

tension, **SP**: línea eléctrica

Line means WAYOFTRANSPORTATION, DIRECTION, PLACE

83. **a line as railway line, railroad**; **CH**: 路線 lùxiàn route, itinerary (e. g. "the East Coast line" 東海岸鐵路線 Dōnghǎi'àn tiělùxiàn (the railway of the East Coast); **GE**: Trasse, Bahnlinie, Bahnstraße, Schienenweg, Zugstrecke, Eisenbahnlinie (lit. the track, the line of the vehicle, the road of the vehicle, the road of the rails, the stretch of the train, the line of the railway); **SP**: línea ferroviaria, línea de ferrocarril; **FR**: ligne ferroviare, ligne de chemin de fer **IT**: linea ferroviaria

84. **a (straight) line**; **CH**: 照直走 (e. g. 你只管照直走 nǐ zhǐguǎn zhàozhí zǒu, "just keep going in the straight line"); **GE**: Linie, Richtung, Trajektorie (lit. line, direction); **FR**: ligne, direction; **IT**: linea, traiettoria, direzione; **SP**: trayectoria, línea, dirección

85. **the departure line**; **IT**: binario di partenza; **SP**: vía de partida, vía de salida; **FR**: voie de départ; **GE**: Ausfahrgleis. I could not find the expression in Chinese.

86. **to stand in line, to line up, to wait in line** (e. g. "you have to stand in line to get your food stamps."); **CH**: 排隊 páiduì (lit. to line up, e. g. "the students stand in line to get their new books" 學生們排隊取新書 xuéshengmen pái duì qǔ xīn shū); **GE**: anstehen, in einer Reihe stehen, in einer / der Schlange stehen, Schlange stehen, sich anstellen (same as in English); **IT**: fare la fila, fare la coda; **FR**: faire la queue; **SP**: hacer cola

87. **the line** (meaning the line of a train, metro or bus) (e. g. "être sur la ligne 1 Genève-Minsk", "to be on the line Geneva-Minsk"; "être pilote de ligne"); same in German, Italian and Spanish (die Linie, la linea, la ligne, la línea, **CH** (路 lù, 地鐵 [number] 號綫 dìtié hào xiàn [the subway line], e. g. "which subway line goes to Beijing Road?" 幾號地鐵綫去北京路 jǐ hào dìtié xiàn

qù Běijīng lù?)

88. **to streamline** means [a] to channel, to wire, to connect, to address towards a precise direction. In common language, 'streamline' as verb, noun and adjective ('streamlined') means [b] to give a smooth shape so that it can move easily in water or through air or [c] to make a system, an organization work smoothly (e. g. "the attention needs to be streamlined and channeled properly"); **CH**: 使成流線型 shǐ chéng liú xiàn xíng, lit. to cause / to make streamlined, e. g. "the cars all have a new streamlined design", 這些汽車都是流線型新款 zhèxiē qìchē dǒu shì liúxiànxíng xīnkuǎn), 使增產節約 shǐ zēngchǎn jiéyuē (lit. to apply + increase + economize / practise thrift, e. g. "the production process has to be streamlined", 生產流程還需改進 shēngchǎn liúchéng hái xū gǎijìn lit. the production stream still requires improvement); **GE**: Stromlinie; **FR**: ligne d'écoulement, ligne d'écoulement; **IT**: linea di flusso; **SP**: línea de flujo), TRANSPORT (**GE**: aerodynamisch, stromlinienförmig, sanieren, rationalisieren, durchrationalisieren, straffen, modernisieren; **IT**: carenado, aerodinamico, ottimizzare [lit. to optimize]; **FR**: caréné, aérodynamique, rationaliser; **SP**: aerodinámico - in English one can also say aerodynamic, faired), racionalizar

89. **line** can be a physical or abstract DIVISION (e. g. "the line between being extraordinary and common is very thin and you decide which side you want to be"). It can be a water line, a district line, a county or state line; **CH**: 分界線 fēnjièxiàn (e. g. 軍事分界線 jūnshì fēnjièxiàn, a military demarcation line), 界限 jièxiàn (demarcation line; e. g. 我們要超越種族性別和宗教的界限 wǒmen yāo chāoyuè zhǒngzú, xìngbié hé zōngjiào de jiěxiàn (lit. we want to surpass the lines of race, gender and religion, "we want to cut across lines of race, gender and religion"); **IT**: linea di demarcazione (lit. demarcation line); **FR**: ligne, ligne de démarcation (same as in Italian); **SP**: línea

divisoria, línea de demarcación, delimitación (lit. division line, demarcation line, delimitation); **GE** Demarkationslinie, Grenzlinie (lit. demarcation line, borderline)

90. **line** in this sense can also stand for WALL, BARRIER, BORDER (e. g. "life behind the line / s" (minorities in Pakistan)); **GE**: Grenzlinie, Abgrenzung, Scheidelinie, Mauer (lit. the borderline, the division, the wall); **IT**: confine, limite, linea (lit. border, limit, line); **FR**: ligne / s' (e. g. "témoignages sur les tranchées, la vie derrière les lignes, la tambouille des camps, le front, les charges" "documentary of a war in color: life in the trenches, life behind the lines, the grub of the camps, the war fronts, the charges"); **SP**: línea, la línea divisoria

91. **to cross the line / s**. The expression means [a] to cross a painted, physical line or [b] to go over something that is considered acceptable, or to overdo something. In this sense, it can also mean to commit a crime. Or it means [c] a telephone call that interrupts another call (line here stands for COMMUNI-CATION); **CH**: (be careful not to) cross the line, 小心別越過道路的中界線 xiǎoxīn bié yuèguò dàolù de zhōng jièxiàn (lit. be careful not to cross the middle dividing line, be careful not to cross the line), 過馬路 guò mǎ lù (lit. to cross the street), 過終點線 guò zhōng diǎn xiàn (lit. to pass over the finishing line, e. g. "who was the first to cross the line?" 第一個衝過終點線的人是誰 dì yī ge chōng guò zhōng diǎn xiàn de ren shì shéi?), 觸線 chùxiān (to cross the line, to commit a crime); **GE**: die Grenze überschreiten, durchs Ziel gehen, die Ziellinie überqueren (lit. to pass over the boundary, to pass through the goal, to step over the finishing line); **IT**: tagliare il traguardo (lit. to cut the winning thread), "superare il limite" (lit. to pass by the finishing line); **FR**: franchir la voie, franchir la ligne d'arrivée (lit. to step over the way, to step over the finishing line); **SP**: *salirse* de la raya (lit. to go out with oneself of the

line, llegar en cabeza (lit. to arrive first on the finishing line, e. g. "Sabemos ya qué competidores llegarán en cabeza: las multinacionales que disponen de infraestructuras muy avanzadas y barcos refrigerados" "We already know which competitors will cross the line first: the multinationals with their high-performance equipment and refrigerated ships", "cruzar la línea" (lit. to cross the line, e. g. "Algunos cruzan la línea e incurren en un delito al tratar de disuadir a testigos" "And some will cross the line into criminal attempts to dissuade the witness")

92. **the line *of* departure** (same as jump-off line, deployment line, meaning a line in tactical operations that needs to be crossed by military forces during an attack); **GE**: Ablauflinie; **IT**: linea di dispiego (same as deployment line); **FR**: ligne de débouché, ligne de départ; **SP**: línea de salida (e. g. "Los controles lineales para Misiones de Ofensiva son límites a izquierda y derecha, la Línea de Salida (LOD), las Líneas de Fase (PL), y el Límite de Avance (LOA)", "The linear controls for Offensive Missions are left and right boundaries, the Line of Departure (LOD), Phase Lines (PL), and the Limit of Advance (LOA)"; **CH**: 起飛綫 qǐ fēi xiàn (lit. take off line of an airplane)

The line of departure is not the same as the departure line or the departure track (put under line as ROUTES / DIRECTIONS)

Line means SERIES, CONCRETEEVENT, ABSTRACTEVENT

93. **line of succession**, **a line of ancestors**; **CH**: 通過父系 tōngguò fùxì ("to pass through the paternal line"), "she came from a long line of doctors" (same as "a line of doctors run through her family", 她來自一個醫生世家 tā láizì yī ge yīshēng shìjiā (lit. she came from one doctor's family); **GE**: Nachfolge, Thronfolge (lit. the one that follows / comes after, the one that comes after on the throne); **SP**: línea de sucesión (e. g. "Kim Jong-il no está bien, y no hay una clara línea de sucesión" "Kim Jong-il is not well, and there is no clear

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line of succession"); "línea de sucesión (al trono)" (same as in English); **FR**: ligne de succession (same as in English); **IT**: 'successione' (succession)

94. **(somewhere) along / down the line**. The expression can mean [a] at a certain point during an activity (time-related), [b] a certain point during an activity (space-related), [c] in accordance with or [d] along an existing physical or abstract line / thread (with line as OBJECT); **IT**: a un certo point (lit. at a certain point), da qualche parte (lit. somewhere); **GE**: im Sinne von (lit. in the sense of), irgendwann (lit. at a certain point, whenever), auf der ganzen Linie (lit. all along the line), irgendwo (lit. somewhere); **SP**: en algún momento (lit. at a certain moment), en algún lugar de la línea (lit. somewhere on the line, e. g. "el cambio a alta tensión en algún lugar de la línea principal puede producir tales picos", "high voltage switching somewhere in the main line can cause such a spike to occur"; **FR**: quelque part (lit. some part, e. g. "En bout de ligne, cela signifie normalement que l'utilisateur quelque part en aval devra payer et payer chèrement" "the end result is usually that the user somewhere down the line is the one who will have to pay and pay heavily"); **CH**: (e. g. "somewhere along the line a large amount of money went missing" 有一筆巨款在某一環節上不翼而飛 yǒu yī bǐ jùkuǎn zài mǒu yī huán jié shàng bù yì ér fēi; 在以後的階段 zài yǐhòu de jiēduàn (lit. at a later stage, e. g. "we shall take care about this issue and come up with a strategic decision down the line" 我們將在以後的階段對此問題作出決策 wǒmen jiāng zài yǐhòu de jiē duàn cǐ wèntí zuòchū juécè)

95. **to come on line** (meaning to start functioning); **GE**: ans Netz gehen, in Betrieb gehen (lit. to go to the network, to go to the production); **IT**: entrare in esercizio, entrare in funzione (lit. to come into practice, to start functioning, e. g. "La centrale da 177 MW annunciata da PG&G dovrebbe entrare in esercizio nel 2010" "The 177 MW plant announced by PG&G should come

in line in 2010"); **FR**: "entrer en vigoeur" (lit. to come into force); "mettre en service" (lit. to start, to initiate); **SP**: entrar en operación, entrar en funcionamiento (lit. to start working, to start functioning); **CH**: 實行 shíxíng (to implement, to put into practice, e. g. 新的操作方法將在六月實行 xīn de cāozuò fāngfǎ jiāng zài liù yuè shíxíng "the new working methods will come on line in June")

96. **to be first / second / .. in line** [a] to position something or someone in a row (a meaning that should be included under line as DIRECTION / ROUTES or [b] to put something on a scale in order of importance; **CH**: 他的地位僅次於主席 tā de dìwèi jǐn cìyú zhǔxí (lit. his position is barely second to the chairman's, "he is second in line to the chairman"), 為王位繼承人 wèi wángwèi jìchéngrén (lit. to become kingship's heir, "to be next in line to the throne"); **GE**: in erster Linie... in zweiter Linie.... (same as in English) "an der erster / zweiter / .. Stelle *liegen / stehen*" (lit. to stand / to lie on the first / second /... place); **IT**: essere in prima / seconda /.. linea (same as in English); **FR**: être en première / deuxieme / ligne (same as in English); **SP**: estar en primera / seguenda línea (same as in English)

97. **all along the line**, meaning completely, utterly (e. g. "it was a success all along the way"). I've put this expression under SERIES / ACTIVITY because although it describes a WAYOFBEING / STATE, it implies that the success of the achievement relies in going through all the (temporal / spatial) stages (as it becomes clear in French); **GE**: auf der ganzen Linie (lit. on the whole line), 'insgesamt' (lit. altogether); **IT**: in tutti i sensi (lit. in all senses); **FR**: tout au long, à chaque étape (lit. all along, during all phases, e. g. "elle a conclu que la solution résidait dans des améliorations à chaque étape du processus" "she determined that the answer was to be found in improvements all along the line"); **SP**: a lo largo de todo el camino (lit. throughout all the way, e. g.

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"economía y ecología a lo largo de todo el camino" "economy and ecology all along the line"); **CH**: 始終 shǐ zhōng (lit. from the beginning to the end", all along, e. g. "you were right all along the line", 你始終是正確的 nǐ shǐzhōng shì zhèngquède)

Line means BODY, BODYPART

98. **lines** with line as wrinkle (e. g. "she has fine lines around her eyes"); **CH**: （細的）皺紋 xì de zhòuwén, e. g. 他的眼睛周圍有細的皺紋 tā de yǎnjing zhōuwéi yǒu xǐ de zhòuwén (lit. around his eyes there are little wrinkles); **IT**: 'linea' (line), "rughe attorno agli occhi" (lit. wrinkles around the eyes); **GE**: Fältchen (Augenfältchen, Stirnfältchen, Dekollete- und Halsbereichfältchen), feine Linien um die Augen (lit. wrinkles [around the eyes, on the forefront, on the decollete or the neck area], small wrinkles around the eyes); **SP**: las líneas debajo de los ojos (lit. the lines under the eyes); **FR**: les lignes autour des yeux (same as in Italian and Spanish)

99. **line** can also stand for BODY (e. g. "to look for a slim line"); **GE**: die Linie (e. g. "auf die schlanke Linie achten / etwas für die schlanke Linie tun", "to look for / to do something for the slim line"); **IT**: linea; **FR**: la minceur (thinness, slimness); **SP**: adelgazar (to lose weight, to get thin); **CH**:, 輪廓線 lúnkuòxiàn (an outline, a silhouette), "a slim girl / woman" 苗條的少女 miáotiao de shàonǔ. 'Line' in this case is similar to 'form', 'shape' (形體 xíngtǐ (physique, the form and structure, e. g. 漢字的形體 hànzì de xíngtǐ, "the form of Chinese characters"), 形狀 xíngzhuàng (lit. form, e. g. "a pineapple is different in shape than an apple", 鳳梨和蘋果形狀不同)

Line means THOUGHT, STATEMENT

100. **line /s** can refer to words (e. g. "you should write one line a day"); **CH**: 便條 biàntiáo a note, 留言條 liúyán tiáo (lit. to leave a message); **GE**: Linie; **FR**: ligne (e. g. il a laissé un message de deux lignes" "he left a two-line

message"); **SP**: "una o dos líneas (de información)" (one or two lines); **IT**: una o due linee (one or two lines)

101. **the storyline**, **the story line**; **GE**: die Handlung; **IT**: la trama; **FR**: l'intrigue (la); **SP**: un argumento (e. g. to plot a story line, idear un argumento); **CH**: 情節 qíngjié (lit. the plot, the circumstances)

102. **(to pursue / to follow) a line of thought**; **GE**: Gedankenfaden (lit. line / thread of thoughts); **IT**: linea di pensiero (same as in English), pensiero (thought), riflessione; **FR**: proposition, ligne de pensée, idée; **SP**: línea de pensamiento, línea; **CH**: 推理方法 tuīlǐ fāngfǎ (lit. inference method, inference way), e. g. "I don't follow your line of reasoning" 我不理解你的推理方法 wǒ bù lǐjiě nǐ de tuīlǐ fāngfǎ (lit. I + do not understand + your inference method)

103. **the official line** (e. g. "according to the government official line; **CH**: 官方的理念 guānfāng de lǐniàn (lit. the idea / principle of the government); **SP**: el / los discurso / s oficiale / s" (lit. the official speech), la línea oficial (e. g. "Sin embargo, la línea oficial de Moscú ha sido más cautelosa, expresando su preocupación por los disturbios, que suponen una amenaza a la estabilidad" "Moscow's official line, however, has been more cautious, expressing concern with the riots that threaten stability"); **FR**:la ligne officielle, **IT**: posizione ufficiale, versione dei fatti ufficiale (lit. the official position, the official facts); **GE**: die offizielle Linie (same as in English)

Line means WAR, SOLDIER

104. **the battle line, the line of battle** (similar in meaning to the battlefield) (e. g. "behind the Soviet battle lines") can be [a] the physical fence in a war environment, similar to "the line of fire" or [b] an abstract fence between different opinions / views; **GE**: die Schlachtlinie, die Schlachtreihe, die Kampflinie (lit. the slaughter line, the combat line); **IT**: il fronte, linea difensiva (lit. line

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of defense); **FR**: le front (de bataille), les lignes de bataille (lit. the front, the

lines of war); **SP**: línea de batalla, el fronte de batalla (same as in French);

CH: 戰場 zhàn chǎng (e. g. "although he was badly hurt, he refused to leave

the battle line", 雖然他嚴重的受傷了但拒絕離開戰場 suīrán tā yánzhòng

de shòu shāngle, dàn jùjué líkāi zhànchǎng

105. **the command line** [a] in military, the command line stands for authority (e. g.
the army is the largest unit of the military line of command), [b] in informatics,
the command line is a specific function in computers; **SP**: la línea de coman-
dos (same as in English); **FR**: ligne de commande (same as in English); **IT**:
linea di comando (same as in English); **CH**: 命令行 mìnglìngháng (command
line in computing); **GE**: Kommandozeile, Befehlszeile (in informatics), Be-
fehllinie

106. **(to be in) the firing line**, **to come into the firing line**, **the line of fire** (e. g.
"Line of fire: Diary of an unknown soldier") can stand for [a] the physical
line where soldiers act in war or [b] a well-debated controversial issue where
people are usually picked up and heavily criticized / ostracized ; **GE**: in die
Schusslinie geraten, ins Fadenkreuz geraten (lit. to end up in the line of fire,
to end up in the crosshairs); **IT**: linea del fuoco, linea di fuoco (lit. line of fire,
fire line); **CH**: 射擊路線 shèjī lùxiàn (e. g. "be careful to stay away from the
lines of fire" 注意待在射擊路線以外 zhùyì dài zài shèjī lùxiàn yǐwài lit. pay
attention + to stay + at + to fire / to shoot + route + apart from); **SP**: la línea
de fuego (same as in English); **FR**: la ligne de mire, la ligne de tir, la ligne de
feu (lit. the shooting line, the fire line)

107. **the frontline** (e. g. "many youngsters decide to leave their home country to
fight on the front line"; "interpreters were in the frontline in Afghanistan and
now they are singled out and treated like traitors"); **GE**: die Frontlinie, die
Kampffront, die vordeste Linie (lit. the very first line; the line which is above

all other lines); **IT**: la linea del fronte (same as in English); **SP**: la primera

línea (lit. the first line); **FR**: le front (the front), la ligne du front (lit. the line

of the front); **CH**: 前敵 qián dí (lit. the front line, mil.), 前線 qiánxiàn (front

line, military front, "cutting edge"), 這個團被派到前線作戰 zhè ge tuán bèi

pài dào qiánxiàn zuòzhàn (lit. this regiment + passive + sent + to + the front

line + to combat / to fight, "this regiment was sent to the frontline to fight").

Notice that frontline has nothing to do with the collocation to be *on* the front-

line (e. g. to be on the frontline of growing up); **IT**: essere in prima linea (lit.

to be on the first line), enlisted here under line as ATTITUDE

Line means ROWS (rows of people, rows of things)

108. **a line** can stand of a ROW of PEOPLE or THINGS; **CH**: 排 pái (lit. row, e. g.

"a long line of trees", 一長排樹 yī cháng pái shù, "a row / a line of chairs",

一排椅子 yī pái yǐzi); **IT**: 'linea', 'fila' (line, row); **GE**: Linie, Reihe (line,

row); **SP:** fila, hilera; **FR** ligne

109. **to line (with something)** (e. g. "the walls were lined with books"); **CH**: 靠

牆是一排排的圖書 kàoqiáng shì yīpái pái de túshū (lit. to lean on + wall

+ to be + row + a line of books); **GE**: linieren; **IT**: mettere in fila, mettere in

riga / linea (lit. to put in a line, a row), allineare; **FR**: mettre en file, mettre en

queue (lit. to put in line, to line up), aligner; **SP**: alinear, alinearse

Line means TELECOMMUNICATION (and CONCRETEOBJECT)

110. **a telephone line**. The term can either refer to [a] a real tangible WIRE, [b]

a telephone number or [c] the air communication between one user and the

other; **CH**: 突然電話斷了 tūrán diànhuà duàn le (lit. suddenly the tele-

phone broke, "suddenly the line went dead"), 請你不要掛斷電話 qǐng nǐ

bùyào guàduàn diànhuà (lit. please do not hang up the phone, "please hold

the line"); **IT**: linea telefonica; **FR**: ligne téléphonique; **SP**: línea de telefonía;

GE: Telefonleitung

111. **online, offline** (e. g. "I am following an online course"); **CH**: 在線 zàixiàn (e. g. 所有的新建住宅都已聯機 suǒ yǒu de xīnjiàn zhùzhái dōu yǐ liánjī "all the new homes are online"); **FR**: en ligne, pas en line; **IT**: online, in linea, offline; **SP**: en línea, fuera de línea (lit. out of the line); **GE**: online, offline

Line means ATTITUDE, STATEOFMIND, PREDISPOSITION, BEHAVIOR

112. **to take a firm / a strong line**; **CH**: 強硬的態度 qiángyìng de tàidu (strong manners; e. g. 政府現對恐怖主義採取的強硬的態度 zhèngfǔ xiàn duì kǒngbùzhǔyì cǎiqǔ de qiángyìng de tàidu, "the governement is taking a firm line against terrorism"); **GE**: "gegenüber etwas energisch / bestimmt auftreten" (lit. to position oneself against something in an vigorous, firm way), "eine harte Linie verfolgen" (lit. to follow / to pursue a hard line); **IT**: procedere con rigore contro, adottare misure forti contro, prendere provvedimenti forti contro (lit. to act in a rigorous way against, to adopt strong measures against, to take into account hard rules); **FR**: lutter contre (lit. to fight against), maintenir d'orientations fermes contre (lit. to keep solid positions against); **SP**: adoptar una posición firme (lit. to adopt a firm position against), optar por una línea sólida (lit. to pick up a solid line, e. g. "el Grupo PSE ha optado por una línea sólida para proteger a los menores de promociones dañinas relacionadas con el alcohol y el tabaco" "the PSE Group has taken a strong line to protect minors against harmful promotions relating to alcohol and tobacco")

113. **on the sidelines (to keep, to remain, *to stand* on the sidelines)** means to watch something going on, without being involved in it. According to context, this expression can be translated as "to be an outsider"; **CH**: 他满足於站 在一旁 tā mǎnzú yú zhàn zài yīpáng ("he was happy / satified to stay on the sidelines"), 是目睹一切的局外人 shì mùdǔ yīgiè de júwài rén (lit. to

be someone who stands outside and witnesses all, e. g. "during the political crisis I stand on the sidelines" 在這一政治危機時期我是目睹一切的局外人 zài zhè yī zhèngzhì wēijī shíqī wǒ shì mùdǔ yīqìe de júwài rén); **GE**: im Hintergrund bleiben, sich aus allem heraushalten, tatenlos zusehen, unbeteiligter *Zuschauer* sein, als unbeteiligter Außensteher beobachten (lit. to remain behind the scenes, to keep oneself out of someone's business, to look without doing nothing, to be a spectator who is not involved in the scene); **IT**: restare da parte, *restare a guardare* (lit. to keep aside, to stay still and watch), *restare con le mani in mano*; **FR**: rester sur la touche (e. g. "Noun ne voulons pas rester sur la touche et faire des commentaires" "We don't want to stand on the sidelines and comment"); **SP**: *quedar de brazos cruzados* (lit. to remain with crossed arms, e. g. "como diputados electos al Parlamento, no podemos quedarnos de brazos cruzados frente a esta tragedia" "as elected members of parliament, we cannot stand on the sidelines in the face of this social tragedy"), "quedarse al margen" (lit. to look oneself and stay aside)

to be sidelined. The expression can either mean [a] that someone is prevented from playing in a team, e. g. because of an injury, or [b] that someone is prevented from having an important part in something (e. g. "he was eventually sidelined by the IS troops and was asked to carry out menial tasks such as cleaning toilets"); **GE**: beseitigt werden (same as in English), zur Seite geschoben / beiseite geschoben werden (lit. to be pushed aside), kalt gestellt werden (lit. to be frozen), auf die Ersatzbank verbannt werden (lit. to be condemned / relegated to the substitutes' bench); außer Gefecht gesetzt werden (lit. to be put outside action); **FR**: être mettre sur la touche (lit. to be put on the bench), être remplacer (to be replaced); **SP**: dejar sin jugar (lit. prevent from playing), marginar (to marginalize); **IT**: lasciare fuori (dal campo di gioco) (lit. to be left outside the playing field), essere messo da parte (same as in

English); **CH**: 不讓參賽 bù ràng cānsài (lit. not enabled to take part to the competition), "to crowd out", "to push aside" (e. g. "the vice-president is increasingly being sidelined" 副總統被日益排擠到權力中心之外 fùzǒngtǒng bèi rì yì pái jǐ dào quánlì zhōng xīn zhī wài)

114. **(to be)** *in the* **frontline, in the line** (meaning to do something important and of value); **CH**: 在最重要的崗位上 zài zuì zhòngyào de gǎngwèi shàng (lit. to be / stand at the most important position), 站在最前線 zhànzài zuì qiánxiàn (lit. the first thread of something, e. g. 在研究的第一線度過一生 zài yánjiū de dìyī xiàn dùguò yī shēng (lit. "an entire life spent in the frontline of research); **IT**: essere in prima linea (lit. to be, to stand on the first line); **FR**: être en première ligne (lit. to be on the first line); **SP**: mantenerse en la primera línea (lit. to keep oneself on the first line); **GE**: in der ersten Linie bleiben, sein (to be in the first line)

115. **to be in line with**, meaning to conform, to be at the same level of something (physically or not), to share someone's opinion; **GE**: in Übereinstimmung mit jemandem sein, mit jemandem einverstanden sein. mit jemandem übereinstimmen, etwas entsprechen (lit. to share the same opinion of someone, to agree with someone, to correspond to something / someone), auf der gleichen Linie mit jemandem sein (lit. to be on the same line with someone else); **IT**: essere in linea con (same as in English, to be in line with); **SP**: ser acorde con (lit. to agree with, e. g. "nuestro control debe ser acorde con las disposiciones del tratado vigente y la legislación en vigor" "our monitoring must be in line with current treaty provisions and legislation in force"); **FR**: être conforme avec (to comply with); **CH**: 保持一致 bǎochí yīzhì (lit. to keep unanimous, e. g. "Britain must be brought in line with the rest of Europe on taxes" 英國必須在稅收上與其他歐洲國家保持一致 yīngguó bìxū zài shuìshōu shàng yǔ qítā ōuzhōu guójiā bǎochí yīzhì)

116. **to make someone toe the line /mark, / to toe the line / mark** (meaning to conform to a norm or a standard) (e. g. "all those who refuse to toe the line are either assassinated or taken out"); **GE**: sich einfügen, spuren; **IT**: *mettersi in linea* (lit. to put oneself in line), "essere in linea con qualcuno" (lit. to be in line with someone), rigare dritto (lit. to walk straight), allinearsi (lit. to take a stance); **FR**: marcher droit (lit. to march straight), se mettre au pas (lit. to catch pace with something, to walk at the same pace length), marcher sur (une certe) voie (lit. to walk on a certain path), suivre la ligne de quelqu'un (lit. to follow the line of someone); **SP**: bailar al son que tocan (lit. to dance at the sound that plays), "hacer entrar en vereda a alguien" (lit. to make someone start to lead an orderly life), conformarse (to conform), seguír la línea (lit. to follow the line), acater la disciplina (lit. to respect the discipline); **CH**: 順從 當局 (或集體) shùncóng dāngjú (huò jítǐ) (lit. to be obedient to the authorities [maybe to the collective])

117. **to cross the (red) line** The expression can mean [a] to try something new, to be hazardous (e. g. "in his last creations, he has simply crossed the line", "he has gone beyond everybody's expectations") [b] to violate and disrespect something, to do something wrong (e. g. "if you steal somebody's idea you have crossed the line", taken from the Free Dictionary online), [c] to change from being socially acceptable to socially unacceptable (e. g. "I though that your jokes have crossed the line and this is simply embarassing", also taken from the online Free Dictionary) or [d] to physically go from place to another by crossing a line ("we have crossed line" [telecommunications], "the goods should have already crossed the line by now"); **GE**: die Grenze überschreiten, eine rote Linie überschreiten (lit. to go over the borderline, to go over the red line); **IT**: superare il limite (lit. to overcome the last step); **FR**: franchir la ligne (lit. to step over a line), violer la loi (lit. to break the law); **SP**: salirse

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de la raya (lit. to go off the line), "atravesar / cruzar la línea" (same as in English, to cross the line); CH: 紅線 hóngxiàn (lit. red line; e. g. "the issue of sovereignty is a red line that cannot be crossed" 主權問題是一條不能跨越的紅線 zhǔquán wèntí shì yī tiáo bùnéng kuàyuè de hóngxiàn)

118. **to be / to put something on the line**, meaning [a] to stand in a risky and dangerous situation (which can also apply to financial matters) (e. g. "if this goes wrong, my job is on the line") or [b] to invest a lot of energy and engagement in the first place (e. g. "they have been putting their blood on line with our brothers and sisters so we should really move heaven and hell to get them here"). When in this meaning, the espression may be paraphrased with "to be put in the first line with"; **CH**: 我們要是賺不了錢我就有失業的危險 wǒmen yàoshì zhuàn bù liǎo qián, wǒ jiù yǒu shīyè de wēixiǎn ("if we don't make a profit, my job is on the line"); **GE**: etwas aufs Spiel setzen (lit. to put something to play, e. g. "die eigene Kreditwürdigkeit und Reputation sind ernsthaft aufs Spiel gesetzt" "the credit credibility and reputation are seriously on the line"); **IT**: essere messo a repentaglio (lit. to be put at risk); "essere in prima fila" (lit. to be on the first line); **FR**: être remis en question (lit. to be doubted again), risquer (to risk); **SP**: poner en juego (to put somehting to play, same as in German), arriesgar (to risk)

119. **to lay (it) on the line, to stand a line** (meaning to express clearly what one thinks, both for person or institution). To lay (it) on the line is more than making a statement, it is more like taking a stance; **FR**: se ne mâcher pas des mots (lit. to chew, to gnaw one's words, e. g. "Je ne mâcherai pas mes mots, il n'y a rien de tel fossile pour lequel on pourrait faire une raisonnement incontestable" "I will lay it on the line, there is not one such fossil for which one could make a waterlight argument"), "prendre (quelque chose) à deux mains" (lit. to take something with two hands, e. g. "vous devrez, un jour

ou l'autre, prendre votre courage à deux mains, monter sur scène et faire vos preuves" "there comes a time when you have to lay it all on the line, stand on that stage and show what you can do"; **SP**: se la jougar en cada torneo (lit. to play it on each tournament, e. g. "para quienes se la juegan en cada torneo, no puede haber otra opción" "for those who lay it on the line every time out, there can be no other choice"); **GE**: die Karten auf dem Tisch legen (lit. to put cards on the table, e. g. "VW muss die Karten auf dem Tisch legen und versuchen, die Geschäftspraktiken in Einklang mit den Leitsätzen zu bringen" "VW must lay it on the line and try to reconcile its business practices with the guidelines"); **IT**: mettere le carte sul tavolo (same as in German); **CH**: 坦率的說 tǎn shuài de shuō (lit. candid talk, candid speak), 實話實說 shí huà shí shuō (to tell the truth, to tell it as it is), 經理開門見地說：有些人將要失去工作 jīnglì kāi mén jiàndì shuō – yǒu xiē rén jiāng yào shīqù gōngzuò (lit. the manager spoke an open-the-door opinion – some people will lose their work, "the manager laid it on the line – some people would have to lose their jobs")

120. **to be on the right lines**, meaning that someone is doing the right thing, that will bring good results, or similarly that something is positioned in the right / good directions and will bring good results, (e. g. "Do you think you are on the right lines with the project?"). I have decided to enlist the expression under line as ATTITUDE rather than line as DIRECTION, because the DIRECTION is in this case either RIGHT or WRONG (i. e. it implies a position statement); **IT**: muoversi / essere nella giusta direzione (lit. to be in the right position, to go along the right direction; e. g. "sono misure che muovono nella giusta direzione e che mirano a ristabilire l'alleanza strategica e l'equilibrio armonioso" "these measures are on the right lines and aim to restore that strategic alliance and harmonious balance"); andare nella giusta direzione (lit. to go to the right direction, e. g. "credo tuttavia che l'accordo in questione non

vada nella giusta direzione" "However, I do not think that the agreement in question is on the right lines"); **FR**: aller dans le bon sens, aller dans la bonne direction, être sur la bonne voie (lit. to go to the good sense, to go to the good direction, to be on the right way); **SP**: seguir el camino correcto (lit. to follow the right path), andar en la dirección adecuada (lit. to go to the appropriate direction), estar en la dirección acertada (lit. to be on the right / proved direction); **GE**: sich in die richtige Richtung orientieren (lit. to move towards the right direction), "auf dem richtigen Weg sein" (lit. to be on the right path), richtig liegen (lit. to lie right). I could not find the expression in Chinese.

121. **to walk a fine / thin line** (meaning [a] to be in a difficult or dangerous situation, where one can easily make mistakes [b] to take a risk [definition for which I have decided to put this expression under line as ATTITUDE], [c] to balance oneself between something good and something bad); **CH**: 如履薄冰 rú lǚ báo bīng (lit. as walking on thin ice), 走鋼絲 zǒu gāngsī (lit. to walk on tighttrope, to take a risk); **GE**: sich auf einem schmalen Grat bewegen (lit. to move oneself along a tiny edge / burr / ridge), "eine feine Gratwanderung machen" (lit. to make a walk on a thin edge), "einen schmalen Grat betreten" (lit. to enter a thin edge) (e. g. "Berlin-based painter Uwe Kowski (born 1963 in Leipzig) walked a fine line between abstraction and representation" "Maler Uwe Kowski (geb. 1963 in Leipzig) bewegte sich auf einem schmalen Grat zwischen Abstraktion und Gegenständigkeit"); **IT**: camminare su una linea sottile, percorrere una linea sottile (lit. to walk on a fine / thin line); **FR**: trouver le juste équilibre (lit. to find the right balance, e. g. "de nos jours, tous les gouvernements démocratiques ont du mal à trouver le juste équilibre entre ces deux revendication" "today, all democratic governments walk a fine line between these two claims"; **SP**: recorrer una fina línea divisoria, caminar por una delgada línea divisoria (lit. to cross a fine separating line, to walk along

a thin separating line)

4.6 Shape

SHAPE means SHAPE, CONCRETEOBJECT, ABSTRACTOBJECT

122. **the shape** (meaning a form); **CH**: 一個形狀 yī ge xíng zhuàng, e. g. 正方形，圓形和三角形是三種形狀 zhèngfānxíng, yuánxíng hé sānjiǎoxíng shì sān zhǒng xíngzhuàng (lit. squares, circles and triangles are three kinds of shape); **GE**: Form, Gestalt, Zustand, Kontur, Verfassung (lit. form, shape); **IT**: forma, figura; **SP**: forme, estampa; **FR**: form, format, profile, moule

123. **(in) all shapes and sizes**, **(in) all forms and shapes**; **CH**: 各種形狀和大小的... gèzhǒng xíngzhuàng hé dàxiǎo de (lit. every kind of form and shape), e. g. "candles come in every kind of form and shape", 有各種形狀和大小的蠟燭出售 yǒu gèzhǒng xíng zhuàng hé dàxiǎo de làzhú chūshòu (lit. there are candles of every kind and form to sell), 任何形式 rènhé xíngshì (any form / any appearance) in any shape and form; **IT**: in ogni forma e dimensione (lit. in every form and dimension); **GE**: (in) alle(n) Formen und Größen (lit. in all forms and dimensions); **FR**: sous toutes les formes et dans toutes les tailles'(lit. under all forms and all sizes); **IT**: di / in tutte le forme e dimensioni (lit. in / of every form and size); **SP**: de todas las formas y tamaños, de cualquier forma y tamaño (of all form/s and size/s)

124. **-shaped**, meaning in the shape of (e. g. "a pear-shaped woman", "an apple-shaped man", "an hourglass-shaped object", almond-shaped, L-shaped); **CH**: 杏眼 xìngyǎn (almond-shaped eyes), (指人) 罐子狀的 zhǐ rén guànzi zhuàng de (with reference to people, in the shape of a pot / a jar); **FR**: prendre la forme de, avec la forme de (lit. with the form of); **GE**: in der Form von, -förmig (lit. in the form, in the shape of"; **IT**: a forma di (in the form of); **SP**: ser de la forma de (lit. to be in the form of)

125. **to change [physical] shape** or **"shape shifter"**. The expression can refer to both persons and things that morph their current shape into another form (e. g. "water is a shape-shifter, from solid to vapor". In colloquial language (found under Urban dictionary), a 'shape-shifter' is someone who morphs his / her life into the person that happens to be dating, i. e. by adopting the same music taste, fashion styles, food, mannerism. The verb is "to shape shift", meaning "to morph into another form"; **GE**: Gestaltwandler (lit. someone that morphs his form); **FR**: être un / e métamorphe (lit. to be someone that undergoes metamorphosis, e. g. "la métaphore du juge en dit long si l'on se rappelle que le protéus était un métamorphe qui se transformait pour éviter de répondre à des questions sur l'avenir" "the judge's metaphor is rather telling when one recalls that the proteus was a shape-shifter who would transform himself in order to avoid anwering questions about the future"), "se transformer sous diverses formes" (lit. to change oneself under different forms); **SP**: adoptar múltiples formas (lit. to adopt different forms, e. g. "Sin embargo, la violencia es un fenómeno omnipresente que adopta múltiples formas y que está al acecho en lugares de trabajo" "But violence is an ubiquitous shape-shifter, lurking in formal and informal workplaces alike"). I could not find the expression in Italian

SHAPE means BODY, BODYIMAGE, STATEOFBODY (mental and physical)

126. **to be in good / bad shape**, **to keep in good / bad shape, to get in good / bad shape**. SHAPE in this form is meant to be a physical / mental BODYCONDITION; **CH**: 身體不錯 shēntǐ bùcuò (someone's body / health not bad), 身體不好 shēntǐ bù hǎo, 保持健康 bǎochí jiànkāng (lit. to keep healthy), e. g. "I like to keep in shape", 我喜歡保持健康 wǒ xǐhuan bǎochí jiànkāng; **GE**: gut in Form sein, gut beineinander sein, gut beisammen sein, noch auf dem

Posten sein (lit. to be good, to keep it together nicely, lit. to still have all assets in place); **IT**: essere in buona / cattiva forma (same as in English); **FR**: avoir du muscle (lit. to have some muscle), se porter bien (lit. to carry oneself well), être en bonne santé, être en bon état (lit. to be / to find oneself in good health / in a good situation / state), être à l'aise de faire quelque chose (lit. to feel confortable to do something); **SP**: estar en buena forma, ester en un buen estado físico (same as in English), gozar de buena salud (lit. to enjoy good health)

Notice that the expression to be in good / bad shape can also be used in economy, to show that a company or business are doing good or otherwise

127. **to get *oneself* into shape**; **CH**: 強身健體 qiángshēn jiàn tǐ (lit. to build up a strong body); **SP**: ponerse en forma (lit. to put oneself in shape); **FR**: se mettre en forme; **IT**: mettersi in forma; **GE**: sich in Form bringen (same as in English)

The expression to get *oneself / someone* into shape does not have the same meaning of to get *something* into shape, reported in the category below

128. **to shape up** (same meaning of to get in shape and *stay in* shape). I could find this expression in this meaning for English, but not for the other languages. Vice versa, I could find to shape up with further three different meanings (reported below)

SHAPE means CHANGE, CREATION, MUTATION (of physical or abstract concepts)

129. **to shape**, [a] to mold, to change an already existing state or [b] to create something anew (e. g. "your body language shapes who you are"'; "migration shaped our world", "empower the children, shape the future"); **CH**: 成形 chéngxíng (lit. to take shape, shaping); e. g. "our plan is beginning to take shape", 我們的計劃開始成形了 wǒmen de jìhuà kāishǐ chéngxíng le;

IT: plasmare, cambiare attivamente, formare (lit. to mold, to actively change, to form); **FR**: façonner (le développement de quelque chose), donner forme (lit. to shape, to give form to); **SP**: dar forma, diseñar (la futura dirección) (lit. to give form to, to draw [e. g. the future direction]), construir (to build); **GE**: mitgestalten (to co-create, e. g. "jemand kann mit Lehre und Forschung die Zukunft der Wissensgesellschaft mitgestalten" "everyone can, by using teaching and research, actively shape the future of the knowledge society"); prägen (lit. to forge, to influence)

130. **to shape**, meaning [a] to give something a shape (e. g. "shape and tweeze your eyebrows regularly"), [b] to have an important influence on something or [c] to kick-off start something; **IT**: formare, forgiare (lit. to form, to coin); **FR**: façonner; **SP**: labrar, conformar; **GE**: formen, gestalten; **CH**: 這個工具是用來加工木料的 zhè ge gōngjù shì yònglái jiā gōng mùliāo de (lit this tool is used for processing the lumber, "this tool is used for shaping wood"); 他的思想深受戰時經歷的影響 tā de sīxiǎng shēnshòu zhànshí jīnglì de yǐngxiǎng, "his ideas had been shaped by his experiences during the war", 她正準備再一次擊球 tā zhèng zhǔnbèi zài yīcì jīqiú (lit. she is just preparing to hit the ball again, "she is shaping to hit her second shot)

131. **to get *something* into shape**. The expression can either mean [a] to generate something out of nowhere or [b] to bring order into something that already exists (e g. "she tried really hard to get her ideas into shape"); **SP**: acondicionar algo (lit. to prepare something); **FR** mettre quelque chose en forme (same as in English); **GE**: seine Vorstellungen Gestalt vorbringen (lit. to provide form to the own ideas); **IT**: dare forma, plasmare (lit. to give form to, to change). I could not find the expression in Chinese

132. **to shape up**, meaning [a] to develop nicely, in a good way, [b] to improve someone's behavior, to work hard, to work better, to feel better (more collo-

quial), [c] to take / gain a shape (gradually, e g. "the idea started to shape up");
CH: 我們的計劃進行很好 wǒmen de jìhuà jìnxíng hěn hǎo (lit. our plans
develop very well) "our plans are shaping up nicely"; 他要是不改好很快就
會丟飯碗的 tā yàoshi bù gǎi hǎo kuài jiù huì dīu fànwǎn de (lit. if he does not
change in well, he rapidly can lose his job right away, "if he does not shape
up, he will soon be out of a job"); **GE** sich entwickeln, sich gut benehmen,
sich ausrüsten, sich gut vorbereiten (lit. to develop oneself, to behave appro-
priately, to equip oneself, to well-prepare oneself); **IT**: equipaggiarsi (lit. to
be well-prepared, to get the right equipment); **FR**: prendre de l'envergure (lit.
t take breath, to expand, e. g. "cette visite pourrait prendre de l'envergure"
"this visit could be expanded"); **SP**: resister (to face, to counteract, e. g. "Una
cosa es establecer unos principios éticos y otra ver si esos principios son apli-
cables y cómo resisten la prueba de la realidad" "Once it has set down ethical
principles or guidelines it must see to it that they are distributed as widely as
possible then see how they shape up to real situation")

**SHAPE means ATTITUDE, STATEOFMIND, PREDISPOSITION, BEHAV-
IOR**

133. **to go pear-shaped**, colloquial British-English form to say that something or
someone is going wrong; **CH**: 出毛病 chū máobing (lit. to go or be out
of order), 出問題 chū wèntí (to have something going wrong); **FR**: être en
panne (lit. to have broken down, to have come to a halt), aller mal (lit. to go
wrong), se déranger (lit. to mess up); **GE**: Problem bereiten, schief gehen,
völlig daneben sein (lit. to be problematic, to go in the wrong direction, to be
a total failure, totally inappropriate); **IT**: farsi critico (lit. to become / reach a
critical phase, e. g. "everything starts to go pear-shaped", "la situazione inizia
a farsi critica"), andare nelle ortiche (lit. to end up in the stinging nettles;
e. g. "la recensione va alle ortiche", "the review goes pear-shaped"), andare

storto (same as in German, to go to the wrong direction); **SP**: se poner crítica / o (same as in Italian, things start getting complicated; e. g. "la cosa se pone crítica"), ir mal (lit. to go wrong, e. g. "Lo vemos en estos mismos momentos cuando todo empieza a ir mal en este aspecto en países como Irlanda, España, Italia y Grecia" "We are seeing it right now as everything is going pear-shaped in this regard in countries such as Ireland, Spain, Italy and Greece")

134. **to shape up or to ship out** (e. g. "Tom was late so I told him to either shape up or ship out") (meaning to either improve one's performance / behavior or to leave; used as a command); **CH**: 要麼幹要麼走人 yàome gàn yàome zǒurén (lit. either [someone / something] works or [someone / something] leaves); e. g. 他們告他，要麼幹要麼走人 tāmen gàosu tā, yàome gàn yàome zǒurén "the told him to shape up or to ship out", 改好 gǎi hǎo (change in good, e. g. "if he does not shape up..." 他要是不改好 tā yàoshi bù gǎi hǎo...). I could not find the expression in the other languages

4.7   Chapter conclusions

Chapter 3 aims at investigating shape words' metaphorical meanings and their ontological mappings across different languages, with the final intent of an ontological representations of the same. The quest was conducted on corpora and dictionaries (appendix B, page 323) and it led to several conclusions.

Metaphorical senses of shape words were retrieved when these words were mainly used within tropes other than traditional metaphors. Tropes include phrasal verbs, collocations, idioms. Hence the shape words were supposed to be sources, while the retrieved meanings represent their targets.

Similarly to the outcome of the lexico-semantic analysis introduced in chapter 3 (3, page 95), the considered shape words often do not stand for shape or form, but

for something else, specified in the targets.

As the reader may recall from chapter 3 (3, page 95), the metaphorical senses or targets of the metaphors of the shape words were retrieved from (a) the shape words' senses as searched in WN and (b) the shape words' frame-related definitions or COD.

In this case, on the contrary, the targets of the shape words as metaphors were retrieved from the senses of tropes in which the shape words are mainly used.

In fact, by studying figurative forms of language containing the shape words circle, triangle, square, line, point, and shape, it was noticed that these words hold metaphorical meanings in the context of their tropes. In that kind of use, the shape word does not hold the supposed meaning for geometric shape or form, but it stands for something else, that may be attributed as the target of the metaphor.

An interlingual approach was conducted to investigate the presence of similar tropes across languages, i. e. tropes or expressions bearing the same meaning/s and holding the same or similar shape word as semantic component. For the cases in which a 1-to-1 match was not possible, other ways of saying in that language were proposed. Some translations are therefore mere approximations of the original English form or literal renderings of the same. They were also been included in the quest since they show the closest possible way found to the English expressions.

The metaphors as retrieved across languages have been sampled into ontological groups. The proposed ontological concepts were compiled with the intent to catch linguistic or cultural similarities and differences across expressions, a scope outside any ontological purpose. Each ontological representation aims at being valid and applicable for all the entries below it. Therefore, it does not take into account cultural implications that may be implied with and within these translations.

The ontological mapping was carried out by starting with upper concepts up to middle ones, in the case that the context of use of the trope provided sufficient

evidence to support the choice of a mid-level concept over another.

The following categorization represents the major patterns that could be retrieved from the investigation. In fact, it was noticed that all considered shape words partially show overlapping ontological mapping. All shape words were in fact targets mappable to:

- CONCRETEOBJECT, ABSTRACTOBJECT

- CONCRETEEVENT and ABSTRACTEVENT (the word shape enabled a further specification of the kind of EVENT in the sense of CREATION; the words square and line specify for instance EVENT in the sense of MEASURE)

- ATTITUDE or STATEOFMIND (other proposed middle concepts for this category include: PREDISPOSITION and BEHAVIOR)

Circle, triangle, square, line, point and shape are all geometric forms as well as OBJECTs, which can be grasped and idealized (therefore: shape word as CONCRETEOBJECT, ABSTRACTOBJECT).

Point can also stands for PARTOFOBJECT, with the point being part of a specific OBJECT, as the rendition of the term point in Chinese shows well (尖 jiān, 鋒 fēng, 穎 yǐng, 錩 chǎng, 銚 guǎng, 鑯 jiān and 鋩 máng, all translations for point). This ontological specification also reminds of the constitutive qualia (describing the relation between the object and its constituent parts), as presented in the section about the Generative Lexicon Theory in chapter 2 (section 2.5, page 65). It also reminds of the semantic classes introduced in the WN analysis to better identify the retrieved upper concepts (in chapter 3, 3, page 95).

Circle can mean CONCRETEEVENT and ABSTRACTEVENT, as the expression turning circle or the circle of life (CH: 生命圈 shēnmìng quān) suggests.

Triangle can also stand for CONCRETEEVENT and ABSTRACTEVENT, such as when used in the idiom 三角戀愛 sānjiǎo liàn'ài, the eternal or love triangle.

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Square can be EVENT more in the sense of MEASURE (ABSTRACTMEA-SURE, CONCRETEMEASURE), for example when used as single word, POS verb. To square can in fact mean to take measurements of something concrete, while also referring to the EVENT of putting order (alias MEASURE) into something (GE: in Ordnung bringen, ausgleichen, lit. to put something in order, to balance something). The expression to be all square (CH: 打平的 dǎ píng de) also implies the search for MEASURE of balance in the agent involved.

Point can be ABSTRACTEVENT or CONCRETEEVENT in the sense of MEA-SURE when describing the succession of facts (abstract or concrete) that lead to, for instance, a freezing point or a melting point (collocations that can find use in different domains, from politics to chemistry).

Line, when applied in the meaning of CONCRETEEVENT, ABSTRACTEVENT, can also stand for SERIES. For instance, the instantiation behind línea de sucesión (line of succession, line of ancestors) or somewhere along or down the line is that the EVENT showed by line may have a starting and finishing point, i. e. a succession of EVENTs or facts or people involved.

Shape is ABSTRACTEVENT, CONCRETEEVENT with a particular emphasis on the CHANGE, CREATION, MUTATION of the physical or abstract ENTITies it involves (e. g. something gets into shape; something or someone shapes up).

Shape words also find metaphorical meanings in relations to humans and human cognitions. As targets, they stand for BEHAVIOR as well as BODY.

All the considered shape words also mean ATTITUDE, STATEOFMIND, PRE-DISPOSITION, BEHAVIOR.

These middle concepts were proposed in the attempt to clearly identify the kind of EVENT involved. In fact, all of them may be regarded as specifications of the upper concept EVENT. The PREDISPOSITION or BEHAVIOR of an agent namely

implies the existence of this agent as thinking ENTITY with a fact or more to think about.

Circle, for instance, is STATEOFMIND when used in the idiom to be caught / trapped in a vicious circle (惡性循環 è xìng xúnhuán). Given that the trope describes an EVENT, it is the the collocation vicious - and not virtuous circle that helps the language learner understand the PREDISPOSITION or STATEOFMIND of the PERSON involved in this EVENT.

Square also means ATTITUDE when describing the EVENT of repeating or reattempting a previous action (in the course of an EVENT), such as in the idiom to go / to be back to square one (translated in Chinese as literally to go back to the starting point; 回到起點 huídào qǐdiǎn).

The actions (alias EVENTs) or REASONING and UNDERSTANDING were retrieved from two tropes with point, namely to be / come / go / get / to the point (IT: andare dritto al punto, lit. to go straight to the point) and to (not) get one's point, translated in a non-idiomatic expression in the other languages.

Line is also BEHAVIOR in the expression to toe / mark the line (IT: rigare dritto, with riga also meaning line [lit. to walk straight]).

SHAPE means ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR in expressions like to shape up or to ship out (CH: 要麼幹要麼走人 yàome gàn yàome zǒurén, lit. either [someone / something] works or [someone / something] leaves), meaning to take a stance, to behave and react.

The considered shape words are also used in expressions involving the presence of humans (PERSON) and of the human BODY.

Circle, for instance, can mean GROUPOFPEOPLE / RESTRICTEDGROUP (CH: 家庭圈子 jiātíng quānzi, lit. a family circle; 小圈子 xiǎo quānzi, lit. an inner circle; GE: Familienkreis, lit. family circle).

Square can also mean BODY, BODYIMAGE (such as in the expression a man of square build).

When wrinkles on someone's face are described as lines, the word line also stands for BODY or more specifically BODYPART.

To be in good / bad shape or to keep in good / bad shape also implies shape as BODY, in particular STATEOFBODY.

BODY as a target can also mean the cognitive part of a BODY, more in the sense of THOUGHT or STATEMENT, such as in the collocation to follow a line.

With reference to the ontological concept BODY, it has also been noticed that verbs or body parts are also heavily used in figurative language across languages. Examples include: to *see* someone square in the *eyes* (IT: *guardare* qualcuno dritto negli occhi, same as in English); to point, translated as 指 zhǐ, finger, in Chinese; to *point the finger* against someone; to *throw* the first stone, all implying BODY / BODYPART / BODYACTION.

A point can be dead (*dead* point; IT: punto morto, GE: am toten Punkt angelangt sein, all expressions including dead point).

To *touch* a sore point becomes even more BODY-oriented in Italian, Spanish and French with the specification of the object of the touch the *finger* (IT: mettere il dito nella piaga; SP: poner el dedo en la llaga; FR: mettre le doit sur un point sensible).

Being just to the point of doing something is like *standing* on the point of doing something.

Someone on the spot in English, *stands* on his / her own *feet* in Italian (su due piedi).

Someone on the edge in English literally has *nerves* so tense to be seen through the skin in Italian and Spanish.

The shape words circle, point and line, can also refer to PLACE (e. g. a crop

circle), with it being CONCRETEPLACE or ABSTRACTPLACE (e. g. the high point, point of no return). The shape word in a trope can also show an (ABSTRACT or CONCRETE) DIRECTION in a PLACE (e.g. to line up, to streamline).

The analysis of shape words in a cross-linguistic and ontological approach also revealed that same idiomatic expressions (i. e. bearing the same semantic composition and the same meaning) are occasionally found across different languages. In fact, many of the proposed translations are mere renderings of the English form in other words or with expressions that do not include the original shape word.

In other cases, the English expression does not exist in another language (e. g. to make a *point* in English could not be found in French, hence the decision to provide the literal translation).

Another remark to make concerns the attribution of the upper concept EVENT.

It has been possible, through the information provided by some tropes, to identify the target of the metaphor not only as EVENT but as a certain kind of EVENT. This observation has led to the introduction of polarity [POSITIVEEVENT, NEGATIVEEVENT] in some of the examples.

For instance, to be caught / trapped in a vicious circle is an EVENT that can be identified as NEGATIVEEVENT, while (to be a) virtuous circle is POSITIVEEVENT. To come / to turn full circle is apparently a POSITIVEEVENT but, through the analysis of the context of use, it has been possible to define it as NEGATIVE (or NEUTRAL)EVENT. To put somebody on the spot reveals point as ATTITUDE and in particular NEGATIVEATTITUDE of the person putting someone else in an awkward position. To be on a tight spot shows a NEGATIVEEVENT.

The shape words point and edge are used in many different phrasal verbs where the kind of EVENT (whether static or dynamic) is often described by means of apparently small details, such as prepositions.

For instance, the expressions to the point, to bring someone to the point, to come to the point, show different kinds of EVENTs or STATEs, with to the point describing a STATE, and to come/bring to the point focusing on an active EVENT.

This reminds of the differentiation between static and dynamic EVENTs that could be retrieved in the course of the analysis of shape words in relations to frames (in chapter 3, 3, page 95).

During the investigation, it has been noticed that an English expression can exist in another language with the same meaning, but a different shape word.

For instance, the English phrasal verb to talk around (which contains a hint of circle), can be rendered in Chinese with the expression 拐彎抹角的說 guǎiwān mòjiǎo de shuō, which contains the character 拐 guǎi, meaning corner. A paraphrase of the same form in English would be to not get to the point.

When a situation spirals out in the English language (assuming that the movement is circular), it recalls a linear (uprising) movement in Chinese (上漲) and in other languages (IT: aumentare, FR: augmenter, SP: alzarse).

Being all square in Chinese implies a flat / linear movement / state (打平的 dǎ píng de, with 平 píng meaning flat, linear).

To look someone square in the eyes is translated with the words straight or straightforward (CH: 直瞪; IT: guardare dritto, regarder droit). Something straight cannot be circular. It might be excessive to state that straightforwardness stands for shape, but the STATE of the EVENT gives a direction, which supposedly follows a precise shape-defined path.

The same reasoning applies for instance to the expression 回到起點 huídào qǐdiǎn, which translates into to go back to square one. Going is rendered in Chinese with 回 huí, literally meaning to curve; square is rendered with 點 diǎn, meaning point. In German, the same expression translates with (literally) the circle closes itself.

In *to hit the nail square on the head*, the Chinese form 正中要害 implies a perpendicular movement (正中).

To be out of square becomes in German *to be out of angle*, while it is something diagonal in Italian.

As already remarked, circle, and the other shapes, do not always correspond to circle and the correspondent shape words in another language.

In Chinese, for example, the word circle can be translated into 圈 quān (circle) as well as into 框 kuàng (frame). It can be therefore derived that circle means *full form* as well as for "form-coming-into-being". The same applies for the example *circle of friends*.

In Chinese and in other languages, there exists both an expression with the word circle and one without (朋友圈 péngyǒu quān, 圈子 quānzi [lit. friend circle, clique], 一大群朋友 yī dà qún péngyou [lit. a large group of friends]). Another expression with similar meaning is *to be / to go over the edge* (where EDGE can stand for PLACE / EVENT / ATTITUDE), translated into Italian, French, German and Spanish as: *to be over the border / the limit*, which stresses more the concept of line rather than of edge.

In other cases, it was noticed that the a certain trope exists in other languages, but that it either adopts another shape word, another OBJECT or another concept.

For instance, the expression *to think outside of the square*, translated into German as *to look over the edge of the plate*.

To be on the edge bears a different meaning from *to be / to walk on a razor-edge* (which stands for NEGATIVEEVENT). And while English are or walk on the razor's edge, Italian walk on the razor's line, while French and Spanish live or hang on a thread.

Someone excited does not simply hangs around, but *sits on the edge of the seat* in English; while someone sits with bated *breath* (IT: *col fiato sospeso*) in Italian,

face a situation in French and is on the point of *standing up* in Spanish.

When someone does not come / go / is to the point in English it is like, in Germany, as if this person would be sitting *around* talking around hot porridge (GE: um den heißen Brei herumreden). The same subject in the same situation rather turns around in circles in France, Spain and Italy. While in English something or someone lays (it) on the line or stands a line, Italian and German dispose playing *cards* on the table, Spanish play (it) at each tournament, while French *chew* on their own words.

These different linguistic choices for the same meaning may reveal different ways of thinking and different cognitive processes worth of exploration, but they also imply the identification of the linguistic differences by means of a literal translation of the tropes.

The exploration of shape words in the context of tropes as well as single words in several languages enabled the identification of metaphorical uses of the same. In particular, the shape words do not only mean geometric forms, but, through the semantic proximity of prepositions, verbs and attributes, or when studied as single words (very few cases against the examples with tropes) they are conferred different meanings from the supposed one.

The meanings as retrieved from the tropes and single words in English and their closest or possible translations into other languages were then mapped to the standard ontology SUMO, first by looking at upper concepts, then by trying to identify the latter better by means of mid-level concepts.

For each shape word, the following ontological mapping could be found:

- SHAPE circle; target is:
    - CONCRETEOBJECT, ABSTRACTOBJECT
    - CONCRETEPLACE, ABSTRACTPLACE
    - CONCRETEEVENT/ABSTRACTEVENT
    - GROUPOFPEOPLE / RESTRICTEDGROUP

– ATTITUDE, STATEOFMIND, PREDISPOSITION, BEHAVIOR

- SHAPE triangle; target is:

  – CONCRETEEVENT, ABSTRACTEVENT

- SHAPE square; target is:

  – CONCRETEOBJECT, ABSTRACTOBJECT

  – ABSTRACTMEASURE, CONCRETEMEASURE (within EVENT)

  – BODY, BODYIMAGE

  – ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR

- SHAPE point; target is:

  – CONCRETEOBJECT, ABSTRACTOBJECT, PARTOFOBJECT

  – CONCRETEMEASURE, ABSTRACTMEASURE (within EVENT)

  – CONCRETEPLACE, ABSTRACTPLACE

  – CONCRETEEVENT, ABSTRACTEVENT

  – ATTITUDE / STATEOFMIND / BEHAVIOR / PREDISPOSITION

- SHAPE line; target is:

  – CONCRETEOBJECT, ABSTRACTOBJECT

  – WAYOFTRANSPORTATION / DIRECTION / PLACE

  – SERIES, CONCRETEEVENT, ABSTRACTEVENT

  – BODY, BODYPART

  – ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR

  – THOUGHT, STATEMENT

  – WAR, SOLDIER

  – ROWS (of people and things)

  – TELECOMMUNICATION (and CONCRETEOBJECT)

- SHAPE shape; target is:

  – CONCRETEOBJECT, ABSTRACTOBJECT

  – BODY, BODYIMAGE, STATEOFBODY (mental and physical)

  – CHANGE, CREATION, MUTATION (of physical or abstract concepts)

  – ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR

The analysis on shape words in tropes revealed a wealth of information regarding their metaphorical meanings. The outcome adds to the research results obtained from the analysis of the shape words as word nouns and in relation to frames, as presented in chapter 3 (3, page 95) as well as to the theoretical discussion on metaphors held in chapter 1 (2, page 9). Further conclusions in this regard will be drawn in the upcoming chapter 5.

The investigation of shape words and tropes also contributed to answering the main research questions, namely whether shape words do entail metaphorical meanings and whether the ontological representation of the same can be extended to mid-level concepts.

In the course of the study, further observations were deducted from the collected data. They have been added in chapter 5 5, page 249 as part of future research plans.

Chapter 5

Conclusions and future work

The presented research represents an approach to automatic lexico-semantic information on shape words and their metaphorical meanings.

Two main research questions were asked:

1. Do shape words have metaphorical meanings?

2. Are metaphors (of these words) sufficiently represented through only upper concepts?

Three main approaches were taken to the investigation of metaphors in shape words:

1. They were searched as word nouns and in their hyponymic-hypernymic structures

2. They were searched as frames and in relation to frames

3. They were studied when retrieved in tropes

The selected words were circle, triangle, square, line, point, and the word shape. They do not foresee to be comprehensive, but they may be related to each other in a generational effort (it takes a point to create a line, and a line to create a shape, included all the shape considered).

Information on shape words was retrieved from Princeton WordNet, FrameNet and several corpora and dictionaries (enlisted in appendix B, page 323).

The selected languages for cross-linguistic and comparative analysis were English, Chinese, German, Italian, French and Spanish. Although small in number, they were deemed able to demonstrate a modest interlingual approach.

The final goal of the investigation is to lay the ground for an ontology of shape. The ontological approach adopted thus implies that any cultural and linguistic variations of the forms are irrelevant to the main goal to (inter- and intralingually) retrieve concepts that apply by nature to all languages indistinctly.

Metaphors are complex linguistic figures that enable the expression of meaning by transfixing the original senses of the words they are made of, like in the case of "the political system is running well". They are greatly, and often unconsciously, used in all kinds of discourse, including rigorous sciences.

There exist different theories on metaphors. For this research, the Lakoffian approach was adopted, which foresees the differentiation in metaphors of two domains, a source and a target. The polarity among the two is presumingly fixed (1 to 1), so that a source corresponds to a target and vice versa. This principle was questioned in the course of the investigation with the introduction of so-called metaphor(s)-in-metaphors, i. e. metaphorical forms that seem to contain more than one metaphor at a time, as retrieved from a random search for metaphors in corpora.

Lakoff and Johnson are also the authors of the Embodiment Theory, which states that the creation of abstract conceptual thinking is based upon and rekindled through concrete experiences, often in the form of human body interactions.

In light of qualitative observations retrieved from corpora, a multi-layered interpretation of the Embodiment Theory was advanced, where embodiment can stand for:

- BODY (and BODYPART / BODYPROPERTY / BODYACTION)
- CONTAINMENT / CONTAINER (with the implied SHAPE) and

- CONTAINMENT / CONTAINER (and, more than that, the SPACE surrounding the implied SHAPE)

Examples also showed that SHAPEATTRIBUTE, such as FLANESS, DEPTH or LENGTH, may be, in some cases, a better definition for the source of the metaphor.

The Lakoffian thinking was adopted for its notoriety and also because it was used by the Taiwanese School, a self-labeled term that describes the works of Ahrens, Chung and Huang on metaphor analysis. The scholars developed a Conceptual Mapping Principle or CMM, which enables to derive, given a set of defined targets, their respective sources. In the conducted research by the School, both domains were mapped to an upper ontology, SUMO, also adopted in this research.

The current investigation diverged from the methodological approach of the Taiwanese School in two ways: 1) rather than defining the targets, shape words were supposed to hold the meaning of shapes or geometric forms before their analysis as lexico-semantic components. Hence they were treated like source SHAPE. The targets were instead automatically retrieved and disambiguated through the ontological hybrid approach 2) the ontological mapping of the retrieved metaphors was namely accomplished by means of upper and mid-level concepts.

SUMO is an open-source knowledge repository of upper and partially middle concepts. It represents reality as it always holds and that is not affected by language variations or cultural differences. In fact, like every ontology in computer science, it tries to collect universally valid concepts.

This specification is particularly relevant for the third step of the research (retrieval of shape words' information from tropes across languages), since the ontological mapping carried on in this investigation aims at being representative for all languages.

Metaphors were introduced in chapter 2 together with other forms of figurative language, including collocations, idioms, metonymies, similes, analogies and col-

loqualisms. Research of random metaphors in corpora conducted during the study showed in fact the presence of metaphors in these tropes. Moreover, the forms were put in relation with each other, while assuming a certain dependency (from analogies to similes to metaphors to idioms).

The Generative Lexicon Theory was also briefly introduced, in the theoretical approach to the study, to show that the qualia structure it proposes may be used for a better specification of metaphors. Finally, an interpretation of the term paraphrase was advanced in chapter 2, to indicate the possibility in language to render figurative expressions by means of other figurative forms, rather than relying on the translation of a form in plain words, an attempt also made in the cross-linguistic analysis in chapter 4.

In chapter 3, shape words were studied as word nouns. Lexico-semantic information on the words was collected from Princeton WordNet and by considering the words as POS noun.

WN was accessed through the NLTK module in Python. NLTK is a repository at the crossroad between a lexicon and a thesaurus, but, as for the case of FrameNet, introduced below, the outcome of this investigation showed the potential use of FN and WN as ontologies since they resemble one.

NLTK contains a clear distinction among synsets, which correspond to batches of words sharing the same or similar meaning/s, and senses, corresponding to words' meanings and lemmas or single words.

A preliminary study of the source showed that shape words in WN are mapped as either direct synsets or related to synsets. Hence the lexical analysis took into account these two perspectives, by collecting information from each individually.

All shape words revealed metaphorical meanings when used as word nouns. The supposed source, shape words as SHAPE, was therefore enriched through the assignment of newly retrieved targets, corresponding to the metaphorical senses of

the shape word.

The outcome of the research in WN showed that all targets can be ontologically linked to the upper concepts OBJECT, EVENT and PERSON.

The ontological labeling was further deepened, in the attempt to define more properties for these upper concepts. To this purpose, semantic classes were introduced in the analysis of the shape words. All senses, not only the metaphorical ones, were therefore re-investigated, in light of the proposed semantic classes.

These classifications were then translated into ontological middle concepts, assigned to the respective targets. It was thus determined that:

- the targets for circle can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT, PERSON

- the targets for triangle can be CONCRETEOBJECT and ABSTRACTOBJECT

- the targets for square can be CONCRETEOBJECT, ABSTRACTOBJECT, SPACE and PERSON

- the targets for line can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT, SPACE and PERSON

- the targets for point can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT and SPACE

- the targets for shape can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT and SPACE

The lexico-semantic approach to the shape words was continued in FrameNet, another resource accessed through the NLTK module. The motivation behind this choice is that FrameNet, contrarily to WordNet, provides lexico-semantic information of words as semantic units. This means that the definitions or COD (Content of Definitions) for the words annotated in FrameNet also contain specifications about the settings or conditions necessary for an EVENT to happen (e.g. the conditions for

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Cooking would be the presence of Cook, Heat, Food, Container). These annotations resemble an *ad hoc* ontological mapping.

Similarly to WordNet, shape words in FrameNet are annotated in three different ways: as lexical units, as frames, as attribute nouns of the frames.

Information has been collected through the three approaches and it has been defined that:

- the targets for circle can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT (assumingly static) and SHARINGPERSON

- the target for triangle can be CONCRETEOBJECT and ABSTRACTOBJECT

- the targets for square can be ATTITUDE, CONCRETEOBJECT, ABTRACTOBJECT

- the targets for line can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT

- the targets for point can be MATTER, CONCRETEEVENT, ABSTRACTEVENT

- the targets for shape can be CONCRETEOBJECT, ABSTRACTOBJECT, CONCRETEEVENT, ABSTRACTEVENT

Moreover, FrameNet has enabled a further specification of the upper concepts, in particular in terms of abstraction and concreteness as well as static and dynamics involved in the definition of OBJECTs and EVENTs.

The final step of the investigation was the retrieval of shape words' information when the words are used in the context of tropes. For this purpose, shape words were searched in corpora and dictionaries.

As for the previous two undertaken approaches, the study revealed the presence of metaphorical meanings, with the metaphor having SHAPE as a source and different, automatically defined targets.

When used in the context of tropes, the shape words are greatly enriched by the information provided by the other elements of the trope.

Hence several targets were retrieved for each shape words with different attributes.

All shape words have in fact targets mappable to:

- CONCRETEOBJECT, ABSTRACTOBJECT

- CONCRETEEVENT and ABSTRACTEVENT (the word shape enables a further specification of the kind of EVENT in the sense of CREATION; the words square and line specify EVENT in the sense of MEASURE)

- ATTITUDE or STATEOFMIND (other proposed middle concepts for this category include: PREDISPOSITION and BEHAVIOR)

WordNet, FrameNet and the investigated dictionaries and corpora were all created for different linguistic purposes and should therefore be treated distinctively. Nevertheless, the list here below provides a summary of the ontological mapping of shape words' targets as collected from the single outcomes (i. e. from the outcome of the study of shape words in WordNet, in FrameNet and in the corpora).

The bold concepts for each shape word represent the matching mappings across the three consulted sources.

- **SHAPE circle; target is**:

    - **CONCRETEOBJECT, ABSTRACTOBJECT**

    - CONCRETEPLACE, ABSTRACTPLACE (information derived from tropes)

    - **CONCRETEEVENT/ABSTRACTEVENT**

    - GROUPOFPEOPLE / RESTRICTEDGROUP (information from tropes)

    - ATTITUDE, STATEOFMIND, PREDISPOSITION, BEHAVIOR (information from tropes)

    - SHARING PERSON / PERSON (information from FN and WN)

- **SHAPE triangle; target is**:

    - CONCRETEEVENT, ABSTRACTEVENT (information from tropes)

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- – CONCRETEOBJECT, ABSTRACTOBJECT (information from FN and WN)

- **SHAPE square; target is**:

  - – **CONCRETEOBJECT, ABSTRACTOBJECT**

  - – ABSTRACTMEASURE, CONCRETEMEASURE (information from tropes)

  - – BODY, BODYIMAGE (information from tropes)

  - – ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR (information from tropes)

  - – SPACE (information from WN)

  - – PERSON (information from WN)

  - – ATTITUDE (information from FN)

- **SHAPE point; target is**:

  - – CONCRETEOBJECT, ABSTRACTOBJECT, PARTOFOBJECT (information from tropes and WN)

  - – CONCRETEMEASURE, ABSTRACTMEASURE (information from tropes)

  - – CONCRETEPLACE, ABSTRACTPLACE (information from WN)

  - – SPACE (information from WN)

  - – **CONCRETEEVENT, ABSTRACTEVENT**

  - – ATTITUDE / STATEOFMIND / BEHAVIOR / PREDISPOSITION (information from tropes)

  - – MATTER / QUESTION (information from FN)

- **SHAPE line; target is**:

  - – **CONCRETEOBJECT, ABSTRACTOBJECT**

  - – WAYOFTRANSPORTATION / DIRECTION / PLACE (information from tropes)

  - – SPACE (information from WN)

  - – SERIES, **CONCRETEEVENT, ABSTRACTEVENT**

  - – BODY, BODYPART (information from tropes)

  - – ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR (information from tropes)

  - – THOUGHT, STATEMENT (information from tropes)

- PERSON (information from WN)

- WAR, SOLDIER (information from tropes)

- ROWS (of people and things; information from tropes)

- TELECOMMUNICATION (information from tropes)

- **SHAPE shape; target is**:

  - **CONCRETEOBJECT, ABSTRACTOBJECT**

  - CONCRETEEVENT (info from WN and FN)

  - BODY, BODYIMAGE, STATEOFBODY (information from tropes)

  - CHANGE, CREATION, MUTATION (of physical or abstract concepts; information from tropes)

  - ATTITUDE / STATEOFMIND / PREDISPOSITION / BEHAVIOR (information from tropes)

The three-fold approach to the lexico-semantic, frame-related and corpus-based investigation of shape words thus revealed that the considered shape words entail many different metaphorical meanings, that these meanings can be ontologically mapped by means of upper and mid-level concepts, and that the shape words as sources share some of their targets' upper concepts, specifically the ones marked in bold in the list above.

The future research presented in the following section shows limitations and observations sampled during the investigation as well as other potential areas of interests within the scope of the researched topic.

Future research

Possible extensions for chapter 2

Different theoretical approaches to metaphor studies

In chapter 2, the exploration of metaphors was based upon the Lakoffian studies, which have also been followed by the Taiwanese school. A possible extension of the research may include the analysis of metaphors starting from another theoretical perspective, for instance by taking into account the approach adopted by [McGlone, 1996], [Glucksberg and McGlone, 1999] and [Glucksberg and Keysar, 1990]. The authors introduce the Attributive Category Vehicle (ACV) Theory as a possible interpretation of metaphorical understanding and reasoning. The theory foresees the existence of a tenor or topic rather than of a target, and of a vehicle rather than of a source. In the first chapter, the decision was made to consciously skip the attempt to define the rationale behind the source-target match. As the reader may recall, the discussion was terminated by asserting that, while it is sometimes possible to define (rational) reasons behind the domains of a same metaphor, it appears to be a shallow attempt for others. Hence the decision to take metaphors as given forms.

The ACV theory tries instead to justify this bound through the retrieval of all possible overlapping collocations that exist between the source and the target of one same metaphor. For instance, in the case of the metaphor "love is a journey", Glucksberg and colleagues argue that both love and journey can be tiring, long, exiting, promising. The more collocations coincide, the more natural and thus conventional the expression becomes.

Although entailing some challenges, such as for example the establishment of a sort of threshold or gold standard for the identification of a "strong" metaphor, the ACV approach to metaphor studies is an alternative in metaphor theory that is worth

investigating.

Study of metaphors through the GL theory

As also clarified in chapter 2, the analysis of metaphors within the context of the Generative Lexicon (GL) theory was merely previewed, mainly due to the concerns, raised by several consulted scholars and scientists in Computational Linguistics, about the applicability of the theory to quantitative approaches that do not preclude strong subjective attribution of qualia.

Nevertheless, the proposed GL analysis of generic metaphors revealed that GL may be beneficial in the information retrieval process of metaphors. If described in conjunction with other tropes, and with qualia, many more details may in fact be added to the description of a metaphor. For instance, an expression like "to be put behind bars", rather than being simply labeled as a phrase, may be described as a collocational, idiomatic, metaphorical and constitutive (meaning specifying the part_of component)-quale-laden trope.

Metaphors in other tropes

In chapter 2, it was also anticipated that metaphors can often be found in colloquialisms as well as in other idiomatic forms. This was meanwhile also proved within the frame of a recent research on metaphors and addiction, [Quattri, 2014b], where it was noticed that shape words are extensively used in slangs in different languages.

As mentioned in chapter 2, slang is considered a form of metaphorical thinking, where one word is used instead of another, or created *ad hoc*, to camouflage the real meaning and purpose of use of another term.

This is particularly the case when people try to hide illicit activity, or when, on the contrary, the language speaker tries to reach out as many people as possible.[77]

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[77]*Lunfardo*, for instance, is a dialect originated as prison slang in the late 19th century between

The language of drugs in general offers endless examples about the power of slang and the use of shape words in this context.

For the conducted investigation on shapes and drugs, German, English and Italian expressions were sampled, and their metaphorical use was analyzed from the perspective of different actors of the drug scene: (a) the drug users and dealers and (b) the drug interventionists, such as governmental and non-governmental health carers and regulators, including policy makers.

For this purpose, around 16 hours of recorded material was collected.[78].

Two main language registers could be traced from the videos: the language of the outcasts, the so-called "underdog", basically composed by slang and colloquial expressions, and the more formal language of their carers.

Several observations could be drawn from the data, including:

- Shape words are very often used like colloquialisms. This means that they often do not stand for their original encyclopedic meanings, but new meanings (neologisms or *ad hoc* definitions), within the context of drug use and abuse, are assigned to them (e. g square and circles stand for marijuana; bubbles for bath salts; cake for cocaine; cigarettes, Rohypnol, or any muscle relaxant are called roofies).

  These linguistic forms are considered metaphors (a cake is not cocaine), hence cake stands for something beyond its encyclopedic traditional reach. This newly assigned definition is metaphorical.

  Also, generative inference can be drawn from the forms (with something being OBJECTPART of an OBJECT, e. g. bubbles are the products of bath salts

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prisoners to prevent guards from understanding (`http://en.wikipedia.org/wiki/Lunfardo`). Even Pope Francis has recently contributed to neologisms. The words or neologisms he often uses in his sermons (called bergoglismi, from his name, Bergoglio), such as nostalgiare (lit. to nostalgia, to homesick) or mafiarsi (lit. to dirty oneself's with illegal work), are becoming more and more popular. In Italian, the choice of the words is not random, but intentional (as "it strengthens concepts and experiences"), `http://roma.corriere.it/notizie/cronaca/15_gennaio_02/da-nostalgiare-mafiarsi-neologismi-francesco-8e155606-9250-11e4-aaf8-f7f9176948ef.shtml`

[78] A selected reference list of analyzed material can be found under appendix (B, pag. 323).

but, again, bath salts are inhaled and not dissolved in water; circles reminds of the circles of smog that are produced while smoking).

These colloquial forms are almost always non-translatable from language to language. For instance, there exists dozens ways in Italian to talk about cocaine or coke, some of which do not make any sense in any other context: bianca, svelta, rosa, foffa, tiro, ricamo, ricamino, caffè, ammazzacaffè, botta, controbotta, sbranga, fuffa, frusta, riga, pista, liscia, bamba, lastra, polvere, bonza, danza, musica. All these words and more refer, in other contexts, to real things (such as coffee or a stroke) or are neologisms carrying no meaning. Slang words are undoubtedly "catchier" than plain language, where drugs are normally referred to as paraphernalia (e. g. "She was covered in white paraphernalia").

- Shape words, if properly studied, may allow to better understand, prevent and cure risky or deviated social behavior. Shape words are used by both drug users and the drug healers, but with different meanings and purposes. The different approaches taken from each stakeholder remind of social perspectives, as also presented by Albertazzi.[79] For instance, drug users often perceive edges as negative SPACEs and / or EVENTs with SPACES (they are put on the edges of society, they are treated as outcast, abusers are put *on tight corners*). Edge and corner can both mean physical PLACEs, but also uncomfortable EVENTs. Points are perceived by regulators and helpers, as well as drug victims, as important, life-changing EVENTs, or as the PERSON itself (with degrading meaning) (e. g. "the turning *point*", "turning someone's life *around*", "choosing the other *side*"; "I did not want to be treated like a *spot*"). Also lines are peculiar EVENTs in life, both positive and life-threatening (e. g. "you are learning to *shape down* your fear, you want to *cross the line*", "a

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[79]Under `http://mitpress.mit.edu/authors/liliana-albertazzi`; Liliana Albertazzi, Gert J. van Tonder and Dhanraj Vishwanath, *Perception Beyond Inference. The Information Content of Visual Processes*, MIT Press, 2011

drunkard's life is *on the line*", "her life was *on the line*"). Side/s also clearly imply a given spatiality and dimensionality[80] in an EVENTs (e. g. "the other *side* of addiction is cure; the other *side* of cure is a life free of medications"). Also the generic prepositions in, out, behind are indicators that both drug users and carers perceive the disease as within a frame ("I just wanted to fit *in*, so I started taking drugs"; "eventually I got recognition *in* my *circle of friends*"; "In our prevention program, nobody is left *behind*").

• Shape words are useful indicators not only of social behavior and social settings, but they also seem to reveal different perspectives of how the drug user perceive him / herself in an altered state across different languages. For instance, a drug user "gets *off* the ground" in English, "turns *around*" ('sbandato') in Italian, and sees him / herself from the side in German ("Ich stand völlig *neben* mir"). Different languages thus seem to reveal different perspectives, shifting from the bird-eye to the third-person approach.

• Drug language (as the language of other pandemic diseases, such as food addictions) is often a violent language. Extreme words often replace more politically correct or plain ones to convey concepts (e. g. "to *hit* the bottle", "to get *hooked* with a shot / a hit of drug", "to *shoot* cocaine", "to get *stoned*", "to feel the *rush*", "to be / feel *stuffed*").

The sustained thesis is in line with current parallel studies on medical care and medical issues [Semino, 2014], and claims in fact that a better understanding of this discourse from the side of health carers and regulators can potentially lead to a more efficient doctor / carer-patient communication while facilitating cure.

The research on shapes, metaphors and drugs could be further extended and deepened in the course of future research.

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[80]'Dimensionality' is hereby used as "a property of space", "extension in a given direction"; from `dictionary.reference.com`, `dictionary.reference.com/browse/dimens ionality`

Further interpretations of the Embodiment Theory

In chapter 2, several interpretations to the Lakoffian Embodiment Theory were provided.

Through qualitative analysis in corpora, it was namely been possible to retrieve metaphors where the concept of embodiment can stand for a) BODY / BODYPART / BODYPROPERTY / BODYACTION; b) CONTAINMENT / CONTAINER and c) (CONTAINMENT/CONTAINER) and SPACE.

CONTAINMENT / CONTAINER hints about the existence of an OBJECT, which may or may not be explicit in the trope (e. g. "deep down", "to be an outcast") or be very specific (e. g. "from the bottom of my heart").

These examples showed that it is often the mid-level concept SHAPEATTRIBUTE, such as FLATNESS, DEPTH or LENGTH, rather than the upper concept SHAPE the most suitable ontological identification for the metaphor source.

It also showed that SHAPE as source can be shadowed by SPACE, implied or specified by SHAPE, which helps understand the metaphorical meaning of a trope. In some expressions, the term "experiential perspective" was introduced to describe the case in which SPACE is observed and experienced by a particular agent in a particular EVENT.

Another possible interpretation of the Embodiment Theory that was not presented in chapter 2 includes cases in which CONTAINER does not necessarily implies physical SHAPE, but it can be interpreted as a broader sense. This happens when CONTAINER is EVENT, deprived of any spatial and temporal information, and labeled by the language user with a series of sub-events and features that makes it in the end a CONTAINER of something, but in abstract terms.

This interpretation, which may be defined "Embodiment as A-SHAPED or SHAPE-INDEPENDENT EVENT" applies to expressions where words have a particularly deep cultural meaning.

Colors, for instance, are meaning carriers heavily loaded with different values across cultures.

They can describe a mood or represent an entire event; their use can be inspired by a single element, such as the color of a flower, the symbol of a nation, the color of a flag.[81]

Colors as ATTRIBUTEs are meaning dependent to the language they are used in. For examples, while a man wearing a green hat in America would not rise any suspicion, in China or Taiwan he would not pass unnoticed. The expression 戴绿帽子 dài lǜ màozi, "to wear a green hat", means in fact to be cuckolded.

In the following, some examples with expressions containing colors are provided, with the mere intent to show their cultural implications.

The color black (or darkness) are associated to both negative and positive events.

For instance, the Black Monday, October 19, 1987 is remembered in the American history as the day when the Down Jones Average dropped at almost 22 percent. The Black Thursday, October 24, 1929 is also remembered as a negative event that signed the start of the Great Depression, followed by the Black Tuesday, the day when U.S. markets lost 11 percent.

Black can nevertheless also stand as a good omen and be remembered as a pleasant EVENT. For example, short before Thanksgiving, people around the world (and businesses with them) celebrate the Black Friday, which still currently holds a positive connotation as the day when consumers can take advantage of super discounts. However, as history teaches us, the original connotation of the day was negative, since Black Friday was synonym for social disorder, and it was remembered as the

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[81] This point can be further explored within the scope of the so-called "Color Revolutions", such as the Orange Revolution in Ukraine in 2004, the Rose (red) Revolution in Georgia one year earlier or the Tulip (yellow) Revolution in Kyrgyzstan in 2005, the Sunflower (yellow) student Movement in Taiwan (March-April 2014), or the more recent Umbrella (yellow) Movement in Hong Kong. A monograph on colors and social unrest was written by Julia Gerlach with the book "Color Revolutions in Eurasia", Springer Verlag Heidelberg / Berlin 2014; also `http://en.wikipedia.org/wiki/Colour_revolution`.

date when police in the States charged masses of people and traffic because they jammed the streets to get heavily discounted goods.

Other examples which show a discrete similarity in meaning across languages include:

- To operate / to be in the *black* (meaning to register incomes and no debts); GE: *schwarze* Zahlen schreiben (same as in English); IT: essere in *nero*, essere in attivo (lit. to be in the black). BLACK (target) refers to PROFIT (source).

- To be in a *black* mood, IT: essere di umore *nero* (lit. to have a black mood"); CH: 鬧情緒 nào qíngxù (lit. to cause trouble mood; the contrary can be 情緒不錯 qíngxù bùcuò, e.g. "The boss is in a good mood today", 老闆今天情緒不錯 lǎobǎn jīntiān qíngxù bùcuò); FR: être de bonne/mauvaise humeur (lit. to be in a good / bad behavior), SP: estar de hocicos (to keep grudges). BLACK (target) stands for ATTRIBUTE (i. e. negativity; source).

- To be in someone's *black* list, to be *blacklisted*, IT: essere / comparire nella lista *nera* di qualcuno (same as in English); SP: figurar en la lista *negra* de alguien (same as in English); FR: être dans la liste *noire* de quelqun (same as in English); CH: 黑名單 hēimíngdān (same as in English), e. g. "he was on the *black* list" (他上了黑名單 tā shàngle hēimíngdān). BLACKLIST (target) stands for PUNISHMENT (source).

- To be the *black* sheep; GE: "der Sündenbock / das *schwarze* Schaf sein" (lit. to be the scapegoat; same as in English; to be the *black* sheep); IT: essere la pecora *nera*, essere il capro espiatorio (lit. to be the scapegoat; same as in English); CH: "害群之馬" hài qún zhī mǎ (lit. a horse that brings trouble to its herd), a trouble-maker, a black sheep; FR: être un / une brebis galeuse (lit. flaking ewe); SP: ser un perro sarnoso (lit. to be a mangy dog). BLACK-SHEEP (target) is PERSON (source); BLACKSHEEP is BADOMEN.

- GE: "(Die meisten Taten) bleiben im *Dunkel*." EN: "most facts lie in the

shadows / in *black*", IT: "la maggior parte dei fatti resta all'*oscuro* / nelle tenebre" (same as in German and English), FR: "la pluspart des facts reste dans le *noir* / dans l'obscurité" (same as in English); SP: "la mayor parte de los hechos permanecen en *las sombras*" (same as in English). DARKNESS (target) is UNKNOWN / HIDDEN (source).

- IT: Essere raro come le mosche *bianche* (lit. to be as rare as *white* flies); GE: selten sein wie ein *weißer* Rabe (lit. to be as rare as a white raven); to be a rare breed; FR: être come un mouton à cinq pattes (lit. to be like a sheep with five legs). (WHITE)ANIMAL (target) is UNUSUALNESS (something rare, source).

- (to be a) *dark* figure (of crime) (e.g. the dark figures of poor children; the dark figures of child pornography); GE: die *Dunkel*ziffer (sein) (same as in English); IT: dati nascosti (lit. hidden figures, figures that do not appear in official statistics); FR: chiffres cachées (same as in Italian). The crime is herewith compared to a broader event, which considers the illegal action as a number on an official record of statistics. DARKNESS (target) is UNKNOWN / HIDDEN / ILLEGAL (source).

- To be (caught) *red-handed* (same as to be caught head on into something): in the act of committing something wrong. Red reminds the color of blood, as if someone was caught with the hands red from blood after committing a crime or something shameful. CH: 现行犯的 xiànxíngfàn de (lit. of the criminal caught, same as in English); IT: essere colto in flagrante (lit. to be caught in the action), essere colto con *le mani* nel sacco (lit. to be caught with the hands in the bag"); SP: pillar a alguien con *las manos* en la masa (lit. to catch someone with the hands in the dough), FR: (sur)prendre qn *la main* dans le sac (lit. to surprise / to catch someone with the hand in the bag"); GE: jemanden bei der Tat er*greifen* (lit. to catch someone on the scene), jemanden auf frischer

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Tat ertappen (lit. to catch someone at fresh scene). The same limb, hand, is used across different languages with the exception of German. The presence of the hand as instrument for the act of catching and being caught is reiterated by both the use of the word and the verb to catch. The expression, which would let to think that red is dominant meaning carrier, is nevertheless another example for embodiment, given the recurrence of hand and hand-related activities across languages. Hence the metaphor here is HAND (specific for BODYPART / BODYACTION) stands for INVOLVEMENT / REMOVAL (either is somebody involved in an event or removed - by means of a virtual hand - from an event).

This further interpretation of the Embodiment Theory was discarded for the moment because it lies outside the scope of the current investigation, whose goal is to retrieve ontological concepts from metaphors, alias concepts that are assumed to be valid in all languages. The research is therefore not supposed to analyze cultural variations of linguistic forms, but the topic is highly relevant and it can be explored in the course of future plans.

Analogy and metaphor and metaphor and paraphrase

During the presentation of different kinds of tropes, such as similes, collocations, metonymies, idioms and colloquialisms, it was suggested that analogies may be the *conditio sine qua non* or the necessary condition for all tropes to exist. Analogies were therefore regarded as the trigger to the cognitive human ability to understand a new meaning from different senses (indeed, in the case of metaphor, meaning transcends from the original respective meanings of the source and of the target). It would be therefore desirable to study more about the relationship between metaphors and analogies as well as analogies and other tropes.

The last part of chapter 2 dealt with the investigation of a proposed new inter-

pretation of the term paraphrase and the process of paraphrasing. As shown, current research on metaphors, like the one carried on by [Shutova and Veale, 2014], [Bollegala and Shutova, 2013], [Shutova, 2010], approaches these tropes by first literally paraphrasing their meaning. Studies by [Citron and Goldberg, 2014b], [Citron and Goldberg, 2014a] nevertheless revealed that metaphorical senses may stimulate different brain areas and thus different emotions, which disappear if the tropes are simply literally rendered.[82]

In chapter 2, it was nevertheless observed that language has enough variations to enable a translation of metaphorical forms by means of other metaphors or tropes having same or similar meanings. This trope-to-trope translation was therefore defined a new kind of paraphrasing. For instance, the expression to stir up a hornet's nest bears almost the same meaning of to open Pandora's box, which happens to exist in different languages with the same semantic structure. The two expressions seem to match in sense as well as partially in lexico-semantic choice, with the words nest and box being similar.

Hence it would be worth exploring this new approach to paraphrases, in one as well as across different language. This acknowledged, it can already be foreseen that the exploration may bear some challenges, given for instance the presence in language of very specific expressions that might exist in one or few languages only. One example can be the English trope to have a beef with somebody (meaning to be in trouble with someone), which could not be identified in the other considered languages.

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[82]Citron and Goldberg state for instance that taste-related metaphors containing words such a "sweet" or "bitter" trigger specific emotional centers in the human brain.

Possible extensions for chapter 3

Exploration of additional resources in NLTK

The NLTK module is an extensive module written with Python and containing several big-sized corpora.

For the purpose of this research, only the WN and FN corpora were taken into account. For the first, given the wealth of information, it was then decided to limit the information retrieval to the POS noun.

Future research can include an extension of the query to the other POS as well as to the Extended Open Multilingual WordNet.[83]

NTLK also contains SentiNet and VerbNet, two smaller resources, only partially related to WN. "VerbNet (VN) (Kipper-Schuler 2006) is the largest on-line verb lexicon currently available for English."[84] The lexicon is domain-independent and built around a hierarchical structure. It outsources information contained in other lexical resources, including WordNet, Xtag (XTAG Research Group, 2001) and FrameNet.

SentiNet is a sentiment analysis tool in Python NLTK that enables the detection of positive, neutral and negative sentiments (information retrieved from a tagged dataset of movie reviews) while allowing text classification. SentiNet may be used for the study of metaphor with the intent to explore further ways to increase the batch of information that may be attached to these tropes, which may be in fact also classified in terms of intensity of the emotions conveyed through their domains.

Another lexical and semantic extension to the study of metaphors in NLTK deals with the investigation of semantic forms other than hyponyms and hypernyms. In fact, WN also provides detailed information about many other lexical forms, in-

---

[83]http://compling.hss.ntu.edu.sg/omw/cgi-bin/wn-gridx.cgi?gridmode=gridx
[84]Source: http://www.nltk.org/_modules/nltk/corpus/reader/verbnet.html

cluding meronyms, holonyms, antonyms and similars, which can be then further explored by means of the attributes reported below.

```
instance_x () (e.g. instance_meronyms())
member_x()
substance_x()
part_x()
attributes_x()
entailments_x()
causes_x()
also_sees_()
verb_groups()
similar_to_x()
common_x()
lowest_common_x()
derivationally_related_forms()
similar_tos
pertainyms
```

In particular, the `.ss` function for similars retrieves information about distant synonyms for the same synset. It can be recalled in WN with the `.ss` function in the NLTK module and it retrieves all possible similar lemmas from terms of the same synset and from other synsets.

For instance, the similars for the adjective circular are: `ring-like.s`, `co-coid.s`, `goblet-shaped.s`, `roundish.s`, `pinwheel-shaped.s`, `apple-shaped.s`, `capitate.s`, `bulblike.s`, `barrel-shaped.s`, `discoid.s` and `round.s`.

As for antonyms in WN, it was noticed, through various experimentation with the NLTK module, that they better be treated and retrieved at the level of lemmas, not at the level of synsets, such as for instance by inputting the code line `wn.lemma('circular.a.01.circular').antonyms()` rather than the line `wn.synset('circular.a.01').antonyms()`, that generates instead the output `invalid syntax`.[85]

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[85]The user may find it useful to explore Christopher Potts' proposed functions for explor-

By looking at antonyms of shape words at the level of lemma in WN, it is therefore possible to retrieve information on all considered lemmas; to retrieve all lemmas that stand behind a `wn.lemma` group; to assign a name to each lemma (e. g. `wn.lemma(`circle.n.01.circle')`, and to retrieve, for each lemma name, its lexico-semantic relations.

Another solution to understand the intricacy of lexico-semantic relations in WN would be the calculation of the hypernymic and hyponymic paths, which corresponds to the calculation of the distance between synsets in the WN hierarchy.

This may be possible through the application of different similarity tests, such as:

- Taxonomy distance.The shortest path, expressed in terms of the number of synsets, that connects the senses in a taxonomy. It bases on the `hypernym_paths()` list for each synset, but it is not the same like the list, since it calculates the shortest path.

- Path similarity. The shortest path that connects the senses in scores ranging from 0 to 1.[86]

  In case a score cannot be found (e. g. as for verbs with many taxonomies), the value is negative (-1). A score equal to 1 appears in case the sense is compared to itself.

- LCH similarity. Also known as the Leacock-Chodorow similarity. It calculates how similar two word senses are based on the shortest path that connects the senses and the maximum depth of the taxonomy in which the senses occur.

- WUP similarity. Also known as the Wu-Palmer similarity. The test returns how similar two word senses are based on the depth of the two senses in the

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ing WN; `compprag.christopherpotts.net/code-data/wordnet_functions.py`. The list of functions proposed by Potts seems to be more comprehensive than the one proposed by [Perkins, 2012].

[86]For more information on how to run them consult `http://stackoverflow.com/questions/22031968/[...]`

taxonomy and their Least Common Subsumer, i. e. most ancestor node.

All tests return different values and they should therefore well pondered before use.

One bottleneck of these tests, although useful to mark similarity distance and closeness of senses, may be that, similarly to the case of the Resnik similarity test, they can just be applied for comparison of similarity between two nouns or between two verbs in WN. NLTK also enables the calculation of the taxonomic depth between words in other corpora.

In order to calculate that value, the Information Content file of the corpus needs to be uploaded first, as shown below with an example from the Brown corpus.[87]

```
from ntlk.corpus import wordnet_ic
brown.words()
brown_ic = wordnet_ic.ic(`ic-brown.dat')
circle.res_similarity(shape, brown_ic)


2.2984864148968094
```

If the command line `<corpus_name>.words()` does not work for a specific corpus, an Information Content dictionary can be created *ad hoc*, for instance as the one here below generated for the Gutenberg corpus:

```
from nltk.corpus import gutenberg
gutenberg.words() # does not enable this function
gutenberg_ic = wn.ic(gutenberg, False, 0.0)
circle.res_similarity(shape, gutenberg_ic)


2.481915387409916
```

This shows that similarity tests vary and the choice of one over the other should be well thought. It also shows that the tests can be run on corpora provided that the necessary files exist.

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[87]Example taken from [Bird et al., 2013]; `http://www.nltk.org/howto/wordnet.htm l`

Research on metaphors may be extended to other corpora, for instance to microblogs, such as tweets, Facebook posts and chats.

The analytical and statistical approach to metaphors may be deepened, following the steps pioneered by [Shutova and Veale, 2014], [Bollegala and Shutova, 2013].

For instance, studies may be conducted on the predictability of metaphors and other tropes, when included in the same discourse. Linear and regression models can help detect elements that influence the number of metaphors in a text as well as the probability for a metaphor to occur in a paragraph.

My latest research in progress shows for instance that it may be possible to justify metaphors in tweets by means of other elements of language, such as idioms, collocations and metonymies, as well as the presence of concrete and abstract words. Moreover, it may be possible to determine the probability for a metaphor to occur in microblogs, given the presence or absence of other independent variables in the same.

Exploration of tropes in FN

With regards to the analysis of shape words in FN, the investigation of the frames showed that phrasal verbs and collocations are sometimes included in the frame description. For instance, the following figurative expressions could be retrieved from the analyzed frames:

- For line: "in / out of line"; "make a beeline"
- For point: "high / low point"; "extreme point";"point of dispute";"point of view" (one of the extra-thematic frames of Point_of_dispute)
- For shape: "take shape"; "go into shape"

This information hints at the possibility to only focus the queries on figurative forms in frames, in a figurative form-to-frame fashion. Moreover, it was also observed that some expressions are directly mapped to frames (e. g. the idiom "kick

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the bucket", directly linked to the frame [`<frame ID=53 name=Death>`]). Other expressions[88], on the contrary, do not seem to be directly linked to frames, thus suggesting the possibility that, also for the case of figurative form-to-frame queries, different approaches with different levels of granularity may be needed.

Finally, the research on FN may be extended to other languages as well by asking granted access to current projects on various multilingual framenets.[89]

Further extension of the SUMO ontology with shape-related properties

The ontological mapping to SUMO was extended to upper as well as mid-level concepts, with the proposition of some new or newly labeled middle concepts which are currently not listed in SUMO.

The in-depth analysis of SUMO throughout the period of this research also led to the extension of the knowledge repository, and in particular of its upper concepts.

I participated to this extension as primary investigator and I compared the outcome and challenges of the approach taken with other existing ontologies, e. g. LEMON [Quattri et al., 2014], [McCrae et al., 2014]. The project led to the the manual compilation of more than 300 default size-related measurements for SUMO upper concepts. The measurements were compared to ISO standards and U.S. governmental regulations, in order to provide a reliable source of investigation with officially recognized sizes. Default values were approximated only for the cases in which standardized measurements could not be retrieved from official sources. The annotation was peer-reviewed.

Size measurements include for instance the definition of minimum and maximum length, height, width, weight and volume, as showed in the example for Vehi-

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[88]Expressions with shape words for which direct frames could not be found include: to connect the dots, to go around in circles, to step outside the line, fair and square.

[89]A list of the current framenets built in other languages can be found under: `https://fram enet.icsi.berkeley.edu/fndrupal/framenets_in_other_languages`

cle below:

```
(defaultMinimumLength Vehicle (MeasureFn 3.5 Foot))
(defaultMaximumLength Vehicle (MeasureFn 14 Foot))
(defaultMinimumHeight Vehicle (MeasureFn 4.6 Foot))
(defaultMaximumHeight Vehicle (MeasureFn 4.8 Foot))
(defaultMinimumWeight Vehicle (MeasureFn 1 TonMass))
(defaultMaximumWeight Vehicle (MeasureFn 1.7 TonMass))
```

The mapping represents an extension to the current information on upper concepts in SUMO, which includes higher-order logic definitions and WN definitions.

The advantages of the annotation may be summarized as:

- Ontological formalization. The project shows the development of a reliable set of measures for upper concepts that serves the main purpose of any ontology, namely to show a kind of reality that always holds. Further validation of the method is also provided by the measures as taken from current ISO standards.

- Physical objective measurements. The SUMO extension presents physical defaults grounded in objective dimensional properties of upper concepts.

- Computability. All defaults are computable and reproducible.

The size-related measurements in SUMO may be extended to include measurements for the upper concepts' children or middle concepts (included the inclusion of the concepts proposed in this research) as well as the introduction of shape-related properties for the concepts (such as Round as intrinsic property for the Object wheel or Square for PassPhotograph).

Study of metaphors in other ontologies

Finally, the study of metaphors may be extended to other standard ontologies, although further investigation needs to be done about whether the ontological properties retrievable from the classifier-noun match are mostly entailed in either the classifier or the noun or equally shared.

Previous research [Quattri, 2012b] dealt with the topic during the investigation of Hantology [Chou et al., 2008], a linguistic resource for Chinese language learning and study, which enables the discovery of conceptual systems in Chinese based on orthographic convention.

The investigation showed the presence of ontological features in certain Chinese classifiers (張 zhāng，管 guǎn，團 tuán，條 tiáo，本 běn, 片 piàn), that help define the noun they accompany. For instance, 片 in 一片地 yī piàn dì (a flat land) defines the ShapeAttribute flatness for 地, which solely means land, place, earth, ground in Chinese. 團 tuán corresponds to English verb to roll, to roll into a ball, to gather. As a noun, it translates into regiment, group, society, body (which metaphorically can mean conglomeration of substance or mass of people). As adjective, 團 means circular, round, collective. Finally, in the role of classifier, it collocates with round objects, such as doughs (e. g. 一團麵糰 yī tuán miàntuán). The classifier 條 tiáo determines the features of the noun that it follows, which should be long, flexible, bent. For instance, when combined with shorts (一條短褲 yī tiáo duǎnkù), it characterizes this kind of trousers for their length, not for other properties, such as viscosity or color.

The research can be further extended in light of retrieval of ontological features and metaphorical meanings, and it may be deepened by further decomposing classifiers into radicals, to see whether they inherit ontological properties from there. An example for this is the case of 本，跟，株 běn, gēn, zhū, which seem to derive their ability to classify elongated objects from the radical 木 mù, meaning tree, which they all entail.

Possible extensions for chapter 4

The investigation in chapter 4 deals with the retrieval of metaphorical information from tropes and, in some cases, single words, in which the shape words are used.

The analyzed shape words are circle, triangle, square, line, point and shape.

In the course of the investigation, the wealth of tropes with shape words also revealed forms that do not contain the specific shape word, but rather an approximation of the same.

This is the case for the word circle, which appears in other tropes in the form of the adverb around or the adjective round as well as in the form of the nouns rings, cycles, spirals and rounds.

The examples that follow show that the investigation on circle and some shape that approximates or resembles it may be deepened, in the attempt to clarify not only the role of the shape word in the figurative expression but also the lexico-semantic relations that may exist between a shape word and the form that approximates it, so to clarify whether the choice of one word over the other ultimately affects the meaning of the trope.

- **to talk around**; **GE**: im Kreis reden, drum herumreden (lit. to talk around, same meaning of sich wiederholen, lit. to talk in circle, to repeat oneself's). The verb to talk is often used in English expressions implying space and circles. For instance: to talk around / round something has the same meaning of to go round in circles, i. .e the person talks vaguely without dealing with the most important part of the talk. To talk around something (same meaning of to talk in circle) translates into **CH** as 拐彎抹角的說 guǎiwān mòjiǎo de shuō (e. g. "Get to the *point*. Don't talk around it / don't beat about the bush", 說話不要拐彎抹角 shuōhùa bùyào guǎiwānmòjiǎo), 不著邊際的說 bù zhuó biān jī de shuō (lit. not relevant talk / not to the point / wide of the mark talk / neither here nor there). **FR**: éviter de mentionner qc (lit. avoid mentioning something); **IT**: girare intorno a qualcosa (lit. to turn around something); **SP**: hablar en tondo (to talk around)

- **to talk somebody around / into / out of doing something** means [a] to per-

suade a person to do or to accept something, or [b] to explain a person how something works. It can be translated as: **SP**: convencer a alguien (lit. to *convince* someone), "disuadir a alguien de algo" (lit. to *dissuade* somebody about something); **FR**: convaincre qn de faire qc/de ne pas faire qc; **IT**: convincere (to persuade someone into doing something); **GE**: jemanden herumbringen, jemanden überreden (lit. to bring someone to the point one wants, to talk over someone); **CH:** 說服 shuōfú ('persuade'); 勸說某人同意 quànshuō mǒurén tóngyì (lit. to persuade a certain person to agree), to talk somebody around, to talk somebody out of something (e. g. "we have talked him out of his original plan", 我們已經勸說過，叫他放棄原來的計劃 wǒmen yǐjing quànshuō guò tā, jiào tā fàngqì yuánlái de jìhuà; 我們最後總算說服他們接受我們的想法 wǒmen zuìhòu zǒngsuàn shuōfú tāmen jiēshòu wǒmen de xiǎngfǎ, lit. we finally have persuaded them to accept our idea, "we finally managed to talk them around our way of thinking")

- **to do / go the rounds** (i. e. circulating rumors, hence ROUNDS stands for RUMORs); **GE**: die Runde machen (lit. to do the round); **SP**: (poner) un rumor en circulación (lit. to spread a rumor), (e. g. "las historias que circulan desde hace décadas acerca de la creación de" "rumors have been doing the rounds since decades about the creation of .."); **FR**: le bruit court que (lit. rumor has it that); **IT**: (la chiacchera) sta facendo il giro (same as in English); **CH**: 迅速傳開 xùnsù chuánkāi (to spread rapidly; of news), 迅速流傳 xùnsù liúchuán (lit. to spread rapidly). Notice that the expression to do / go the rounds does not bear the same meaning of to make the rounds (CH: 到各處去 dào gèchù qù, 巡迴 xúnhuí, to go around, to tour), used especially during political campaigns to indicate the action of going around to look for support

- **something gets around / round** (e. g. "she was terrified that the publication of the document would have meant that her career was going to be over

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once it got round"), here meaning: starting to develop, to take over, to rise in fame. There also exists the expression word would get round (which is close in meaning to "rumors start to spread that"); **GE**: sich *herum*sprechen (lit. to talk oneself around, e.g. "inzwischen hatte sich die Kampagne herumge-sprochen", "by this time, word had got around"); **IT**: la voce si e' diffusa, tutti sanno che (lit. the voice has spread that; everybody knows); **FR**: le mot a déjà *couru*, tout le monde sait que (same as in Italian); **SP**: *se corre* la voz (there runs the voice); **CH**: 聽說 tīngshuō (there is the rumor; voices say); 消息散佈到各處 xiāoxi sànbù dào gèchù (lit. news spread to every place, word got around)

- **to spiral out** (e.g. "Now, after seven years of Afghan war, the fighting is spiraling out of control"); **CH**: 物價飛漲失去控制 wùjià fēizhǎng shī qù kòng zhì (lit. prices + soaring inflation + to lose + control) "prices are spi-raling out of control"; 急劇上漲的保健費用 jíjù shàng zhǎng de bǎo jiàn yòng (lit. the rapid rise of the health protection care; "the spiraling prices of health care"); **GE**: außer Kontrolle geraten (lit. to get out of control); **SP**: alzas incontroladas (e.g. de los precious) (uncontrollable rise of prices); **FR**: augmenter de façon démesurée (to hugely rise / increase); **IT**: degenerare, aumento incontrollato (degenerate, unmanageable rise)

- **to buy a round** (meaning to offer something to drink to a group of people). A ROUND is a DRINK (in the other languages too); **GE**: eine Runde aus-geben (lit. pay a round, eine Runde schmeißen, [colloquial], lit. to throw a round), eine Runde spendieren (lit. to offer a round); **IT**: offrire (sul conto di qualcuno) (lit. somebody offering a drink); **SP**: pagar una ronda (same as in English); **FR** offrir (to offer); **CH**: 巡 xún (lit. to make one's round), e.g. 這一巡輪到我了 zhè yī xún lúndào wǒ le (lit. this round is on me)

- **to break the ring**; **GE**: der Ring, der Kreis brechen (e.g. "der Kreis des

Schweigegelübden brechen") (lit. to break the ring / the circle of silence; to break the vow of silence); **FR**: rompre le silence (same as in English); **IT**: rompere il silenzio (same as in English); **SP**: romper el silencio (same as in English); **CH**: 他就此結束了不在公開場合露面的狀態 tā jiùcǐ jiéshù le bùzài gōngkāi chǎng hé lòumiàn de zhuàngtài (lit. she terminated her + situation not public to the open eye + de + state / mode, "she broke her public silence"). The metaphor here is (-) EVENT > SHAPE; PARTOFSHAPE (RING) > EVENT

- **(to perpetuate) the cycle** (usually of something negative, e. g. "to perpetuate the cycle of bad habits"); **CH**: 循環 xúnhuán cycle, circulate (e. g. 循環不息 xúnhuán bùxī, to move in endless cycles, 四季的循環 sìjì de xúnhuán, the cycle of the seasons); **GE**: der Zyklus, der Kreislauf; **FR**: cycle; **SP**: ciclo; **IT**: ciclo

The word point, when searched in the context of tropes, also reveal some lexico-semantic peculiarities, which may be explained in terms synonymy, hyperonyomy or hyponymy in comparison with other words.

One of these, which seems to be used interchangeably with point, is the word spot. Although it is not in the focus of this investigation to argue whether spot should be treated as shape word, it may nevertheless be interesting to uncover the potential relation that the lemma holds with point, or vice versa, the differences that keep them different.

Some expressions with spot in tropes include:

- **a spot** (meaning something or someone insignificant, with no relevance), e. g. "she is more than a spot"; **IT**: essere un puntino, essere una nullita' (lit. to be tiny, to be like a tiny spot); **FR**: un coin à l'ombre (lit. a spot in the shadows); **SP**: una mancha (lit. a spot); **GE**: eine Flecke, ein Mackel

- **be in the hot / trouble spot / fire point** (meaning a PLACE which can be

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[a] characterized by political and verbal fighting, [b] conflict and war zones [also paraphrasable with trouble spot], [c] entertaining and related to show business, [d] very hot due to fires burning, related to industrial production or natural resources), [e] a very unfavorable situation; **CH**: "I am in a hot spot right now!" 我的處境艱難啦！wǒ de chǔ jìng jiān nán la!, 不安定的地區 bù'ān dìng de dìqū (lit. a not peaceful zone, a war zone), 動亂的國家 dòng luàn de guó jiā (lit. country where there are upheavals, turmoils); **GE**: Gefahrenherd', Krisenherd (lit. dangers' zone, crisis zone), Brennpunkt (lit. firing point, boiling point, e. g. "viele Menschen sind gerade an den Brennpunkten der Welt, auf dem Libanon, in Lybien, Afghanistan und Iraq", "many people are right now in the hot spots of the world, in Libanon, Lybia, Afghanistan and Iraq"); **IT**: zona calda (lit. warm / hot place), locale notturno (lit. nightclub), zona molto popolare (lit. well-known place); **FR**: endroit chaud (lit. place hot), zone de guerre (lit. war zone), boîte de nuit (lit. night club); **SP**: centro de fricción (lit. friction center), zona de conflicto (lit. war zone)

- **to be in a tight spot** (meaning to be in a difficult position, situation; also paraphrasable as to be in a tight corner, to be in a tight squeeze); **CH**: 在困境中 zài kùnjìng zhōng (lit. to be / to lie + difficult position + in the middle), 處於困境 chǔ yú kùnjìng (lit. to be in a difficult situation) (e. g. 我兄弟處境困難 wǒ xiōngdì chǔjìng kùnnan (lit. my + brother [humble term by men] + unfavorable situation + difficult, "my brother is in a tight squeeze"); **IT**: essere in una strettoia, essere all'*angolo, essere con le spalle al muro, stare con l'acqua alla gola* (lit. to be in a narrow road, to be put in a tight corner, to be with the shoulders against the wall, to be with the water to the throat); **FR**: (se trouver / se sourtir) d'un mauvais *pas* (lit. to be / to free oneself's from a bad pace); **SP**: *estar con el agua al cuello* (lit. to be with the water to the

neck), estar aviado (en un apuro) (lit. to be in a difficult situation); **GE**: sich in einer Klemme befinden, in der Patsche *drinsitzen* (lit. to find oneself's in a terminal, in jam)

- **on the spot / on the scene** (meaning immediately); **CH**: 當場 dāng chǎng (他 們當場就錄用了我 tāmen dāng chǎng jiù yùlòngle wǒ, "they hired me on the spot", "he answered the question on the spot", 他當場就回答了那個問題 tā dāng chǎng jiù huí dá le nàge wèntí); **FR**: sur place (lit. on the square / place); **SP**: en el acto (lit. in the act, at once); **GE**: sofort, sogleich, auf der Stelle (lit. right there, on the place). On the spot can mean either to be at the same place where something is happening or immediately; **IT**: su due *piedi* (lit. on two feet), in tronco (lit. suddenly, e. g. "mi hanno licenziato in tronco", "I was fired on the spot") POINT as PLACE

- **to put somebody on the spot** (meaning to challenge someone or to put some-one in an awkward situation, e. g. "drop by and put me on the spot with a tough question. It is always awkward to ask questions and face silence"); **CH**: 使某 人難堪，尷尬，為難 shǐ mǒurén nánkān, gāngà, wéinán (lit. to make someone embarassed, ackward); **GE**: in Verlegenheit geraten (lit. to be in quandary, to end up in *embarassement*; the passive form [to be put on the spot] is translat-able as in Zugszwang geraten, lit. to end up in compulsion, to be in a tight spot); **IT**: essere messo all'*angolo* (lit. to be put in the edge), *essere messo con le spalle al muro* (lit. to be pushed with the shoulders against the wall); **FR**: mettre qn sur la sellette (lit. to put somebody in the hot seat); **SP**: quedarse *pegado a la pared*, poner a alguien en un brete, dejar a alguien pegado a la pared (lit. to remain attached to the wall, to put someone in fetters [a chain or manacle used to retrain prisoners], to leave someone sticked to the wall)

- **to be on the spot** (meaning to be in the same place when something is hap-pening), **CH**: 現場報道 xiànchǎng bàodào (on-the-spot-report), 現場採訪

xiànchǎng cǎi fǎng, on-the-spot-interview; e. g. ; **GE**: am Ort sein (lit. to be
on the place); **IT**: essere sul posto (lit. to be in loco, on the place), **FR**: re-
portage à chaud ("on-the-spot-report", lit. hot report), sur place, sur-le-champ
(lit. in place); **SP**: in sito, sobre el terreno (lit. on the ground)

Moreover, the shape word point also happens to be occasionally translated as the
correspondent word for hole or cave into other languages (穴 xué; xuè in Taiwanese).
The word hole, in particular, seems to be very salient in meaning.

The importance of holes is strictly related to the spatial settings in which they
are located. For instance, a hole in the ground may be a serious issue, the same
as a hole in a pocket. A sink hole may be dangerous. Cases of sinkholes in Xi'an
or Guanzhou where entire streets have been swept underground have to be deemed
serious. A hole in a helmet can also be life-threatening, and annihilates the whole
concept of helmet as safety shell.[90] A detailed study on holes and other parts can be
found in [Casati and Varzi, 1995] and [Casati and Varzi, 1999].

A hole can, the same like a point, be a physical ENTITY (hole is linked to the up-
per concept HOLE in SUMO, which is a sub-branch of ARTIFACT), strictly related
to the PLACE, hence SPACE, in which it is located. The expression to have an ace
in the hole, for instance, also translatable as to ace up one's sleeve, means to have
an hidden advantage or resource kept in reserve until needed. Although ace stands
here for a winning ball hitting a hole in the first shot, the hole remains the physi-
cal ENTITY. The same applies for holes in cheese, or black and white holes in the
space. The human body is physiologically already compared to a cavity, with holes
in the mouth and nose (to indicate the nostrils), or holes in the heart. The word hole
in this regard is strictly collocational to the expressions just mentioned; in fact, lan-
guage users may not interchange the collocation white holes (a hypothetical region
in space) by using instead white spots or white caves.

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[90]The word helmet is linked to the KB term CLOTHING in SUMO.

The research has also shown that spot may be a synonym for point when related to SPACE. There are exceptions to this rule (such as the spots of a jaguar), but both the verb (to spot) and the noun spot refer to geographical PLACEs.

While to finger or to point imply the use of the human hand to accomplish the event, to spot implies the human sight. Spot is also collocational, such as in the expressions on the spot (e. g. "they hired me on the spot", 他們當場就錄用了我 tāmen dāngchǎng jiù lùyòngle wǒ) or to put somebody on the spot (e. g. 使某人難堪 shǐ mǒurén nánkān, lit. to make / to cause someone to be embarrassed).

Hole is on the contrary an ABSTRACTENTITY when used in expressions such as a hole in the soul (e. g. "Gospel can fill holes in the soul"), down the rabbit hole (a phrase often used in consciousness-related topics) or lost in the K-hole, which refers to ketamine and the drug addiction it causes. Derogatorily, a hole is in colloquial language even synonym with the female vagina. Finally, hole can stand for prison (e. g. "Sarah Shourd was kept in an Afghan hole from 2009 to 2011").

Hole can also simultaneously mean *both* physical and abstract ENTITY, according to the interpretation that one gives. For instance, a book with holes is a book where holes are physically carved inside the book, so that children can use their fingers and play with them, but it can also stand for a book with lacking content.

Eventually, surpassed collocations for hole could be found. For example, although the collocation to drill a hole is commonly used in geothermal jargon to indicate the source of energy (gas drilling, oil drilling - with gas or oil being the material for which holes are dug in the ground; a collocational constitutive and telic expression, according to the Generative Lexicon, 2.5, page 65), drilling a hole through fingernails or toes is nowadays not called drilling any more, but it is commonly known as trepanning[91].

In some cases, the word point has also been observed in relation to the word

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[91]en.wikipedia.org/wiki/Trepanning

time, such as:

- **a point in time** (e. g. 到這種時刻，我們只好等待了 dào zhè zhǒng shíkè, wǒmen zhǐhǎo děng dài le (lit. until this + classifier + moment, we without any option wait + le; "at this point in time we just have to wait"). In **Ch**inese there are also the forms 時點 shí diǎn (上午時點名 shàng wǔ shí diǎn míng, "roll-call will be at 7 pm"); **GE**: Punkt, Periode, Jahreszeit, Stunde, Uhr (lit. point, period, period of the year, hour); **SP**: en un momento determinado, en un momento dado (lit. in a particular / given point); **FR**: à un moment précis, a un moment prévu (lit. in a precise / foreseen moment); **IT**: in un momento preciso / stabilito / dato, a un certo punto (lit. in a precise / established / given point, in a certain point). POINT as TIME can be interpreted in both abstract and concrete terms

- **to be *to* the point *of* doing something** (same as to be on the verge of doing something); **CH**: 近乎 jìnhū (lit. close to) (e. g. "he was rude to the point of being aggressive", 他粗魯到蠻不講理的地步 tā cūlǔ dào mán bù jiǎnglǐ de dìbù, lit. he + rough / rude + go to + impervious / unreasonable + de + condition); **SP**: estar en trance de hacer algo (lit. to be through doing something), estar a punto de hacer (same as in English); **IT**: stare per, essere sul punto di (lit. to be going to do sth, to be on the point to), essere al baratro (lit. to be at the chasm, on the verge of the abyss, e. g. essere al baratro, to be to the point of dying); **FR**: être au point de faire quelque chose (same as in English), aller faire quelque chose (lit. to go doing something); dabei sein, etwas zu tun (lit. going to do / to be in the process of doing something); **GE**: dabei sein, etwas zu tun (lit. to be going to do something)

- The expression to be to the point of (doing something) is very close in meaning to **to be *on* the point of doing something** (e. g. "he was on the point of leaving"), which is also translatable as

- **to be (just)** *to* **the point** *to*. **FR**: être sur le départ, [lit. to be on the departure]), être sur le point de (lit. to be on the point, e. g. "un dealer est sur le point d'arriver du Surinam avec une cargaison importante" [a dealer is to the point to arrive in Surinam with an important cargo] ; **GE**: kurz davor stehen, etwas zu tun [lit. to be right before doing something]; **IT**: essere in procinto di [same as in German], essere sul punto di (same as in English); **SP**: estar en vísperas de hacer algo [lit. to be just before of doing something]; **CH**: 正要 zhèng yào (lit. to be just about to, to be on the point to, e. g. 我正要離開家的時候開始下雨了 wǒ zhèng yào lí kāi jiā de shíhou kāishǐ xià yǔ le, "I was just on the point of leaving when it started to rain")

Finally, another possible extension of chapter 4 deals with the investigation of shape words and their metaphorical meanings in light of a culture- and language-oriented investigation, rather than an ontologically-driven one. In other words, a new research may be conducted by taking into account the linguistic and cultural variations of the shape words and their translations or corresponding tropes into other languages.

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Appendices

Appendix A

References per topic

In the following I present the complete list of all *cited and consulted* references as divided by topics. In square brackets ("[]") I have reported keywords which should rapidly identify the content of the respective reference within the respective topic frame. The keyword is in no case meant to be exhaustively descriptive. The authors are put in random order.

Ontologies, Conceptual Modeling and Logics

[Ahrens et al., 2004] [conceptual metaphor, SUMO, WordNet®]; [Auer et al., 2007]; [Baader and Nutt, 2003]; [Bankston, 2003]; [Bellandi and Turini, 2012] [Bayesian networks]; [Bennett, 2002] [physical objects, identity, vagueness]; [Bennett, 1998a]; [Boem et al., 2013]; [Borgo and Kutz, 2011] [shape similarity]; [Buitelaar, 2010]; [Calvanese et al., 1998]; [Casati and Varzi, 1999]; [Casati and Varzi, 1995]; [Cimiano et al., 2011]; [Cimiano et al., 2012]; [Chou et al., 2008] [Hantology, Kanji]; [Chung et al., 2008] [concrete senses extraction, ontologies]; [Chung et al., 2004b] [conceptual metaphor, WordNet®, SUMO]; [da Costa and Laskey, 2006]; [Dubois and Prade, 1988]; [Elkan, 1994]; [Elkan, 1993]; [Eschenbach, 2000]; [Fonseca and Jorge, 2000]; [Fortunato and et al., 2008]; [Gangemi et al., 2003]; [Goguen, 1969] [fuzzyness, vague concepts]; [Gruninger et al., 2014]; [Hahmann and Brodaric, 2012]; [Haemmerli, 2012]; [Hobbs et al., 2012]; [Hobbs, 2005]; [Hobbs and Narayanan, 2002] [spatial representation]; [Hobbs, 1992] [metaphor, abduction]; [Hobbs et al., 1987]; [Hobbs, 1985]; [Hobbs, 1981] [metaphor interpretation]; [Hobbs, 1979] [metaphor schemata, selective inferencing]; [Huang et al., 2010a] [ontology, lexicon]; [Huang et al., 2008] [Chinese radicals, concept derivation];

[Huang et al., 2007c] [core concepts on Swadesh list, ontology]; [Huang et al., 2007d] [core concepts on Swadesh list, ontology]; [Huang et al., 2010b] [ontology of Chinese radicals]; [Huang and Ahrens, 2003] [individuals, kinds, events, classifiers]; [Hong et al., 2004] [SUMO, prediction compound relations]; [Kennedy, 2007] [gradability, adjectives]; [Lewis and Lewis, 1970] [holes]; [Lopez et al., 2013]; [McCrae and Unger, 2014]; [McCrae et al., 2012]; [McGuinness and et al., 2004]; [Ponsoda, 2011] [multilingualism in ontology]; [Morzycki, 2013b]; [Nardi and Brachman, 2003]; [Navigli, 2002] [pruning, trimming, general ontologies]; [Nolt et al., 2011]; [Obrst et al., 2014]; [Pease, 2011]; [Pease and Niles, 2000]; [Plantinga, 1987] [mental models and metaphors]; [Quattri et al., 2014]; [Quattri, 2012b]; [Quattri, 2012d]; [Quine, 1948]; [Regoczei and Plantinga, 1987]; [Hsieh et al., 2007] [ontology, SUMO, MILO, multilingualism]; [Hsieh, 2006] [HanziNet, enriched conceptual network of Chinese characters]; [Hsieh and Huang, 2006] [ontology, Chinese characters]; [Ha and Pala, 2001] ["Chinese radicals and top ontologies in EuroWordNet"]; [Chung and Ahrens, 2006b] ["Source Domain Determination: WordNet®-SUMO and Collocation"]; [Chung, 1995] [market metaphors in Chinese, English and Malay]; [Stuckenschmidt, 2011]; [Styrman, 2002]; [Truong et al., 2005] [binding probabilistic models to context ontology]; [Zadeh, 1975b]; [Zadeh, 1975a]; [Zadeh, 1965]; [Zhao and Boley, 2008];

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[Aarts and Calbert, 1979] [metaphor, non-metaphor]; [Abdullah and Frost, 2005]; [Ahrens, 2012a] [book review of "Metaphor and Symbol"]; [Ahrens, 2011a] [book review]; [Ahrens, 2011b] [conceptual metaphor, U.S. presidential speeches]; [Ahrens, 2010] [mapping principles, conceptual metaphor]; [Ahrens, 2009] [conceptual metaphor, political language]; [Ahrens and Lee, 2009] [conceptual metaphor, discourse, U.S. Senate]; [Ahrens, 2005b] [conceptual metaphor]; [Ahrens, 2005c] [metaphor, politics, presidents]; [Gong and Ahrens, 2004] [metaphor, discourse analysis]; [Ahrens et al., 2003] [conceptual metaphor]; [Ahrens and Huang, 2002] [metaphor, time passing is motion]; [Ahrens, 2002] [conceptual metaphor, source to target domain pairing]; [Ahrens and Huang, 2001] [comparative study, Chinese and English synonym pairs]; [Ahrens and Say, 1999] [image-schemas, translating metaphors]; [Ahrens, 1999] [mutability of verbs and noun meaning]; [Ahrens, 1998] [lexical ambiguity

resolution]; [Alonge and Castelli, 2003] [metaphor, wordnets]; [Amoia and Gardent, 2006]; [Beck, 2000] [antonyms]; [Bennett, 2006]; [Bennett, 2001] [topoi, concepts]; [Bennett, 1998b]; [Bertagna et al., 2007] [multilingual wordnets]; [Bond et al., 2014]; [Bouillon and Busa, 2001] [word meaning]; [Bouillon and Viegas, 1999]; [Bouillon, 1999] [generative lexicon, adjectives]; [Brown and Palmer, 2012] [Verb-Net, metaphor]; [Chomsky, 2001]; [Chomsky, 2000]; [Chou et al., 2007] [Hanzi grid]; [Chung et al., 2013] [conceptual metaphors in English and Mandarin]; [Chung, 2010] [metaphor, Chinese five elements, body part]; [Chung et al., 2005] [source domain derivation, conceptual metaphor mapping (CMM)]; [Chung and Ahrens, 2004] [teaching metaphor]; [Chung et al., 2004a] [metaphor, economic recession]; [Chung et al., 2003b] [metaphor, Chinese, economy as transportation device]; [Chung et al., 2003a] [metaphor, Chinese, economy as person]; [Chung and Ahrens, 2003] [metaphor, Chinese, stock markets as oceans, comparative multilingual study (EN, CH, SP]; [Bruin and Scha, 1988]; [Dowling, 2012] [metaphor, meaning]; [Eschenbach et al., 1998] [shape nouns and shape concepts, corner]; [Feilke, 1996]; [Fellbaum, 2009]; [Fellbaum, 2007] [idioms and collocations]; [Fillmore et al., 2003] [Frame-Net]; [Forceville and Urios-Aparisi, 2009] [multimodal metaphor]; [Forceville, 1996] [pictorial metaphor, advertising]; [Geary, 2009]; [Grady, 2005] [conceptual metaphor]; [Goatly, 1997] [metaphor]; [Gong and Ahrens, 2007] [conceptual metaphor]; [Gong et al., 2008] [conceptual metaphor, BUILDING source domain]; [Hong and Huang, 2007] [Chinese characters, ontology, learning Chinese]; [Hong et al., 2011] [sense prediction, two case studies]; [Hong and Huang, 2006] [Gigaword, SketchEngine, linguistic research]; [Huang et al., 2013]; [Huang and Lee, 2008]; [Huang et al., 2007b] [Chinese SketchEngine, collocations]; [Huang et al., 2007a] [ontological analysis of metaphor]; [Huang et al., 2006] [parallel wordnets]; [Huang et al., ied a] [domain taxonomy, multi-domain LP]; [Huang et al., ied b] [Chinese thesaurus, domain lexico-taxonomy]; [Huang et al., 2002] [multilingual wordnets]; [Huang et al., 1998]; [Huang, 1981] [time is flowing water]; [Justeson and Katz, 1991]; [Kilgariff, 2007] ["I don't believe in word senses"]; [Kövecses, 2010] [metaphor]; [Lakoff, 2009] [metaphor, frames]; [Lakoff, 2008]; [Lakoff, 1993] [contemporary theory of metaphor, conceptual metaphor theory]; [Lakoff and Johnson, 1980a] [metaphor]; [Lai and Ahrens, 2001] [source domain, plant, Chinese]; [Landau et al., 1988] [shape in early lexical learning]; [Larson, 1998]; [Levin, 1993]; [Lin and Ahrens, 2005] [word meaning estimation, Chinese, English]; [Lin and Ahrens, 2005] [word meaning estimation in Chinese and English]; [Löennecker-Rodman, 2003]

[wordnets, metaphor]; [Lu and Ahrens, 2008] [BUILDING metaphors, Taiwan political speeches]; [Maienborn et al., 2011]; [Mascardi et al., 2007]; [MᶜCrae et al., 2014]; [McCathieNevile, 2011]; [MᶜNally and Boleda, 2004]; [Miles and Bechhofer, 2009]; [Mollin, 2009]; [Montague, 1970]; [Morzycki, 2013a] [gradability, adjectives]; [Yu, 1997] [metaphor, Chinese perspective]; [Paprotté and Dirven, 1985] [ubiquity of metaphor]; [Partee, 2001]; [Partee, 2003]; [Peters and Peters, 2000]; [Petruck and de Melo, 2012] [FrameNet]; [Pinker, 2009a]; [Pinker, 2009b]; [Pinker, 1994]; [Pustejovsky, 1992] [event structure]; [Pustejovsky, 1991] ["The Generative Lexicon"]; [Quattri, cted]; [Quattri, 2014a]; [Quattri, 2014c]; [Quattri, 2013b]; [Quattri and Huang, 2012]; [Raskin and Nirenburg, 1995]; [Reddy, 1979] [the conduit metaphor]; [Reichenbach, 1948]; [Ricoeur, 2007] ["The Rule of Metaphor [...]"]; [Tianqi, 2011] [Chinese idioms]; [Rusiecki, 1985]; [Saint-Dizier and Vasquez, 2004]; [Hsieh et al., 2008] [classifiers]; [Siepmann, 2007] [collocations]; [Siepmann, 2004] [collocations]; [Siepmann, 2003] [collocations]; [Sontag, 1989] [metaphor, illness]; [Sontag, 1978] [metaphor, illness]; [Teodorescu, 2006]; [Tsevtkov et al., 2013] [cross-lingual metaphor detection through semantic features]; [Tsevetkov et al., 2014] [cross-lingual metaphor detection through semantic features]; [Turner and Fauconnier, 2002] [metaphor, metonymy, binding]; [Turner and Fauconnier, 1998] [metaphor, metonymy, binding]; [Vendler, 1968]; [Weng and Huang, 2003] [the semantics of shape, 圈子]; [Xu, 2008] [space in languages in China]; [Yu et al., 2009] [Chinese word sense distinction, Lexical Markup Framework]; [Zhang et al., 2012]; [Liu and Chan, 2012] [qualia structure in Mandarin];

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[Agerri, 2008]; [Agerri et al., 2007]; [Arasanz, 2013]; [Baccianella et al., 2010] [SentiWordNet 3.0]; [Bird et al., 2013]; [Boas, 2009] [multilingual framenets]; [Boas, 2005] [semantic frames]; [Calzolari, 2011]; [Calzolari and et al., 2010]; [Chung and Ahrens, 2006a] [source domain, WordNet®-SUMO, collocation]; [Davis, 2008]; [Davis, 1984] [shape, solid object, function]; [Fazly and Stevenson, 2005]; [Hanks and Jesek, 2008]; [Hamouda and Rohaim, 2011] [classification, SentiWordNet]; [King et al., 2005] [Lexical Functional Grammar, ParGram, space]; [Hovy, 2014] [distributional semantics, collocations]; [Wu and Hsieh, 2010] [PyCWN, Chinese WordNet, Python]; [Jurafsky, 2012]; [Jurafksy and Martin, 2009]; [Kennedy and McNally, 1999] [gradability, adjectives]; [Kilgariff et al., 2010] [word sketches];

[Koller and Friedman, 2009] [probabilistic graphical models]; [Lee et al., 2009] [Chinese WordNet, WordNet domains, bootstrapping]; [Ng, 2012] [neuronal networks]; [Özbal and Strapparava, 2012]; [Page, 2012]; [Peng, 2005] ["What's in a Chinese character"]; [Perkins, 2012] [Python]; [Polley, 2012] [metaphors for happiness in English and Chinese]; [Pustejovsky et al., 2004] [automated induction of sense in context]; [Richardson and Domingos, 2006] [Markov logic networks]; [Stefanowitch and Gries, 2006] [corpus-based approaches to metaphor and metonymy]; [Unger and Cimiano, 2011] [Pythia, NLP]; [Vossen, 2001]; [Wallington et al., 2006] [metaphor, computational analysis]; [Zhu, 2014] [automatic identification Chinese collocations and idioms];

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[Ahrens, 2012b] [theoretical modeling in psycholinguistics]; [Ahrens, 2005a] [conceptual metaphor, embodiment]; [Bennet, 2009] [shape, consumer, psychology]; [Bipin, 1992]; [Bipin, fied]; [Bierwiaczonek and Turula, 2010]; [Bierwiaczonek, 2004] [geometry, perception]; [Boroditsky, 2010] [on language and whether it shapes our world perception]; [Boroditsky, 2000] [spatial metaphors, time]; [Cattani et al., 2007] [visual memory, shape, deaf]; [Clausner and Croft, 1997] [productivity and schematicity in metaphors]; [Cytowic, 2002]; [Cytowic, 1993] [synesthesia]; [Cytowic and Wood, 1982] [synesthesia]; [Damasio, 1994]; [Evans and Green, 2006]; [Farah, 2005] [agnosia]; [Flusberg et al., 2010] [conceptual metaphor, connectionist approach]; [Fuhrman et al., 2011] [the conception and directionality of time for English and Mandarin speakers]; [Gentner et al., 2001] [analogy]; [Hanson-Vaux et al., 2013] [synesthesia, smelling shapes]; [Hong et al., 2007] [sense prediction, Chinese verbs, ingestion]; [Hsieh, 2013] [economic expressions in German and Chinese, cognitive analysis]; [Huang et al., 1993] [mental lexicon, Chinese linguistics]; [Kapur et al., 2011] [paradoxical brain]; [Kristiansen et al., 2006]; [Landau et al., 2010] [social cognition and metaphor]; [Nussbaum, fied] [brain regions]; [Ramachandran, 2011] [qualia, metaphor]; [Ramachandran and Hubbard, 2003] [synesthesia]; [Ramachandran, 2008] [phantom limbs]; [Ramachandran, 1990] [shape, shading, perception]; [Roediger, 1980] [memory metaphors, cognitive psychology]; [Quattri, 2014b]; [Schank et al., 1982] ["What's the point?"]; [Semino, 2014] [metaphor, cancer, war, CASS Lancaster]; [Spence and Gallace, 2011] [synesthesia]; [Thibodeau and Boroditsky, 2013] [natural metaphor, reasoning]; [Thibodeau and Boroditsky,

2011] [metaphors, policy issues, crime]; [Thibodeau and Durgin, 2008]; [Veale, 2012]; [Yu, 2009] [metaphor, Chinese 'heart', cognitive science]; [Zaltman and Coulter, 1995] [synesthesia, metaphor, advertising];

Others

[Barnden, 2008] [creativity, metaphor]; [Bounegru and Forceville, 2011]; [Chao, 1976]; [Chao, 1968]; [Cherumbim, 1980]; [Colleen et al., 2009] [obesity metaphors]; [Fontana, 1994]; [Golçaves, 2008] [consumer behavior, perception]; [Hiraga, 2005] [metaphor, iconicity]; [Hsu, 2008]; [Kress, 2010]; [Kristallis, 2005]; [Levenson, 1977]; [Leyton, 2001] [a generative theory of shape]; [Lewandowska-Tomaszczyk and Kwiatkowska, 2004]; [Lundmark, 2005] [metaphor and creativity, advertising]; [Machin and van Leeuwen, 2007]; [Minsky, 2003]; [Quattri, 2013a]; [Quattri and Delaney, 2013]; [Quattri, 2012a]; [Quattri, 2012c]; [Sangoi, 2012]; [Schmidt, 2010]; [Sternberg, 2007]; [Yu, 2007] [metaphor, food advertising]; [Wallington et al., 2011] [sentiment analysis, metaphor, ontology]; [Whittick, 1989]

Appendix B

Consulted corpora and dictionaries

Dictionaries, thesauri, corpora

- ACADEMIA SINICA BALANCED CORPUS OF MODERN CHINESE, 2006, `http://rocling.iis.sinica.edu.tw/CKIP/engversion/20corpus.htm`
- CAMBRIDGE English online, `dictionary.cambridge.org`
- COCA Corpus of Contemporary American English, `corpus.byu.edu/coca/`
- [Francis and Zhang, 2010]
- [Francis and Zhang, 2003]
- DICT.CC German to many languages online dictionary, `www.dict.cc/`
- DICT.CN Chinese to many languages online dictionary, `www.dict.cn`
- DWDS.de German online dictionary, `www.dwds.de`
- The FREE ONLINE DICTIONARY (for idioms and collocations); `www.thefreedictionary.com`
- HANDEDICT.de German <> Chinese online dictionary, `www.handedict.de`
- IATE online (English, French, German, Italian, Spanish), `iate.europa.eu/`
- IDIOMBIBLIOGRAPHIE und IDIOMDATENBANK (Kollokationen im Wörterbuch und Idiomyearnbank, collected German collocations), Berlin-Branderburgische Akademie der Wissenschaften (BBAW), 2007–present, `kollokationen.bbaw.de/bib/s.html`
- LINGUEE English <> Italian online dictionary, `www.linguee.com/`

- LINGUEE English <> German online dictionary, `www.linguee.com/`
- LINGUEE English <> French online dictionary, `www.linguee.com/`
- LINGUEE English <> Spanish online dictionary, `www.linguee.com/`
- MULTIWORDNET ONLINE, A Multilingual Lexical Database, `http://multiwordnet.fbk.eu/online/multiwordnet.php`
- MDBG Chinese dictionary (CEDICT Chinese), purchsed professional version
- [Turnbull, 2005]
- PONS English <> Italian online dictionary, `www.pons.com`
- PONS English <> French online dictionary, `www.pons.com`
- PONS English <> Spanish online dictionary, `www.pons.com`
- PONS English <> German online dictionary, `www.pons.com`
- SKETCH Engine Brown Corpus, `www.sketchengine.co.uk/`
- SKETCH Engine Chinese Gigaword 2 Corpus: Simplified, `www.sketchengine.co.uk/`
- SKETCH Engine Chinese Gigaword 2 Corpus: Traditional, `www.sketchengine.co.uk/`
- THESUARUS online, `www.thesaurus.com`
- TRECCANI online, Italian dictionary, `www.treccani.it/`
- THE URBAN DICTIONARY (for slang), `www.urbandictionary.com`

Projects and further links

- [da Costa and et al., 2013];
- IARPA METAPHOR PROGRAM; Dr. Heather McCallum-Bayliss, program manager; 2011–present, Office of the U.S. Director of National Intelligence, `http://www.iarpa.gov/Programs/ia/Metaphor/metaphor.html`
- [Lakoff et al., 1991];
- [Lenci et al., 2000]
- IMAGENET: Image database organized according to the WordNet®hierarchy, Li Feifei et al., 2011–present, `www.image-net.org/`
- THE HAMBURG METAPHOR DATABASE, Carina Eilts and Birte Löennecker-Rodman, 2002, `www.metaphorik.de/03/eiltsloenneker.pdf`
- THE SUMO ONTOLOGY, The Suggested Upper Merged Ontology, `www.adampease.org/OP/`

- SEMIOTICS INSTITUTE ONLINE, `http://semioticon.com/sio/`

Video/audio selected references for project on metaphors and drugs

- *The Cocaine Producer*, uploaded on August 21 2012 by National Geographic Channel, `channel.nationalgeographic.com/.../drugs-inc/.../the-...`
- *The New Face of Heroin Addiction*, Uploaded in October 30, 2010 by ABC News; last seen in 2014, `www.youtube.com/watch?v=cskq_zGVSZs`
- *Drogas, Heroína y Cocaína*, uploaded on August 14, 2011 by Mr Rendon1976, `www.youtube.com/watch?v=TbDICuhc1Yc`
- *Il Mercato della Droga in Italia*, documentary movie transmitted by TG2 Il Punto.it, uploaded on November 18 2008 by steadycam, `http://www.youtube.com/watch?v=A2NkkdMRIv8`
- *Drug Abuse: Documentary on Gateway to Heroin*, uploaded on February 11 2013 by divdocuchannel, `www.youtube.com/watch?v=wlBGojbpjTs`
- *Malcolm Gladwell: The Power of the Underdog.* Interview with Anderson Cooper at 60 Minutes, published on November 24, 2013, last accessed on December 4, 2013, `https://www.youtube.com/watch?v=asOGHqbex4I`
- *Drugs, Inc.: High in Houston.* Uploaded on October 19, 2013 by National Geographic Channel, `www.youtube.com/watch?v=M0pSM9VRyVM`
- *Heroin: The Drug Devil*, uploaded on August 15, 2013 by Zaida Veller, `www.youtube.com/watch?v=Yu9TusumDZo`
- *Teen Drug Use in Hong Kong.flv*, uploaded in 2011 by omgmrpang, `https://www.youtube.com/watch?v=pHtzWzNIycI,`
- *Drugs, Inc. - MDMA Therapy*, uploaded on December 29, 2011 by National Geographic Channel,`www.youtube.com/watch?v=Dm9c9XiRl1A`
- *NBC New York - New Trends in Teen Drug Use*, uploaded on October 4, 2012 by Phoenix House, `www.youtube.com/watch?v=ZIfUC2u2cqo`
- *The Overtaken.* Documentary uploaded on May 09, 2013 by Kaarl Bombe, `www.youtube.com/watch?v=e9oj3E-NPtI`

- *Drugs, Inc.: San Francisco Meth Zombies*, uploaded on September 20, 2013 by National Geographic Channel, `ww.youtube.com/watch?v=avDmn1K-_w4`

- *Swansea Love Story*, uploaded on June 20, 2013 by VICE, award-winning video,`www.youtube.com/watch?v=aIbpt1aDFqM`

- *Union Square*, uploaded on July 21, 2008 by classicrock64. Documentary movie von Dir Stephen Szlarski, first released in 2003, `www.youtube.com/watch?v=PtlSbSKeegc` ,`www.unionsquarethemovie.com`

Appendix C

Consulted corpora and book samples in NLTK

In the following, a list of the consulted corpora and book samples as to be found under the NLTK library is proposed.

The corpora are followed by the number of the file IDs that each of them contains (retrievable through the option `len(<name of the corpus>.fileids())`, provided that this number is given. To retrieve the total no. of tokens in each corpus one simply needs to sum the no. of tokens from each file ID.

Each book is followed by the number of total tokens it contains. The list can simply be retrieved by inputting the command line `from nltk.book import *`.

The list of the corpora does not mean to be exhaustive, in fact many more books in the NLTK library have not been taken into account for this research, since they provide lists of words rather than sentences (words in context). Also, some of the sentence-based corpora collected there can be downloaded, yet they are "not callable" once one tries to download them. This applies for Chat80 The Chat80 Data Files Corpus; the oanc_masc Open American National Corpus; the pil Patient Information Leaflet Corpus, problem_reports the Problem Reports Corpus and the The Inaugural Address Corpus.

Interestingly, under the book samples one can also find txt files that should be under corpora, such as text 4, 5, 7 and 8. This mainly justifies the choice to include the "Book" samples within the NLTK corpora investigation.

Further information can be found in [Bird et al., 2013], Chapt. 2 (*Accessing Text*

Corpora and Lexical Resources[92], as well through the command line `nltk.down-load()`. The last enables to open a full window with the most updated files. Updates of the same occur in roaming.

- gutenberg Project Gutenberg Selections; 18
- reuters The Reuters-21578 benchmark corpus; 10,788
- brown Brown Corpus; 500
- abc Australian Broadcasting Commission Corpus 2006; 2 ('rural.txt' and 'science.txt')
- udhr2 Universal Declaration of Human Rights – updated Unicode version; 388
- udhr Universal Declaration of Human Rights – old version; 310
- movie_reviews Movie Reviews Corpus; 2,000
- europarl_raw, Sample of The European Parliament Proceedings Parallel Corpus,
- knbc NKB Corpus (Annotated Blog Corpus)
- qc Experimental Data for Question Classification; 2 ('train.txt', 'test.txt')
- rte PASCAL RTE Challenges 1,2,3; 6
- shakespeare Shakespeare XML Corpus Sample; 8
- timit TIMIT Corpus Sample; 642
- webtext Web Text Corpus; 6
- ycoe York-Toronto-Helsinki Parsed Corpus of Old English Prosody NOT CALLABLE

- text 1 Moby Dick by Herman Melville 1851; 260,819
- text 2 Sense and Sensitivity by Jane Austen 1811; 141,576
- text 3: The Book of Genesis; 44,764
- text 4: Inaugural Address Corpus; 145,735
- text 5: Chat Corpus; 45,010
- text 6: Monty Python and the Holy Grail; 16,967
- text 7: Wall Street Journal; 100,676
- text 8: Personals Corpus; 4,867
- text 9: The Man Who Was Thursday, by G. K. Chesterton, 1908; 69,213

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[92] `http://www.nltk.org/book/ch02.htmlhttp://www.nltk.org/book/ch02.html`

Appendix D

Consulted websites for more coding options

On NLTK 2.7 / 3.0

- Processig Raw Text (from [Bird et al., 2013]'s book); `http://www.nltk.org/book/ch03.html`
- NLTK Tokenizers / Punkt; `https://github.com/evandrix/nltk_data/tree/master/tokenizers/punkt`
- NLTK Stanford Py; `https://github.com/nltk/nltk/blob/master/nltk/tag/stanford.py`
- NLTK.corpus.reader package; `http://www.nltk.org/api/nltk.corpus.reader.html#nltk.corpus.reader.wordnet.WordNetCorpusReader.of2ss`

On Encoding / Decoding

- Defining Python Source Code Encoding; `http://legacy.python.org/dev/peps/pep-0263/`
- Windows cmd encoding change causes Python crash; `http://stackoverflow.com/questions/878972/windows-cmd-encoding-change-causes-python-crash`
- Solving Unicode problems in Python 2.7; `http://www.azavea.com/blogs/labs/2014/03/solving-unicode-problems-in-pytho`

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n-2-7/
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- Unicode How To; `https://docs.python.org/2/howto/unicode.html`

- Non-English characters. One code to rule all them: `http://www.tulane.edu/~howard/CompCultES/unicode.html#what-happens-when-you-type-a-non-ascii-character-into-a-python-console`

- Codecs - Codec registry and base classes; `https://docs.python.org/2/library/codecs.html`

- Charbase: Latin Extended-A; `https://bugzilla.redhat.com/show_bug.cgi?id=882233`

- Chinese Python: Multilingual programming; `http://reganmian.net/blog/2008/12/04/chinese-python-multilingual-programming-2/`

- Google proxy result of Python Unicode error 'charmap'; `http://g.webswit.com/search?q=python+unicodeencodeerror+%27charmap%27+codec+can%27t+encode+characters+in+position&hl=en&gbv=2&ei=hPoaVN-ADNDioATrgoG4Dw&start=0&sa=N`

- UnicodeEncodeError: 'ascii' codec; `http://stackoverflow.com/questions/9942594/unicodeencodeerror-ascii-codec-cant-encode-character-u-xa0-in-position-20`

- The Absolute Minimum Every Software Developer Absoultely, Positively Must Know About Unicode and Character sets (No Excuses!), Joel Spolsky, founder of StackOverflow (highly recommended article); `http://www.joelonsoftware.com/articles/Unicode.html`

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- Why I cannot display the Chinese character in Python; `http://stackoverflow.com/questions/19538822/why-i-cannot-display-the-chinese-character-in-python-even-with-the-use-of-encodi`

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- hanziconv package, hanziconv 0.2.2 documentation; `https://pythonhosted.org/hanziconv/index.html#module-hanziconv`
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- ltchinese documentation; `https://pythonhosted.org/ltchinese/`
- PEP 0263 Defining Python source encoding; `http://legacy.python.org/dev/peps/pep-0263/`
- Python IDLE and Unicode chars (2.5.4); `http://stackoverflow.com/questions/1637479/idle-and-unicode-chars-2-5-4`
- Python programming in the Eclipse IDLE; `https://www.ics.uci.edu/~pattis/common/handouts/introtopythonineclipse/`
- Python Unicode: Encode and decode strings (in Python 2.x); `http://www.pythoncentral.io/python-unicode-encode-decode-strings-python-2x/`
- Unicode Support - Tkinter WIKI; `http://www.pythoncentral.io/python-unicode-encode-decode-strings-python-2x/`
- GTK+ installation and usage tutorial; `http://www.gtk.org/download/win32_tutorial.php`

Miscellaneous

- The Stanford NLP Group; `http://nlp.stanford.edu/software/tagger.shtml`
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- How to find semantic relationship between two synsets in WordNet®; `http://stackoverflow.com/questions/17671081/how-to-find-semantic-relationship-between-two-synsets-in-wordnet`
- WNDB (5WN) Manual page; `http://wordnet.princeton.edu/wordnet/man/wndb.5WN.html#sect3`
- WNGloss (7WN) Manual page: `http://wordnet.princeton.edu/`

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man/wngloss.7WN.html
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- Dive into Python; `http://www.diveintopython.net/xml_proce ssing/unicode.html`
- Bug 882233 - Chinese (TW) shows Simplified Chinese instead of Traditional Chinese; `https://bugzilla.redhat.com/show_bug.cgi?id=88 2233`
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- Global WordNet Grid; `https://github.com/nltk/nltk/issues/ 505`
- Shut Up and Ship: Working with text in Python; `http://www.shutupa ndship.com/2012/01/working-with-text-in-python-use-u nicode.html`
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- Learn Python; `http://learnpythonthehardway.org/`
- Natural Language Processing and Python; `http://www.slideshare.n et/anntp/natural-language-processing-and-python`
- CompCultES documentation; `http://www.tulane.edu/~howard/Co mpCultES/index.html`
- Gensim (pycairo); `http://stackoverflow.com/questions/473 1786/pycairo-importerror-dll-load-failed-the-specifi ed-module-could-not-be-found`
- Python Central. Python programming examples, tutorials and recipes; `ht tp://www.pythoncentral.io/`