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# *Rock climbing and terminology: towards a trilingual termbase for Italian, English and Spanish*

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## Contents

# i. Introduction

This work revolves around the creation and production of a preliminary trilingual termbase in English, Italian and Spanish about rock climbing, and more specifically about tools and techniques employed by climbers all over the world. This thesis is a continuation of a project that had already started during the second year of master degree, when the course held by Federica Vezzani about translation oriented terminography has been attended. After classes, as final exam, it has been presented a first terminological report about rock-climbing tools in Italian and Spanish, in which a concept system and two lexical networks were produced and therefore, that project was the bedrock and point of departure for the development of this thesis. As the degree thesis (Triennale) was a translation from Spanish to Italian of three mountain stories written in three different centuries (from the end of the XIX to the beginning of the XXI), it has been chosen to produce the final report for the master exam in Spanish thanks to the previous knowledge not only as a climber, but also as a linguist having already worked with the Spanish language within this particular domain. Then, for this thesis we have decided to add the English language and to write it in English as it is the "lingua franca" also for rock climbing terms and, moreover, it is a world-wide known language that could make this project more international and understandable not only for Italian speakers, increasing its visibility.

The whole project is based on the implementation of both a semasiological and onomasiological approach at the same time, fostering multidimensionality and analyzing both the conceptual and linguistic dimensions. This leads to a more complete and less ambiguous termbase, that has the aim to ease and simplify the communication between experts of the field (climbers, climbing instructors or guides, etc.), but also to help translators of technical climbing manuals and route reports by providing trilingual triplets of terms that designate the same concept.

In the first chapter, we briefly explain the history of terminology and terminography, from their genesis due to the General Theory of Terminology (also known as GTT) by Wüster to their development and to their affirmation as self-disciplines, but at the same time as interdisciplinary disciplines that encompass many other different fields. In fact, in the second section, we underline its common traits with other disciplines,

such as linguistics, lexicology and lexicography. Furthermore, always in the first chapter, the fundamental and more important theories about terminology are explained, focusing on the dichotomies between general and special language and between term and word, on concepts and characteristics, semasiology and onomasiology, conceptual relationships and definitions, as well as on multidimensionality. For the issue about semasiology and onomasiology we have used as a reference the paper written by Rute Costa and Claudia Santos in 2015, namely *Domain specificity: Semasiological and onomasiological knowledge representation*, while for the interdisciplinarity of terminology we have employed the paper always written by Rute Costa in 2013, i.e., *Terminology and Specialised Lexicography: two complementary domains.* For the other theories explained in these first six sections we have used the reference to the ISO 1807:2019 and the ISO 704:2022. Finally, a last section where the most important features of sport terminology are presented conclude this first chapter, as climbing is a sport discipline that is rapidly increasing its popularity worldwide thanks to media, to the new world competitions, such as the world championships organized by the IFSC (International Federation of Sport Climbing) which was born in 2006 and to the introduction of climbing as an Olympic sport at the Tokyo 2020 Olympic Games.

To continue, in the second chapter the domain of this thesis is explained, namely rock climbing and alpinism. After an initial section where we have presented and recalled the history of alpinism and climbing from its early years explaining the emblematic story of Ötzi to its modern and contemporary age, focusing on the evolution and development of this discipline as well as of its tools and gear, the different types of climbing have been described in the second section of this chapter. In fact, many types of climbing exist (such as ice climbing, mixed climbing, dry-tooling, deep-water solo, bouldering, etc.) and each type presents different characteristics and employ different tools. Furthermore, there is also alpinism (not to talk about ski alpinism), which is generally different from climbing as it is based on a progression on snowy or icy slopes and normally it is more akin to a hard hike rather than to true climbing; however, it can be considered as a type of climbing as the aim is always the same: ascend and reach the peak of a mountain. We have decided to focus mainly on rock climbing not only because it was the same domain addressed in the report for the final exam at the University, but also because it is the most common and popular type of climbing.

Moving on, in the third section, we have outlined the most important equipment that a climber uses when climbing a rock route, explaining its mode of operation, while the less important have been described in the terminological entries on FAIRterm. As the last and fifth chapter completely revolves around the analysis of the triplets about climbing tools (and techniques), in this section we have decided to explain only the most important and fundamental tools such as climbing shoes, rope, harness, helmet, carabiners and in a more general way also belay devices, protections and anchors that permit to clip the rope and stop a climber fall. It is important to underline that most climbing tools are subject to the standards of the UIAA (*Union internationale des associations d'alpinisme)* and of the CEN (*Comité européen de Normalisation)* if the product has been produced in the European Union or if it is intended to be sold in the EU. In this way, a climbing factory must adhere to these production standards, which guarantee the safety and quality of a tool, if it wants to sell that product. In section 2.4 we have done the same also for climbing techniques, explaining in detail how to belay and rappel, which are two of the most important and basic climbing skills, as the first permits to stop a climber's fall, while the second allows to go back to the route point of departure when a trail or path does not exist. Finally, in the last section of the second chapter we have outlined the most popular climbing rating systems, which are many and each one has the task to grade each route and assign to it a rating that allows climbers to consider if the route is within their range and ability. Among the most used there is the UIAA rating system, which uses Roman numerals, the French system, which employs Arab numbers alongside the letters "a, b, c" to grade the difficulty of the route, the YDS system (Yosemite Decimal System) that always uses Arab numbers, but if the French spaces between 1 to 9, the YDS goes between 5.2 and 5.15, always accompanied by the letters "a, b, c". There is also a rating system only for bouldering, namely the Sherman V-scale.

Continuing to the third chapter, the thesis become much more practical compared to the first two chapters which are mainly theoretical. In fact, the methodology and the terminological approach that has been employed to create this thesis is outlined, paying attention to concept systems, lexical networks, and corpus-based terminology. After the first section where the theoretical foundations of concept systems and lexical networks are laid, we have illustrated alongside some pictures how Miro works, which is the software that we have used to create and produce the systems and the networks about rock

climbing tools and techniques. Used by more than 60 million people, it allows not only to quickly create concept systems and lexical networks, but also to produce diagrams, tables and workflows that can be modified by more than one person at the same time, permitting to collaborate on a project even from different homes and places. Then, another theoretical section is presented, in which the main characteristics of corpus-based terminology are explained, as the project also revolves around the creation and employment of corpora to discover and confirm the existence and frequency of technical climbing terms. Therefore, in the next section the software Sketch Engine is outlined with some pictures illustrating its features, as it is the application that we have used to produce three corpora in the three languages of this work, namely Italian, English and Spanish. This software, developed by Adam Kilgariff in 2003, it is one of the best and most used for the production and the analysis of corpora through the employment of a series of algorithms that allow to carry out complex operations automatically. For example, the feature Word Sketch automatically permits to consult the grammatical and collocational behavior of a specific term, or the feature Concordance allows to observe the keyword in context (KWIC), i.e., the selected term, within its contexts of use inside sentences, etc. The specific characteristics and data of the three corpora that have been produced for this thesis have been outlined in the fourth chapter. Finally, the last section of the third chapter is dedicated to FAIRterm, the software developed by Federica Vezzani and Giorgio Maria di Nunzio (Professors at the University of Padua) that we have used for compiling the terminological entries, and which revolves around the FAIR terminology paradigm (i.e., Findability, Accessibility, Interoperability and Reusability). The aim is to provide a paradigm that permits to organize terminological data following the FAIR principles developed by the ESOC (European Open Science Cloud Association) which revolve around the ISO TC/37 SC/3 and tries to fix the problem of data, as well as of termbases and terminological databanks structuration and standardization. Also, for this section we have added some pictures to better explain the software.

Moving on, the fourth chapter (as well as the fifth and last chapter of this thesis) is mainly a practical chapter where no theoretical bibliographies have been used or consulted, except for specific technical books and manuals about rock climbing that have been used as a reference for the initial selection of climbing terms. As a matter of fact, it essentially presents the steps that have been carried out to reach and achieve the creation

of a preliminary termbase about rock climbing. Preliminary in the sense that only the main tools and techniques have been analyzed, while the most peculiar and less used have been left out for the scope and extent of this master thesis, but it is undoubtedly a first step towards a fully complete trilingual termbase that could and hopefully should be extended and expanded in the future. In fact, not only the number of terminological entries and therefore the number of concepts in the concept systems could be enlarged, but also the definitions in Spanish and Italian in FAIRterm are not intensional, in contrast to the English definitions indexed in the table at the end of this thesis. Thus, one of the future tasks to enrich this project must be simplifying these definitions and make them intensional. Therefore, in the fourth chapter the analysis of the three trilingual corpora is presented, highlighting their most important peculiarities. In fact, the practical side of this project started with the creation of three corpora on Sketch Engine, one for each language, which has been used to find and confirm the existence and frequency of specific terms about the domain of climbing, even though they have been mainly used as a countercheck for verifying terms that had already been found on climbing books and manuals, which have been highly consulted. The specific data and counts of the three corpora are the following: the English corpus contains 287.088 tokens, 247.467 words, 16.490 sentences, 8.175 paragraphs, and 117 documents; the Italian corpus contains 394.998 tokens, 335.484 words, 18.667 sentences, 9,899 paragraphs, and 222 documents; the Spanish one contains 476.747 tokens, 416.346 words, 24.846 sentences, 13.732 paragraphs, and 232 documents. The other section of this chapter presents and depict the conceptual systems (one in English for tools and one in English for techniques) and lexical networks (six in total, two per language) that we have produced on Miro.

Moreover, in the fifth and last chapter we have analyzed the terminological entries compiled on FAIRterm by comparing and explaining the most important differences and characteristics of each trilingual triplet of terms designating the same concept. After having produced and analyzed the concept systems and lexical networks for each language, all terms have been added on FAIRterm and the related terminological entries have been compiled; for each term we have filled in a series of categories such as the part of speech, pronunciation, etymology, notes regarding a specific term (which can help the reader or the translator), the definition, semic analysis, synonyms, hypernyms, hyponyms, meronyms, holonyms, its variations, abbreviations, acronyms, but also its usage, thus its

domain, register, context and collocations. Then, after this phase of compilation for each term for each language, we have analyzed each triplet of terms designating the same concept.

And finally, after conclusions, a table of concepts is presented, where concepts written in English are indexed in alphabetical order alongside their intensional definitions written in natural language always in English, while the definitions in Italian and Spanish, as well as the complete terminological entries can be viewed and consulted only on the FAIRterm web application or by requesting the TBX file.

To conclude, this thesis tries to lay the bedrock for a future project that could enlarge this termbase about rock climbing and that could be the point of departure for a complete terminological work about a domain for which few investigations, studies, dictionaries or glossaries have been carried out or produced.

# 1. Terminology and terminography: an overview

During the 18th century, society witnessed a major and significant technological development that fostered the need for the study of terminology which could manage and overcome the global expansion of knowledge and the growth of communications. However, in this period it had not yet been recognized as a scientific discipline nor had its social importance been considered. Only in the 20th century, and more specifically since the 1930s with the birth of the General Theory of Terminology by Eugene Wüster who is credited as the founder of modern terminology, these aspects started to be considered as an essential part of this activity (Cabré 1999, p.1).

Although some academics such as Sager (1990, p.1) were reluctant to grant terminology the status of independent discipline, which was seen by himself "as a number of practices that have evolved around the creation of terms, their collection and explication and finally their presentation in various printed and electronic media", over the last century it has been surely depicted as an interdisciplinary field related with linguistics, logic, ontology, information science, lexicology, and lexicography (Sager 1990, p.2). The contribution brought by the connection with these linked disciplines alongside the realization of the importance of analyzing also sociolinguistic and cultural factors stressed the aim of terminology: seek standardization rules to avoid ambiguous communication between experts of a subject field (Faber, L'Homme 2022, p.2). In fact, as Cabré (1999, p.10) states:

> Defined as the process of compiling, describing, processing, and presenting the terms of special subject fields in one or more languages, terminology is not an end in itself, but addresses social needs and attempts to optimize communication among specialists and professionals […] concerned with the standardization of a language.

Over the last decades due to the development of technology and science, a multitude of new concepts were created, and they needed to be related to accurate, precise, and shared designations that could be used internationally in the communication between specialists of a certain area of specialization. This phenomenon led to the desire for establishing a methodology and a theory for processing terminological data which evolved over the years (Sager 1990, p.1). Adapting to the evolution of society, fostering clear specialized communication, and trying to manage avant-garde designations of specialized concepts, terminology underwent significant changes in the 1990s, when new approaches to the

General Theory of Terminology (GTT) arose, some evolving around it and others drifting away from it. In any case, the GTT is still nowadays considered the bedrock of this discipline, a pioneering turning point in the evolution of the field, but many scholars began to question and analyze the complex relationship between concepts and terms (Faber, L'Homme 2022, pp.1-2). Therefore, new and complementary theories were forged by many academics in the field (Faber, L'Homme 2022, p.3).

During the 20th and 21st centuries, many definitions of terminology have been laid out. For example, Sager (1990, p.3) affirmed that according to its etymology, the word "terminology" is a polysemous term with more than one sense or meaning and this interpretation drifted apart from the earliest historical employment of the word, which was exclusively used to refer to technical vocabulary, namely the collection, study, knowledge of terms. Therefore, he described terminology in three different ways stating that it has three different meanings: firstly it is a collection of practices and methods for collecting, describing and presenting terms (as a matter of fact, nowadays terminology is also seen as the result of a terminological activity that creates a set of terms linked to a particular specialized field through glossaries, thesauri and dictionaries); secondly, it is a theory that explains the relation between concepts and terms and thirdly a specialized vocabulary of domain expertise (Sager 1990, p.3). Almost ten years later also Cabré identified terminology as a word that can be seen from three different points of view, i.e., the fundamental principles concerned with the study of terms (this definition is linked with the general field of terminology and seen for this point of view it is clear that is an interdisciplinary activity related with the naming of specialized concepts resulting in standardized linguistic forms), the guidelines for producing a terminographic work (this is related to its methodology) and finally the collection of terms belonging to a particular special field (this refers to a specialized subject set of terms) (Cabré 1999, p.32).

To foster international cooperation and to develop globally shared standards and definitions that could avoid ambiguous communication between terminology experts, scientists and professionals of particular fields, the International Organization for Standardization (ISO) was created in 1947 (Cabré 1999, p. 195) and in 1951 the ISO/TC 37 (Technical Committee 37) was founded (Humbley 2022, p. 18).

> Ninety countries currently participate in the ISO, representing 95% of worldwide industrial production. There are 190 technical committees on different subjects, and they publish the results of their work in the form of various types of international standards or technical reports, e.g. standards for products, processes, control, services, measurements, etc. (Cabré 1999, p.198)

The ISO Technical Committee 37 Terminology (Principles and Coordination) aims to establish the basic principles of terminology promoting international standardization and consists of 15 members and 32 observers (Cabré 1999, p. 202). Over the years it has published several standards that dealt with terminology vocabulary, international coordination, terminological principles, and procedures (Cabré 1999, p. 202). Therefore, it could be useful to comply with and conform to the newest and most recent standards developed by this body in giving the general definitions of terminology and terminography. As the ISO 1087:2019 *Terminology work and terminology science – Vocabulary* states:

- Terminology is the set of designations (the representation of a concept by a sign which denotes it in a domain or subject) and concepts (unit of knowledge created by a unique combination of characteristics) belonging to one domain or subject.
- Terminography is a terminology work (work concerned with the systematic collection, description, processing and presentation of concepts and their designations) aimed at creating and maintaining terminology resources (a terminological data collection, i.e., a collection of terminological entries).

## 1.1 A brief history of terminology

Before analyzing the theoretical and methodological aspects of terminology, it is important to also observe the evolution and growth of the discipline from an historical point of view. Scientists were the main protagonists of terminology during the 18$^{th}$ and 19$^{th}$ centuries and they were joined by engineers and technicians in the 20$^{th}$ century (it is no coincidence that Wüster was an engineer and not a linguist nor a terminologist), but the growth in technology and society forced them to try and find a way for naming new concepts alongside ensuring that they all agreed with the new terms that had been chosen (Cabré 1999, p.2). As the world entered the post-industrial period abandoning the rural one, another important cultural change was witnessed in addition to technologization: the

value of information which affected language and communication. The development of this aspect led to an increase in education and written communication became more relevant than the oral one, spreading the new concept of a "standard language" (Cabré 1999, p.3). These social changes did not only influence society, but also language and therefore terminology in many ways. As mentioned above, technological developments caused the proliferation of new conceptual fields that had to be named while new forms of communication were born, resulting in updated vocabularies and the creation of modern language industries. Moreover, these changes affected the industrial production that became generally standardized, the global transfer of knowledge (which created new exchange markets, but also raised the issue of multilingualism between these markets) and the amount of information available that witnessed an exponential growth resulting in the creation of the first multidimensional databases; thus, society entered the era of mass production and mass communication, which permitted terminology to spread worldwide and to start analyzing the interaction between general and special language. Finally, these changes pushed governments to step in the field seeking standardization through the creation of ad hoc organizations that could manage and organize terminological works (Cabré 1999, p.4).

Having analyzed the principal aspects that radically changed society and consequently terminology, it is essential to underline the evolution of this discipline throughout the 20$^{th}$ century. In fact, as Auger affirms (1988 in Cabré 1999, p.5), the development and dissemination of modern terminology can be divided into four periods: the origins, from 1930 to 1960, characterized by the early works of Wüster and Lotte, whom were mainly concerned on the methodology for creating new terms systematically and practically; the structuring of the field, from 1960 to 1975, when computers, documentation and databanks began to spread leading to the creation of the first international efforts to coordinate terminology processing; the boom of terminology, from 1975 to 1985, which is characterized by several terminology projects processed through the new and user-friendly personal computer; and finally the expansion, from 1985 to the present day, which focuses on computer science and the creation of international networks aiming to information exchange as well as the formation and training of terminologists (Cabré 1999, p.5-6).

> The work carried out in the 1930s, simultaneously but independently by Austrian, Soviet, and Czech scholars, is the basis for the beginning of what the Austrians would call terminology science. The three classical schools of terminology—the Austrian, the Soviet, and the Czech schools—all emerge from this work (Cabré 1999, p.7)

From a geographically point of view, the need for a terminological theory was perceived firstly in Austria with Wüster, who firstly was interested in methodology and standardization as shown in his doctoral thesis from 1930, but after the methods of compilation had been explained in his book from 1968 *The Machine Tool,* he tried to develop a theory around the nature of terms (Cabré 1999, p.7). However, alongside the interest in terminology from Austrians another two countries began to analyze this discipline at the same time: the former Soviet Union and the former Czecho-Slovakia. The works carried out by these three countries permitted terminology to spread firstly throughout France and Canada, then in whole Europe and finally in the whole world. As Auger (1988 in Cabré 1999, p.12) states the three main terminological schools, namely of Vienna, Prague, and Moscow, had a clear orientation in how terminology could be adapted to the linguistic system. Wüster was the most representative academic in the Vienna School which revolved around his GTT, and it is known for the production of a series of principles that became the foundations of many theories that appeared later on, analyzing and standardizing concepts. On the other hand, the Czech School of terminology was mainly concerned with special languages and Drodz was its most well-known protagonist, while the Russian School was more akin to Wüster's ideas and therefore it was active in searching standards between concepts and terms through the works of Lotte. Thus, these schools together laid the theoretical and methodological groundwork of terminology (Cabré 1999, p.13). It is also important to mention the activities carried out by the Canadian province of Quebec and the Walloon part of Belgium regarding translation and language planning-oriented terminology. As bilingual countries they created the basis for the work of multilingual international associations such as UNESCO or the EU through the development of databanks such as the Canadian Termium Plus[1] or the European IATE [2] and Eurodicautom, as well as issuing official and governmental policies and interventions to support bilingualism in their countries and to promote the use of their minority languages trying to reject terms imported from

[1] https://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng
[2] https://iate.europa.eu/home

technologically dominant languages (Quebec, for instance, is trying to grant French a better status) (Cabré 1999, p.13-14).

As being recognized as the father of the modern theory of terminology, it is important to say a few words about Eugene Wüster (1898 – 1977) and his works as honorary professor at the Vienna School of Terminology. Here he was deeply concerned with linguistics and, in particular, he played an active role in studying the emerging field of Applied Linguistics and LSP studies in German (Humbley 2022, p.18). He is also recognized as the first academic who stressed the importance of creating a technical committee in terminology that could work in cooperation with the ISO, resulting in the creation of the ISO/TC 37, as well as the documentation center Infoterm (1971) and the TermNet network (1979/1980) (Humbley 2022, p.16). His most famous book was published posthumously in 1979, *Einführung in die allgemeine Terminologielehre und terminologische Lexikographie* (Introduction to the General Theory of Terminology and Terminological Lexicography) which is well known because it consecrated the establishment of the GTT, but at the same time it generated a series of reactions and critics from several academics interested in the field (Humbley 2022, p.21).

Wüster and his GTT affirmed that three main aspects had to be considered: the fact that concepts are the starting point of terminology work rather than terms, which are conversely analyzed by linguists; vocabulary must be their priority, not grammar; and they had to concentrate on the synchronic dimension, while diachrony could be left out (Candel 2022, p.41). The goal Wüster wanted to reach was finding rules for naming concepts and establishing the relationships between them through the creation of a classification based on subordination, superordination, and coordination inter alia, because terminology must analyze all concepts of a concept system as Kocourek (1991 in Candel 2022, p.44) stated. Moreover, the relevance of the concept over the meaning of the word underlined the fact that he considered mainly denotative aspects instead of connotative ones and this is reflected in the three types of conceptual relation he presented, namely logical subordination (apple/fruit), logical coordination (apple/pear), and diagonal relation (mammal/snail) (Wüster 1979 in Candel 2022, p.44). Regarding specialized dictionaries his main concern was analyzing meronyms (whole-part relations) and he started organizing concepts from the more generic to the more specific one (Candel 2022, p.44). Another important principle he coined was the opposition between the *Soll-*

*Norm* and the *Ist-Norm*, where the first is prescriptive and states how things should be whether the second is descriptive and it is used to show how things are. These two norms were also applied to definitions, therefore alongside general, extensional, and intensional ones he added the *Istdefinitionen* (which describes "what is" through general language) and the *Solldefinitionen* (which prescribes "what should be" through standardization) (Wüster 1979 in Candel 2022, p.47). In addition, he was particularly concerned with the term *biunivocity:*

> This term means reversible unambiguity or ambiguity in both directions. In other words, the relation between a term and its designation is unambiguous if this term only has one designation and if this designation has no other meaning (Gerzymisch-Arbogast 1996, 10 in Candel 2022, p.48)

Finally, he stressed that in terminology "the starting point is the concept, not the denomination" (Wüster 1979 in Candel 2022, p.48), therefore he preferred the onomasiological approach over the semasiological one. According to all these factors and aspects that made up the GTT, it is clear that he rejected all kinds if synonyms and homonyms which he considered confusing and he tried to eliminate them during the process of standardization (Candel 2022, p.48). As Budin summarized (1998 in Candel 2022, p.48) "Wüster's leitmotif is unambiguous communication in the professions and sciences" while "Wüster's main topics" are "terminology standardization and its basic principles".

However, as mentioned above, several terminologists expressed their doubts about the GTT, especially after Wüster death and proposed alternative approaches and ideas. The first discipline that rejected some of the basic principles of Wüster was Socioterminology, i.e. Sociolinguistics applied to terminology, which is considered to be the antithesis of the GTT (Humbley 2022, p.23). This approach began to spread in the 1980s and it was given a theoretical background in the 1990s, which relied on the idea that terminology could be analyzed from two different points of view, i.e. employing a dual approach: sociolinguistic and materialistic (the first relates to science, while the second to philosophy) (Delavigne, Gaudin 2022, p.178). The main source of disagreement between socioterminology and the GTT was the problem of the transparency of terms, because socioterminologists affirmed that biunivocity (one-to-one correspondence) did not always exist and neither was a desirable result, thus they criticized the idea of monosemy (Humbley 2022, p.23).

> The sociolinguists' dissatisfaction with the General Theory of Terminology stems from both a different linguistic environment and divergent aims. The most important difference in aims and environment was certainly the attitude towards discourse both as an object of study and a communication tool. The sociolinguists observed that in real specialized exchanges, variation was rife and the ideal of one term representing one concept was rarely attained and perhaps not even desirable (Humbley 2022, p.24)

Another important aspect of Wüster's GTT that has been critically analyzed by socioterminology was that the father of modern terminology exclusively looked at specialized communication, while Gaudin and Delavigne, two of the most important socioterminologists underlined the fact that terminology is a useful tool also for popularizing specialized terms and knowledge, a phenomenon known as vulgarisation (Humbley 2022, p.25). Moreover, "sociolinguists also rejected Wüster's distinction between word and term, considering that terms are simply words used in a particular way" (Alexandru and Gaudin 2006, p.59 in Humbley 2022, p.25). It is essential to state that this new current in terminology was essentially descriptive, and it issued several problems regarded with the description of usage of terms such as "the question of corpora as an observatory of language, methods for collecting data, and the way in which term usages are to be reinserted into the contexts of their production, circulation, and reception" (Delavigne, Gaudin 2022, p.186). Therefore, even though terminology used to begin its work using an onomasiological approach, socioterminology prefers the semasiological one, as it aims to observe and analyze terms used in speech communities through descriptions and the production of terminological resources which are made by observing term usage and language practices and, therefore, term variations in discourse are deeply analyzed (Delavigne, Gaudin 2022, p.189).

Another reaction against the GTT was the communicative approach developed by Maria Teresa Cabré and her Communicative Theory of Terminology. Through the observation of how terms are used and employed in social situations, Cabré stated that terminology has three different dimensions that have to be concurrently considered: not only the cognitive one, but also the linguistic and the communicative dimensions (Humbley 2022, p.25).

> Cabré is close to Wüster inasmuch as their material, institutional and scholarly achievements effectively reinforced the overwhelming impact they have had on terminology studies. Contrary to Wüster, though, Cabré places Terminology firmly within the field of Linguistics and thereby heralds one of the foremost themes of the 1990s and beyond: the relations between Terminology and Linguistics (Myking 2020 in Humbley 2022, p.26).

More or less in the same period, also Rita Temmerman theorized a new line of research that criticized Wüster's works, that is sociocognitive terminology (Humbley 2022, p.25). The main source of dissatisfaction was the way Wüster dealt with basic concepts and the development of this new approach was based on the analysis of the ontological dimension (Humbley 2022, p.26). Consequently, she fostered the discipline of Termontology and Termontography, which is:

> a multidisciplinary approach in which theories and methods for multilingual terminological analysis of sociocognitive theory are combined with methods and guidelines for ontology engineering. A clear distinction is made between conceptual modeling at a language-independent level and a language-specific analysis of units of understanding (Temmerman 2007 in Humbley 2022, p.26)

These Units of Understanding (UoU) were adopted to tackle the traditional theory for concepts which was considered inadequate, and they represented the starting point for all sociocognitive terminology works: "the unit of understanding pertains to the understanding of a referent in a situated reality and how this understanding is expressed in language (terminology in the discourse of a subject-field)" (Temmerman 2022, p.331). She stated that UoUs existence is based on the fact that the understander perceives reality through senses and a functioning mind, and these units are placed into discourse with language abilities; therefore, four issues were to be considered: "prototypicality in understanding, embeddedness in society, a diachronic perspective, and the impact of metaphorical framing" (Temmerman 2022, p.331). It is also notable that she revisited the Ogden-Richards triangle, deeply analyzed as this discipline relied itself on meaning, reference, thought and understanding (Temmerman 2022, p.333).

Another branch of terminology that arose in contrast with some ideas outlined in the GTT is Cultural Terminology, which was developed by Diki-Kidiri. By placing the human being, considered not only as an individual but also as part of a community, at the core of any terminological work it is identified as a cultural being who forges culture using appropriation strategies for new concepts; in fact, "the aim of Cultural Terminology is not the international harmonization of multilingual terminologies but the appropriation of knowledge and know-how by a specific speaker community rooted in its culture" (Diki-Kidiri 2022, p.197). Analyzing these strategies, he claimed that the concept is not only a mental representation, but also an idealized and cultural perception; therefore, each concept is perceived as a *percept*, i.e. it can be analyzed from many different points of view (Diki-Kidiri 2022, p.197). Focusing on how African languages transferred

knowledge and how their society integrate new concepts in their culture, he fought against the Wüsterian principle that culture disturbed scientific communication between experts, considering terms and concepts as a product of a culture that must be integrated into it through appropriation. This new approach shared several points with the other disciplines stated above:

> socioterminology acknowledges the existence of multiple technolects based on the social status of workers within the same company. Sociocognitive Terminology studies the mental mechanism whereby we can understand specialized discourses. The Communicative Theory of Terminology focuses on the multidimensionality of the term as an object of communication (Diki-Kidiri 2022, p.198)

However, Cultural Terminology is the only one that considered the transfer and appropriation of knowledge in a particular culture or community (Diki-Kidiri 2022, p.198). Furthermore, Diki-Kidiri is well known also for having revisited the historical assertion of Saussure that the linguistic sign is arbitrary, criticizing the fact that it was only concerned with the relation between signifier and signified, while he focused on the relation between linguistic sign and concept, stating that the signified could also change in the same culture: the concept is the idea of an object, while the signified is its perception which could be seen from different angles (Diki-Kidiri 2022, p.204).

To conclude, two others approaches developed in the 1990s and 2000s as a reaction against the GTT: Textual Terminology, which focused on specialized texts through Corpus Linguistics, thus through the analysis of corpora from which terms can be extracted (Humbley 2022, p.27), “In Textual Terminology, as for the French semanticist Rastier (1998b), it is neither the term nor the corpus that constitutes the most significant element but rather the text” (Condamines and Picton 2022, p.222); and Frame Based Terminology theorized by Pamela Faber, which focused on the representation of concepts and their relationships through a cognitive approach and the construction of conceptual models which integrated concepts and their designations into knowledge structures, i.e. frames (Faber 2022, p.353).

> Frames can be used to link terms in different languages to the same specialized concept. Conceptual structure should thus be made explicit in term entries so that users can locate each concept within a specialized domain and view its relations with other concepts. From a linguistic perspective, these semantic relations should be reflected in the terminological definition, which is the natural language representation of conceptual structure (Faber 2022, p.354)

## 1.2 Terminology interdisciplinarity

> Like all interdisciplinary fields in science, terminology is a discipline that is defined in relation to the other fields from which it takes a specific set of concepts. Nevertheless, we must consider that an interdisciplinary subject does not define its field of study as the sum of the concepts from the disciplines that comprise it, but rather that, firstly, it chooses from these fields only a specific set of concepts and elements and, secondly, that it elaborates from these concepts its own object and field; only by doing so does it acquire the status of discipline (Cabré 1999, p.25)

Terminology shares several aspects with Linguistics and in particular with Applied Linguistics through the common concern about LSP as both try to present a description of special languages lexicon; it is also linked to information science because both have the aim of classifying and structuring concepts, as well as to philosophy regarding knowledge structure and concept formation, to psychology for communication and perception theories and to lexicography in the way they both deal with the structure and description of words (Sager 1990, p.4). Concerning applied linguistics, it was the study of the social function of language and the focus on applied sciences that fostered the establishment of new branches of this discipline, namely lexicography and terminology (Cabré 1999, p.28).

Before analyzing the dichotomy Terminology-Specialized Lexicography, it is essential to present the main features of lexicology and lexicography. The first is mainly concerned with the lexicon, which is made up of words, i.e., units of reference that link the speaker to the reality it perceives (Cabré 1999, p.29). Therefore, it aims to build the lexical structure of an idiom without forgetting that a speaker has an implicit idea of how words are used and connected with grammar, providing information on such knowledge that is language independent and extralinguistic; through this goal, lexicology wants to underline how a word is used in the real world (Cabré 1999, p.30). On the other hand, if lexicology is involved in describing words and how a speaker used them, lexicography is concerned with the methodology of dictionaries and their production:

> A dictionary is a linguistic product that brings together a chosen set of words (or other language units) and provides information about them. The way the entries are selected and ordered in a dictionary constitutes its macrostructure and the information about the entries, its microstructure (Cabré 1999, p.31)

In addition, two main types of dictionaries exist: the general dictionary, which is based on general language and presents elements such as the source of information, the choice, form and order of entries, as well as grammatical and semantic information about these entries; and the special dictionary that focuses on specialized languages of a certain

subject field and presents the same structure, but differs in the source, the choice and nature of entries alongside the type of information (Cabré 1999, p.31).

As stated above, terminology is also linked to Linguistics and they share a few characteristics, but at the same time they present differences, such as their approach to the formation of terms and to the production of dictionaries. Concerning terminology and lexicology, the first deals with concepts, considered as independent from the terms that designate them, while the second deals with words connected to grammar (Cabré 1999, p.33). To sum up, these two disciplines share the fact that both are concerned with words and dictionaries, but at the same time they differ regarding the domain (lexicology has a larger domain because it deals with general language words, terminology analyses words of a specific subject and its domain is smaller), the basic unit (lexicology studies words, while terminology is concerned with terms, but the dichotomy word vs. term will be further explained in the next section), the objectives (lexicology underlines the lexical units and the speaker competence through general language dictionaries, while terminology identifies concepts of specialized fields seeking standardization) and the methodology (lexicology starts from hypothesis and analyzes discourse, while terminology passes on behavior and tries to identify terms in concept systems) (Cabré 1999, p.36-37).

The dichotomy Terminology vs. Specialized Lexicography has been deeply analyzed by Rute Costa in her article published in 2013 (*Terminology and Specialized Lexicography: two complementary domains*). She states that these two disciplines have in common the same domain, i.e., the term, and for this reason they need to be distinguished; and the main fact that separates the two is that terminology relies on a double dimension, not only linguistic, but also conceptual, thus the term for terminology is represented not only as a unit of discourse, but also as a unit of representation (Costa 2013, p.30-31).

> On the one hand, there are the communities that have the term, i.e., the designation as their core study object; on the other hand, there are those whose priority is the concept. It is from this double dimension, and from the study of the relationship between one and the other, that Terminology acquires its status of autonomous scientific domains. If attached to only one of those dimensions, it will lose its specificity, its autonomy and consequently its object of study (Costa 2013, p.31)

Specialized lexicographers are interested in terms conceived as specialized lexical units, while terminographers are concerned with terms as concept designations, which present

relationships with other concepts belonging to the same concept system (Costa 2013, p.33). Therefore, in lexicographic and specialized dictionaries terms have no reference to concepts and they aim to fix communication issues as well as translation problems by providing a description of their meanings and place them in a discursive context (thus, specialized lexicography is a descriptive task), while terminology does not produce dictionaries, but terminological resources where concepts are systematically presented in systems that link them to their respective terms through natural language definitions (Costa 2013, p.36).

Finally, also terminography and lexicography present differences especially in the linguistic aspects of dictionaries (the first deals with specialized documentation, while the second with general language), the goal of the work (terminography seeks standardization through terminological units that can be used as a reference to avoid ambiguous communication, while lexicography aims to inform and describe) and the working procedure (the first is generally onomasiological, while the second is semasiological) (Cabré 1999, p.37-38). Kageura (2015, p.57) has outlined a useful table that lists the main differences between these two disciplines:

| | TERMINOGRAPHY | LEXICOGRAPHY |
|---|---|---|
| THE OBJECT OF STUDY | Terms and terminology | Words |
| DOMAIN | Language of specialized domain | General language |
| POINT OF VIEW | Normative/prescriptive | Descriptive |
| APPROACH | Onomasiological (starting from the analysis of concepts and then assign terms as designations of these concepts) | Semasiological (starting from the analysis of words and look for the senses or meanings) |
| INFORMATION PROVIDED | Concept system and conceptual relations, definitions, and designations | Words, a range of linguistic information, meanings, usages, examples, etc. |
| ORGANIZATION | Systematic or thematic | Alphabetical |
| USERS | Specialists, terminologists and documentalists | Lay people |

### 1.3 The dichotomies: general vs. special language and term vs. word

The ISO 1087:2019 provides a definition for language, as well as for general language and special language: the first is defined as a "system of sounds, characters, symbols used for communication", the second as a "natural language (language that is or was in active use in a community of people, and the rules of which are mainly deduced from usage) characterized by the use of linguistic means of expression independent of any specific domain (a field of special knowledge)" and the third, which is also known as language for special/specific purposes or LSP, as a "natural language used in communication between experts in a domain and characterized by the use of specific linguistic means of expression".

Given these fundamental definitions, it is crucial to underline the similarities and differences between general and special language. As Cabré (1999, p.59) states, general language consists of rules and limitations that are intrinsic in the knowledge of a speaker, while special language presents a series of specific subcodes that are influenced by the subject field, the type of speaker, the communicative situation, etc.; thus, it has to take into account the communicative environment and the purpose of communication for the interlocutors. Therefore, special languages are considered variants of the general one or pragmatic subsets as well (Sager 1980 in Cabré 1999, p.62), which present a series of characteristics: they are used in special subject fields by experts and professionals which possess a specific knowledge of a particular field that goes beyond general communication; the communicative exchange is generally formal and they present linguistic and textual features that can vary according to the situation; and finally, they present common linguistic features with general language, sharing the purpose of maintaining a stable exchange (Cabré 1999, p.65). Many types of special languages exist, and each subject field has its own, but they all share some aspects such as the limited number of users, a formal environment, and an informative function (Cabré 1999, p.68), as well as the production of precise and impersonal texts, preferring nouns instead of adjectives (Cabré 1999, p.70).

> Since terminology is concerned with the language used in special subject fields, this presupposes a division of language into as many special sublanguages as there are separate subject fields or areas of knowledge and activity in a given linguistic community. From the point of view of terminology, therefore, the lexicon of a language consists of the many separate subsystems representing the knowledge structure of each subject field or discipline (Sager 1990, p.13)

Before analyzing the dichotomy term vs. word, it is important to present the state of the art of wording conventions related to objects, designations, and terms, which are underlined in the ISO 704:2022: “objects are perceived or conceived and are abstracted into or conceptualized as concepts; designations designate or represent concepts, are assigned to concepts and refer to objects.” Moreover, words describe general language in dictionaries, while a terminological resource employs designations, which are categorized as terms, proper names and symbols, thus the term is a type of designation that “represents general concepts that correspond to various types of objects” (ISO 704:2022, p.48-49).

According to Sager (1990, p.19):

> The items which are characterized by special reference within a discipline are the 'terms' of that discipline, and collectively they form its 'terminology'; those which function in general reference over a variety of sublanguages are simply called 'words', and their totality the 'vocabulary’.

Therefore, as lexical units are not infinite, sometimes words can acquire a double aim and are used as terms in special languages (Sager 1990, p.19), but as they can seem not so formally and semantically different, the most distinctive aspect between them is that terms, as opposed to words, designate concepts of a special subject (Cabré 1999, p.81). This means that terms can be used only if the speaker has the sufficient knowledge to understand their role in a concept system, which is achieved by a group of experts in the field who tries to standardize them through the establishment of a fixed relationship between the term and its associated concept (Sager 1990, p.20). In fact, terms are classified according to the class of concepts they represent, which are put together through common features and relationships: “Within a special subject, concepts are organized in structured sets that are called concept systems, and these systems reflect the view of the real world held by the experts in the discipline or activity” (Cabré 1999, p.88). Moreover, as Kageura states (2015, p.48) words are generally functional elements while terms represent domain-related concepts that in most of the cases are nouns and complex terms (only the 20/30% of terms are simple). In conclusion, terms can be classified as derived words or compounds, as a combination of words (terminological phrase), as acronyms, abbreviations and short forms and they can be created from scratch or acquired through borrowings (Cabré 1999, p.85-88).

### 1.4 Concepts and characteristics, semasiology, and onomasiology

According to ISO 1087:2019, a concept is a "unit of knowledge created by a unique combination of characteristics", which are "abstractions of a property", that is the "feature of an object". In addition:

> Concepts depict or correspond to objects or groups of objects, are represented or expressed by linguistic or non-linguistic designations or by definitions, are connected by concept relations and organized into concept systems that are structured according to concept relations (ISO 704:2022)

Many academics and terminologists have stressed the importance of the concept in terminology, but here the theoretical perspective proposed in ISO 704:2022 is adopted. Firstly, in every terminological work a concept is a unit of knowledge which is linked to one or more objects and a designation (i.e., a term, a proper name, or a symbol) is assigned to the concept and not to the object; therefore, an object is connected to its designation through a concept. Secondly, a concept is always analyzed in the context of a special language, and it is not only represented by linguistic designations, but also by definitions (which will be discussed in the following section). Thirdly, the same object can be perceived differently in different domains; thus, it can present different definitions that create different concepts (ISO 704:2022, p.3). In addition, concepts can be divided into general concepts (which include unlimited objects that create a group with common properties, and they are designated through terms or symbols, for example "planet" or "tower") and individual concepts (which include only one object or a class of objects that can be considered as unique and are designated by proper names or symbols, for example "Saturn" or "Eiffel Tower") (ISO 704:2022 p.3-4). On the other hand, conceptualization is vital in recognizing objects that share the same properties in a specific domain, as these properties are later abstracted into characteristics, which are put together and permit concept formation. Therefore, "each concept is comprised of at least one characteristic and each object is abstracted into at least one concept" (ISO 704:2022, p.5). Characteristics are used for identifying and analyzing concepts, as well as to produce concept systems and definitions; therefore "the set of characteristics that make up the concept is the intension of the concept. The set of objects conceptualized as a concept is the extension of the concept. The intension determines the extension" (ISO 704:2022, p.7). Moreover, characteristics are divided into essential and non-essential or complementary characteristics: the first ones are called so because their absence could

lead to the misunderstanding of the concept or to the definition of a different concept (for example, the color "red" is an essential characteristic for the concept "traffic light"), while the second ones can be removed without changing or modifying the concept in question (using the same example with color, it is a non-essential characteristic for the concept "computer mouse"). Another important distinction is made between shared characteristics, which represent similarities with other concepts, and delimiting characteristics that on the contrary show their differences (for instance, the characteristic "support for the back" could be employed to differentiate between the concepts "stool" and "chair", while "made of wood" could be a shared one); it is the combination between all these types of characteristics that permits not only to identity a specific concept, but also to distinguish it from others (ISO 704:2022, p.7-8). Even though the theoretical aim of terminology is to seek monosemy and mononym to foster precise specialized communication, in many cases this is not possible, and this is clear when the relationship between designations and concepts is analyzed. In fact, designations can also present synonyms (interchangeable in all situations, such as "term bank" and "terminological data bank") or quasi-synonyms (interchangeable only in certain situations, for example "dashboard" and "instrument panel"), equivalents (for multilingual works), antonyms (that represent concepts in contrast with each other, like "lawful" and "unlawful"), polysemes (identical terms that designate concepts with some related features, for example "bridge" as the dental plate and "bridge" as the structure used by cars), homonyms (designating unrelated concepts that are phonetically and orthographically identical, for example "rock" as the music genre and "rock" as the stone), homophones (phonetically the same, but orthographically different, such as "sun" and "son") and homographs (orthographically the same, but phonetically different like the verbs "tear" – to cry – and "tear" – to separate – that are pronounced differently) (ISO 704:2022, pp.57-58).

Having defined the term in section 1.2 and the concept here above, it is essential to talk about the onomasiological and semasiological approach in terminology, deeply covered by Claudia Santos and Rute Costa in their article *Domain specificity: semasiological and onomasiological knowledge representation* (2015). Even though terminological theories during the 20th century have underlined the fact that terminology processing could start from the concept or from the term, thus employing an

onomasiological or semasiological approach, the two academics demonstrate that these perspectives are instead complementary and can be used together using corpora as well as considering the knowledge of experts in a specific domain (Santos, Costa 2015, p.154). In fact, as stated above, terminology has a double dimension, both linguistic and conceptual, that has to be taken into account, otherwise the discipline could not be considered as specific and autonomous (Santos, Costa 2015, p.155). Wüster argued that every terminology work must begin with the concept, but the development of the Internet caused textual production to be much more accessible and many scholars decided to reverse the approach of Wüster, preferring designations over concepts (Santos, Costa 2015, p.157).

> The specialized text is undoubtedly a vehicle of knowledge and, in Terminology the term plays a fundamental role in the text, given that it is a core element in the semantic nodes which we can identify in the texts. These semantic nodes frequently correspond to core points that are at the base of the construction of lexical and semantic networks and that reflect knowledge that is present in the text or in a set of texts (Santos, Costa 2915, p.159)

However, for terminologists the relationships between concepts cannot be left out, as well as the relation between the designation and what has been designated; therefore, each terminological work must consider both linguistic and extra-linguistic aspects and not focus on only one of them (Santos, Costa 2015, p.159). As a matter of fact, in knowledge representation, terminologists must use the onomasiological approach building concept systems that present relationships between concepts alongside the semasiological approach producing lexical networks that show relationships between terms and "the map resulting from text analysis will contain linguistic manifestations of knowledge that might be close to the conceptualizations mirrored in the concept map" (Santos, Costa 2015, p.170). In conclusion, it is advisable to employ a double approach that considers both dimensions, starting with onomasiology and then using semasiology to confirm conceptualizations; the cooperation between experts and terminologists as well as the analysis of specialized text corpora is fundamental as:

> The lexical network built from text sequences extracted from a text for special purposes reflected a conceptual organization, evidenced by the proximity with the concept map. The graphic representation of the lexical network, the terms and their relations, were accepted by the experts, hence the linguistic representation was valid. It was observed that, deriving from text, it was possible to represent a set of complex relations that may enrich the initial concept map (Santos, Costa 2015, p.177)

## 1.5 Conceptual relationships and definitions

As Nuopponen states (2022, p.63) conceptual relations are essential to produce a terminology work, to extract information about concepts, to organize and define them as well as to specify the link between concepts and terms; and with the explosion of digitalization, they have become even more important for fostering knowledge transfer.

> Concept relations can be defined simply as relations between concepts (ISO 1087:2019, 4). They are different from relations between terms, i.e., linguistic designations for specialized concepts […] and from the relationships between terms and concepts (Nuopponen 2022, p.65)

Again, also in this chapter, the main reference will be ISO 704:2022 as it provides a deep and clear explanation of conceptual relationships. The existence of a concept is possible when it is related with other concepts and not as a single unit of knowledge; and these relations, identified through mental activity, are essential in developing concept systems, whose framework is represented by the domain that is analyzed. Therefore, in concept systems, concepts are related to each other by several typologies of conceptual relationships and the most common are hierarchical relations, which include generic and partitive relationships, and associative relations (ISO 704:2022, p.8).

> Concepts connected by hierarchical relations are organized into levels of superordinate concepts, subordinate concepts and coordinate concepts. A hierarchy requires at least one subordinate concept below a superordinate concept. Concepts are superordinate, subordinate or coordinate, not on their own, but always in relation to each other in a hierarchy (ISO 704:2022, p.10)

In generic relations, also known as genus-species relations (ISO 1087:2019, p.4), "the intension of the subordinate concept includes the intension of the superordinate concept plus at least one additional delimiting characteristic", while "the extension of the superordinate concept includes that of the subordinate concept" (ISO 704:2022, p.10): for example the concepts "vehicle" and "car" or "person" and "child" present a generic relation (ISO 1087:2019, p.4). Moreover, generic relationships are characterized by the principle of inheritance, i.e. the subordinate concept in a concept system inherits all the characteristics of the superordinate one, acquiring a vertical orientation, while a set of coordinate concepts constitute a horizontal series (ISO 704:2022, p.12). Finally, there is never only a way to create a concept system, but several, according to the criterion of subdivision chosen by the terminologist (ISO 704:2022, p.14) and concerning individual concepts such as proper names, they are always placed at the bottom of the system, as they cannot be subdivided in other specific concepts. In addition, the most common way

to build a concept system is using concept diagrams such as tree diagrams (ISO 704:2022, p.16). Concerning the other type of hierarchical relationship, partitive relations connect concepts without transferring characteristics and they are defined as a relation "between a comprehensive concept (concept in a partitive relation that is viewed as a whole consisting of various parts) and a partitive concept (that is viewed as a part of a whole)" (ISO 1807:2019, p.4): for example, the concepts "bicycle" and "wheel" or "molecule" and "atom" present a partitive relation. These parts can be optional or essential, and in the latter case they can be abstracted into delimiting characteristics, which distinguish a comprehensive concept from other similar ones. Consequently, to identify a partitive concept, it is fundamental to fix the place of the comprehensive one in a hierarchical system, as its position establishes its partitive concept and its extension (ISO 704:2022, p.17). As opposed to generic relations, if an individual concept is perceived as comprehensive in a partitive relationship, it can be divided into other parts (ISO 704:2022, p.23). The last main type of conceptual relations is the associative or pragmatic relation that is simply defined as a "non-hierarchical concept relation" (ISO 1087:2019, p.6) and it is used to stress the relationships between objects (for instance, the concepts "education" and "teaching" present an associative relation). Many types of associative relations exist, such as contiguity relations (locative relations such as "milk carton" and "milk", material relations such as "seawater" and "salt", rank relations such as "chair" and "vice-chair", etc.), sequential relations (temporal relations such as "production" and "consumption", spatial relations such as "floor" and "ceiling" or causal relations such as "humidity" and "corrosion"), activity relations (agent relations such as "teach" and "teacher", object relations such as "publication" and "book", tool relations such as "click" and "computer mouse", purpose relations such as "medical examination" and "diagnosis", result relations such as "hospital discharge" and "patient", etc.), origination, instrumental, interactional, transmission and opposite relations (ISO 704:2022, p.24-25).

The last important topic that has to be analyzed is the definition, which is defined by ISO 1807:2019 as the "representation of a concept by an expression that describes it and differentiates it from related concepts" (p.6). Therefore, a definition must include the essential characteristics of a concept, but omitting the ones that are not necessary; this is the main difference between a definition and an encyclopedic description (ISO 704:2022, p.32). Illustrations and formulas can also be parts of a definition, especially for describing

scientific or technical concepts, but in writing a definition the terminologist must consider the knowledge of the target audience: if it consists of experts a definition can be exhaustive, while for non-experts additional information has to be included, such as the context, explanations or examples (ISO 704:2022, p.33). There are two essential types of definition: intensional and extensional definition. The first one is defined as a "definition that conveys the intension of a concept by stating the immediate generic concept and the delimiting characteristic(s). For example, optical mouse: computer mouse in which movements are detected by light sensors" (ISO 1087:2019, p.7). The aim of this definition is to provide only the sufficient information that permits to identify a concept and differentiate it from others; that is the reason why it starts by stating the closest superordinate concept and in terminology resources it is the most used as it reveals concept characteristics (ISO 704:2022, p.33).

> Intensional definitions shall enable terminology users to reconstruct the concept system. The characteristics selected and presented in an intensional definition shall indicate the difference between one concept and another concept or the relation between the concepts (ISO 704:2022, p.34).

Moreover, in writing intensional definitions, some features have to be taken into account: apart from being concise, they must follow the conventions of the natural language used to write the definition, as well as avoiding general language concepts that do not need to be defined as they are already present in general language dictionaries; they must be concerned with only one concept and not with the words that constitute the designation; and they must omit those characteristics that constitute their generic or specific concept (ISO 704:2022, p.35-36). On the other hand, the extensional definition is defined as a "definition that enumerates all the subordinate concepts of a superordinate concept under one criterion of subdivision" (ISO 1807:2019, p.7). As opposed to intensional, extensional definition is a list of designations constituting the subordinate concepts, namely the objects that determine the extension of the superordinate concept (ISO 704:2022, p.33). However, this type of definition is less used compared to the intensional one, and it can be employed only in certain situations, such as when:

> the number of subordinate concepts to be enumerated is finite, the list of subordinate concepts is complete under one criterion of subdivision, and the subordinate concepts can be clarified by intensional definitions or are well known (ISO 704:2022, p.34)

Finally, in writing extensional definitions it is important to distinguish between generic extensional definitions, which are used when the concept is linked to a series of

enumerated subordinate concepts through generic relations and the list presents the operator "or" (such as "Noble gas: helium, neon, argon, krypton, xenon, radon or organesson"), and partitive extensional definitions, which are employed when the concept is connected to its subordinate ones by partitive relations and the list presents the operator "and" (such as "Family 18 in the Periodic Table: helium, neon, argon, krypton, xenon, radon and organesson") (ISO 704:2022, p.40).

### 1.6 Multidimensionality

> Multidimensionality (Bowker 1993) describes a situation in which concepts may be classified in a variety of different ways, depending on perspectives. For example, in the upper levels of a concept hierarchy reflecting generic-specific relations, vehicles may be categorized according to the environment in which they are used (e.g., surface vehicles, air vehicles, aquatic vehicles), how they are powered (e.g., motorized vehicles, self-propelled vehicles), or what they transport (e.g., cargo vehicle, passenger vehicle), with the remaining distinctions potentially appearing at lower levels of the hierarchy. It is not uncommon to find examples of varying hierarchical structures within the same corpus, making establishing a single unanimous conceptual structure challenging (Marshman 2022, p.299)

Lynne Bowker, in her article about multidimensionality published in 2022 in "Theoretical Perspectives on Terminology", provides a straightforward example that helps to understand this troublesome concept. Taking into consideration the superordinate concept "wine" and following the characteristic "color", it can be subdivided into subordinate concepts such as "red wine" or "white wine" and this represents one dimension of the concept "wine". However, this is not the only way of categorizing the concept; in fact, if another characteristic is considered, like "country of origin", other subordinate concepts arise such as "Italian wine" or "French wine", or also the characteristic "sugar content", which produces subordinate concepts like "dry wine" or "sweet wine". These are all different dimensions of the same concept which is simply seen from different points of view representing different ways to classify it (Bowker 2022, p.130). It is important to say that this idea of multidimensionality differs from the GTT of Wüster, which as stated before was onomasiological and seek univocity (each term refers to only one concept and vice versa) producing concept systems in which a concept has only one and fixed position (Bowker 2022, pp.129-130).

> We use the term multidimensionality to describe the phenomenon of classification that occurs when more than one characteristic can be used to distinguish between things, and hence those things can be classified in more than one way. A dimension represents one particular way of classifying a group of things; a classification with more than one dimension is said to be multidimensional (Bowker 1998, pp.488–489 in Freixa 2022, p.417)

Moreover, one of Wüster's goals was to standardize special languages to facilitate communication between experts in a field. For this reason, even though the focus was on the concept, the aim of terminology was in these days mainly linguistic as represented in the first term banks such as Termium Plus or IATE used by translators, which include especially linguistic information alongside few details about conceptual relations (Bowker 2022, p.131). However, it soon became clear that translation is a process that must consider not only the term, but also the concept behind it and therefore also the relationship between concepts making translation a knowledge-based process rather than only linguistic. Consequently, translators of specialized texts should have access to the terminologist work such as concept systems as to better understand the whole context, but this type of information is not present in traditional and conventional term banks (Bowker 2022, p.132).

Thus, at the end of the 20th and beginning of the 21st century, users of terminology resources began to ask for more information and started to seek multidimensionality also due to technological improvements (Bowker 2022, p.133). This need of providing more conceptual and encyclopedic knowledge led Meyer and other colleagues (Bowker, Eck and Skuce) to create a TKB (terminological knowledge base) known as COGNITERM; this new term bank put together aspects of conventional and linguistic banks with a knowledge base seeking multidimensionality. In fact, one of the most important differences with Termium Plus or IATE as stated above, is that COGNITERM does not only include linguistic information, but also conceptual by adding conceptual relationships through accessible graphical representations (Bowker 2022, pp.135-136). Therefore, considering both linguistic and conceptual information seeking multidimensionality permits not only to create more useful terminological resources, but also improving the knowledge about a concept and producing a more holistic understanding of concepts and terms by analyzing different dimensions (Bowker 2022, p.134).

In conclusion, Bowker and Meyer (1993 in Bowker 2022, pp.136-137) have produced a table with a series of guidelines for recognizing and representing multidimensionality in order to help terminologists to represent it in resources:

| Guidelines for recognizing multidimensionality | Guidelines for representing multidimensionality |
|---|---|
| Work with a graphic representation (e.g., concept map) | Work on one dimension at a time, completing it as exhaustively as possible |
| Consider all possible ways of classifying a subject field at all levels of the classification | Rank the dimensions in order of relative importance |
| Recognize signs that multidimensionality exists | Clearly distinguish the different dimensions on the graphic representation |
| Identify and correct false multidimensionality | Clearly indicate the characteristics underlying each dimension |
| | Revise the graphic representation of the concept system as more is learned about the subject field |

### 1.7 Sport terminology

As this project revolves around the creation of a terminological databank about rock climbing and alpinism, it is important to underline the fundamental aspects of sports terminology in general, especially after sport climbing became an official Olympic discipline in 2020 at the Summer Olympics in Tokyo, Japan, which has increased its popularity worldwide.

Firstly, looking at the etymology of the word "sport", it is clear that it derives from the old French "desport" and in the beginning it meant "leisure" (Ljubičić 2019, p.253). In fact, the first English definition of this word, which was coined around the 14$^{th}$ century, was simply "anything humans find amusing or entertaining" (Ljubičić 2019, p.253). Therefore, sport was mainly considered as an act of playing, a spontaneous activity that people carried out for fun. However, if the word "sport" is seen from a different point of view, it acquires a different meaning; when rules were introduced to regulate this activity, it became a "game" or a "competition" that athletes want to win and that is the main difference between a regulated or formal sport and simple play. And it is interesting to underline the fact that games and competitions appeared way before the first English

definition of sport described above, namely with the first Olympic Games that took place in Ancient Greece in 776 BC, which included rule-bound sports like chariot races, wrestling or disk throwing (Ljubičić 2019, p.254). Thus, the word "sport" can acquire the meaning of a simple play, but also of an organized event where people compete: the difference lies in the regulation of this activity. As a matter of fact, the current definition of this word in present dictionaries such as Cambridge is "a game or activity that people do to keep healthy or for enjoyment, often competing against each other", a definition that more or less includes the two aspects presented above, playing and competing, but also adding the point of view of practicing sports to keep healthy, a phenomenon that has spread in the last century with the evolution of society, as people began to considered sport not only as a way to compete or to play for fun with friends, but also to keep fit in a world that has become multimedia and drives people to stay in front of a TV watching sport rather than practicing it. However, from a terminological point of view, this aspect alongside the regulation of sports and the introduction of world records (that pushes athletes to train and compete always more) has made sports competition a popular and followed activity worldwide, causing the proliferation of a lot of new sport technical terms and jargon used and coined by TV presenters, commentators, sports journalists as well as athletes and trainers:

> For decades, we have been able to observe an increasing popularity of sports as a media event. The presence of sport in the media (press, radio, TV, and the Internet) has resulted in the language of sport becoming more significant (Taborek 2012, p.237)

Secondly, another important aspect of the language of sport is that it is considered as a type of special language, which is defined by Cortelazzo (1988, p.246 in Rossi 2003) as a functional type of a natural language that depends on a specialist area of knowledge used by a smaller group of speakers compared to the entirety of speakers of a certain language. Therefore, even though the language of sport is strictly related to the general language, it is without a doubt a class of special language that can acquire three different meanings: the language of sports journalists, a set of technical terms that encompasses all kinds of sports and the language of supporters (Rossi 2003); in fact, as Beccaria states (1973, p.46 in Rossi 2003) the language of fans and journalists is a technical language because it deals with a very specific topic that makes people feel as a part of a group and creates a sort of complicity and linguistic intimacy. Thus, the importance and the diffusion

of the language of sport, as well as the creation of new technical terms in this field is due to the media and means of communication which focus on sports (especially football and most recently car racing), given that the 40% of all television programs and radio broadcasts are about sport and sport newspapers are the best-selling and most read (Rossi 2003).

Moreover, it is essential to underline also that the language of sport used in other countries is deeply influenced by English, which plays the role of a word donor in mostly any language being the "lingua franca" in every field, but in particular in sport that is considered one of the topics that better assimilate anglicisms. The reasons of this phenomenon lie in the fact that English words are considered more fashionable and fascinating, many local languages struggle in producing attractive equivalents (for example in Italian the words "curling" and "tennis" have no equivalent as their translation, namely "piastra sul ghiaccio" and "pallacorda", are considered unattractive and unappealing) and especially that many sports originated in English speaking countries such as cricket, rowing, golf, tennis and football in England and surfing, volleyball, basketball and baseball in USA (Pirsl D. and Pirsl T. 2014, pp. 145-146). As a matter of fact, looking for example at the Italian sports language, it is clear that many English words have been introduced in the form of loanwords, calques and foreignisms that in some cases have been established and popularized, while in others they have been adapted; for instance, the word "pressing" is used in Italian as a loanword without an equivalent, but modifying the suffix and replacing it with the Italian one "are" the neologism "pressare" have been created (Murrmann, Surmaj 2015, p.199). Other loanwords that have been morphologically adapted in the Italian language are, among others, the verbs "crossare", "derapare", "dribblare", "stoppare"; also, loan translations are common, like "fuorigioco" from offside, "pallacanestro" from basketball and also semantic calques such as "angolo" from corner, "incontro" from meeting, "rete" from net, "volata" from sprint and so on (Rossi 2003). In any case, as stated above, loanwords from English that have not been adapted are very common in the Italian press and this has been underlined by an investigation carried out by Murrmann and Surmaj in 2015 at the University of Warsaw, who analyzed several issues of the most famous sports newspaper in Italy, "La Gazzetta dello Sport", creating a corpus and they identified many loanwords and anglicisms used by Italian journalists like mister, stress, highlights, derby, playoff, rookie, staff, match

point, doping, etc. (Murrmann, Surmaj 2015, pp.203-204). However, in some cases these loanwords co-exist with Italian equivalents, especially in football: for example, “corner” and “calcio d’angolo”, “penalty” and “rigore”, “goal” and “rete” (Duro 1993, p.23 in Murrmann and Surmaj 2015, p.199). Loanwords and calques from languages different than English are also present, but in smaller quantities: for instance, Gallicisms in the Italian sports language exist, though they are borrowed mainly from cycling (Caretti 1985, pp.77-78 in Murrmann and Surmaj 2015, p.200).

In conclusion, it is important to underline the most important characteristics of the language of sport. First, there are some differences between the technical language of sport, employed to communicate between athletes or between coaches and athletes, and the language of sport used by the media to communicate with fans and supporters. The latter uses a series of linguistic techniques to engage and captivate the reader or listener such as prepositional phrases, quoting format, conversational echoes, cliches, many personal pronouns, adjectives, acronyms, and particular constructions employed to create irony and build a group identity (Pirsl D. and Pirsl T. 2014, pp. 146-147).

> This rough panorama of grammatical items in the language of sports leads to what can be called “popularization” of the language. Simple structures, present or simple past tense, grammatical mistakes seem to make the language poorer: an explanation might be the fact Sports Newspapers have a largely working-class readership and they are written using simple grammar structures and echoing conversational faux pas. Consequently, it is important to note that this kind of journalistic behavior tends to modify the language, because of the vast amount of readership and because newspapers have been always associated with the highest prestige of language (Pirsl D. and Pirsl T. 2014, p.147)

In addition, the entertainment created by the media using these techniques leads fans to show an interest not only in the technical aspects of the game or match, but also in the world that surrounds the sports event, such as the athletes’ personal life, the relationship between the coach and the federation or the team, etc.; this aspect drives journalists and TV commentators to use technical terms alongside other words borrowed from other semantic fields in order to emphasize the event and create engagement. For example, in tennis there are many words from general language that acquire a different meaning such as “ace” (a playing card, but in tennis is a perfect serve), “love” (a feeling, but in tennis is a score of zero) and the verb “to serve” (Pirsl D. and Pirsl T. 2014, p.147). This phenomenon is evident especially in football as it is one of the most popular sports around the world and therefore one of the most analyzed from a linguistic point of view; in fact, the language of football presents an infinite number of metaphors and borrowings from

other fields and domains like war (maybe because football became extremely popular at the beginning of the 20th century during the two World Wars): many military vocabularies are used such as “attack”, “defend”, “press”, “strategy”, “fortress”, “bomber” and so on; theater: the stadium is described as a theater, the pitch as an arena, players are actors, coaches are directors and the match is a performance; and also religion: Wembley stadium for instance is depicted as the temple of football where players are worshiped by fans. Another interesting lexical device used in football is antonomasia: the team of France is usually called “the Blues”, Italy as “the blue team” or “Squadra Azzurra”, Liverpool as “the Reds”, Arsenal as “the Gunners”, etc. (Taborek 2012, pp.246-248).

Moreover, from a grammatical and morphological point of view, the language of sport employs many phrasal verbs (work out, warm up, knock out, kick off, etc.), nouns are coined using derivational suffixes such as “-er” (player, trainer, defender) and “-ship” (championship, sportsmanship), but also through the process of conversion transforming a verb into a noun (“to work out” – “workout”) or vice versa (“ace” – “to ace” a test, for example). Finally, the language of sports presents many nouns compound with “sport” (sportswear, sportscaster), “ball” (football, basketball), “team” (teamwork, teammate), “line” (sideline, baseline) etc., as well as nouns compounds preceded with an adjective (free kick, half-time, red card) (Ljubičić 2019, pp.258-259).

After this general overview about the language of sport, the domain of this thesis, rock climbing and alpinism, will be deeply analyzed in the following chapter, underlining the most important elements of this sport: the history of climbing, climbing tools and climbing techniques are some of the topics that will be explained in depth.

## 2. Alpinism and climbing: the domain of the terminological termbase

As already said before, this project consists in the creation of a trilingual termbase in English, Spanish and Italian about alpinism and climbing, with particular attention on tools and techniques used by climbers in order to provide a terminological resource that can be useful to alpinists who climb in foreign countries or with climbers who speak a different language as to improve specialized communication between them or also to translators who need to translate documents about mountains, climbing or alpinism as well as technical relations of climbing routes. However, before explaining and presenting the concept system and the linguistic network, the corpus that has been used and the criteria for its creation and finally the characteristics and the peculiarity of the most important terms and equivalents, it is fundamental to explain the domain of this work, presenting some facts about the history of alpinism and climbing, the morphology of mountains, the techniques, tools, gear and types of climbing.

### 2.1 Brief history of alpinism and climbing

As defined by Cambridge dictionary, alpinism is "the sport of climbing in high mountain areas, especially the Alps[3]"; in fact, as explained later on in this section, the sport of alpinism and therefore climbing originated in the Alps between the end of the 18th and the beginning of the 19th century when people all over Europe began to be fascinated by these huge and unexplored peaks and tried to reach the summit just for pleasure and as a kind of hobby. However, before alpinism and climbing were considered free time activities by people who had a true passion for mountains, these practices already existed, but they were not carried out for fun (Douglas et al. 2017a, p.55). As a matter of fact, since ancient and prehistoric times alpine valleys and caves were already inhabited by tribes as confirmed by the copious number of artifacts and bones that have been found in these places (Masciadri 1988, p.5). This phenomenon is strengthened by one of the greatest discoveries in the history of the Alps: in September 1991, Erika and Helmut Simon found the corpse of Ötzi (also called the Iceman) buried in ice and well preserved in an avalanche chute near the border between Austria and Italy, alongside his copper axe and other tools which he used for climbing. After some analysis and

[3] https://dictionary.cambridge.org/dictionary/english/alpinism

investigation, the body was found to be almost 5.000 years old and therefore it is considered the first alpinist in the history of humankind. In the beginning, scientists thought that he was wandering at about 3.500 meters high because he was grazing animals or he wanted to reach another tribe for trading; however, after some exams an arrowhead was found inside his body and it was clear that he was killed by someone's arrow: he was not climbing for pleasure, he was running away from violent invaders (Douglas et al. 2017a, pp.17-19).

This discovery underlines the fact that in the prehistoric age some people already climbed and lived in the Alps chain, but not for their own choice; they were forced to move in these mountain areas by the invasion of more numerous and powerful tribes, and they found shelter there. However, except for reaching these peaks to escape from danger, people avoided mountains and looked at them with fear and respect. Until the 18th century in fact, mountains were perceived as holy and deified places (for example Himalayas is sacred to Hindu people and Fujiyama to Japanese, Buddha climbed the mountains of Nepal to purify himself, Moses climbed Mount Sinai, for the Greeks the Olympus was the home of the gods, etc.) or as frightful and terrifying areas inhabited by monsters, dragons and ghosts (Masciadri 1988, pp.5-7). Only the Romans tried and dared to venture into the Alps, where they built several roads that were used during wartime or as commercial routes, and Hannibal who led his army of elephants through the Alps during the Second Punic War (218-202 BC) (Douglas et al. pp.20-21). But in these cases, the aim was to find the fastest and easiest way to pass through the chain, reaching the mountains peak was not even considered and unfortunately these roads were forgotten during the Middle Age, when Christianity began to spread all over the world fostering the idea that mountains were the home of the devil and therefore cursed (Masciadri 1988, p.7).

As a consequence, during this period mountains were perceived as dangerous and forbidden places, as a sort of natural barrier that only a few merchants, hunters or pilgrims on their way to Rome tried to overpass, with the notable exception of Francesco Petrarca; the most known Italian poet of the 14th century, together with his younger brother, climbed and reached the peak of mount Ventoux (about 1.900 meters high) in 1336 not for practical or forced reasons, but only for the sight and for finding his poetic inspiration. He described his ascent as a journey of the soul, as an act of devotion to Laura, his Muse, and as a way to elevate his spirituality. For these reasons he is considered to be the first alpinist

who climbed and reached a peak for pleasure and for the inspiration he could achieve from the view at the top (Douglas et al. 2017a, pp.40-41).

Later, during the 16th century, mountains began to be studied and analyzed from a theoretical point of view and in this case, it is important to mention Josias Simmler (1530-1576) who is considered one of the forerunners of alpinism and the first writer of a book about alpinism. In fact, he wrote and published "De Alpibus Commentarius", which is the first work about the Alps that included not only other thoughts and ideas about these mountains from classical authors, but also suggestions, recommendations and tips to manage and understand the alpine environment, as well as some descriptions of the tools and gear that merchants and pilgrims could use to ease their journey through the chain; for example, he is the first who described snowshoes, as wooden branches bent circularly and tied with twine to avoid the foot from sinking into the snow, crampons, as horseshoes that were clung to the sole and provided with three iron tips to improve adherence to the ice, and alpenstocks, as wooden sticks with an iron tip that climbers could use to maintain balance (Douglas et al. 2017a, pp.44-45).

Thus, it is possible to say that the Renaissance paved and cleared the way for the Age of Enlightenment, when scientists, naturalists, botanists and geologists started to be interested in the Alps and began wandering these areas for scientific reasons; from a theoretical study of this chain carried out in the 16th century, scientists in the 18th century looked at these mountains from a practical point of view (Masciadri 1988, p.15). Academics and researchers started to explore this yet unknown and almost unexplored environment in search of scientific proofs: many fossils were found, and they collected samples of rock, stone, ice, and snow; after some investigation and analysis, these examinations permitted them to formulate the first modern theories about the age of the Earth and how mountains and glaciers are formed (Douglas et al. 2017a, p.56).

One of the most known and notable scientists of this period is Horace-Bénédict de Saussure (1740-1799), a Genevan geologist and meteorologist who thanks to his journeys, investigation and explorations is considered to be the founder of scientific alpinism. In fact, through his observations he argued that, in contrast with biblical beliefs, the Alps and mountains in general were formed through a process of compression that pushed layer over layer, and that glaciers were in constant motion because the heat of the Earth melted their base and made them slide due to the force of gravity; later on, he

gathered all his works and writings in a book called “Voyages dans les Alpes” composed of four volumes, which became one of the first books about glaciology and mountains formation of the Western Alps. Moreover, he was the first to discover that glass can retain solar heat and invented the solar oven: through his works he was able to change the European perception of the Alps, no longer seen as a fearful place to avoid, but fascinating and captivating from a scientific point of view. However, apart from being a scientist, he was literally obsessed with climbing these peaks and when he visited Chamonix for the first time in 1760, his bigger dream became ascending the Mont Blanc (Douglas et al. 2017a, p.64). For the next 25 years, he tried several times to climb this iconic peak, organizing exploratory expeditions with tens of guides and he also offered a money reward to whomever discovered a path to the summit; unfortunately, all the times he tried he was forced to come back because of bad weather conditions. Alongside his efforts, other mountaineers began to be interested in ascending the Mont Blanc, namely Bourrit from one side and Paccard and Balmat from the other side: it is one of the first times that climbing a mountain became a competition between alpinists, who wanted to reach the peak before the others for glory and fame. After many attempts, and for the envy of Saussure, Jacques Balmat, and Michel Gabriel Paccard were the first who reached the peak in 1786 and formally this date represents the real birth of alpinism; only one year later also Saussure was able to reach the summit (Masciadri 1988, pp.16-23).

This feat and the articles that have been written about it fostered the knowledge and the interest in the Alps all over Europe, which were always more visited by scientists and geologists. However, at the beginning of the 19$^{th}$ century thanks to the improvement of the means of communication, the evolution of society and the construction of the first hotels for climbers and tourists in the Alps, alpinists began to try and complete new and more difficult ascents: between 1800 and 1804 many peaks had been conquered, such as the Grossglockner, the Monte Rosa and the Ortler. In this period mountains began to be climbed not only by scientists who wanted to know more about the morphology of these areas, but also by alpinists who simply tried the ascent for the pleasure of it (Masciadri 1988, pp.26-27). This trend is at the base of the Golden Age of alpinism which spread throughout the second half of the 19$^{th}$ century, and it symbolically started when Alfred Willis climbed the Wetterhorn in 1854. During this era, that lasted until the 1880s, always more people began to be interested in the Alps, which became more accessible thanks to

the development of the rail system that passed through the chain. Moreover, the first Alpine Club was founded in London, England in 1858 with John Ball elected as president; this club, composed of several members all thrilled by mountains, fostered the idea that alpinism was already a sport characterized by a great cultural value and it started publishing articles and essays about climbing in its Alpine Journal, providing tips and news about new ascents, as well as spreading the lifestyle and values of an alpinist during that period. Being a part of this club meant being a member of a national group that shared the same interest and passion, useful for finding new climbing partners or for discovering new routes. After the birth of the Alpine Club in England, other countries in Europe likewise created their own Alpine clubs: the Austrian Alpine Club in 1862, the Turin Alpine Club in the same year (which became the Italian Alpine Club three years later), the Swiss Alpine Club in 1863 and the German Alpine Club in 1869 (Douglas et al. 2017a, pp.124-125). The birth of these clubs and their increasing popularity made alpinism a sport for all intents and purposes, also thanks to the fact that they began to build many lodges and chalets at high altitudes, which permitted climbers to rest in a more comfortable environment before attempting the ascent, and they also placed permanent ropes and other materials along the most famous routes in order to make them safer and more accessible to Alpine guides and their clients. In fact, during this period, being an Alpine guide became a real and established job, and they began to accompany tourists until the peak for money (Douglas et al. 2017a, p.132).

During the Golden Age, many mountains were climbed and one of the biggest feats was the ascent of the Matterhorn, one of the hardest and difficult peaks to climb of the Alpine 4000ers. The ascent was completed in 1865, but during the way back to the valley four members of the roped party fell and died. This terrible accident shocked the public opinion, especially in England, which divided itself into two sides: the ones that thought that alpinism is a way too dangerous sport performed by people who underestimated the risk and jeopardized their life and the life of the other roped members for a useless purpose; and those who believed the risk is an innate part of this sport such as others and that this accident raised awareness of how dangerous it can be, leading other alpinists to be always more careful when climbing. Even Queen Victoria after this tragedy considered the idea of prohibiting this sport, but in the end, alpinism survived this wave of criticism and the hype created by this news made it even more popular and the risk is also seen

nowadays as a part of the game (Douglas et al. 2017a, pp.144-145). Before the end of the Golden Age alpinism was certainly more dangerous than today as the tools and gear used by alpinists were rudimentary and they did not employ belaying techniques; they only used a rope, alpenstock, and crampons, which made the ascent very risky in case someone fell. In fact, they used the rope by tiding it at their waist and therefore it was common that if a climber fell, he could drag down also the other members of the roped party. However, with the end of the 19th and the beginning of the 20th century new techniques, tools, gear and materials were invented or upgraded and these made climbing a relatively safer discipline compared to all the ascents which were carried out before, but this did not mean that it became a risk-free sport; as a matter of fact, even today and with the most modern equipment many climbers still die on the mountains due to bad weather or bad rock conditions, defects in materials, carelessness or negligence. These innovations (modern and contemporary tools, belaying and rappelling techniques will be deeply analyzed during this chapter) alongside the fact that climbers began to ascend mountains just for pleasure and that the golden age ended as all the biggest peaks were conquered around 1880, opened the way to modern alpinism which overcame classic alpinism during the 20th century (Masciadri 1988, p.56). This new way of perceiving climbing was seen as a sort of revolution based on four main facts: alpinists began to ascend mountains just for the pleasure of it, as already said before; alpinism became a sport where mountaineers aimed not only to climb unexplored and virgin peaks (generally lower in altitude, but with harder routes), but also to repeat difficult ascents to challenge themselves or to open new and more difficult routes on the other faces of mountains that had already been climbed; as the majority of high altitude mountains had been conquered, climbers began to be interested in pure rock climbing (before the ascents were mixed, the first part was generally on rock while the second on ice and snow) and the new disciplines of ski mountaineering, winter alpinism and ice climbing began to develop; and finally, expert alpinists decided to start climbing without the help of Alpine guides (Masciadri 1988, pp.56-60).

This revolution, that lasted until 1914 when the First World War began, transformed traditional alpinism into modern alpinism not only by changing the mentality about this sport, but also by introducing new techniques and tools that permitted to climb routes that were considered inaccessible. Before this change, alpinists thought that they had already

reached the most difficult climbing grade, the fifth (climbing grades will be deeply explained during this chapter), and that it was impossible to find and complete routes with a higher one: overhangs and roofs were considered unpassable. However, an invention completely changed this perception: the rock piton. Pitons already existed and they were used rarely to ease the ascent when the mountain face did not present sufficient natural handholds, but Fiechtl in 1907 upgraded them; he created lighter, shorter and more manageable pitons, which better fitted to the cracks, and they could also be removed and used again. Moreover, this new tool was composed of an eye hole or a ring to which a sling could be attached, or when Herzog invented it in the same years, also a carabiner which improved a lot the efficiency of belaying techniques and therefore the safety of the climb by passing the rope inside of it. This invention was praised by younger climbers who started using it to overcome difficult pitches and the fifth grade was rapidly conquered and surpassed by harder ones. However, the employment of these modern pitons triggered an ethic debate about alpinism and climbing: classic and traditional alpinists heavily criticized the use of these tools as they considered them an illegal and artificial help that distorted the essence of alpinism; they saw them as an unsporting way to overcome difficulties and rejected them. On the contrary, modern alpinists began to use pitons not only as a way to climb more difficult routes, but also to ascend them safer and more protected (Masciadri 1988, pp.76-78).

With the beginning of the 20$^{th}$ century and until the First World War the number of climbers raised exponentially and among the most important there were Tita Piaz (1879-1948) and Angelo Dibona (1879-1957) among the Italians, Paul Preuss (1886-1913) and Hans Dülfer (1893-1915) (Masciadri 1988, pp.79-83). After WWI, alpinists began to leave the peaks of the Alps to focus on the highest mountains in the world: they started climbing in North and South America, but especially in Asia. Here, since the 1920s climbers tried to ascend the biggest peaks of the Himalayas such as K2, Nanga Parbat and of course Mount Everest, all above 8.000 meters high, but the first ascents were catastrophic. The earliest expeditions on Mount Everest were carried out by the British in 1921 when they obtained the authorization by the governments of Nepal and Tibet; Younghusband organized and tried the first climb without success, while Mallory and Irvine tried three times, but on the last ascent in 1924 they died alongside seven sherpa bearers (Douglas et al. 2017b, pp.54-55). Even though these ascents were not completed,

they were important as alpinists employed for the first time the oxygen kit. In fact, above 5.200 meters the amount of oxygen in the atmosphere is almost the half compared to the sea level, causing a drastic deterioration of the physical performance. Therefore, oxygen kits composed of several tanks and a mask were invented to ease the ascent, but in the beginning, they were rudimentary and extremely bulky. Over the years these kits had been enhanced and they became always lighter and more efficient, but the employment of them was questioned, likewise the use of rock pitons, as some considered them unsporting and unethical to the essence of climbing (Douglas et al. 2017b, pp.66-67). But the real race to conquer Mount Everest began in the 1950s after the Second World War and it was won by Edmund Hillary and Tenzing Norgay in 1953 when they finally reach the summit of the highest mountain in the world, using oxygen (Douglas et al. 2017b, pp.88-89). Only in 1978 the dispute about if it was possible or not to climb it without oxygen was settled when Reinhold Messner reached the peak only with an ice axe and crampons; considered one of the greatest alpinists in history, he later on climbed all the fourteen 8000ers without oxygen kit radically changing the perception about the body performance at high altitudes (Douglas et al. 2017b, p.144).

During the second half of the 20$^{th}$ century and still nowadays climbing tools and techniques have continued to improve and this permitted climbers to try and complete always more difficult routes, pushing them to their limits (for example, the upgrade of the rock piton, namely the bolt, permitted to climb also faces without many handholds, as it is an enduring piton drilled and cemented into the rock, making the ascent safer as the climber does not need to place removable protections). Firstly, climbers focused on the north faces of the Alps, considered the most complicated to ascend as they are always in the darkness and therefore colder. Secondly, they focused on big wall climbing (above all El Capitan in the Yosemite National Park in California, a rock face of over 1.000 meters high) (Douglas et al. 2017b, pp.128-129). In the last decades, the innovations in tools and gear pushed climbers to the extremes and new branches of the discipline developed such as free climbing, bouldering and free-solo climbing; competitions began to be organized (among the first very important are those held in Arco, a small city near Trento, Italy) and always more people began to practice sport climbing in indoor climbing gyms or in crags all over the world (Masciadri 1988, pp.138-140). These new types of climbing will be analyzed in the following section.

## 2.2 Types of climbing

As already said before, in the last few decades the innovations and upgrades of climbing tools, gear and equipment permitted not only to make climbing a relatively safer discipline, but also to develop new types and variants of this sport. Firstly, it is important to underline the differences between alpinism and climbing in general, as sometimes these concepts overlap, while they refer to different practices. As defined before, alpinism is "the sport of climbing in high mountain areas, especially the Alps", while climbing is defined as "the sport of climbing on rocks or in mountains, or on specially designed walls inside or outdoors[4]" (Cambridge Dictionary); from these definitions both disciplines are described as "the sport of climbing", therefore it can be assumed that alpinism is a type of climbing and the two differ as alpinism is generally performed on long and mixed routes, starting on rock and finishing on ice, snow, glaciers or snowy vertical faces as the climb proceeds and it generally ends when reaching the summit, while climbing is a more general concept that includes a variety of disciplines that will be described in this section: generally climbing can be carried out on shorter or longer routes, on rock or on ice, in the climbing gym or also on small boulders, trees and even buildings.

Rock climbing can be divided into two big areas: free climbing and aid climbing (Linxweiler and Maude, 2018 p.224). The latter consists in using artificial aids and tools to climb upward, like protections placed in cracks and fissures of the rock if it does not present enough natural hand- or footholds or if the pitch is too difficult for the skills of the climbers and this gear permits to support their weight. It is important to say that, from an historical point of view, most rock climbs have been completed thanks to the use of these aids, especially pitons that were hammered into the rock. However, placing and removing pitons ruins the face, creating ever-widening placements and causing what originally were little cracks to slowly become finger or even hand cracks. For this reason, recently aid climbers have begun to reject the idea of hammering pitons, using only the ones that have been placed by earlier parties without removing them, i.e. fixed protections that include not only pitons, but also bolts and copperheads; or employing new and modern tools that permits climbers to ascend in a "clean" way. In fact, clean aid climbing consists in placing tools that do not need the use of a hammer, such as chocks (also called

[4] https://dictionary.cambridge.org/dictionary/english/climbing

nuts) and spring-loaded camming devices (also called cams or friends), which are also used in other types of climbing, but in a different way as it will be explained later on in this section, alongside tools that are used only in aid climbing such as hooks, daisy chains, aiders (also called *etriers* or webbing ladders) and mechanical ascenders (also known as jugs or jumars) (Linxweiler and Maude, 2018 pp.288-289). On the contrary, free climbing is defined as "simply climbing using your own physical ability to move over the rock via handholds and footholds, with the rope and protection used only for safety" (Linxweiler and Maude, 2018 p.224). Therefore, in this type of climbing, gear and tools are used for belaying in case a member of the rope party falls, but they are not employed for aiding the progression, climbers cannot use protections for holding their weight (apart from when they are resting in climbing anchors or belaying stations in multi-pitch routes). Free climbers can, of course, use fixed protection already present on the route or place removable protections such as nuts or cams, but only for belaying. This new approach to climbing originated in the United Kingdom and USA during the 1960s and completely revolutionized climbing techniques as well as the methods of ascending a route (Angriman 2013, pp.868-869). In fact, the development and diffusion of free climbing created a sort of competition between expert climbers: not only trying to complete hard pitches without using tools for progression or for resting, but also conquering them at the first attempt; these types of climbing are called "on sight", when a climber completes a route never seen before, neither in person nor in video or photo, and without information from other climbers, i.e. the route is completed at the first try only by looking at the face just before starting (Angriman 2013, p.861), and "flash", when a climber finishes a route he/she never tried before, but having obtained information from other climbers, or having seen another person climbing it. Needless to say, in both cases the climber must not use protections for aiding the progression, cannot hang up to the tools (for example to quickdraws) and cannot rest (Angriman 2013, p.868).

In addition, free climbing is a discipline that encompasses a series of other subtypes of climbing: sport climbing, traditional (or trad) climbing, bouldering and free solo climbing. Concerning sport climbing, it:

> Involves routes where bolts have been previously drilled into the rock face for protection. The emphasis is on each climber pushing personal physical limits in terms of gymnastic ability, physical strength, and endurance (Linxweiler and Maude 2018, p.225)

Therefore, in this discipline that originated during the 1970s, thanks to these fixed protections climbers can focus only on climbing pushing to their physical limits, as in case of falling they can trust the endurance of these bolts, because they are drilled and cemented into the rock (Güllich and Kubin 1989, p.1). They just need to hook the quickdraw to the bolt and then clip the rope into the carabiner for belaying (Donahue 2016, p.178). Even though there are several long multi-pitch routes that can be sport climbed as they are fully covered with fixed protections, this discipline is mostly practiced in climbing crags (Angriman 2013, p.859), i.e. a rock face that presents several climbing routes one after the other and they are generally single pitch routes, or in indoor climbing, as climbing gym walls are all equipped with fixed bolts and quickdraws (the climber only has to clip the rope into the carabiner).

In contrast to sport climbing, but always a subtype of free climbing is traditional or trad climbing. In this discipline, climbers do not find bolts on the routes, actually they do not find any protection at all: they have to place and remove their own gear during the climb (Linxweiler and Maude 2018, p.225). Thus, being a type of free climbing, in trad climbing not only climbers have to place removable tools for belaying and safety such as nuts and friends, but also they cannot use them for aiding the progression, they are placed only for protection in case a member of the rope party falls (as said before, these tools are also used in aid climbing, but there they can be used for the progression) (Angriman 2013, p.859). The development of this type of climbing has been possible undoubtedly due to the progress in climbing technology and tools, but at the same time the placement of these new protections can be extremely dangerous; when placing gear on a trad route, the climber must be confident that the nut or the cam is placed correctly and that it would certainly hold. The problem is that every crack is different and if a tool held one time, it does not mean that it would hold in all situations. Moreover, during a trad climb 95% of these tools are never weighted nor alone fallen on and for this reason:

> for aspiring trad masters, the absolute confidence to go for it above your gear needs to be accompanied by a critical eye and acute understanding of the complex physics that happen to the gear, the system, and the climber's body in a leader fall (Donahue 2016, pp.112-113)

Another type of free climbing that was born in the last few decades is bouldering. This discipline consists in climbing relatively low boulders without a rope and it was first invented by rock climbers as a way to train themselves (Angriman 2013, p.863).

However, over the years thanks to its intuitive rules, absence of belaying, a generally comfortable environment, and a lot of time to think and try boulder problems alone or with friends, it has become a very popular activity and a sport discipline in itself (Angriman 2013, p.374). For practicing a boulder sequence, it is required only to have a pair of climbing shoes, a brush to clean the holds, chalk to improve hands adherence to the rock and a crash pad, that is a sort of mat placed under the boulder to protect and lessen the climber fall (Angriman 2013, p.380). In fact, as this type of climbing do not require belaying and the height is generally contained, "bouldering is where the hardest moves that have ever been executed happen. The gymnastic standards in bouldering are typically a full grade or more beyond the hardest moves being done with a rope" (Donahue 2016, p.280). For this reason, a climber practicing this discipline is likely to fall much more times compared to a rope climb and that's why not only the crash pad is fundamental, but also the presence of a spotter, i.e. another person that stands near the crash pad and attenuate the climber fall (Angriman 2013, pp.384-385). The rules are easy: beginning from the "start" hold and finishing reaching the "top" hold in indoor bouldering, while starting from the base of the boulder and climbing on top of it in outdoor bouldering (Angriman 2013, p.381).

Another type of free climbing is free solo climbing (or free soloing). This discipline is considered as the most extreme form of climbing, as it involves a climber ascending a route alone, without the rope or protections of any kind. Therefore, it is one of the most controversial climbing disciplines, because in case of falling the death of the climber is almost inevitable and for this reason many consider free soloing a sort of Russian roulette. This type of climbing must not be confused with rope solo climbing, where the climber ascends alone, but using individual protections that permit belaying (Angriman 2013, pp.858-859). One of the greatest feats in free solo climbing has been carried out by Alex Honnold in 2017, who free soloed Freerider on El Capitan, Yosemite, a 35-pitch route of almost 1.000 meters high, which also become the Oscar-winning film "Free Solo".

Moreover, another type of free climbing that has been recently developed is deep-water-soloing (also DWS) which consists in free soloing routes on cliffs right above the sea, thus in case of falling the climber dives into the water (Angriman 2013, p. 866). In addition, there are other types of climbing that because of their characteristics can be considered as subtypes of alpinism and mountaineering, as well as subtypes of free

climbing if the protections are used only for belaying: ice climbing, mixed climbing, and dry tooling. The first consists in climbing iced mountain faces, iced couloirs, or even iced waterfalls using ice axes and crampons. As well as alpinism, where weather and snow conditions must be monitored before attempting an ascent, also in ice climbing ice conditions have to be taken into account as ice formations are very brief and could melt (Linxweiler and Maude 2018, p.448). In mixed climbing, climbers aim to reach the summit by ascending a route that presents rock sections alongside ice and snow sequences:

> Mixed climbing might mean climbing a rock route in the winter, with ice-filled cracks and snow-covered ledges. Or it may involve making an alpine ascent up an icy face broken by a rock band. Or it may be climbing with one crampon on rock and the other on ice, one hand inserted into a crack and one ice tool placed in a frozen smear (Linxweiler and Maude 2018, p.457)

Finally, dry tooling, which can be considered as a type of mixed climbing, consists in "climbing on technical rock with ice tools and crampons to link formations of ice separated by rock" (Linxweiler and Maude 2018, p.448). The difference between these three types of climbing lies in which protections are used: in ice climbing, climbers use ice pitons or screws to ensure belaying, while in mixed climbing and dry tooling they use only rock-climbing gear and tools for belaying operations.

In conclusion, it is important to mention also competition climbing, i.e. official events where climbers compete against each other in a variety of disciplines climbing artificial walls outdoor or indoor: lead climbing (that is sport climbing, therefore ascending a overhanging bolted route going as high as possible), speed climbing (where climbers run up parallel routes and the winner is the fastest at reaching the top) and boulder. The main organizer of climbing competitions and World Championships is the International Federation of Sport Climbing (IFSC) born in 2007 and it is thanks to this organization that climbing officially became an Olympic discipline in 2020 at the Tokyo Olympic Games and it also hosts paraclimbing competitions for athletes with disabilities[5].

[5] https://www.ifsc-climbing.org/index.php

## 2.3 Climbing tools and gear

In this section the most important and fundamental climbing tools and gear will be described and explained, but as this project consists in the creation of a trilingual terminological databank where the majority of tools will be deeply analyzed and compared through definitions and their characteristics resulting in several terminological entries for each language, here only the main and basic features of essential tools will be presented in order to provide a general introduction.

First of all, it is important to say that many climbing tools are subject to international production standards that have to be followed such as ropes, helmets, harnesses, carabiners, pitons, etc. while others do not require a homologation such as quickdraws (even though they consist of two carabiners connected together through a webbing or a sling and the parts that compose the quickdraw are subject to standards and norms) or braking and belay devices that until a few years ago they did not present a specific regulation (Bedogni et al. 2007, pp.112-113), but recently a safety standard has been also produced for these devices by the UIAA (*Union internationale des associations d'alpinisme*, literally the International Union of Alpine Associations[6]), an international body founded in Chamonix in 1932 that over the years had produced a series of norms and standards to guarantee that a certain tool has been made according to specific production criteria and that it ensures reliability in terms of material endurance and duration. This body is composed of 65 participating countries which work together to define these standards and with registered office in Bern, Switzerland. Buying a product with the UIAA label guarantees to the climber that it has been produced following strict standards which are revised and updated every two years. However, the UIAA norms are optional, and it is the manufacturer who decides to adhere or not to these standards. Moreover, this association works alongside the CEN (*Comité Européen de Normalisation*, known as the European Committee for Standardization) that produces and develops European Standards or Norms (ENs) to which producers and manufactures must adhere if they want to put on the market a climbing tool, thus unlike UIAA norms the ENs are mandatory. Therefore, to sell a climbing product in Europe it must follow these production standards and present not only the EN label followed by the number of the

[6] https://www.theuiaa.org/safety/safety-standards/

norm (for example the EN for ropes is EN892), but also the CE (Conforme aux Exigences) label followed by a number that indicates the body or authority that has released the selling certificate. It is important to say that these ENs are not concerned only with climbing or alpinism, but with every kind of activity that employs tools and PPE (Personal Protective Equipment) to avoid and prevent a possible fall from high ground areas. Depending on how they are produced and in which situations they are used, the PPEs are divided into three categories based on three levels of risk protection: category 1, category 2 and category 3, where the latter refers to tools that are used to avoid falls of over two meters high and therefore to prevent serious injuries or even death; it is a Notified Body that controls and analyze these PPEs and decides if they have been produced correctly and these controls are stricter and more numerous if the tool belongs to category 3 (Bressan and Melchiorri 2014, pp.46-50).

To continue, it is essential to talk about the essential tools and gear a climber must have to carry out and perform every kind of ascension, single or multi-pitch. Firstly, the climber must wear climbing shoes; on easy rock climbs or on alpine rock routes, mixed routes and snow routes mountaineering boots can be used throughout the whole ascension, while on more difficult rock climbs specialized footwear is needed such as rock shoes. Many types of these shoes exist like all-around rock shoes, specialized edging shoes, Velcro-closure slippers and so on, but all share the same features, i.e. flexible uppers, smooth soles and rands of rubber which guarantee a great friction when weighted. A compromise between rock shoes and mountaineering boots are approach shoes, which can be used and worn when the approach to the route does not present snow and when the climb is relatively easy and the footholds are relatively large, allowing to use the edging (when "the climber weights the edge of the shoe sole over the hold", Linxweiler and Maude 2018, p.233) and smearing (also called *frictioning* if employed in slab climbing, when "the foot points uphill with the sole of the shoe 'smeared' over the hold, Linxweiler and Maude 2018, p.233) techniques also with these shoes; but generally on harder climbs rock shoes are the best option (Linxweiler and Maude 2018, pp.225-226).

Another gear that must be part of the climber's equipment is the rope, that is essential for belaying. In fact, the rope is attached to the harness of the first climber and at the same time to the harness of the belayer and then it is clipped to carabiners or quickdraws that have been previously placed and locked on removable or fixed

protection, pitons, and bolts to prevent and arrest a fall by using a belay device that applies friction force to the rope. In the past nylon climbing ropes were used, but now they have been replaced by kernmantle ropes which "are composed of a core of braided or parallel nylon filaments encased in a smooth, woven sheath of nylon" (Linxweiler and Maude 2018, p.150). The main characteristic of these ropes is that they are very elastic, and this is a fundamental component to protect a climber in a fall; as a matter of fact, static ropes are not used for belaying or lead climbing, as the absence of flexibility can generate impact forces that could endanger the anchor system or cause injuries to the fallen climber as the fall is abruptly stopped. On the contrary, dynamic ropes such as kernmantle ropes are used for climbing and belaying as they are able to reduce the impact force of a fall by stretching under the weight of the climber producing a softer and absorbed stop which cause less damage to the rope party member as well as to the anchors. There are several types of dynamic ropes which vary in length (they range from 30 to 70 meters, but the most common and used are of 60 meters), diameter (from 7 to 11 millimeters) and characteristics (Linxweiler and Maude 2018, p.150-151); moreover, mainly three kinds of dynamic ropes are used by climbers: single ropes, which present the symbol "1" and can be used alone by the rope party; half ropes, which indicate the symbol "½" and must be used together with another half rope; and twin ropes, which are recognized by two circles that partly overlap and must be employed in pairs as if they were a single rope (Bressan and Melchiorri 2014, p.53).

Another important and essential gear is the harness: "climbers connect to the rope using a harness designed to distribute the force of a fall over a larger percentage of the climber's body. A climber at either end of a climbing rope ties into the harness with a knot such as the rewoven figure eight or a single bowline" (Linxweiler and Maude 2018, p.165). Nowadays, the most common type of harness used in climbing is the seat harness, which consists of adjustable leg loops that ensure a comfortable seat when rappelling; these loops as well as the waist belt are padded providing comfort. It is provided with a belay loop where a belay device can be attached for belaying or rappelling, and also with gear loops which permit to carry carabiners and other tools, harness buckles, rear riser straps and a keeper strap. Apart from the seat harness, other harnesses exist such as the chest harness or the full-body harness, but they are not so popular amongst climbers as a fall could spin the climber out (Linxweiler and Maude 2018, pp.165-167).

Other important tools that are used in every type of climbing are the helmet, which protects the climber from rockfall, gear accidentally dropped by other climbers or possible impacts and hits against the rock; two main types of helmets exist, hardshell helmets and lightweight foam helmets (Linxweiler and Maude 2018, pp.163-164), but both must have ventilated air vents and an internal and adjustable structure that permits to regulate the distance between the forehead and the shell (Angriman 2013, p.430). Runners (also called slings) are loops of tubular webbing (not to be confused with flat webbing that is used for pack straps, even though tubular webbing also lies flat) or cord very employed in climbing and with a variety of usages such as natural anchor rigging, equalizing belaying stations, attaching the anchor to the rope, and so on; it is important to stress that webbing and cord are not dynamic and must be used alongside a dynamic rope, otherwise also a very short fall will cause massive damage to the anchor system and to the climber. Many types of runners exist of different lengths and widths (single, double and triple-length), they can be previously sewn, tied or tie-off loops (also called hero loops) and are all made of Dyneema and Spectra, two kinds of strong polyethylene fibers (Linxweiler and Maude 2018, pp.167-168). Also, carabiners are

> another versatile and indispensable climbing tool used for belaying, rappelling, […] clipping in to anchors, securing the rope to points of protection, and numerous other tasks. All modern carabiners are marked with the "working load limit", that is, the force at which the carabiner will fail (Linxweiler and Maude 2018, pp.168-169)

Carabiners can be of different shapes and sizes; among the most common and employed there are oval carabiners, standard D carabiners, offset D carabiners, bent-gate carabiners (often used in quickdraws to attach to the rope and bolt hangers) and wire-gate carabiners which have a nonkeylock latch, while standard locking carabiners and pear-shaped HMS locking carabiners (also called *pearabiners*) consist of a keylock latch and present a sleeve that covers one end of the gate to prevent accidental opening or a spring that rotates the sleeve on its own when the gate is being closed (Linxweiler and Maude 2018, pp.169-170). Another common item used by almost every climber, even though it is not considered as life-saving or essential is chalk. Chemically known as magnesium carbonate, this substance is used by climbers (and also by gymnastics athletes) to absorb sweat on the hands and improve the grip on the holds. It can be purchased as loose powder, crushable blocks or in mesh refillable balls (mainly used in climbing gym as they reduce

significantly chalk spillage and this improves air quality in indoor areas) (Linxweiler and Maude 2018, p.226).

To continue, the following tools will be described only superficially as they are more complex in their use and components and therefore, they will be deeply explained and compared in the terminological entries of the terminological databank and in the last chapter of this thesis where the main features, characteristics and usages of all tools and gear will be analyzed in detail. Very important are belay devices as they are essential for carrying out a safe belaying in case of falling:

> belay devices multiply the rope friction and the grip strength of the belayer's braking hand by passing the rope through an aperture, wrapping it around a post in the device, and passing the rope back out through the aperture. This configuration provides a warp, or bend, in the rope to assist in producing a stopping force. The post is usually a locking carabiner or a part of the belay device itself (Linxweiler and Maude 2018, p.178)

Thus, belay devices do not function on its own, as the belayer's hand is the fundamental source of friction; in fact, to stop a fall, the belayer must pull back with the braking hand on the end of the rope, creating an angle of at least 90 degrees and increasing the braking force. These devices are clipped into the carabiner on the seat harness belay loop. Many types of belay devices exist, and they can all be used also for rappelling as descenders, while some can be employed to belay only the leader of the rope party (such as tubular devices) and other also one or two followers (like the Reverso, the Gigi plate or guide plates in general). There are three main categories of belay devices: aperture belay devices that provide an opening though which the rope is pushed and clipped, such as Sticht plates (the first mechanical belay and rappelling device, now less popular), figure eights (some can be used only for rappelling, others also for belaying) and tubular devices (such as the Black Diamond ATC, and these devices present a wire loop that is clipped to the carabiner on the harness); auto-locking belay devices, which are similar to aperture devices, they can be considered as an upgrade of tubular devices presenting an alternative rigging mode that permits to belay also one or two followers at the same time, such as the Petzl Reverso 4; and finally assisted-braking belay devices such as the Petzl Grigri, that consist of an internal cam that automatically locks the rope in a fall and they are used mainly in indoor, sport and crag climbing (Linxweiler and Maude 2018, pp.179-181).

Moreover, to permit belaying, the rope must be clipped to carabiners and quickdraws and these must be clipped to protections that can be fixed, thus already placed on the

rockface by other climbers, or removable, i.e. the leader places the protection and then the follower removes it. Amongst fixed protection there are bolts and pitons: the first are fixed anchors or artificial protections driven into a rock hole that has been previously drilled. They consist of a U-shaped bolt hanger to which the carabiner can be clipped, and they are commonly used in sport climbing routes, crags or indoor climbing, but also in some aid climbing routes where belay stations are bolted with two or more bolts (Linxweiler and Maude 2018, pp.187 and 255). These tools adhere to the rock hole by a process of expansion and there are mainly two types: ring bolts (also known as Spit that is the acronym of *Société de Prospection et d'Inventions Techniques*, the first company that invented it; the first type of Spit was the Spit ROC, but now it has been upgraded and substituted by the Spit FIX, so generally when talking about ring bolts the reference is to the Spit FIX) and glue-in bolts, which are fixed to the rock by using liquid chemical resins (Bressan and Melchiorri 2014, pp.86-87). On the other hand, pitons are metal spikes pounded and hammered into rock cracks and provided with an eye hole where the carabiner can be attached; these tools are generally removed after use by the follower member of the rope party, but sometimes they are left in place, therefore they stand in between fixed and removable protections (Linxweiler and Maude 2018, pp.187 and 256). Several types of pitons exist, but they will be deeply covered in the terminological entries. Concerning removable protections, which are used generally in traditional climbing or aid climbing routes, there are two main categories: passive removable protections, i.e. without moving parts, such as chocks, nuts, stoppers, tricams, etc. (made from a piece of metal that is placed into the cracks and a connecting wired cable) and active removable protections, i.e. with moving parts, such as spring-loaded camming devices (also called Friends) and spring-loaded nuts, but these complex tools will be deeply explained later on. Finally, it is important to also name the tools and gear used exclusively in aid climbing. Apart from all the above tools which are obviously also employed in aid climbing routes, there are several materials that are used only in this discipline, like aiders (also called *etriers*, which are webbing ladders clipped to a protection), daisy chains, fifi hooks and hooks in general, mechanical ascenders (also known as jugs or jumars) and portaledges (Linxweiler and Maude 2018, pp.292-300), but also these tools will be analyzed in depth in the last chapter of this elaborate.

## 2.4 Climbing techniques, belaying, and rappelling

At a first glance, climbing seems an activity that requires a lot of arm strength; of course, well-trained climbers can ascend a certain section only using strength, but they will burn out very fast. On the contrary, mastering an efficient combination of balance, handwork and footwork techniques permits to climb also long routes saving a lot of energy: strength alone is not sufficient (Linxweiler and Maude 2018, p.227). First, footwork is fundamental as a good one allows the climber to maintain balance on the rock face. It is important to look for comfortable footholds, make short steps and stand erect over the feet as this position produces a down-pressure that increases the foot grip on the rock: climbing efficiently means using mainly footwork and leg muscles to reach the next handhold; hands should be used only for balance. Another important technique is to always maintain three points of contact, thus two hands and one foot or vice versa two feet and one hand must be weighted on the rock simultaneously, as this increases the center of gravity improving stability (Linxweiler and Maude 2018, p.228). Alongside other basic techniques that can be used in all types of climbing very important are the downward pressure (i.e. place the fingertips or the hand on the hold and press down), counterbalance or flagging (that means maintaining balance by distributing the body weight, placing a hand or a foot in a certain location on the rock face) and dynamic moves (also called dyno, a sort of lunge from one hold to another that is too far to be reached in a static way) (Linxweiler and Maude 2018, pp.229-230). Moreover, regarding handholds, several techniques exist depending on the kind of rock hold: for example, a jug, i.e. a large hold, allows to place the entire hand, while smaller open grips only some fingertips and require crimping the hold by curling the other fingers and move the thumb over the index (this handhold technique is therefore called crimping); sometimes the hold is so small that only fingers can be used, and these handholds are called thumb pinch (employed for example on tiny ledges), finger pinch, two-finger pocket and mono pocket among others. Handholds that are at the height of the climber's head are perfect for resting, another important technique where a climber hangs on a straight arm while the other is outstretched, and this activity is less tiring than keeping the arms bent (Linxweiler and Maude 2018, pp.231-232). Also for footholds two main techniques are employed, edging and smearing, but these have already been briefly explained previously in this chapter; it is important to add that in large footholds also called buckets it is better not to

put the foot too far into it as this reduces balance and it is advisable to put only the tip if possible and regarding smearing, this technique is mainly used in slab climbing by flexing the ankle, lowering the heel and keeping weight over the feet to improve friction (Linxweiler and Maude 2018, pp.233-234). Other techniques are the mantel (employing the down pressure technique to get the feet on the same hold where the hands are), stemming (a counterforce technique where the climber presses in opposite directions with feet and hands and it is used in crack climbing, chimneys, that are cracks big enough to be climbed inside, and dihedrals) and undercling (i.e. placing hands with the palms up and pull outward beneath a rock lip while pushing with the feet) (Linxweiler and Maude 2018, pp.234-236). The last basic and important technique is liebacking, used in crack climbing, but also in other types by combining it with other techniques, which consists in pulling the hand on one direction and pushing the feet in the opposite direction while the body is leaned back to the side, far from the crack (Linxweiler and Maude 2018, p.241). Finally, a combination of these basic climbing techniques is fundamental to overcome overhangs and roofs, traverses (traversing consists in climbing horizontally, going sideways across a section) and to exit onto ledges or to down-climb (Linxweiler and Maude 2018, pp.246-249).

In addition, it is extremely essential to also explain the basic features of belaying, already explained before, but as it is the technique that can save the life of climbers, it is important to spend a few more words about this topic. As already mentioned, belaying is the technique that permits to stop the fall of a climber by using a rope, a belay device, a belay anchor, i.e. a secure point to which the whole belay system is attached, and the skills of the belayer who has to be responsive and ready to pull back the rope.

> On a climb, belay setups are usually established on the ground or on a ledge that provides reasonable comfort and the possibility of solid anchors. A long climb is divided into sections, with one climber taking the lead and, belayed from below, moving up the route to the next desirable stopping spot and setting up a new belay. The distance between belays is known as a pitch or a lead (Linxweiler and Maude 2018, p.172)

There are three main types of belay scenarios: the slingshot top-rope belay, where the anchor is on the route top with the rope already set up and the belayer belays at the bottom, therefore the rope runs down towards the belayer who takes it in as the leader continues to ascend and this technique is used mainly in crag or indoor climbing; the lead belay, where the climber leads the route and places protection while going up, thus before the

leader clips the rope the belayer has to give the leader some slack in order to ease clipping and then, after the rope has been clipped to a protection it eventually drops down and the belayer has to be ready and move the rope to reduce slack, as the force of fall depends on how above the climber is from the last protection and excessive slack can extend and protract the fall even more; and finally the follower belay, where the leader, after completing the pitch, starts to belay the follower, also known as second (who has obviously finished belaying the lead climber), from the top of the pitch where another belay station has been rigged and this technique is similar to the top-rope belay, as the rope moves up towards the anchor (Linxweiler and Maude 2018, pp.172-174). To carry out a safe and secure belay, the belay anchor to which the belayer is attached must be solid because if it doesn't hold not only the leader would fall, but also the belayer and the whole rope party. There are three types of belay anchors: natural anchors such as good-sized trees, bushes or rock features like pillars, columns, horns and tunnels; fixed and artificial anchors already placed by other climbers, which create fixed belay stations consisting of two or more bolts; and removable anchors built and removed after the pitch has been completed by climbers using removable protections placed into rock cracks (Linxweiler and Maude 2018, pp.185-187).

To conclude, the last essential technique used for descending a route (if a trail to come back is not present) when it has been completed of if a climber gets injured and cannot continue is rappelling. This technique is carried out using four basic elements: an anchor, a rope, a rappel method that applies friction to the rope through a rappel device (which as stated above in the previous section, all belay devices can also be used as rappel devices, such as tubular devices, the Reverso, plates etc.) and obviously a climber rappelling. Firstly, a rappel system must be attached to a reliable anchor, which can be natural such as tree trunks and rock horns where a sling with a rappel ring is tied around the anchor and the rope is looped through this ring, or artificial made with bolts or pitons, where a carabiner or a quick link is attached to them, two slings or previously placed bolted chains with a rappel ring are clipped to the carabiners or quick links and finally the rope is looped through the ring; thus, in both cases the midpoint of the rope is looped through these rappel rings and both ends of it hang down (Linxweiler and Maude 2018, pp.202-203). Then, the two ends of the rope are passed through a rappel device that is attached to the harness and creates friction (i.e. a mechanical friction system), or if a

climber has no rappel device in case of emergency the rope can be wrapped around the body (i.e. a nonmechanical friction system) such as the *Dulfersitz* technique (Linxweiler and Maude 2018, p.204). However, nonmechanical systems are used only if no other devices are available and the most common rappel method is the mechanical by using a rappel-belay device:

> The two strands of rope at the rappel anchor are inserted into the rappel device, which is then clipped with a locking carabiner to the climber's harness, in much the same way as for belaying. During the rappel, the bends in the rope that pass through the device and around the locking carabiner apply friction, magnifying the force exerted by the climber's braking hand. The position of the braking hand, which holds both strands of rope below the device, provides a controlled descent. The rappel device and the braking hand together control the speed of the descent and allow the rappeller to halt the descent at any time (Linxweiler and Maude 2018, p.211)

### 2.5 Climbing rating systems

A rating system is fundamental as it helps climbers to decide if they can challenge a certain route or if it is above their skill levels. The first rating system was developed at the beginning of the 20$^{th}$ century by Willo Welzenbach, it featured Roman numerals, and it was officially used by the UIAA (Linxweiler and Maude 2018, p.569). Since then, many different rating systems have been developed and today there are seventeen; as this thesis revolves around rock climbing, only the main and most important rock-climbing rating systems will be explained, i.e. the UIAA, the French, the Yosemite Decimal System and the Sherman V-scale for bouldering, while the Australian, Brazilian and British rock-climbing rating systems will be left out, as well as rating systems for alpine climbing, aid climbing, ice climbing (New England ice rating system) and mixed climbing (Modern Mixed Grade).

The UIAA rating system, as explained above, uses Roman numerals from I to XII and starting from the V level pluses and minuses are added; the French rating system, on the other hand, is the most used in southern Europe and it consists of ratings from 1 to 9b+, as from grade 6 and above they are subdivided into a, a+, b, b+, c, c+ and 9b+ is comparable to XII in the UIAA rating system (Linxweiler and Maude 2018, p.575). Actually, the book used for this reference "Mountaineering, the Freedom of the Hills" is not fully updated. In fact, 9b+ is not nowadays the higher rock-climbing grade, as Adam Ondra completed the first ascent of Silence, rated 9c, in 2017, Sébastien Bouin conquered

DNA, another 9c in 2022 and in 2023 Jakob Schubert ascended B.I.G, also graded 9c[7]. Regarding the Yosemite Decimal System, it ranges from 5.2 to 5.15c (the 9c routes above are comparable to 5.15d) and from 5.10 ratings are subdivided into a, b, c, and d levels. The 5.15c grade is comparable to XII in the UIAA and to 9b+ in the French rating system. Finally, bouldering has a unique rating system called V-scale developed by John Sherman and it starts at V0-, which is comparable to 5.8 YDS, 5 in the French rating system and V+/VI- in the UIAA rating system. It continues with V0 and V0+ and then from V1 pluses and minuses disappear ending with V16 that is comparable to 5.15c YDS, 9b+ in the French rating system and XII in the UIAA rating system (Linxweiler and Maude 2018, pp.570-573).

After having explained and analyzed the domain of this project, in the next chapter the methodology and the terminological approach that have been employed to produce this thesis work will be underlined, focusing on corpus-based terminology, concept systems, and how to make a concept system and a lexical network, as well as on the software that have been used to create and manage them.

[7] https://climbing-history.org/list/5/hard-sport-climbing-ascents

# 3. Methodology and terminological approach: concept systems, lexical networks, and corpus-based terminology

As already explained before, a terminology work or project consists of a number of planned activities that have to be followed in order to produce a coherent and consistent termbase: the identification of concepts and their relations, the analysis and structuring of concept fields, the analysis and development of concept systems, the visualization of concept systems through the creation of concept diagrams and concept models, the definition of concepts, the assignation of linguistic or non-linguistic designation to concepts and the creation and maintenance of terminology resources in electronic media (ISO 704:2022, p.VI). During this chapter, the methodology and the terminological approach used and employed for this project will be analyzed and explained. Therefore, particular attention will be paid to concept systems and the production of concept diagrams, as well as to lexical networks as knowledge representation and multidimensionality in terminology is fundamental to present unambiguous conceptualizations: not only a domain concept system should be built, but also a lexical network made of terms and relationships between terms that is created through the development of a corpus focusing on the same domain from which terms are extracted from a collection of texts as the combination of these two types of diagrams or networks can enrich and consolidate the concept system and therefore domain-specific conceptualizations (Santos, Costa 2015, p.163). Thus, not only concept systems and lexical networks will be analyzed, but also corpus-based terminology, focusing on how to build and work with corpora with the aim of extracting terms. In addition, also the software used for building concept systems and lexical networks regarding this project domain will be described, namely Miro, as well as the software used for creating the corpus employed for extracting climbing terms, namely Sketch Engine, and finally the software used for the compilation of terminological entries that constitute this terminological work and termbase about rock climbing, namely FAIRterm. The concept systems, lexical networks and the corpus built and used for this project will be explained and depicted in chapter 4, while the most important and interesting terminological entries and linguistic phenomena will be analyzed in chapter 5, providing a complete list in an appendix at the end of this thesis.

### 3.1 Concept system and lexical network

According to ISO 1087:2019, a concept system or a system of concepts is a “set of concepts structured in one or more related domains according to the concept relations among its concepts”, while a concept diagram is a “graphic representation of a concept system” and a concept model is a “concept diagram formed by means of a formal language” (ISO 1087:2019, p.6). Thus, a terminology work is essential to develop a concept system, and the position of each concept within it is set by the intension and the extension. This system also determines the inheritance principle if it is built on generic relations, as specific concepts inherit some characteristics from their generic ones; therefore, concept systems are cognitive tools used for modeling concepts and relationships between concepts that are part of a concept field representing a particular domain, for clarifying concept relations, for laying the groundwork for a standardized terminology, for facilitating the analysis of concepts and their designations within natural languages, for helping definitions writing and finally for including all important concepts in the development of a terminology resource (ISO 704:2022, p.26).

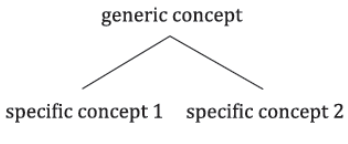
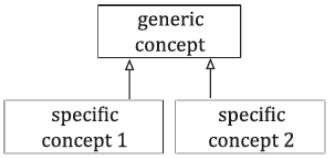
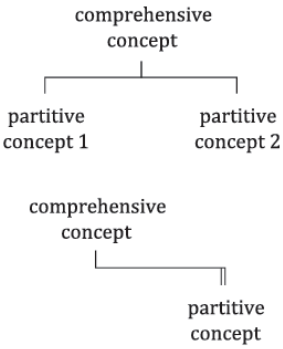
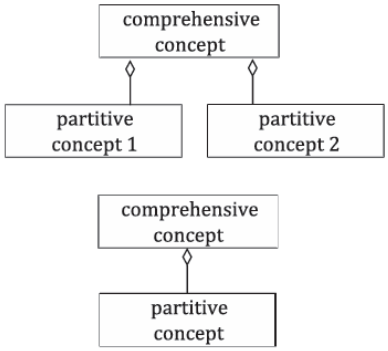
First of all, a concept system must be developed starting from the analysis of a particular subject field and then concept diagram(s) or model(s) can be structured according to and following a series of operations, such as the selection of a concept field, its most important concept and designations by accurately observing the domain or subject that has been chosen; the analysis of concept extension and intension; the determination of which relationship and which position a concept occupies in the system; the visualization of the concept system that has been developed through concept diagram(s) or model(s); the production or the identification and analysis of definitions for the concepts, and this operation must be carried out by observing the relations between concepts; and finally, the attribution of designations to concepts. Consequently, given these operations, it is clear that producing a concept system and defining concepts are very similar activities as definitions reflect the system; thus, “if appropriate definitions already exist, the concept relations within the concept system shall be established primarily by analyzing the characteristics of each concept included in its definition” (ISO 704:2022, p.26).

In addition, concept systems can be developed in the form of a diagram or a model by adhering to a series of criteria and standards: they must be clear, helping users to

quickly understand and visualize the domain of the diagram or model; they must be intelligible, thus intuitive and user-friendly by containing the number of concepts and their relationships showing only the most relevant ones; they must be transparent by representing the relations and their subdivision criteria in the simplest way; and they must be extensible, thus they have to be expandable and modifiable (ISO 704:2022, p.26).

Moreover, not only one type of concept system exists, but several according to the different concept relations that are represented into it such as generic concept systems, partitive concept systems, associative concept systems and mixed concept systems. In the first one, all concepts are organized and structured as generic or specific concepts, in the second one, all concepts are related through comprehensive and partitive concepts, in the third one, all concepts are linked to each other by associative relationships, and these can be different within the same system, thus in many cases they are clarified by a label that indicates the type of associative relation near or above the line that represents the relationship, while in the latter one, all concepts are related through mixed and combined types of relations; this last type of concept system is the one that has been used for the development of the concept system about rock climbing that will be depicted and explained in the next chapter. Furthermore, according to the number of subdivision criteria that are used to develop and organize the system, two main kinds of dimensional concept systems can be produced: monodimensional concept systems, in which only one subdivision criterion is employed in order to subdivide superordinate concepts; and multidimensional concept systems, where more than one subdivision criterion is used for subdividing superordinate concepts (according to ISO 1087:2019, a criterion of subdivision or a subdivision criterion is a “type of characteristic according to which a superordinate concept is divided into subordinate concepts”) (ISO 1087:2019, p.5). Also based on the amount of immediate superordinate concepts, the concept system can be divided into two types, namely monohierarchical concept systems, where all subordinate concepts have just one immediate superordinate concept, and polyhierarchical concept systems, in which all subordinate concepts present two or more immediate superordinate concepts (ISO 704:2022, p.27).

The table below has been taken from ISO 1087:2019 annex A (p.19) and it is useful as it indicates and illustrates how graphical means are used in concept diagrams (on the left) and concept models (on the right):

| Type of concept relation | Concept diagrams[a,b] | Concept models[<?>] |
|---|---|---|
| generic relation (see 3.2.13) |  |  |
| partitive relation (see 3.2.14) |  |  |
| associative relation (see 3.2.23) |  |  |

[b] In concept diagrams, a thicker line (not shown in this table) in the context of generic relations indicates a criterion of subdivision.

*Figure 1 - Concept diagrams vs. concept models*

However, the development of a domain concept system starting from an onomasiological approach, extracting concepts directly from experts in the field and then mapping signs to the concepts after having established a concept system is not sufficient alone to develop a consistent, unambiguous and reusable model, but it has to take into account also the semasiological approach, in which terms are identified in texts or context, generally provided by specialized corpora and then words are mapped to their meanings, and these two approaches are complementary and have to be used simultaneously or one after the other, as they enrich and improve themselves reciprocally (Kageura 2015, pp.53-54). The importance of using an extra-linguistic approach alongside a linguistic one, developing not only a concept system, but also a lexical network has been underlined by Claudia Santos and Rute Costa in their article "Domain specificity" written and published in 2015 in the Handbook of Terminology. In this paper, they explained that they have constructed a concept system departing from the domain "Biological Treatment of Wastewaters" alongside a team of experts, where the main conceptual relations used were

generic (indicated with the label *is_a*) and partitive (or part-whole relation, indicated with the label *part_of*). In this first step, they identified a domain-related set of concepts (Santos & Costa 2015, pp.163-164). After having developed the concept system, they focused on the linguistic approach, as texts are considered to be knowledge in action and given that knowledge expresses itself through linguistic elements, they tried to build a lexical network that could reflect and enrich the concept one; thus, they started analyzing corpora and lexical units in their discursive context using the automatic term extraction feature to identify term candidates and lexical-semantic relationships between them (Santos & Costa 2015, p.169). The aim was to study the same domain that had been analyzed through onomasiology employing semasiology, focusing on the extraction of lexical data that could be used to construct a linguistic network made of relations between terms; and this was achieved thanks to corpus-management software that permitted not only to extract relevant terms, but also concordances and lists of term candidates: "the lexical network is a result of a cognitive transfer process between linguistic data and conceptual data graphically represented" (Santos & Costa 2015, p.170). The result was a lexical network that sometimes reflected the concept system, while other times differed and adding or deleting terms or relations between terms was necessary to improve and enrich bot networks:

> The linguistic analysis of the selected sequences allowed for the construction of several lexical networks connected by hierarchical (generic and partitive) and non-hierarchical relations (associative). The maps corresponding to each sequence and the total map were submitted to the comments and validation of the experts. The final map had a similar graphic aspect to the concept map built directly with the experts. It was possible to assemble all text sequences into a single lexical network (Santos & Costa 2015, pp. 174-175).

To conclude, the terminological data identified and extracted from both the onomasiological and the semasiological approaches contribute and help to construct the concept system and to specify conceptualizations; not only experts were consulted, but there was also the need to employ natural language as a mediator in specifying domain-related concepts. In fact, the lexical networks that have been produced revealed similarities with the concept system, indicating that specialized texts can in part reflect a conceptual organization, as natural language processing is able to simultaneously activate both the conceptual and the linguistic spheres. Moreover, it is also fundamental to underline that not only the cooperation between experts and terminologists is important, but also the terminologist previous knowledge of the analyzed domain as it can improve

and facilitate the development of lexical networks, as well as the identification of implicit concepts (Santos & Costa 2015, p.176). Therefore, applying these two methodologies and employing a mixed and complementary approach is recommended, and even though there is no arbitrary order, it is advisable to start from onomasiology and then use semasiology to confirm and approve concepts representation, as texts could contain inaccuracies or implicit knowledge that could distort conceptualizations:

> The lexical network built from text sequences extracted from a text for special purposes reflected a conceptual organization, evidenced by the proximity with the concept map. The graphic representation of the lexical network, the terms, and their relations, were accepted by the experts, hence the linguistic representation was valid. It was observed that, deriving from text, it was possible to represent a set of complex relations that may enrich the initial concept map. In many cases the linguistic markers that were used enabled the conceptualization to be clarified. That fact confirms that the text may play a decisive role in knowledge representation. However, as previously stated, a text for special purposes may not contain a prototypical structure. A set of lexical data is not ready for automatic transfer to computational knowledge bases. The results of the analysis of the maps indicate that it is not only the representation of data that is at stake. Data are also at stake. Consequently, a text may appear an extremely useful operational and cooperative element, facilitating the representation of conceptualizations. But alas! It may also result in a highly disturbing tool (Santos & Costa 2015, p.177).

Consequently, terminology has a double dimension, both conceptual and linguistic, as no term can exist without its concept, and concepts are characterized by an extra-linguistic nature, as a concept can exist autonomously and does not require a term to prove its existence. Thus, it could be possible to depart from semasiology and use words to extract lexical networks and only later, as terms denote concepts and linguistic relationships can be translated into conceptual ones through language, a concept system can be developed from the linguistic network (Roche 2015, p.130). However, concept systems extracted and developed from specialized texts does not always match with networks constructed by experts through formal language, as "the lexicon of languages does not reflect the scientific approach of the world" (Rastier 2004 in Roche 2015, p.131). That is why it is advisable to depart from onomasiology:

> Only conceptualization, which is not a matter of linguistics but of science in that it attempts to extra linguistically model a reality, is standardized. Natural language itself cannot be standardized, and terms may be polysemic. The one element about which a consensus must be reached – as is the case in all sciences – are the concepts' formal definitions and their identifiers. Linguistic diversity is preserved and, provided the same *view* of the world is shared (conceptualization), it becomes much easier to create multilingual terminologies and find linguistic equivalents (Roche 2015, p.133).

The importance and the cooperation between linguistics and extra-linguistics, lexical networks and concept systems are depicted in the figure below, which underlined

the fact that terminology is focused on three notions, namely the term, the concept and the relation between them as its aim is to establish a relationship between units of language for specific purposes, i.e., terms, and between units of understanding in a domain outside linguistics, i.e., concepts (Roche 2015, pp.133-134). The figure has been taken from the article "Ontological definition" by Christophe Roche in the Handbook of Terminology (2015, p.134) and it is essential to underline, as it is the graphical mean that has been also used for the production of concept systems and lexical networks for this project, that in order to distinguish between conceptual and linguistic sign systems, concepts are represented between single chevrons (<…>) and are written with the capital letter at the beginning, while terms are represented between double quotations marks ("…") and are written with a small letter, instead of a capital one, designating a concept.

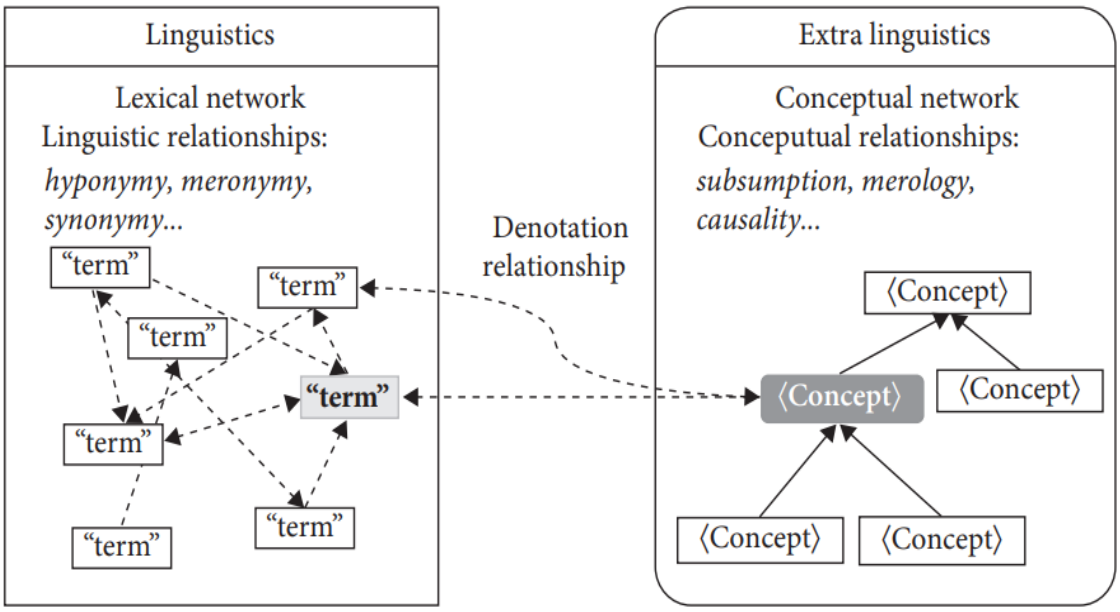



*Figure 2 - Lexical network vs. concept system*

### 3.2 Miro

The software that has been used to build and develop the concept models and lexical networks about rock climbing for this project is Miro, an application that provides a visual workspace where users can design and produce several kinds of maps, models, diagrams and workflows starting from a default template provided by the software or departing from scratch; for example, users can employ Miro for developing process mapping, retrospectives, mind mapping, scaled product planning, whiteboarding, technical diagraming, wire framing, flowcharts, strategy and planning, and so on. All the information and screenshots concerning this software has been taken from the official website,[8] where maps can be built directly online using the dashboard or by downloading the application on the computer.

This software used by more than 60 million people and by big companies such as Nike, Ikea, and Ubisoft (https://miro.com/index/), allows to strategize and plan strategies, goals, and initiatives through the visualization of tasks and priorities, allows to work together with a team on the same project, enabling all members to modify and improve diagrams and tables, and helps to develop new innovations and ideas. However, features like product development workflows, workshops and async collaboration, content and data visualization have not been used for the purpose of this project, leaving aside all company-related tools, and focusing on diagraming and process mapping for building and constructing the terminological concept models and lexical networks. In fact, the online dashboard permits to easily develop maps and diagrams in an intuitive way, and it provides an extensive number of shapes and connectors to link them and to present the relationships between them. For these reasons, this is one of the best software for developing concept systems, also enabling users to present their work through the presentation mode, to change and modify the colors, shapes, font size and type through creative formatting options and to add supporting contents such as images and documents as the canvas that can be produced are relatively infinite.

As stated above, a concept system or a lexical network can be built using Miro starting from a default template provided by the software, or from scratch; employing a pre-built template like the one depicted below permits, of course, to spare and save some

[8] https://miro.com/index/

time, as it is easily modifiable by deleting unnecessary shapes or adding and changing sticky notes, connection lines, text and even the board's background. Nevertheless, if no template accommodates the user needs and ideas, it is always possible to start the diagram from zero, placing the first shape individually.

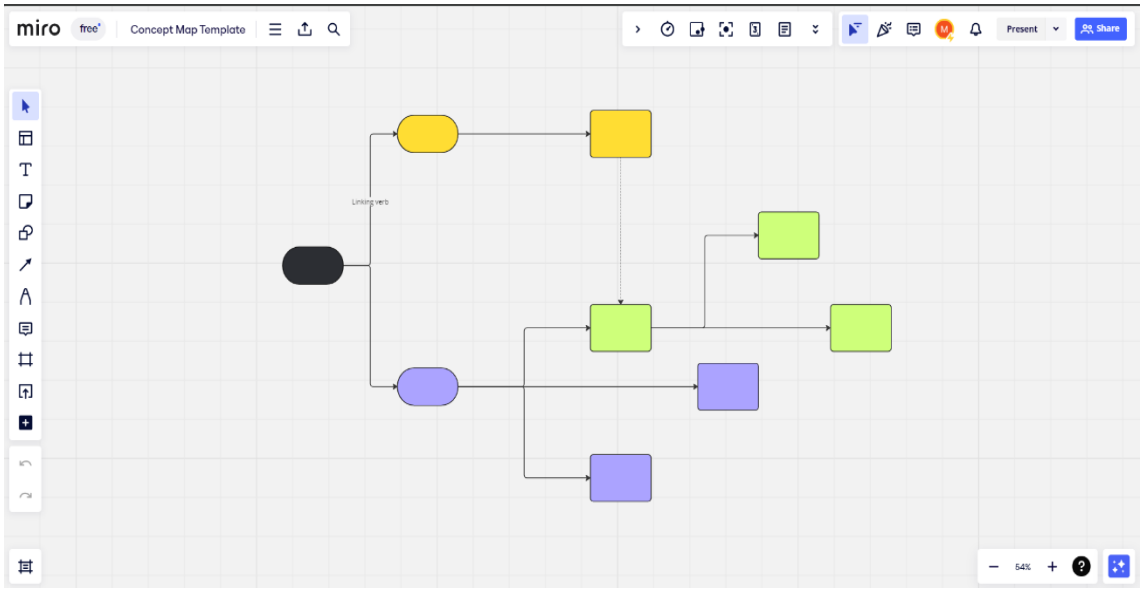



*Figure 3 - Example of a pre-built template*

Another important feature that the software provides is the possibility to build UML (Unified Modeling Language) diagrams, that are very useful for building concept models and lexical networks (ISO 704:2022, p.26). The features provided are the same as before: shapes can be labeled, divided into different colors for helping to establish a hierarchy or deleted, if necessary; connection lines for depicting the relationships between shapes can be rearranged and dragged around; and the template is fully customizable by changing shape sizes, colors, arrow directions and line styles. A default UML diagram template already exists, but also in this case it can also be made from scratch.

First, to begin building a diagram on Miro just browsing the website and enter the homepage, as shown in the picture in the next page, and then click on the upper right icon "go to the dashboard" (also present at the center of the homepage).

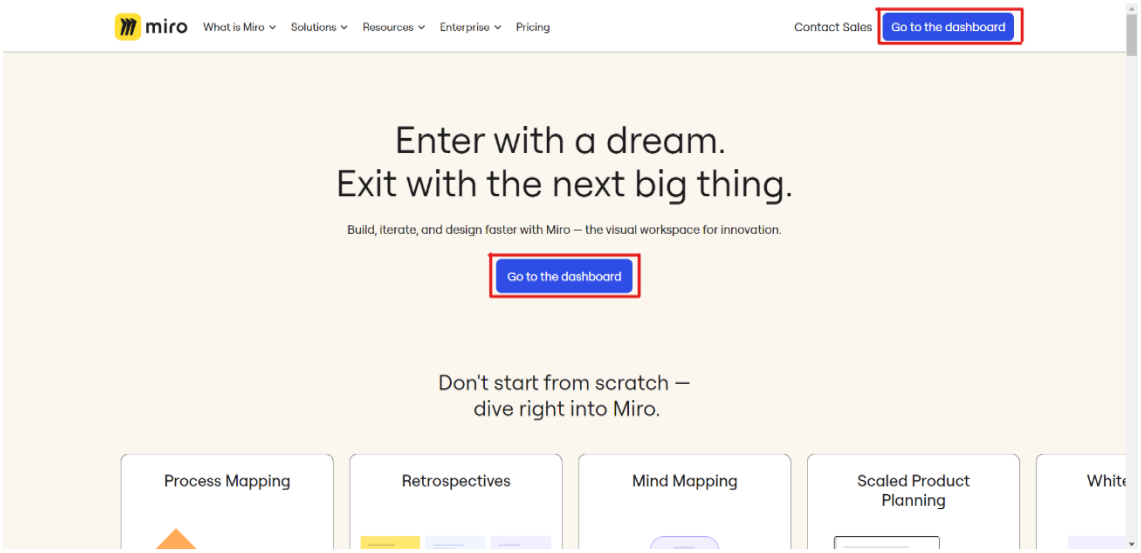



*Figure 4 - Miro homepage*

The icon redirects to the dashboard depicted below, where a new map, diagram or model can be developed by clicking on the blue icon "new board"; on the right side of it boards and projects that have been already started and saved are shown. Just click on any of them to resume and get back to work on a previous project.

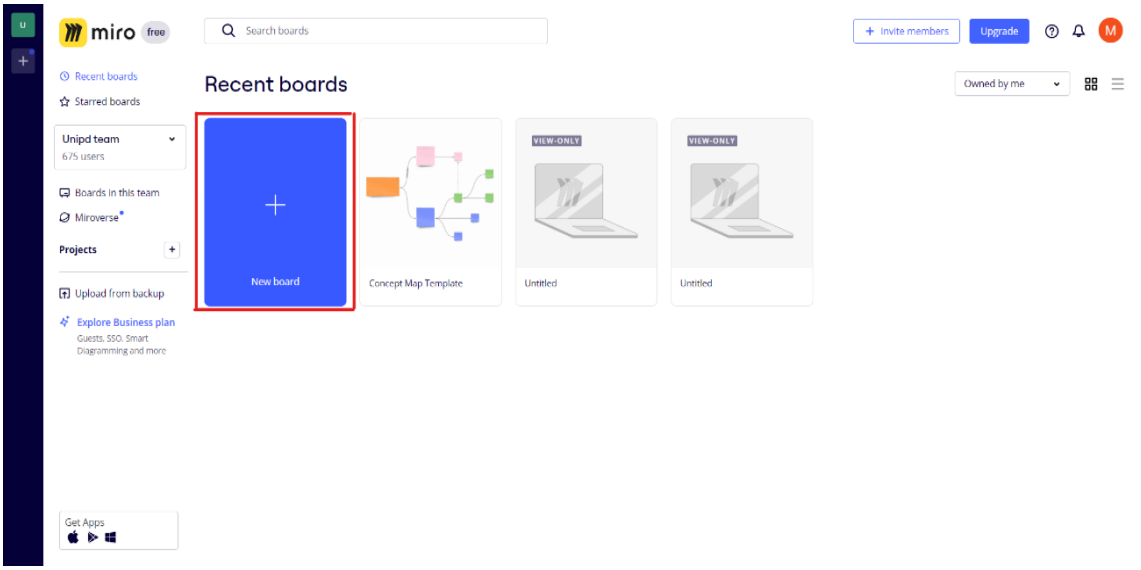



*Figure 5 - Miro dashboard*

After clicking on "new board" the following page appears depicted in figure 6, where a default template can be chosen to start with among a huge list, or just click on the upper right icon "X" to close the template window and to start mapping from zero using a blank board.

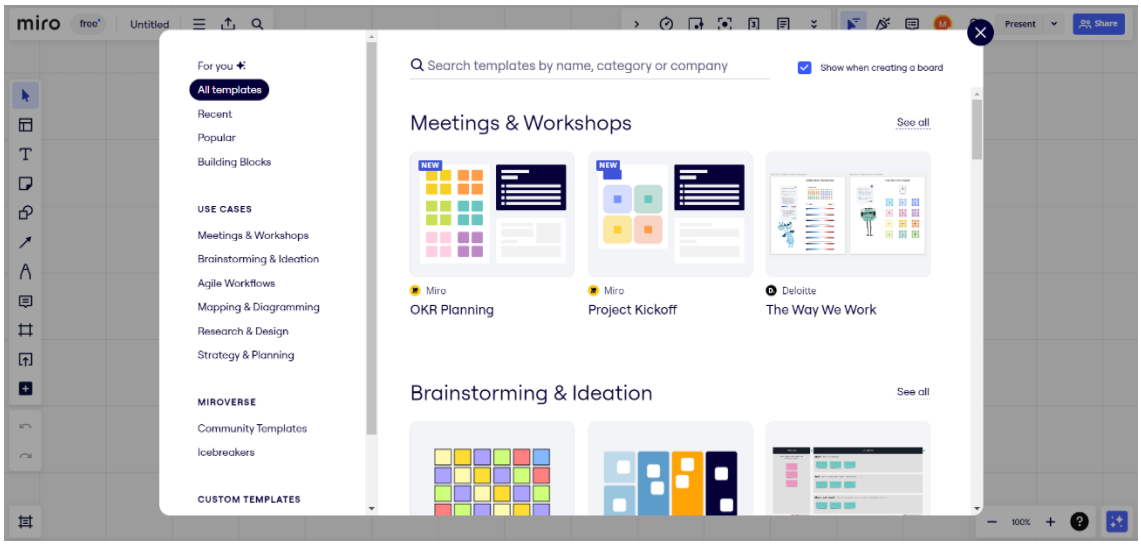



*Figure 6 - Miro default templates*

After this phase, the board can be officially started. If employing a template, just begin the project by double-clicking inside any shape or sticky notes and this permits to write inside them; if employing a blank template, use the tools present on the left side of the screen, namely from top to bottom, select, templates, text, sticky notes, shape, connection line, pen, comment, frame, upload, more apps, undo and redo. In the screenshot below the shape feature is highlighted: to create a shape, just click on the icon “shape”, then choose a type of shape and to build it just drag the mouse and draw the shape.

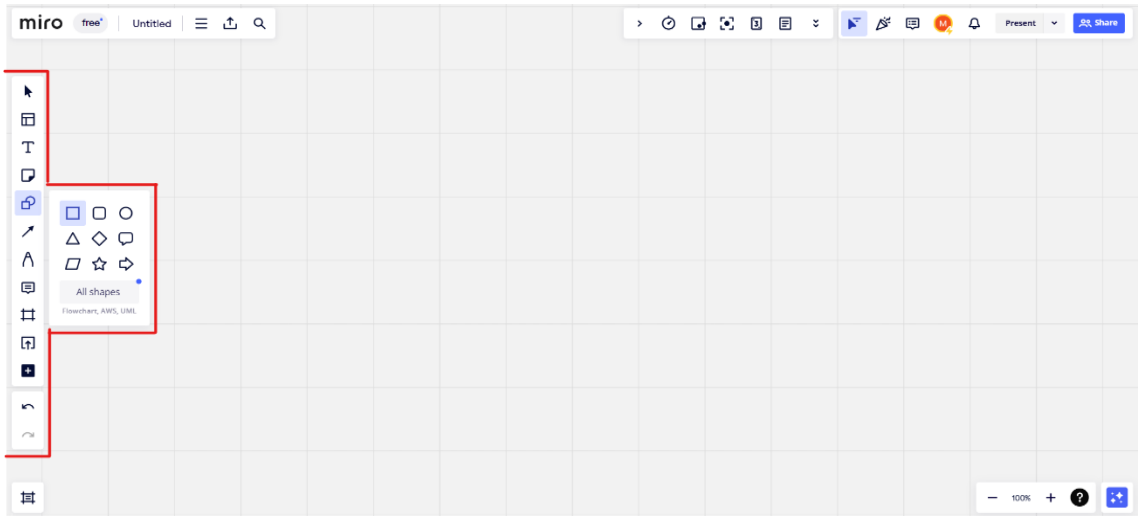



*Figure 7 - Miro tools and shape features*

After placing the first shape, click one time on it to show formatting tools, from left to right namely, switch type, font, font size, font style, alignment, insert link, text color, highlight text, border style, opacity, and color, set color and opacity, comment and lock (highlighted and enclosed into the red line in figure 8). To write something inside the shape just double click on it. To connect different shapes with lines denoting relationships, click on any shape or sticky notes to reveal four blue dots along the edges (highlighted and enclosed into the green line below); click any of those dots to create an arrow from that point and automatically another shape will be generated on the other end, or drag it around the board to modify direction and length and then select which shape or sticky notes will be generated. If an isolated shape is already present, the arrow will automatically connect to it. Another way to draw connection arrows is to use the feature on the left side of the screen and by clicking on the arrow once generated will show formatting tools and options to modify it (for example, very important is the feature that permits to add text or a label in the middle of the arrow to show, in the case of this project, the types of relationships between concepts and between terms).

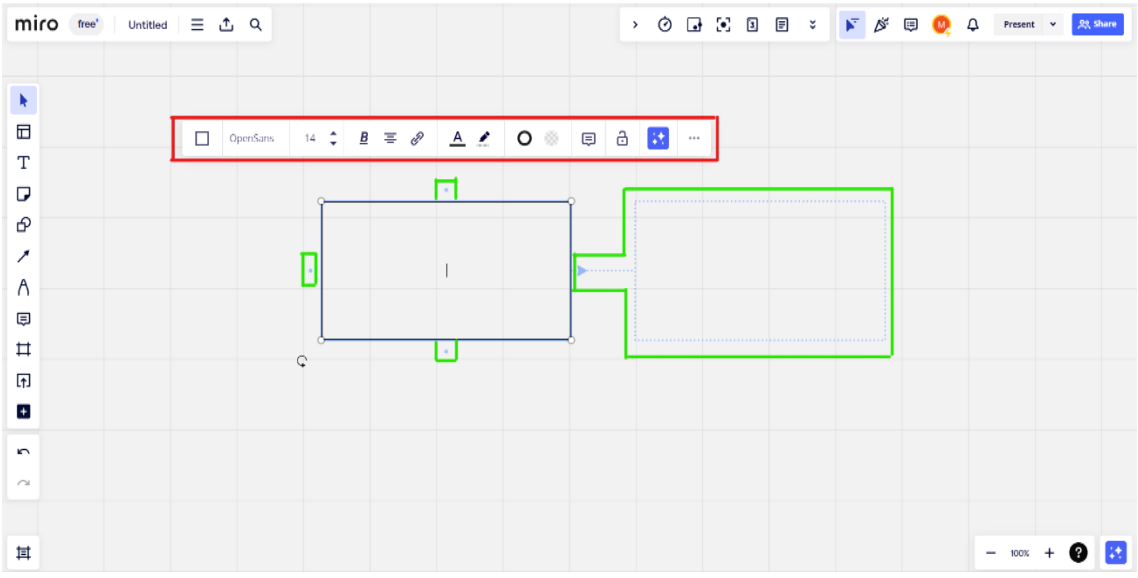



*Figure 8 - Miro formatting tools and connecting shapes*

To conclude, this very useful software can be used for free without charges, but with a limited number of features (for instance, the free version permits to work on only three boards at the same time), while three types of plans can be purchased (starter, business, and enterprise) to unlock all features.

### 3.3 Corpus-based terminology

According to ISO 1087:2019, a corpus, or a text corpus, is a "collection of natural language data" and it can be used for many activities like text analysis or terminology work. And the discipline that studies, uses, and analyzes corpora is corpus linguistics, which essentially focuses on language use, on what people and experts actually said about a specific topic by using and employing computer technology that has exponentially grown in the last few decades (Bowker & Pearson 2002, p.9).

Basically, a corpus is "a large collection of authentic texts that have been gathered in electronic form according to a specific set of criteria" (Bowker & Pearson 2002, p.9): texts are authentic as they represent real language, a live communication between people, and they are not created expressively for being included in a corpus; an electronic text is processed by a computer such as an essay or an article written with a word processor, a book that has been scanned, a text that has been browsed on the Internet, etc. and this type of text can be managed and analyzed through specific software (such as Sketch Engine that has been used for compiling the corpus for this project, and it main and essential features and tools will be explained in the following section) that provides corpus analysis tools, which permit to automatically and quickly identify specific sections or single words in a series of texts, but without interpreting data, a task that has to be carried out by the linguist or the terminologist (Bowker & Pearson 2002, p.10). Moreover, an electronic corpus is larger than printed or written corpora, as electronic texts can be consulted, read and managed in a quicker way due to the web and computer technology, and it is not a random collection of written data: texts are gathered and selected according to specific criteria in order to create a corpus that is representative of a certain language, a subset of that language or a specific subject field (Bowker & Pearson 2002, p.10).

Therefore, from a domain-specific corpus the core vocabulary of a specialized subject field can be extracted thanks to particular software that through algorithms and the advances of computer technology are able to carry out an Automatic Term Extraction (also known with its acronym, ATE) (Heylen & De Hertog 2015, p.203). This function relies on computerized analysis of corpora, it is based on corpus evidence, and it is quicker than a manual term extraction, automatically selecting a preliminary list of term candidates, like a kind of filter. The ATE is based on a series of tasks: firstly, the corpus collection, which consists in the compilation of a corpus that represents a specific domain

(and a general language corpus is also used if the subtask is carried out with a contrastive approach) and it is analyzed with pre-processing features such as lemmatization and part-of-speech tagging; secondly, the detection of Unithood (also known as UH), which consists in identifying those linguistic elements and terms that all refer to a single and unique concept system; thirdly, the detection of Termhood (also known as TH), which consists in classifying and ranking the term candidates from the most valid unit for a specific domain to the less valid; then, the detection of term variants (also known as TV), which is based on the identification of term variations of the same concept; and finally, the evaluation and validation task that permits to guarantee the quality of the ATE by consulting a domain expert (Heylen & De Hertog 2015, p.204).

The result and product of the ATE, i.e. a candidate term list, is used as an input for other activities: it is employed in Terminography, as a bedrock for producing a terminological dictionary or a computerized terminological data bank of a particular subject field (this is the case of this thesis, where ATE and the consequent term list has been used for the compilation of an electronic term data-base about rock climbing); it is also used as a translation support, where the list is consulted as a glossary helping identifying unknown terms or maintaining translation consistency; and ultimately, it finds another application in information retrieval, where the list is used for indexing a collection of domain-specific texts that can be browsed or queried by users (Heylen & De Hertog 2015, p.204).

In addition, many types of corpora exist according to language variations and the different domains and subject fields. Among the most important kinds there is the general reference corpus, which is representative of a certain language and it focuses on language for general purposes analyzing many types of different texts; the special purpose corpus that concentrates on particular and specialized aspects of a language such as a domain-related LSP, a particular kind of text or a language variety (and these two types of corpora can be compared and analyzed in a contrastive way to underline the differences between general and specialized language); the written corpus, which contains written texts; the spoken corpus, that contrastively contains transcripts of spoken and oral conversations (also mixed corpora exist, which comprehend both written and spoken texts); the monolingual corpus based on texts that had been written in only a single language; the multilingual corpus, which contains texts written in two or more languages, and this type of corpus can be subdivided again into parallel corpora that comprehends texts written in

a certain language together with the same texts translated into other languages, and into comparable corpus, which contains texts written in many different languages, but they had not been translated, they are all original texts that share the same communicative function, subject, type and time frame; the synchronic corpus, which is based on texts that were all written during the same time frame; the diachronic corpus that presents texts that had been written in different times and it is useful for analyzing and studying the evolution of a language over the years; the open corpus, which is constantly updated and expanded (also known as monitor corpus); the closed corpus (also known as finite corpus) that, in contrast, is not updated or enlarged after its compilation; and finally, the learner corpus, which contains texts produced by people who are learning a foreign language, and it is useful for teachers for identifying the most common errors made by students by comparing it with a corpus made with texts written by native speakers (Bowker & Pearson 2002, pp.12-13).

Furthermore, it is important to underline the two main tools and features that mainly all electronic software come with, namely the feature that permits to generate a word list that contains candidate terms, and the feature that allows to generate and individuate concordances, both carried out automatically by an algorithm or through AI. The first feature is carried out by a word lister that analyzes the corpus in a statistical way: this tool permits to calculate the number of *tokens*, i.e., the number of different words in a corpus, and also how many times a single word is used; each different term is called *type*, and a list is produced indicating in order of frequency or in alphabetical order all the different words that are present in the corpus (Bowker & Pearson 2002, p.13). While the second feature is carried out by a *concordancer*, which shows all the occurrences and concordances of a word in its contexts: "this information is typically displayed using a format known as keyword in context (KWIC) […]. In a KWIC display, all the occurrences of the search pattern are lined up in the center of the screen with a certain amount of context showing on either side" (Bowker & Pearson 2002, p.13).

To conclude, corpus analysis is fundamental as it permits to identify knowledge patterns (also known with its acronym KPs), which detect, extract and classify occurrences of semantic and conceptual relations in written texts; thus they are used to identify knowledge-rich contexts (also known as KRCs) expressing relations, such as generic-specific (*is a*), part-whole (*is composed of*), cause-effect (*is a result of*), object-

function (*used to*) relations and also synonyms (*also known as*) (Marshman 2022, pp.291-293); and very important in every corpus-based terminology and corpus linguistics is the distributional semantics analysis, that has been developed thanks to the upgrades of AI, which is able to predict knowledge patterns. By analyzing and studying the usage context and linguistic environment of a specialized term in a corpus, semantic information is extracted such as co-occurrences and "the distributional information for a word (or term) is used to compute semantic similarity or semantic relatedness. The underlying idea of distributional semantics is that words or terms with similar distributions have similar meanings" (Bertels 2022, p.311).

### 3.4 Sketch Engine

Sketch Engine, developed by Lexical Computing in 2003 and founded by Adam Kilgariff (1960-2015, researcher of corpus linguistic, computational linguistics and lexicography) (https://www.sketchengine.eu/sketch-engine-team/) is one of the best software used to analyze text corpora through algorithms by linguists, lexicographers, translators, terminologists, etc. and it contains over 700 pre-built and ready-to-use corpora in more than 100 languages made with thousands of texts that the software automatically extracted from the web and official archives. All the information about this software in this section has been taken directly from the official website[9] and the screenshot depicted below from the official dashboard. As it is a very professional and complex software, only the most important and used features will be explained, mainly those that have been used also for compiling and analyzing the corpus employed for this project.

[9] https://www.sketchengine.eu/

After registration (there is a 30-day free trial for new users, but after this a subscription plan has to be purchased) it is possible to open the dashboard, where a series of features and tools can be selected to start analyzing corpora. The screenshot below depicts the home page of the dashboard, where a pre-loaded corpus has already been chosen (otherwise, the first step to begin using the software is to select a pre-built corpus by clicking on "select corpus", which is the second feature on the left side toolbar highlighted in green, and then selecting the preferred language in the central box of the page and this will automatically choose the biggest and more used corpus, or by browsing it on the bar on the right side of the title "dashboard", also highlighted in green), but alternatively it is possible to create a new and personalized corpus by clicking on "new corpus" on the upper right side of the screen (highlighted in red). After having selected a pre-loaded or a new corpus, corpus info can be viewed by clicking on "corpus info" (a feature that shows counts of total words, tokens, sentences, paragraphs, and documents, as well as text types, lexicon sizes, common tags, etc.) and it can also be managed by clicking on "manage corpus", where it can be expanded, modified, downloaded or deleted (both features are highlighted in yellow).

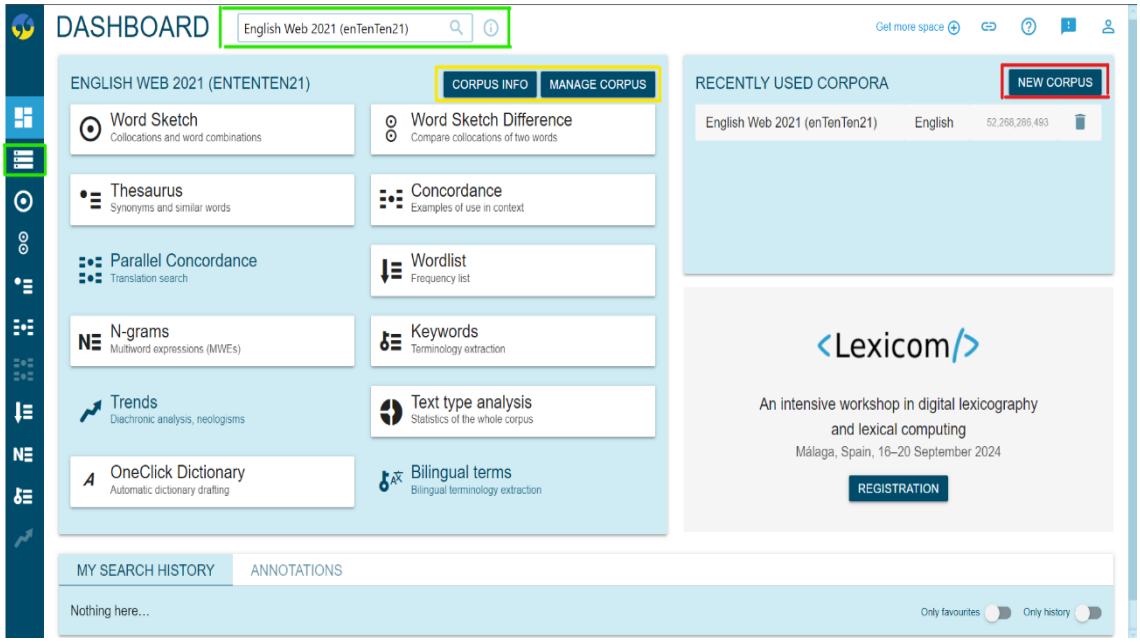



*Figure 9 - Sketch Engine dashboard homepage*

When creating a new corpus, a name has to be chosen, as well as if the corpus will be a single language or multilingual; then the languages that will be used are selected and texts

can be uploaded directly from the computer folders (many text types are supported, such as .txt or .pdf etc.) or the software can browse texts directly from the web. This feature that has been also used for this thesis is depicted in the screenshot below. Texts from the web can be found selecting from three different input types: from web search, where it is possible to type words and the software will find and select many websites and documents that contain those words, it downloads them and processes into a corpus; from URLs, where a list of URLs of a particular web page can be provided and the algorithm automatically uploads all the words present in that URL; and finally, from websites, where links of various websites can be pasted and all words contained in all the pages of the website will be processed into a corpus.

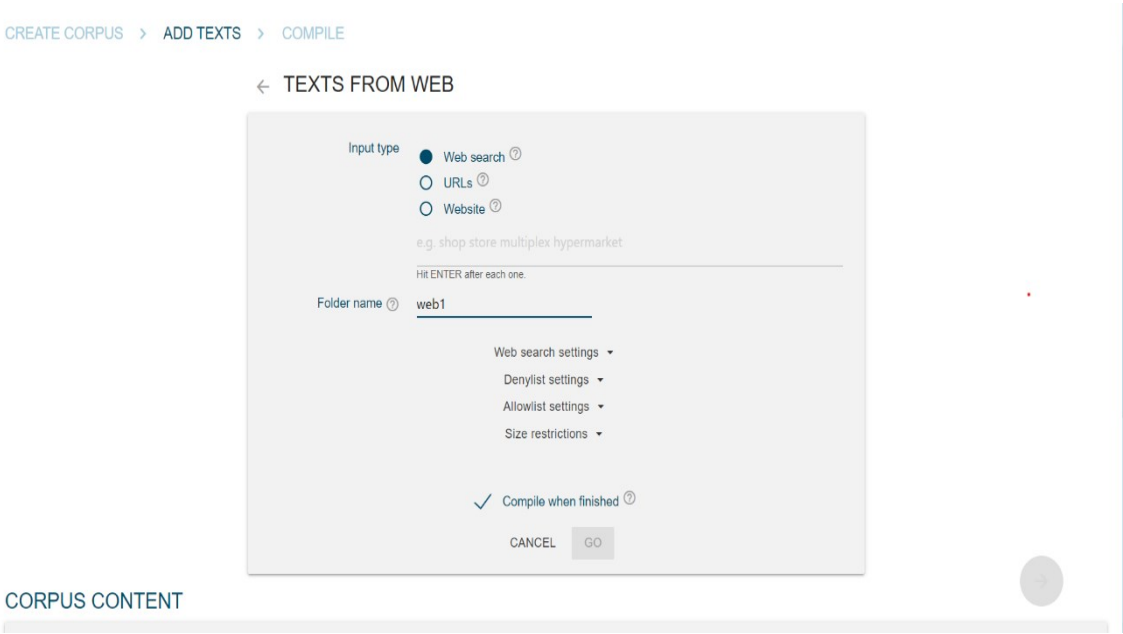



*Figure 10 - Sketch Engine "texts from web" feature*

Going back to the dashboard homepage depicted in the figure 9 in the previous page, after a corpus have been selected or created, a series of features and tools are now unlocked and can be used. These features are shown in the central box with a light blue background, but they are also present and can be accessed through the vertical toolbar on the left side of the screen. From top to bottom, the available features are: dashboard (which simply redirects to the homepage), select corpus (has explained before, this feature permits to select pre-loaded corpora or create a new one), word sketch, word sketch difference, thesaurus, concordance, parallel concordance, word list, N-grams and keywords. The last

features, namely trends, text type analysis, OneClick dictionary and bilingual terms will be left out.

The word sketch feature processes the words collocates and its contexts showing their grammatical and collocational behavior. As shown in the screenshot below, results are organized into grammatical relations or categories such as words that modify the word, words that serve as an object of the verb or as a subject of the verb, prepositional phrases, etc. The user can just type a word and click on search to begin using this feature.

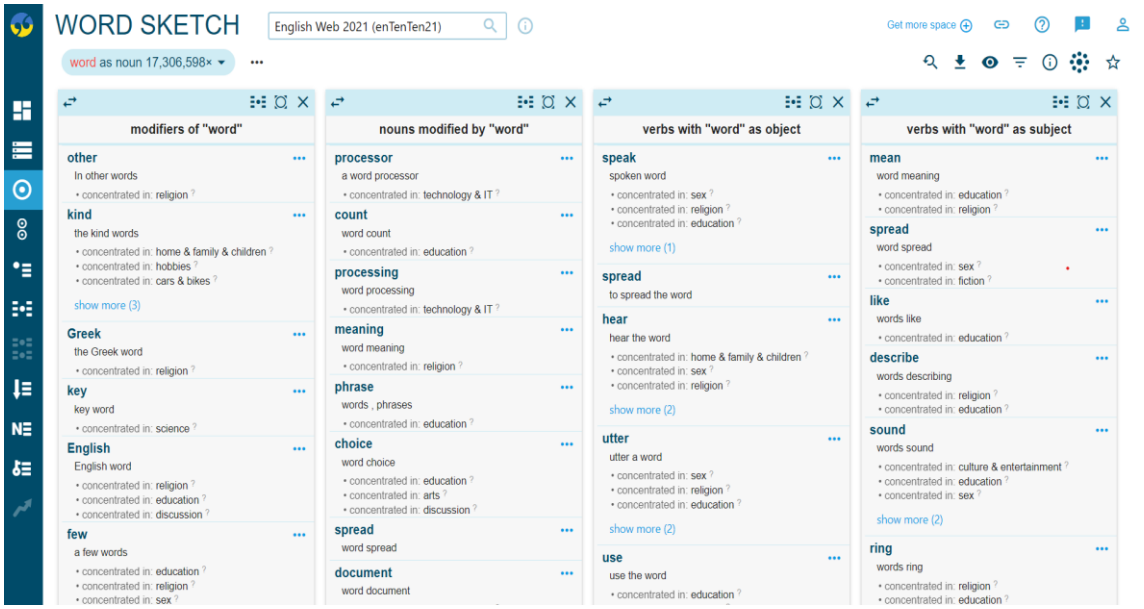



*Figure 11 - Sketch Engine "word sketch" feature*

Another important feature is word sketch difference, which is employed for identifying and analyzing comparisons by contrasting collocations. It is necessary to write two lemmas to begin the comparison, or also two different word forms of the same lemma, as well as one lemma in two different subcorpora of the same corpus, all through their collocates. As depicted in figure 12 in the next page, many categories and comparisons are analyzed, also showing the frequency of the first and second lemma in two different columns.

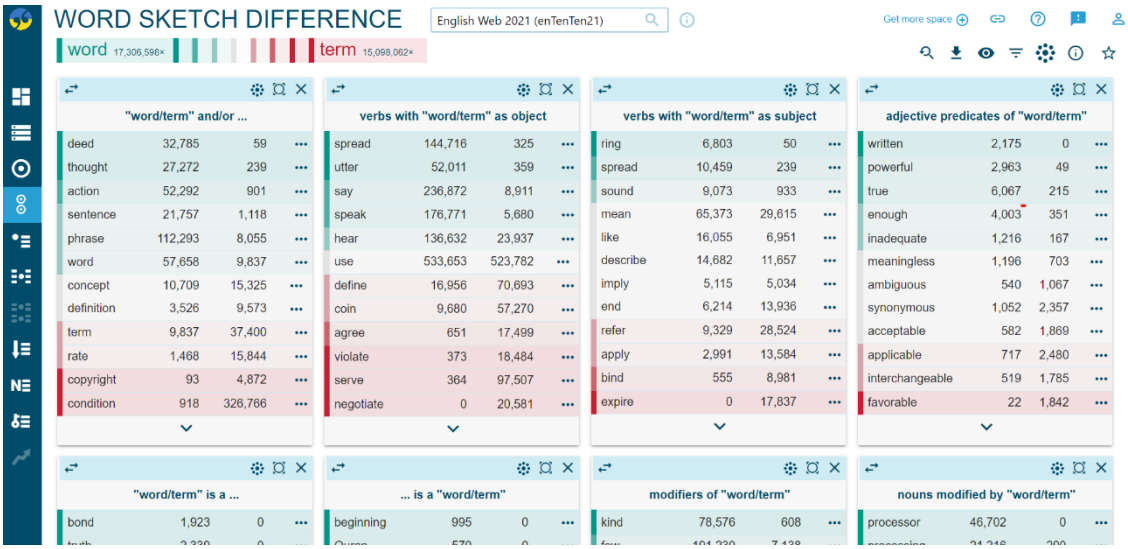



*Figure 12 - Sketch Engine "word sketch difference" feature*

Another important tool is the thesaurus; Sketch Engine automatically generates a list of synonyms, antonyms or similar terms of words that belong to the same semantic field, and the list is made according to the context that surrounds the words in the selected corpus. Generally, only nouns, verbs, adjectives, and adverbs are shown, and the results are depicted in a column that presents “lempos”, i.e. synonymic words, on the left side and the frequency on the right side.

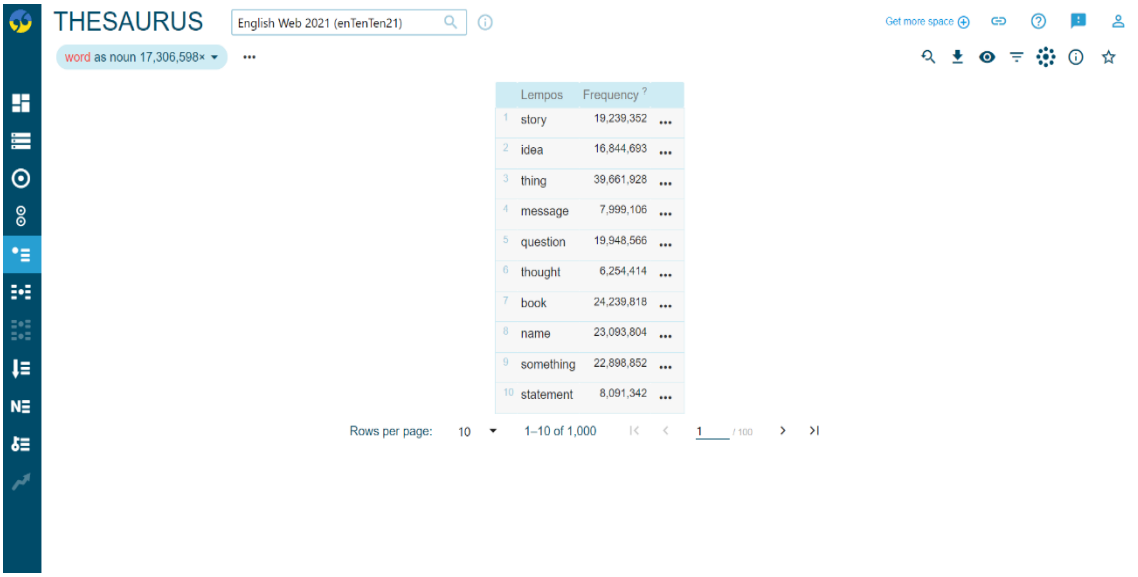



*Figure 13 - Sketch Engine "thesaurus" feature*

Furthermore, the concordance feature is essential, as it shows the keyword in context (KWIC), thus examples of how a word is used in different contexts. This tool permits to find words, phrases, tags, text types and also corpus structures, then results are displayed in the form of a concordance. After having searched a particular word or phrase, from left to right the table will show the source from which the phrase has been taken (for example, the name of the website), the left context, the KWIC, and the right context. In addition, the concordance can be sorted and filtered according to each specific need.

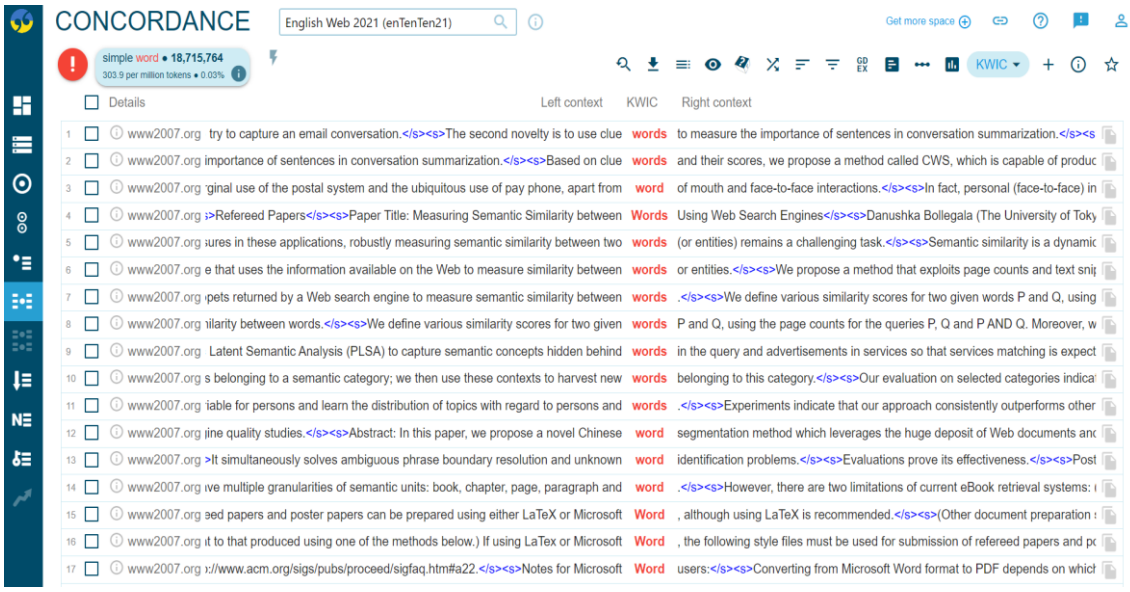



*Figure 14 - Sketch Engine "concordance" feature*

Finally, the last important features available on Sketch Engine are: the parallel concordance, which works exclusively with parallel corpora that have to be aligned, and it searches for words, phrases, and tags in one language and then it shows the same aligned translated word or phrase in another language. The word that has been searched in the source language is highlighted in red, while the related translation is highlighted in yellow in the target language; the word list, which generates a frequency list made of nouns, verbs, adjectives, as well as words beginning or ending, word forms, tags and lemmas; the N-gram tool, which creates a frequency list of a number of tokens in sequence (generally three or four tokens, also called grams in the software, as well as MWEs, namely multi-word expressions, and lexical bundles); and finally, the keyword tool, which permits mono and bilingual term extraction, thus it allows to automatically extract terminology and also compare two corpora or texts in order to identify unique

characteristics of both, and the results are two columns, the one on the left side showing single word items, i.e., keywords, and the one on the right side depicting multiword items, i.e., terms.

### 3.5 FAIRterm

The FAIRterm Web application was developed by Federica Vezzani and Giorgio Maria di Nunzio, professors at the University of Padua; this software is based on FAIR terminology, which is the first initiative to provide a paradigm for organizing terminological data in accordance with the FAIR principles of the European Open Science Cloud (ESOC) Association, namely Findability, Accessibility, Interoperability, and Reusability of terminology (Vezzani, 2022, "*Terminologie numérique: conception, représentation et gestion*"). This paradigm relies on the latest ISO TC/37 SC/3 standards and aims to resolve the problem of structuring, coding, and standardization of terminological data, as well as how to structure them and how to structure their terminological database. All the information provided in this section has been taken from the paper published by Federica Vezzani in 2021 "*La ressource FAIRterm: entre pratique pédagogique et professionnalisation en traduction spécialisée*" (number 17, pp.61-64), alongside screenshots taken from the official web application[10].

As already said, FAIR terminology is based on a paradigm whose objective is to provide basic principles that allows terminological data and therefore terminological entries to be easy to find, quickly accessible, interoperable and reusable in other software, such as CAT tools; and this paradigm relies on three different ISO standards developed by ISO TC/37 SC/3, which are used to manage and organize terminological entries in an electronic software, namely ISO 16642:2017, ISO 12620:2019 and ISO 30042:2019, where the first is related to the Terminological Markup Framework (TMF), the second to data category specifications and the third to TermBase eXchange (TBX). According to ISO 16642, "Terminology databases are comprised of various types of information, called data categories, and can adopt different structural models. However, terminological data often need to be shared and reused in a number of applications, and this sharing is facilitated when the data adheres to a common model"; therefore, as each terminological entry describes a single concept, identifies the terms that designate the concept, and

[10] https://shiny.dei.unipd.it/terminografia_2022_dn/

describes the terms themselves, a TMF has been developed to share a common model that structures terminological entries in the same way, in order to help and facilitate the integration and transmission of data between different software and applications. The TMF metamodel has a vertical structure that presents the terminological data collection (TDC), the terminological entries (TE), the language section(s) (LS), the term section(s) (TS), and finally the term component section(s) (TCS). Moreover, if ISO 16642 allows to define and model entities and their associations, ISO 12620 allows to define and model the properties of entities and associations, i.e., it provides a specific data model for a terminological data collection. Through this standard, data categories of closely semantic or formal related items such as definition, part of speech, subject field, etc. are specified, providing a complete formal representation of data categories, and collected in a repository that improves findability and accessibility of data. Finally, FAIR terminology also relies on ISO 30042, which regards the TBX. The TermBase eXchange is an implementation format written in XML that permits to reuse terminological data compiled on FAIRterm Web application in other software and applications, such as MateCat or SDL Trados. Therefore, through the TBX all terminological data are organized and structured in a way that allows other applications to view, use and modify them by combining the first two standards, thus by combining the TMF with terminological data categories. Thanks to these standards, compiling terminological entries on FAIRterm not only permits to record data in a TMF structure alongside all their categories, but also to use them again in other software due to the TBX dialect. At present, three types of TBX dialects are supported: the TBX-Core, the TBX-Min and the TBX-Basic.

When accessing the web application, the following homepage depicted in the screenshot below shows. Here it is possible to add a new term to the collection by selecting the source language, then typing the term and clicking on “add new term”; in this way, the typed term will show in the “compile record” section, highlighted in red on the left-side toolbar, which is the next step to begin compiling all data categories of the selected term. When the work is finished, just click on “download TBX”, highlighted in green, to download the whole collection in a TBX format, to share it and use it in another application.

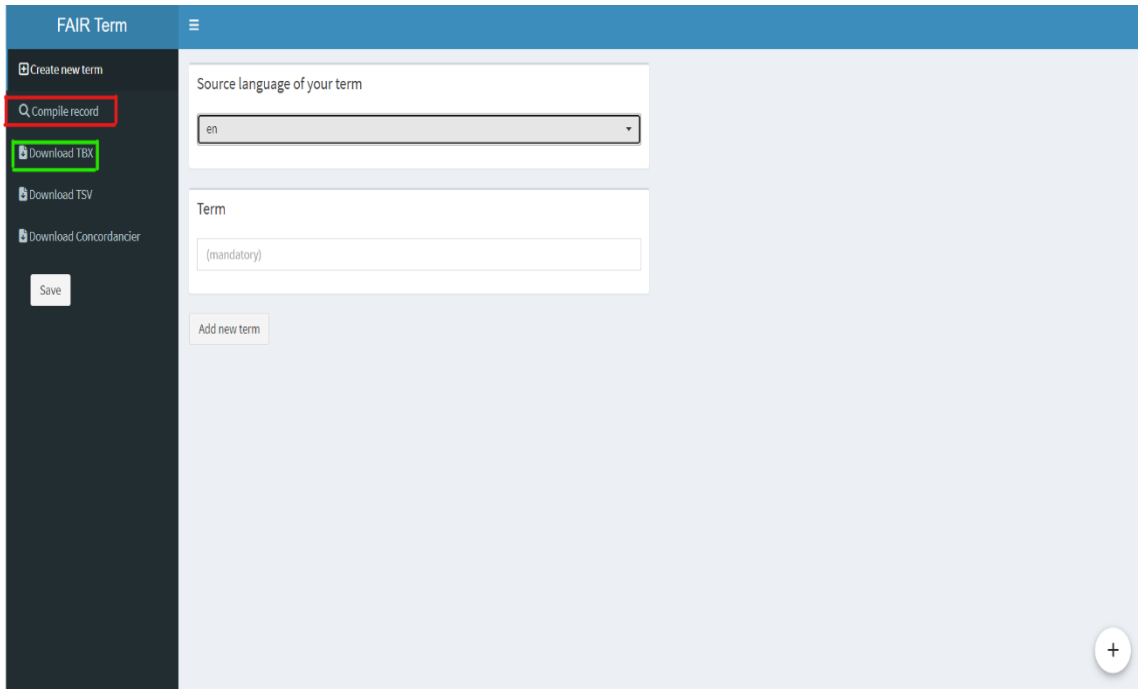



*Figure 15 - FAIRterm homepage*

After a new term has been added, just click on “compile record” to access the following page, showed at page 85; here it is possible to compile all data categories of the term that has been added before in the previous page. Firstly, the source and target language of the term have to be chosen, then in the “search a term” section, terms that have been previously created can be selected, and finally the source term has to be written on the left, while on the right its translation in the selected target language. After these steps, the compilation of the terms categories can begin. There are four types of data categories that can be compiled, namely formal features, semantics, variation, and usage, highlighted in red. Every one of these categories is subdivided into other subcategories that have to be

filled, and each one of these is split in half; on the left side of the screen, there are the categories of the source term, while on the right side of the page there are the same categories, but of the target term.

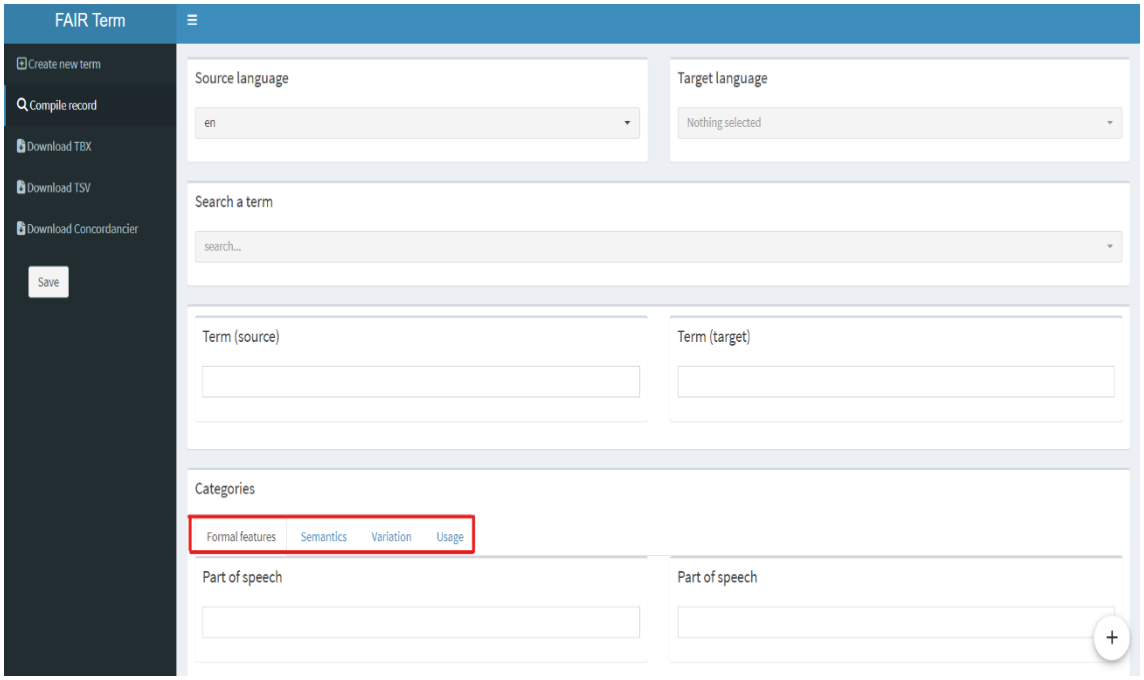



*Figure 16 - FAIRterm data categories*

The formal features section is divided into part of speech, gender, number, pronunciation, etymology, derivative and notes, where the terminologist can add information useful for other terminologists or translators; the semantic section includes definition, external cross-reference, source of the reference, notes, semic analysis, synonym, quasi-synonym, hypernym, hyponym, meronym, and olonym; the variations section is subdivided into common name, scientific name, orthographic variant, acronym, full form, and abbreviation; and finally, the usage section includes subject field, subdomain, register, context, external cross-reference, source, and collocation.

The software and applications analyzed and depicted in this chapter, namely Miro, Sketch Engine and FAIRterm, are the ones used for producing the concept systems and lexical networks for this project, as well as for creating and consulting the corpora and for compiling the terminological entries that constitute this thesis terminological database about rock climbing. In the next chapter, the concept systems and lexical networks for each language (two concept systems in English for tools and techniques, alongside one

lexical network for each language for tools and one for each language for techniques) will be showed, analyzed and explained, as well as the three climbing corpora (one for each language) created and examined on Sketch Engine. The results and peculiar features of the terminological entries produced and compiled on FAIRterm will be presented and discussed in the fifth and last chapter of this work.

# 4. Developing the termbase: analysis of corpora, concept systems, and lexical networks

In the previous chapter, we have outlined the methodological approach for the production and development of this trilingual project about the most important rock-climbing tools and techniques. In addition to providing useful theoretical information and details about corpora and their characteristics, concept systems and lexical networks, we have underlined and depicted how to use the software for developing a specialized language corpus, namely Sketch Engine. Furthermore, we have explained the software employed for producing concept systems and lexical networks, namely Miro. Finally, we have shown the software for compiling the terminological entries, namely FAIRterm.

Conversely, in this chapter the practical steps that have been taken for developing the termbase will be deeply analyzed. All phases that precede the compilation of the terminological entries about climbing tools and techniques will be explained in depth. Therefore, this chapter (as well as the fifth and last chapter of this thesis) is mainly a practical chapter where no theoretical bibliographies have been used or consulted, except for specific technical books and manuals about rock climbing that have been used as a reference for the initial selection of climbing terms. As a matter of fact, it essentially presents the steps that have been carried out to reach and achieve the creation of a preliminary termbase about rock climbing. Preliminary in the sense that only the main tools and techniques have been analyzed, while the most peculiar and less used have been left out for the scope and extent of this master thesis, but it is undoubtedly a first step towards a fully complete trilingual termbase that could and hopefully should be extended and expanded in the future.

Hence, in the following chapter, the corpora that have been employed for confirming and verifying the existence and the frequency of a term will be analyzed. As it will be later explained, all terms about rock climbing have been taken from reliable climbing books, and the corpora have been later consulted for ascertaining the term existence and the related concept has been found due to a process of inference. Therefore, they have been employed as a sort of countercheck. We will explain how the three trilingual corpora in Italian, English and Spanish have been created, highlighting their characteristics and peculiarities, as well as presenting the functions and features that have

been mostly used. Furthermore, the concept systems and lexical networks that have been produced on Miro will be depicted and for the two systems and for each network a brief explanation and analysis will be presented, underlining its most important and interesting characteristics. In total, eight diagrams have been created: two concept systems that has been produced in English as it is the written language of this project (one for climbing tools and the other for climbing techniques), three lexical networks for rock climbing tools (one for each language) and another three for rock climbing techniques (also in this case, one in Italian, one in English and one in Spanish). Their peculiarities and most important differences will be explained by comparing these different hierarchical systems.

Later on, in the fifth and last chapter, all the terminological entries compiled on FAIRterm will be analyzed, and ultimately all English entries will be indexed in alphabetical order in a final appendix alongside their definitions, while the full and complete termbase will be accessible only by requesting the TBX file, where Spanish and Italian definitions can also be found.

### 4.1 Analysis of the three trilingual corpora

One of the first preliminary steps that have been carried out to reach the creation of a trilingual termbase is the selection of the terms that constitute the domain of this project. Since we already possess some background knowledge about rock climbing and mountaineering, as well as a great amount of reliable and well-known climbing books, it has been decided to employ a semasiological approach, as well as an onomasiological one, given that we foster multidimensionality and these two approaches have been employed simultaneously (Santos, Costa, 2015, *Domain specificity: semasiological and onomasiological knowledge representation*). In this way, the concept system and the lexical networks that will be presented in the next section have been produced starting from terms found in climbing books. Subsequently, the related concepts have been achieved through an inference analysis and comparison of these terms' definitions. Only for those few niche tools or techniques that were unfamiliar mainly an onomasiological approach has been carried out. Therefore, after unknown terms had been recognized and analyzed, a concept was assigned to them by inference.

After this initial phase of terms selection and extraction from climbing books (the complete list can be found in the bibliography of this chapter at the end of this thesis), three different corpora in three languages have been created on Sketch Engine: one in English, one in Italian, and one in Spanish. Climbing terms that constitute these three corpora, as well as the features offered by the software, have been used only to confirm the reliability, existence and frequency of the concepts that have been discovered by inference and inserted into concept systems, as well as the terms that have been inserted into lexical networks. Later, each term in each language has been analyzed into FAIRterm, where terminological entries have been compiled and managed, as this software is a terminological managing system (TMS). In this way, the majority of climbing terms had been extracted from climbing books and an exhaustive list have been made consisting of exactly 38 terms for each language regarding climbing tools (114 terms in total, for 38 concepts; 38 for Italian and Spanish, but only 37 for English as it distinguish only between ring bolt and glue-in bolt, while Spaniards and Italian distinguish between “Spit”, “Fix” and “fittone resinato” for the latter, and “Espit”, “Parabolt” and “anclaje quimico” for the first), and 20 regarding climbing techniques (60 terms in total, for 20 concepts). Then, all terms were analyzed in Sketch Engine through the corpora to ensure a reliable countercheck. After this step, all concepts identified by inference were transferred in a hierarchical concept system written in English and all terms for each language in three different lexical networks, but these will be depicted and explained in the following section.

For the production and creation of the three trilingual corpora on Sketch Engine, it has been decided to create three different corpora for each language using the feature “create new corpus” and then “add text from the web”. This feature firstly permits to select an input type, which can be:

- “Web search”: after having chosen and entered some keywords, the software automatically provides a list of websites where those keywords are present and the user can choose which website will be inserted into the corpus; after having selected the most relevant ones and discarded the less reliable, all terms present in those websites will be compiled into a corpus and automatically analyzed by Sketch Engine.

- "URLs": using this feature, the user can copy and paste URLs from websites and in this way Sketch Engine will extract terms only from those URLs and not from the whole website, which is useful if only one page of a certain website is relevant for a specific project.
- "Website": the website can be copied and pasted, and the software will extract all terms from the whole website.

At the beginning, the "Website" feature has been employed, as using well-known and reliable websites about climbing was considered not only a faster way to obtain a solid list of websites without spending time to select them, but also as a way to use specific and famous climbing websites that are undoubtedly reliable (such as https://americanalpineclub.org/, https://www.ukclimbing.com/, https://www.ifsc-climbing.org/, https://www.petzl.com/US/en, and so on). In addition, the AI of Sketch Engine could possibly leave out these websites as a mistake. Unfortunately, and without a logic explanation, this feature took an incredibly long time to complete - more than 25 hours for extracting and compiling only one website. Therefore, this approach has been discarded and the feature "web search" has been used as an alternative. For the English corpus, the keywords that have been used are "climbing", "rock climbing", "climbing tools", "climbing equipment", "climbing gear", "climbing techniques", "rope", "harness", "belaying", "rappelling", and "alpinism". It has been decided to enter some keywords related to the discipline of climbing in general, as to find those websites that explain basic tools and techniques. In this way, we gathered information about the world of climbers. Then, some more specific keywords related to certain climbing tools have been selected to ensure that climbing websites and blogs about tools and techniques for expert climbers were introduced too.

After this step, a long list of websites that include those keywords showed and only the most reliable were chosen, while the others were excluded from the corpus. The initial plan was to select only a few important websites, use the feature "manage corpus" and then "make it bigger" to add to the corpus those specific and reliable climbing websites shown above. However, it was not necessary, as the AI of Sketch Engine already inserted them into the automatically generated list, sparing some effort and time. After the selection of the most reliable websites (about 50 were chosen at the end of this process), the software automatically extracted all terms and compiled them into a usable and

modifiable corpus. The same process was carried out also for the creation of the other two corpora. For the Italian corpus, the keywords that have been used are “arrampicata”, “arrampicata su roccia”, “attrezzatura arrampicata”, “materiali arrampicata”, “tecniche arrampicata”, “scalata”, “scalata su roccia”, “corda”, “imbrago”, “assicurazione”, “alpinsimo”, and “discesa in corda doppia”. Some websites were chosen and there was no need to add more as the most important were already present. For the Spanish corpus, the keywords that have been entered are “escalada”, “escalada en roca”, “equipo escalada”, “técnicas escalada”, cuerda”, “arnés”, “aseguramiento”, “rápel” and “alpinismo”. Again, more or less 50 websites were chosen and no more had to be inserted as the most reliable ones were already present in the list.

As a result, three different corpora were created, all about 300.000 words each. It would have been better to have larger and bigger corpora, but unfortunately Sketch Engine has a storage limit of one million words for all corpora in the free trial version, which can be extended by purchasing more drive space or a premium subscription. Consequently, we tried to restrict each corpus and maintain the total word count at about 300.000. Looking at the corpus info in the homepage of the software, some important information can be found, such as counts, text types and lexicon sizes. The English corpus contains 287.088 tokens, 247.467 words, 16.490 sentences, 8.175 paragraphs, and 117 documents; the Italian corpus contains 394.998 tokens, 335.484 words, 18.667 sentences, 9,899 paragraphs, and 222 documents; the Spanish one contains 476.747 tokens, 416.346 words, 24.846 sentences, 13.732 paragraphs, and 232 documents.

As already said before, these corpora have been used as a countercheck, to verify the frequency, collocations, synonyms, and examples of use in the context of climbing terms identified in books. Concerning synonyms of the selected terms, we have used these corpora to also identify them: for English we have found 39 synonyms regarding tools and 3 regarding techniques; for Italian 28 synonyms for tools and 3 for techniques; and finally for Spanish 37 synonyms for tools and 2 for techniques.

After the lists of selected terms for each language had been produced and compared with the results provided by the corpora, they were inserted into two concept systems, where concepts were arranged in a hierarchical order, and into six lexical networks, where terms were organized alongside their synonyms. Among the many features that Sketch Engine offers, five have been mainly used, namely Word Sketch, that:

> processes the word's collocates and other words in its surroundings. It can be used as a one-page summary of the word's grammatical and collocational behavior. The results are organized into categories, called grammatical relations, such as words that serve as an object of the verb, words that serve as a subject of the verb, words that modify the word, etc. (Sketch Engine, about Word Sketch[11])

Word Sketch Difference, which:

> is designed for making comparisons by contrasting collocations. Three options are available: lemma - compares the use of two different lemmas via their collocates; word forms - compares the use of two different word forms of the same lemma via their collocates; subcorpora - compares the use of the same lemma in two different subcorpora of the same corpus via their collocates (Sketch Engine, about Word Sketch Difference[12])

The Thesaurus, that:

> is an automatically generated list of synonyms or words belonging to the same category (semantic field). The list is produced based on the context in which the words appear in the selected corpus. Only nouns, adjectives, verbs and adverbs are supported in most corpora (Sketch Engine, about Thesaurus[13])

The Concordance feature, which:

> is a tool with a variety of search options. It searches words, phrases, tags, documents, text types or corpus structures and displays the results in context in the form of a concordance. The concordance can be sorted, filtered and processed further to obtain the desired result (Sketch Engine, about Concordance[14])

And finally, the Word List function, that:

> generates frequency lists of various kinds: nouns, verbs, adjectives and other parts of speech; words beginning, ending, containing certain characters; word forms, tags, lemmas and other attributes; or a combination of the three options above (Sketch Engine, about Word List[15])

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11 https://app.sketchengine.eu/#wordsketch?corpname=user%2Fmichele.moser%2Fescalada_es&tab=about&clustercolls=0&sort_ws_columns=s&structured=1&itemsPerPage=50

12 https://app.sketchengine.eu/#sketchdiff?corpname=user%2Fmichele.moser%2Fescalada_es&tab=about

13 https://app.sketchengine.eu/#thesaurus?corpname=user%2Fmichele.moser%2Fescalada_es&tab=about&itemsPerPage=10

14 https://app.sketchengine.eu/#concordance?corpname=user%2Fmichele.moser%2Fescalada_es&tab=about&attrs=word&viewmode=kwic&attr_allpos=all&refs_up=0&shorten_refs=1&glue=1&gdexcnt=300&show_gdex_scores=0&itemsPerPage=20&structs=s&refs=%3Ddoc.website&showTBL=0&tbl_template=&gdexconf=&f_tab=basic&f_showrelfrq=1&f_showperc=0&f_showreldens=0&f_showreltt=0&c_customrange=0&t_attr=&t_absfrq=0&t_trimempty=1&t_threshold=5

15 https://app.sketchengine.eu/#wordlist?corpname=user%2Fmichele.moser%2Fescalada_es&tab=about&wlattr=lc&wlminfreq=0&itemsPerPage=50&cols=%5B%22frq%22%5D&showtimelines=0&diaattr=&showtimelineabs=0&timelinesthreshold=5

Having explained how the three corpora have been created and used, in the next section two concept systems will be depicted and presented, one for climbing tools and one for climbing techniques, as well as six lexical networks, one for each language for tools and one for each language for techniques.

### 4.2 Presenting concept systems and lexical networks

After the phase of terminological extraction explained in the previous section, two concept systems and six lexical networks have been created on Miro, a software for producing graphical diagrams already presented in the third chapter. Firstly, one concept system has been made regarding climbing tools and equipment. The first issue has been choosing the starting and central superordinate concept and its consequent subordinate concepts. In an initial try, it has been decided to use the concept <Climbing> as the first superordinate concept, which has been later subdivided into other three genus-species relations, namely <Indoor climbing>, <Aid climbing> and <Free climbing>. Then <Free climbing> presented another three relations, such as <Trad climbing>, <Sport climbing> and <Climbing with no belaying>. In this way, starting from the discipline of climbing in general, all types of climbing were introduced, and each type presented numerous sequential relationships like "uses" which indicated the kinds of tools used and employed in each different climbing discipline. Consequently, each tool had other generic hierarchical relations showing the different types of that tool or other associative relations indicating its characteristics ("consists_of") or its function ("has_use"). However, this type of concept system has been discarded as it presented many repetitions, given that a lot of tools are used in many types of climbing not only in one specific discipline, and this produced a system that was extremely big and messy. Therefore, another concept system has been created with a slight difference: we tried to use <Climbing tools> as the starting superordinate concept and then all subordinate concepts presented the concept <Tools> in the name, namely <Free climbing tools>, <Aid climbing tools>, etc. In this way, the non-hierarchical sequential relationship "uses" has been substituted by generic relations such as "is_a", but the problem was the same also in this case: a lot of climbing disciplines presented many repetitions of tools that are used in more than one type of climbing, creating confusion, and producing a system that was too dispersive. Therefore, also this type of system has been discarded, and a third one has been created, leaving out

the first two which focused on the types of climbing first, and then on the types of tools. In the third attempt, it has been decided to place the focus first on climbing tools, as they are the main protagonists of this thesis. The concept system depicted in figure 17 is the definitive one in English. In this third and last attempt, the starting superordinate concept is <Climbing tools> and from this, the system travels to a lot of “is_a” generic relationships indicating all main and most important climbing tools (for example <Rope> is_a <Climbing tools>). Basic and fundamental tools such as <Helmet> or <Climbing shoes> do not present other relationships, even though many types of helmets and climbing shoes exist. Therefore, other hierarchical relationships could have been added, but for a matter of time and space, and for the purpose of this master thesis, they have been left out as explained before, alongside very specific tools that are generally not used by basic climbers. However, almost all tools present additional hierarchical relations that indicate the various types of a specific tool (for instance, the <Locking carabiner> “is_a” <Carabiner>). It is important to stress that the arrows that indicate hierarchical relationships point towards the superordinate concept, i.e., towards the central concept, while the arrows that indicate associative relations point towards the associative relationship, therefore towards the borders of the system. For a matter of space, in most cases (excluding some concepts such as <Belay device>, <Artificial anchor>, <Rope>, and <Ice piton>, which present associative relations, even though they are not at the border of the system, but more or less central) the concepts at the end of the system also present associative relationships. They indicate their components (with the label “consists_of” highlighted in green), their function (with the label "has_use” highlighted in red), and in which type of climbing discipline they are employed (with the label “used_in” highlighted in yellow). Where the components of a specific tools are not indicated, it is because the components are too much and they will be explained in the terminological definition when compiling the related terminological entry, or because the tool is made of only one component and further explanations would be redundant (such as <Cord>, for instance). Where the function of a specific tool is not present, this means that it performs various kinds of different functions that will be explained in the

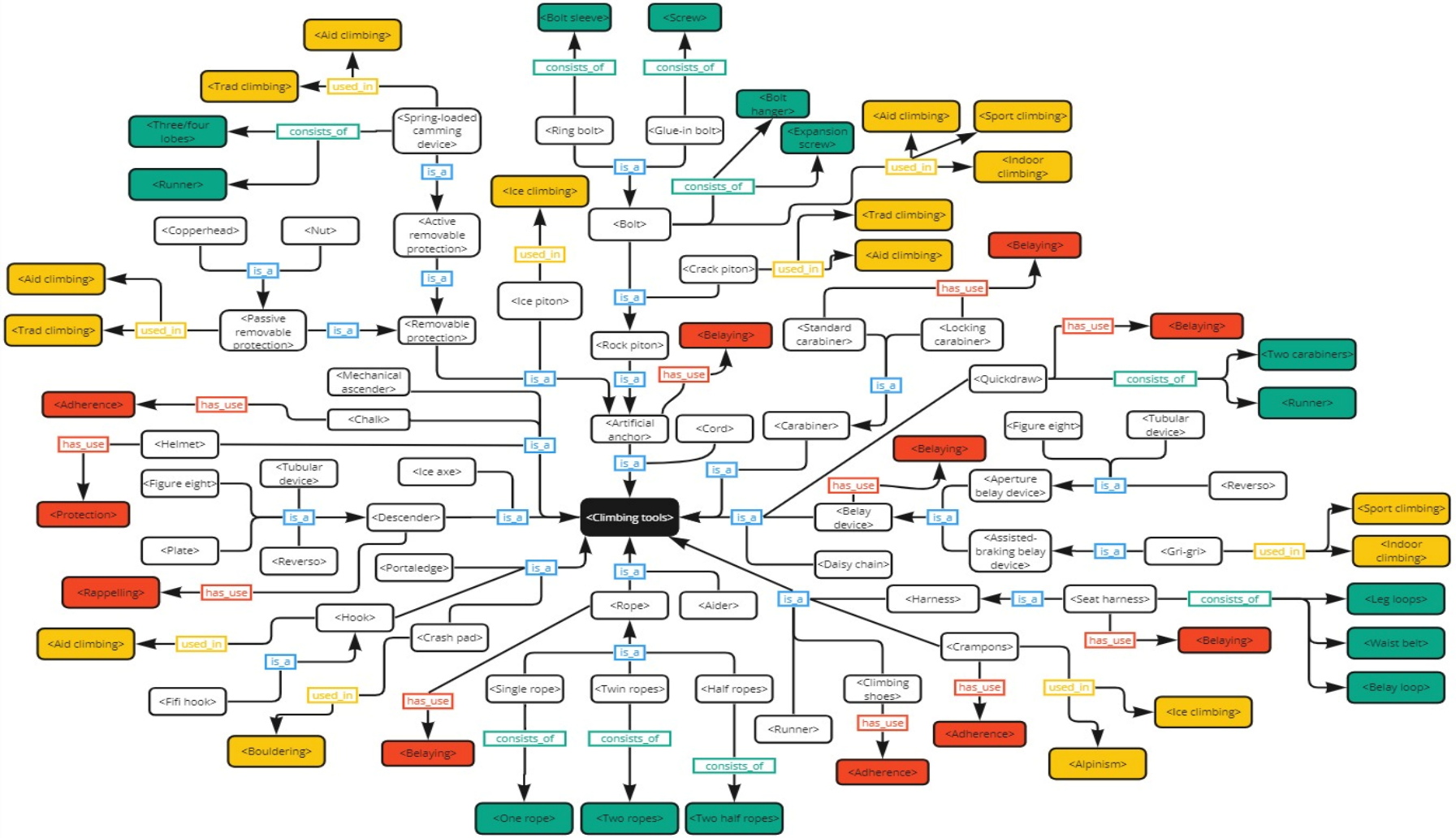


*Figure 17 - Climbing tools English concept system*

terminological entry on FAIRterm, or because its function is indicated in the related superordinate concept. For example, the <Nut> or the <Copperhead> in the system do not present the associative relationship "has_use" because it is a type of artificial anchor and the function <Belaying> has been already added to the concept <Artificial anchor>; therefore, there was no need to add it another time. Finally, if the discipline in which a specific tool is used is not indicated, generally it is because that tool is a common one and it is employed in almost all types of climbing.

After the production of the concept system regarding climbing tools depicted in figure 17, three lexical networks about the same topic have been created. In this case, networks do no present concepts, but terms indicated between inverted commas and with no capital letter (for example, "climbing tools"). Furthermore, the hierarchical relationships are expressed through hyponyms (and hypernyms in the opposite direction, but these are not graphically indicated in the networks), while the only associative and horizontal relations are synonyms, highlighted in green, which are equivalent terminological variants that designate the same concept. Among the types of synonyms, in all three lexical networks there are discursive synonyms, as well as terminological synonyms and quasi-synonyms, but these will be addressed in the analysis of the terminological entries in the next chapter. In the next pages the three lexical networks are depicted, firstly the English one in figure 18; then the Italian one in figure 19, and finally the Spanish one in figure 20. The organization and structure of these networks are approximately the same: for example, in the English lexical network "carabiner" is the hyponym of "climbing tools" as the carabiner is a type of climbing tool, but it is also the hypernym of "standard carabiner", as the latter is a specific type of carabiner. At the same time, "standard carabiner" also presents a synonymic relationship indicated by the term "non-locking carabiner", which is its synonym; this also applies to the Italian and Spanish lexical network. However, one of the biggest differences between the three networks are precisely synonyms. In some cases, a term presents synonyms in all three languages, but in other cases a term in one language present synonyms, while in the other two there are none; or also a term in one language could have one synonym, while in the other one it has two or more. For example, in the English network the term "carabiner" present four synonyms ("biner", "karabiner", "crab", and "climbing clip"), while the equivalent in Italian, namely "moschettone" only has one synonym

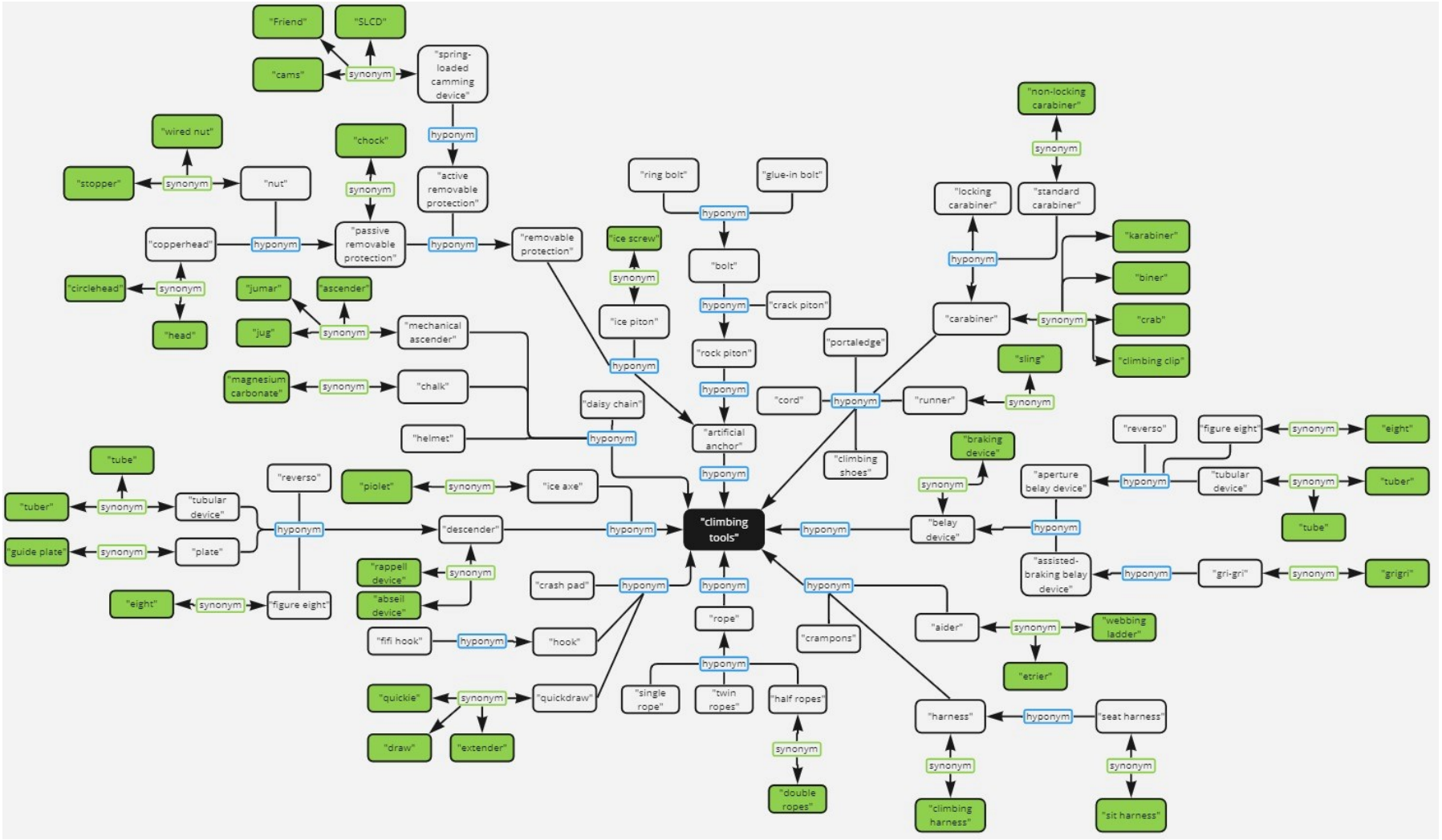


*Figure 18 - Climbing tools English lexical network*

(“connettore”) and the equivalent in Spanish, namely “mosquetón” only has one (“conector”). Or again in the English lexical network, “ring bolt” presents no synonyms, while the equivalent in Italian “Spit” presents two synonyms, namely “spit ROC” and “société de prospection et d’inventions techniques”, which is the acronym of the French firm that invented and produced the Spit for the first time. Whereas in Spanish like in English the equivalent “espit” has no synonyms.

Another interesting difference between these three lexical networks is the fact that the English one (apart from the synonym “etrier” of “aider”, which derives from French) does not present many neologisms as it is a “lingua franca” also in this field, while the Italian one tends to employ literal translations or loans and the Spanish one is inclined to create neologisms. This is the case of “climbing shoes”, which in Italian are “scarpette” (that is a literal translation), while in Spanish the neologism “pies de gato” is used, which is translated literally “cat feet” as climbing shoes are light and permit a gentle stand. Or also the case of “spring-loaded cam device”, also known as “friend”, which Italians tend to call “friend” as a loan, while Spanish prefer the neologism “fisurero de levas” (even though the synonym “friend” also exists in Spanish, but it is less used).

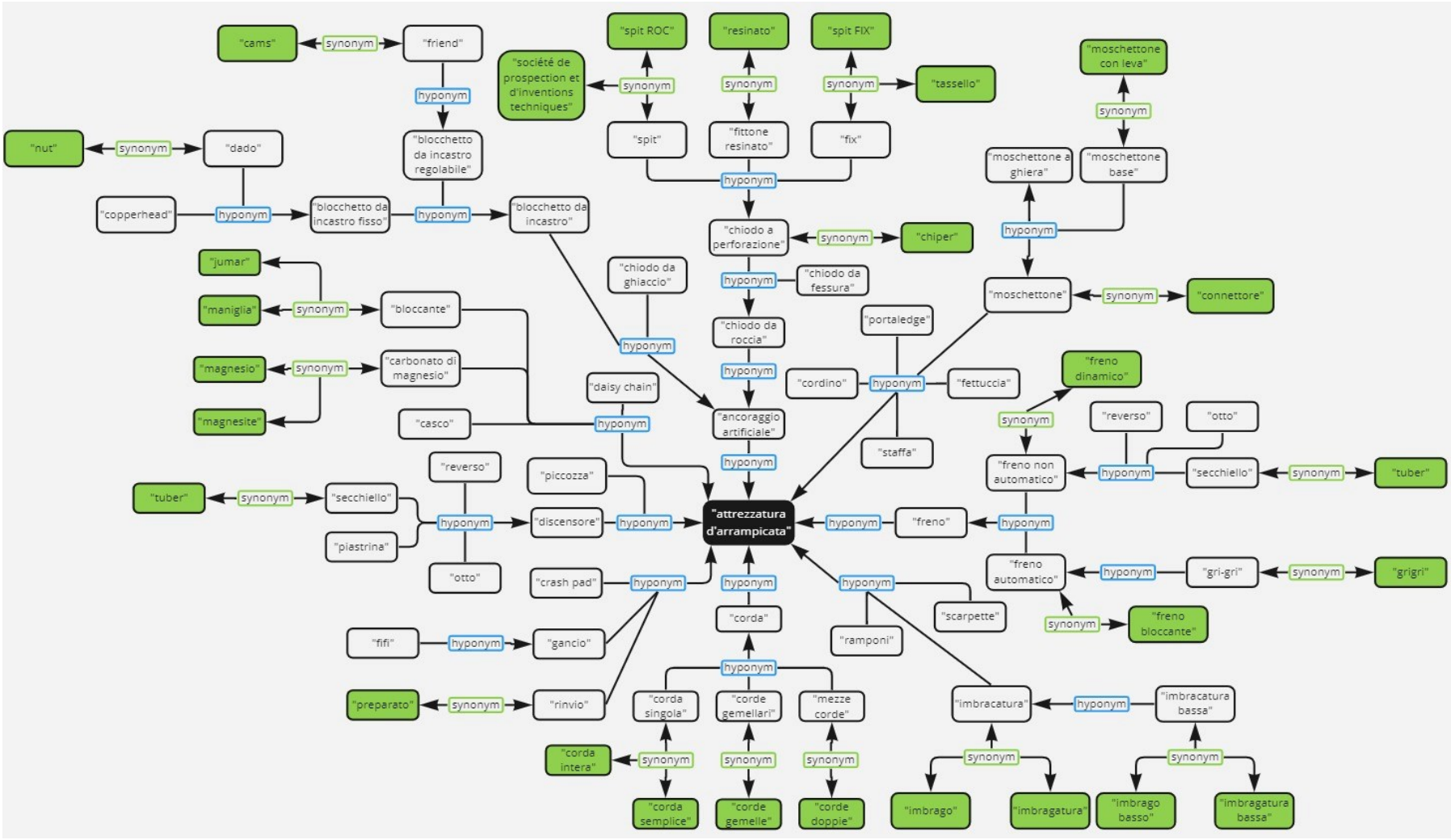


*Figure 19 - Climbing tools Italian lexical network*

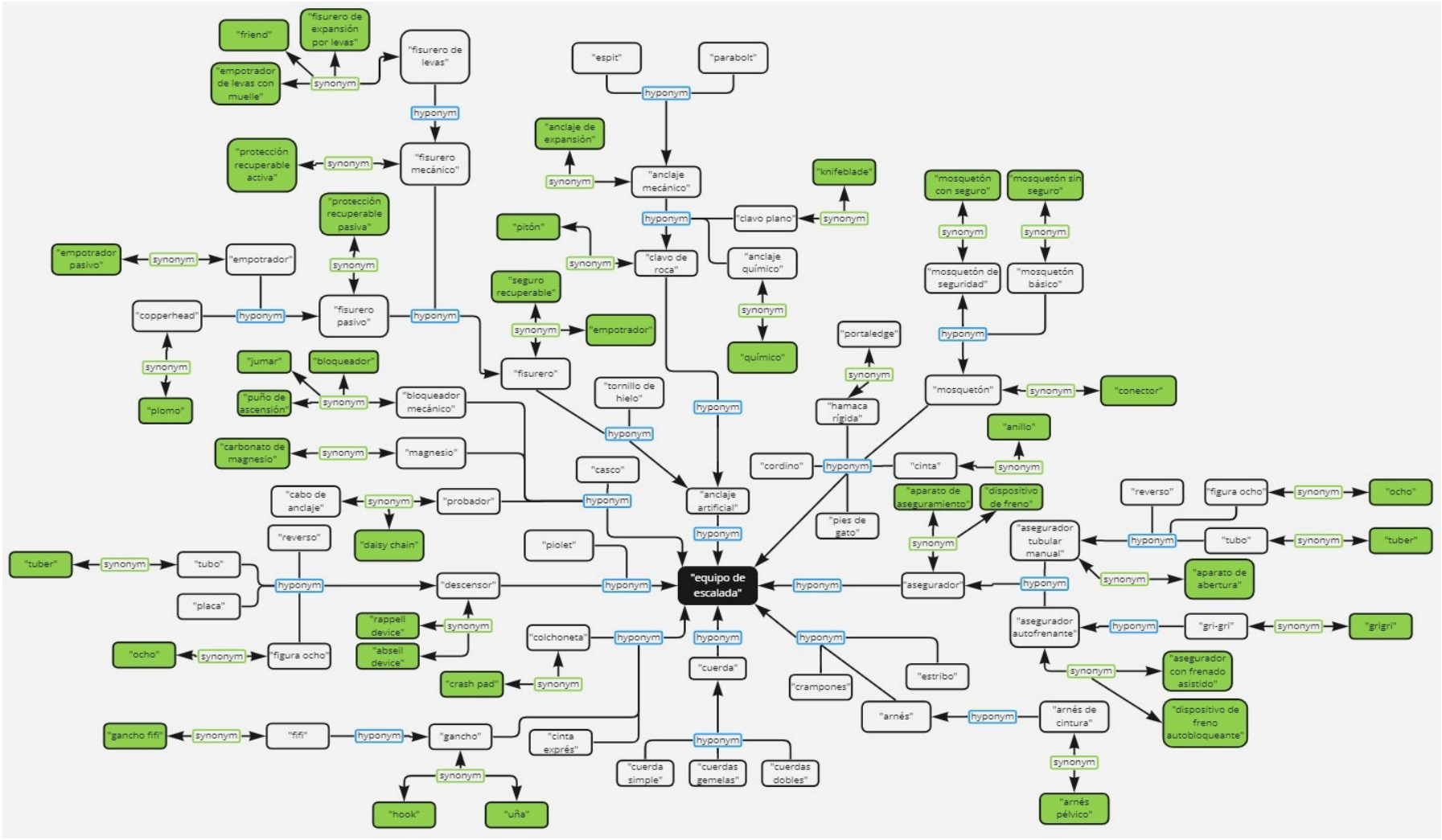


*Figure 20 - Climbing tools Spanish lexical network*

After having produced and explained the concept system and the three lexical networks about climbing tools, another four diagrams were created about climbing techniques, one concept and three lexical for each language. Concerning the structural organization of the concept system, concepts about climbing techniques have been divided as follows: the starting superordinate concept in the concept system is <Climbing techniques>. Then, five main subordinate concepts branch off, which constitute five big areas of climbing techniques, namely footwork techniques, techniques for both footwork and handwork, chimney techniques (also used in dihedrals), traversing techniques, and crack climbing techniques. From these five concepts, other subordinate concepts develop, indicating the specific types of techniques employed in that situation during the ascension. Moreover, many concepts regarding climbing techniques directly spread from the starting superordinate concept and these are techniques there are used mainly in all types of climbing (apart from bouldering). For this reason, it has been decided not to add the associative relation "used_in" as in the previous concept system about tools, as these techniques are employed in all kinds of climbing excluding bouldering. For example, belaying and rappelling are not used in bouldering, but in all other types of climbing. Therefore, it seemed redundant and disorganized to add to each concept a lot of associative relationships just to leave one aside, and it has been preferred to stress and analyze this aspect in the respective terminological entry compiled on FAIRterm. Regarding the other subordinate concepts that do not start directly from the central concept, no "used_in" associative relations have been used as this type of relation is intrinsic in the superordinate concept. For instance, liebacking and jamming are crack climbing techniques, but there was no need to explicit this using an associative relationship because the relative superordinate concept is <Crack climbing techniques> and therefore it is clear that those techniques are employed in crack climbing, as shown in the English concept system in figure 21 in the next page. Also "consists_of" associative relations have not been used, as techniques are not composed of different physical parts, but rather of movements and actions that should be carried out in a certain way. For this reason, no other relationships are present, and the technique will be explained in detail

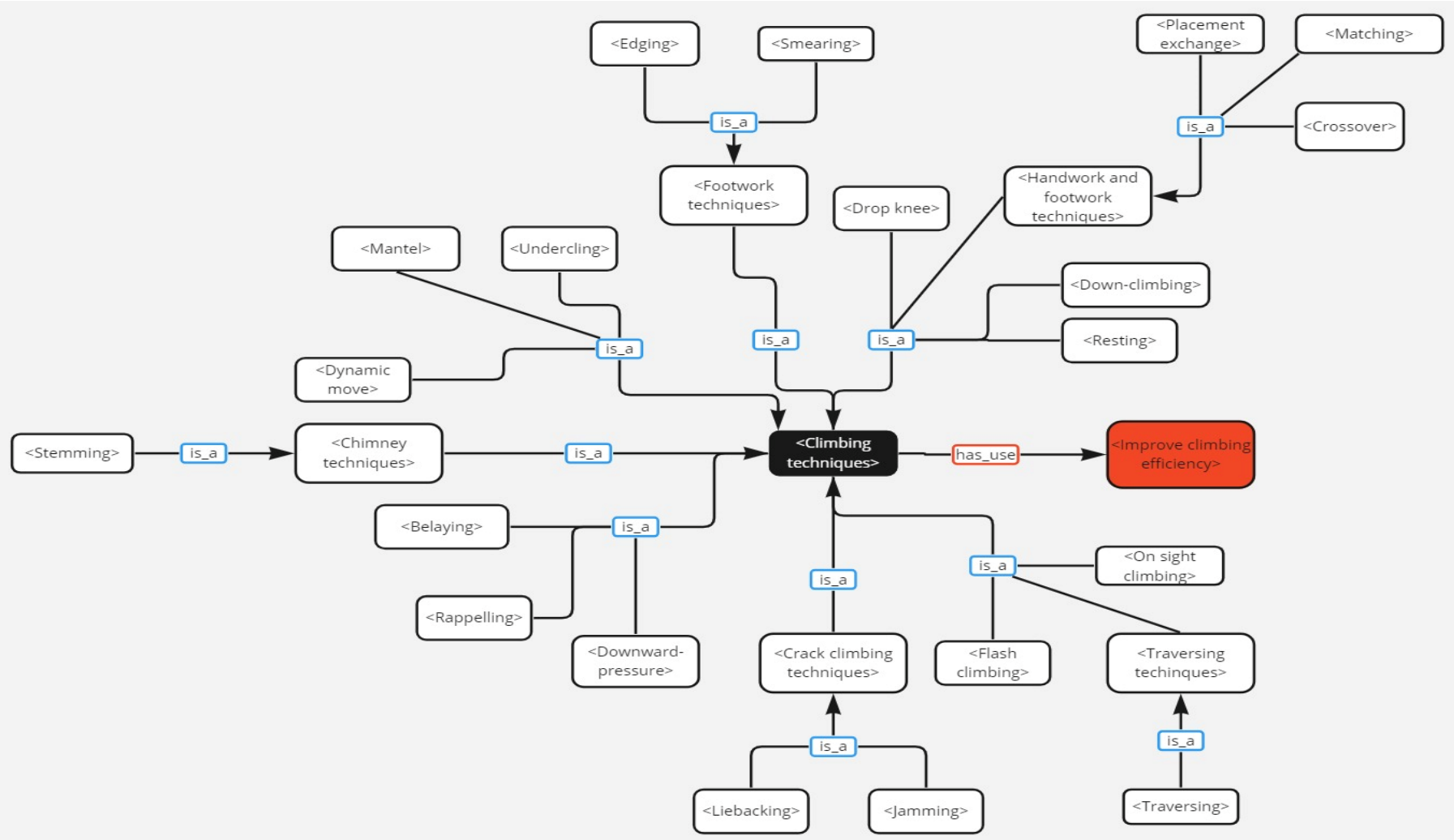


*Figure 21 - Climbing techniques English concept system*

through the terminological definition in the terminological entry. The only associative relation that has been used is a “has_use” relationship, which starts directly from the central superordinate concept <Climbing techniques> and it indicates for which reason techniques are employed, i.e., to improve climbing efficiency, highlighted in red. This concept system shows hierarchical genus-species relationships indicated with the label “is_a” with arrows pointing towards the superordinate concept, while the only associative relationship has an arrow that points towards the associative relation, i.e., towards the border of the system.

The last three diagrams that have been produced are three lexical networks about climbing techniques, one per each language. These networks are organized in the same way as the three lexical networks about climbing tools: hierarchical relations are expressed through hyponyms with the arrows pointing towards the superordinate term, while the only associative and horizontal relations are synonyms highlighted in green with the arrows pointing both towards the superordinate term and the synonymic relation. These networks, as well as the concept system about climbing techniques, are relatively small compared to the system and the networks about tools. This is because the number of techniques is definitively smaller than the number of existing tools and, moreover, only the most important techniques and skills have been inserted into the diagrams, leaving aside the less used and known. In addition, in the lexical networks depicted in the next figures (the English one in figure 22, the Italian one in figure 23, and the Spanish one in figure 24), it is evident that also the number of synonyms is lower compared to the synonymic relations of climbing tools lexical networks: the English network as well as the Italian one only has three synonyms, while the Spanish network only has two synonyms.

Glancing at these networks, it is possible to highlight some interesting facts. First, the issue about the “liebacking” technique. This skill is employed only when a climber is ascending a crack and consists of pulling the hands and pushing the feet in opposition as moving up the crack and it was firstly invented by Hans Dülfer (1892-1915), a German climber born in Barmen (Ruhr). Very interesting to notice is the fact that in Italian the equivalent of “liebacking” is “dülfer”, therefore this term derives from the climber who invented the technique. However, in Spanish the equivalent is “bavaresa” probably because Dülfer climbed a long part of his life in the Bavarian Alps and was an active

member of the Munich alpinists group, thus in this case the term derives from the region where Dülfer developed this technique for the first time (Masciadri 1989, p.83). Secondly, another interesting fact is represented by the "drop knee" technique, which in English is a specification of the movement the climber has to make in order to carry out this skill, namely dropping and rotating the knee and the hip inward to maintain stability. However, the most evident and important differences between these three networks concern the "mantel", "rappelling", and "undercling" techniques. In the first case, it is important to stress that this technique has the same equivalent also in Spanish, where it is borrowed as a loan and the same term is used (not so typical for Spanish, because it tends to create neologisms instead of borrowing a foreign term, as already explained above). Conversely, in Italian it changes completely into a more general "caricamento" as a technical equivalent term does not exist. The second difference regarding rappelling is about the same: the equivalent in Spanish ("rápel") is an adaptation of the English term ("rappelling"), probably because of the influence of British climber's culture, while in Italian the same term is conveyed with "discesa in corda doppia", which is a specification of this type of activity. Finally, in the last example the term "undercling", which is a particular technique where the climber hands pull outward beneath a lip of rock while the feet push against the rock producing a counterforce, has no direct equivalents in the other two languages in the form of calques or loans, thus the same term has been translated through a specification: in Italian "rovescio" and in Spanish "agarre invertido", which specify the hands' position on the rock when carrying out this technique. However, all these cases will be deeply analyzed and discussed in the last chapter of this thesis.

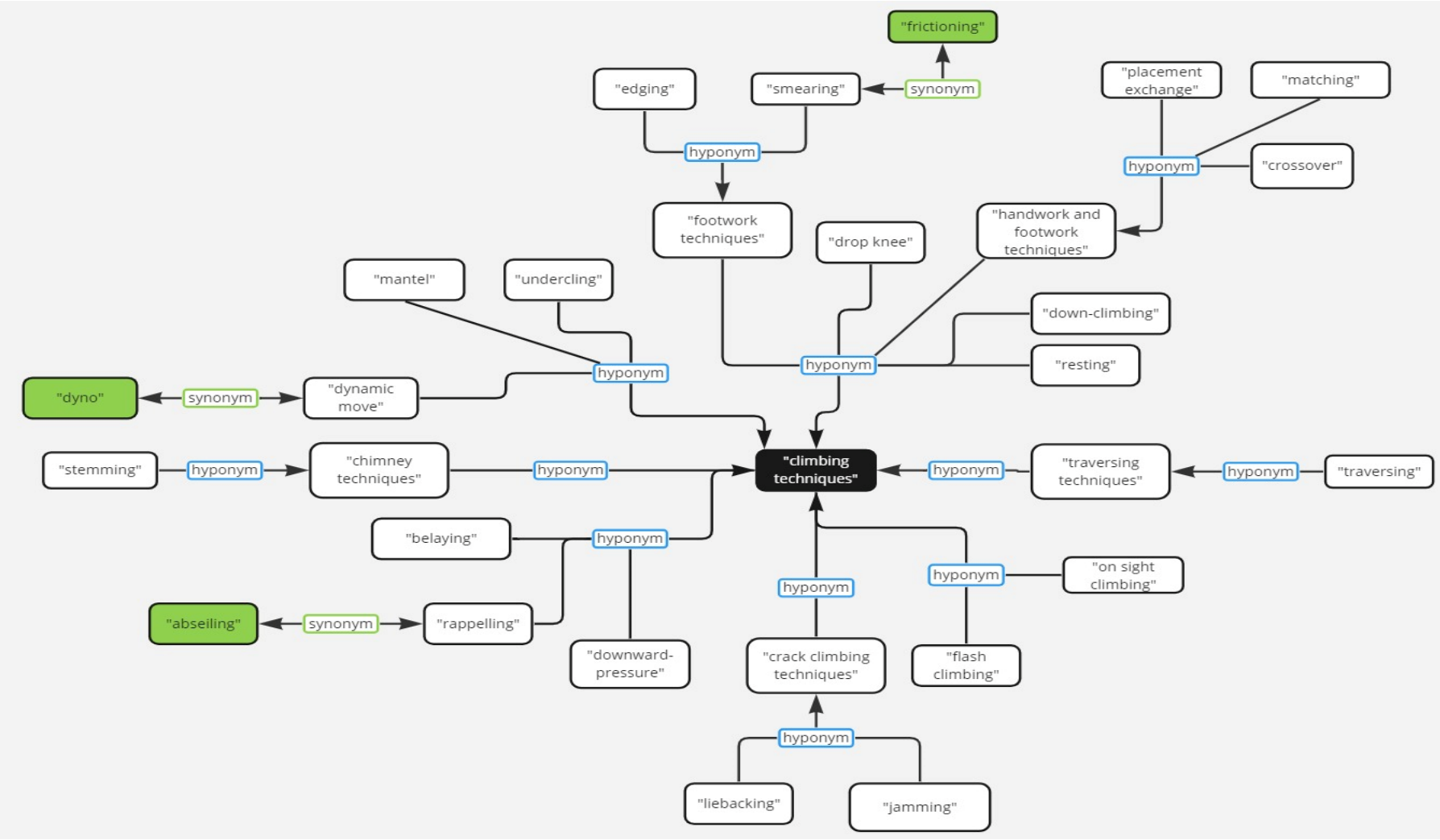


*Figure 22 - Climbing techniques English lexical network*

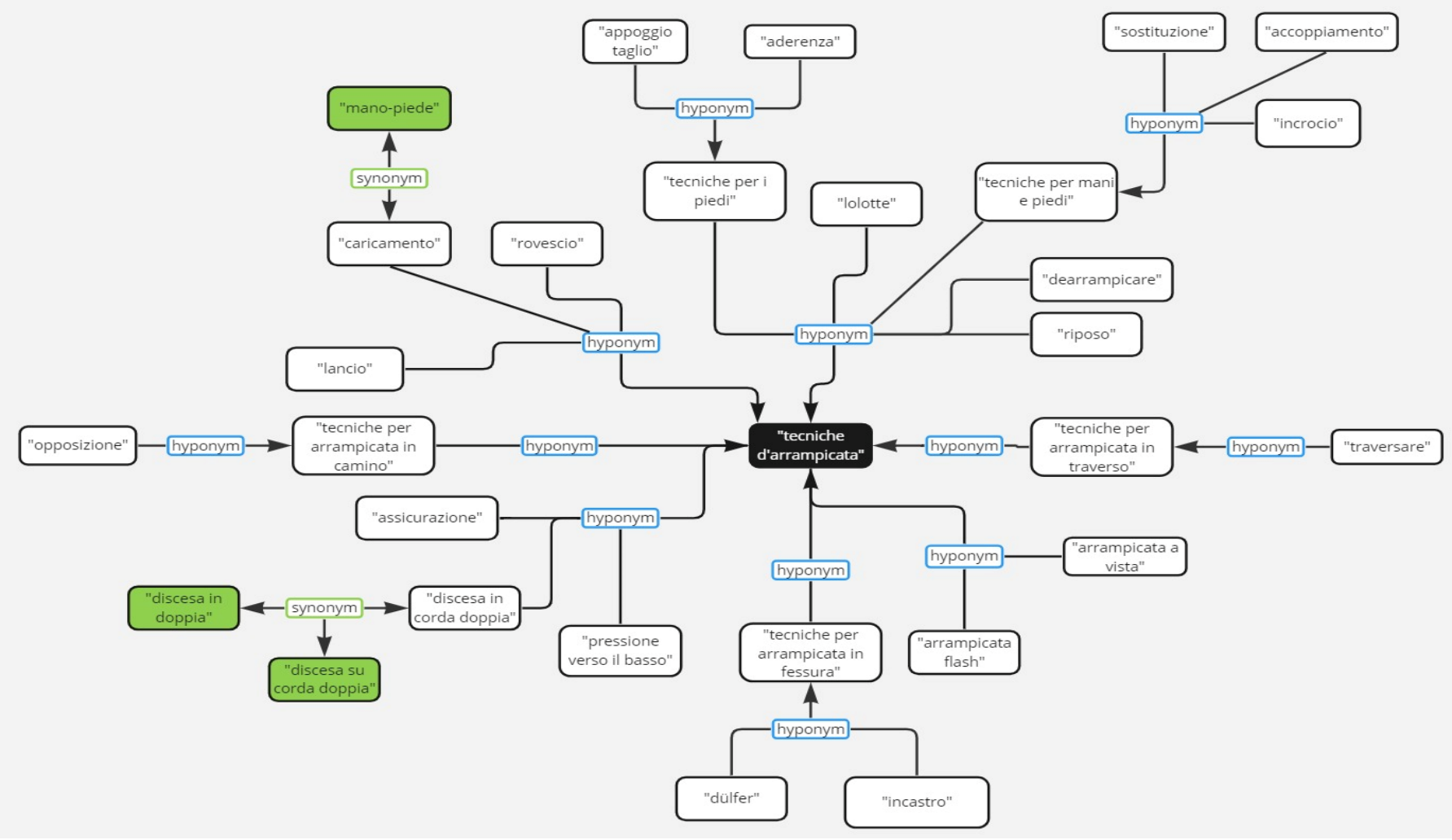


*Figure 23 - Climbing techniques Italian lexical network*

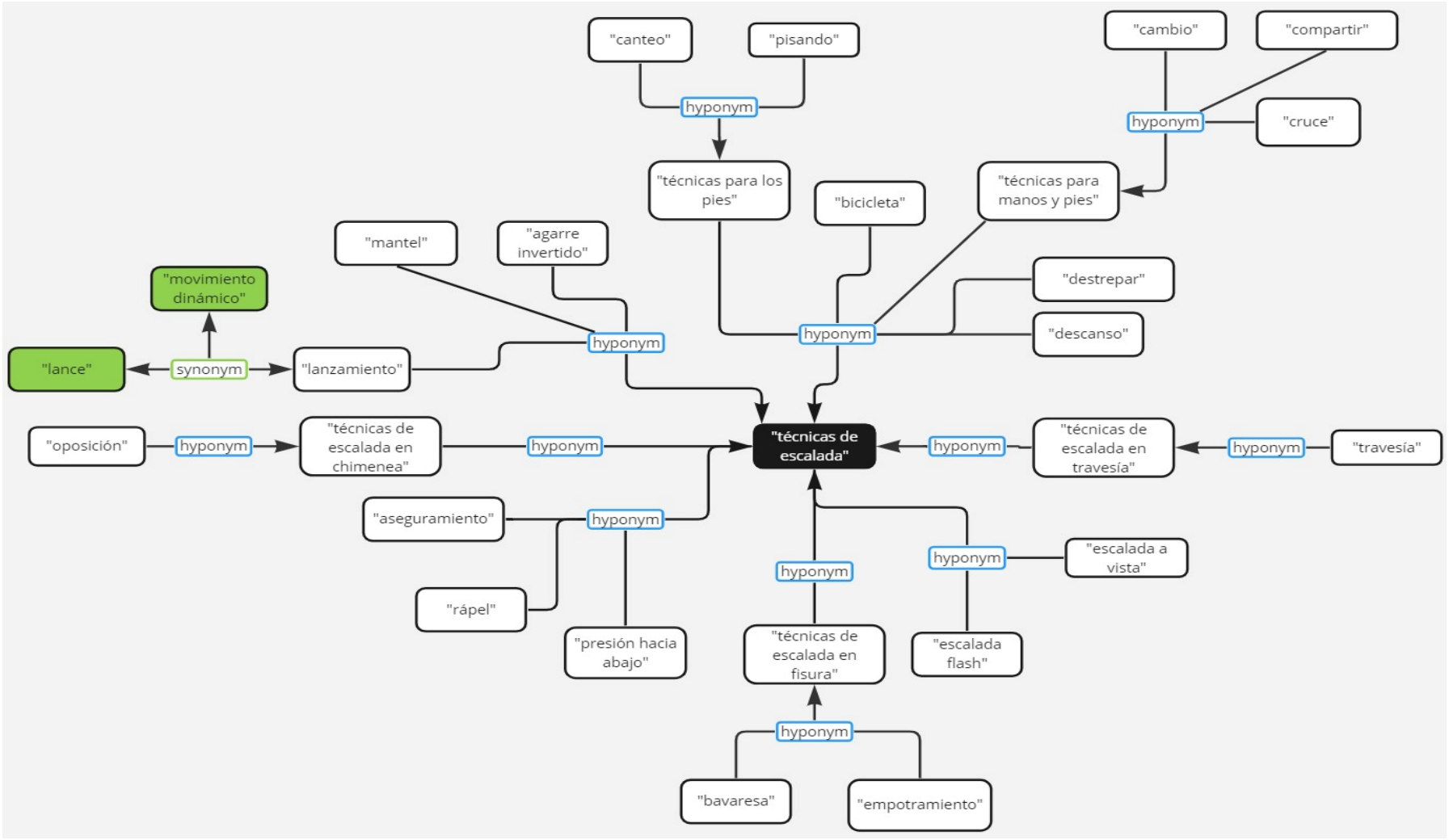


*Figure 24 - Climbing techniques Spanish lexical network*

In Italian what is probably the French name of this technique is used, i.e., “lolotte”, while in Spanish the equivalent of the same term is “bicicleta”, probably because the rotatory movement of the leg resembles the movement a biker makes while riding a bike.

Having presented and explained these eight diagrams, the two concept systems and the six lexical networks have been respectively analyzed and compared with each other employing and fostering a multidimensional approach that encompasses both conceptual and linguistic dimensions. As a result, a complete list of terms alongside their relationships has been made and used as a reference point for the compilation of the terminological entries on FAIRterm. Both the concept system and the lexical networks for each language and for each of the two subdomains (tools and techniques) have been compared, and all terms present on these diagrams have been added to FAIRterm and their terminological entries have been compiled. In the next and last chapter, the most interesting aspects, facts, characteristics, and peculiarities of these terminological entries will be analyzed and explained, and as already mentioned, an annex containing all English entries compiled on the software alongside their terminological definitions can be found at the end of this thesis, after the fifth chapter and before the resources.

# 5. Terminological entries on FAIRterm: analysis and comparison

In this fifth and last chapter, the most important and relevant terminological entries compiled on FAIRterm will be explained, analyzed, and compared. We will highlight their most interesting characteristics and features in a monolingual environment, underlining their peculiarities for native speakers, but also in a translation circle by clarifying differences and stating similarities between a source and a target term. Given that on the FAIRterm Web application two terms of two different languages must be necessarily compiled, one source on the left side of the screen and one target on the right side of the page, and that this project revolves around three languages, it has been decided to always use English as the source language, as it is the written language of this thesis, and then Italian and Spanish as the target language. Therefore, on FAIRterm the same English climbing terms are used two times, one time for creating the comparison with Italian terms, and another time with Spanish terms. Of course, the English terminological entries have been compiled only once and used again without modifying them for the other target language.

This final chapter has been organized as follows: after having produced and analyzed the concept systems and lexical networks for each language, all terms have been inserted on FAIRterm and their terminological entries have been compiled. For each entry, many categories had to be filled in, namely part of speech, pronunciation, etymology and notes about the term (important and interesting facts about a particular term that could help the reader or translator to understand the term definition or usage), as well as its definition and semic analysis, its related synonyms, hypernyms, hyponyms, meronyms and holonyms, its variations, abbreviations, and acronyms, but also its usage, thus its subject field and subdomain, register, context and collocation. After the same concept had been compiled three times for each related term in the three languages of this project, i.e., after each trilingual triplet of terms indicating the same concept has been completed, the triplet has been analyzed and compared, and for each triplet a comment and short analysis have been produced highlighting the characteristics and differences of the three terms. This contrastive analysis is at the core of this final chapter, and it will be outlined in the following section.

As already said before, only the most important and interesting triplets will be analyzed, leaving the most common and predictable out. Moreover, at the end of this chapter, before the resources section, a table showing English terms is depicted. This table shows the concept on the left side (in English), the English term in the middle and its definition on the right side, without the other categories. For viewing the complete terminological entry in English, as well as the other entries in Italian and Spanish, it is necessary to request for the full TBX or TSV file, only downloadable through the FAIRterm dashboard. At the beginning the idea was to produce three different tables, one for each language, indicating the concepts on the left and all terms that have been compiled on FAIRterm on the right. However, for the purpose of this project, it has been decided to produce a single table showing only the concepts alongside their definitions in natural language, leaving aside the Italian and Spanish definitions. In this way, following an alphabetical order for the concepts written in English, the table shows one concept and its definition always in English.

### 5.1 Analysis of the terminological entries: triplets compared and explained

In this section, the most important and interesting triplets of terms designating the same concept will be analyzed and compared. After having completed all entries on FAIRterm, where 38 terms per language about climbing tools (38 for Italian and Spanish, but only 37 for English as it distinguishes only between ring bolt and glue-in bolt, while Spaniards and Italian distinguish between “Spit”, “Fix” and “fittone resinato” for the latter, and “Espit”, “Parabolt” and “anclaje quimico” for Spanish, i.e. English climbers have only a way to call both the Spit and the Fix, namely “ring bolt”) and 20 term per language about techniques have been compiled, a contrastive analysis has been carried out and presented in this last chapter. Regarding definitions, it is important to say that most of them have been found in climbing books, while in some cases they have been taken from online websites, or when an exhaustive definition was not available, a new definition has been created by putting together different characteristics taken from different websites or from different books. In the table that can be found at the end of this thesis, after this chapter, all English terms compiled on FAIRterm are indexed alongside their definition. Concerning the software used for compiling, it is important to underline that in the “formal features” category, the section “etymology” and “pronunciation” have

been completed using monolingual dictionaries or the website Wikitionary,[16] where much information about terms can be found. When two different pronunciations were found, one in British English and the other one in American English, the latter has been chosen as the whole thesis has been written in American English. Finally, the section "notes", where important data about the term can be inserted to help users or translators, has been filled out only when fundamental and peculiar information was essential to help understand aspects or characteristics of a term; in other familiar and straightforward cases, this section has been left blank.

### 5.2 Analysis of climbing tools triplets

The first triplet that has been analyzed is "climbing shoes"; the equivalent in Italian is "scarpette", while in Spanish is "pies de gato". Regarding this triplet, no notes have been added to these terms. It is interesting to underline that in English and Italian the term is more or less the same, with the difference that in Italian climbers tend to use more "scarpette" (which is the diminutive of "shoes") rather than the full form "scarpette d'arrampicata" (which means literally "climbing shoes"), even though the full form exists; while Spaniards use the neologism "pies de gato", instead of the literal translation (that would be "zapatos de escalada"), conveying the idea that wearing these types of shoes permits to be more agile, delicate and precise like a cat walking and jumping.

The next triplet is "quickdraw", which is translated in Italian as "rinvio" and in Spanish as "cinta exprés". Interesting to notice is that in Italian and Spanish the term used is a simple noun, while in English it is a compound word, made putting together the adjective "quick" and the verb to "draw", meaning something that is drawn (in the sense of extracted, removed, used) very quickly (straightforward). In fact, a quickdraw is generally carried by the climber clipped onto a gear loop of the harness and it can be used and employed very quickly. Also, in Spanish this idea is conveyed by the adjective "exprés", while in Italian the term "rinvio" derives from the verb "rinviare". Concerning synonyms, the English term has many like extender, quickie and draw, where the last two are also abbreviations of "quickdraw", while the Spanish term presents the orthographic

[16] https://en.wiktionary.org/wiki/Wiktionary:Main_Page

variant “cinta express” (with the double “s” and without the stress) and two abbreviations, namely “express” and “exprés”; the Italian term has no synonyms.

Another analyzed triplet is “aider”, which in Italian is “staffa”, while in Spanish is “estribo”. There is not much to say about this triplet, apart from the fact that the English term also presents a French synonym, namely "etrier", probably because of the influence of French climbers or because the first aider was invented in France, and also the synonym “webbing ladder”, while in Spanish and Italian there are no synonyms. Furthermore, in English there are also other hyponyms of “aider” such as “offset-step style aider”, “ladder style aider” or “adjustable aider”, which are types of aider, but as already said before, for the purpose of this project, we have decided to stop the lexical networks at “aider” without adding these types of aiders, but at least they have been added in the section “hyponyms” of the “semantics” category in FAIRterm.

To continue, we have analyzed the triplet “helmet”, “casco” in Italian and again “casco” also in Spanish. Important to underline is the fact that among climbers the most common and used term to designate the climbing helmet is "helmet", even though the general and generic term refers to every type of helmet; however, this specification is redundant within the climbing context, thus climbers prefer the abbreviation “helmet”. The same thing applies to Italian, where climbers prefer “casco” to “casco d’arrampicata”, and to Spanish, where climbers prefer “casco” instead of the full form “casco de escalada”. Furthermore, for each language the term presents derivatives, which are all types of helmets (such as the bicycle helmet, the safety helmet, etc.), thus the climbing helmet is a type of helmet, but as already said before, climbers prefer the generic form. Finally, many types of climbing helmets exist, such as the hardshell helmet and the lightweight foam helmet, but for the purpose of this thesis, we have decided to stop at helmet and not adding more hyponyms.

The next triplet is “single rope”, which in Italian is “corda singola” and in Spanish “cuerda simple”. The only important fact to underline regarding these terms is that for all three languages, the definition has been adapted and taken from two different resources (two websites or one website and one book) because the definition used in only one resource was not sufficient to convey the full meaning; therefore, two definitions taken from two different resources were joined and reformulated in order to produce a complete and exhaustive definition which also included the indicators/marks to distinguish single

ropes from other types of ropes, and also the fact that they are controlled by international organizations, such as the UIAA and the CEN (see chapter 2).

Furthermore, not only the single rope exists, even though it is the most common type of climbing rope employed by climbers; “half ropes” (also known as “double ropes”) are another type of rope, which in Italian is translated as “mezze corde” or “corde doppie”, and in Spanish as “cuerdas dobles”. Also, in this case the definition has been formulated by joining two different resources in order to produce a complete and exhaustive definition. The first part of the definition which describes the rope in general is the same, while the characteristics and usage change and they are explained in the second part of the definition. In contrast with twin ropes, half ropes must not necessarily be clipped together to bolts or anchors and for this reason they are useful for trad climbing and zigzag pitches. Another important difference with twin ropes is that half ropes can be used in the same way as single ropes for belaying two followers at the same time. Finally, interesting to notice is that half ropes can be knotted together permitting a longer rappel.

Another triplet that has been examined is “seat harness”; the equivalent in Italian is “imbracatura bassa”, while in Spanish is “arnés de cintura”. Interesting to underline in this case is the variation. In English an orthographic variant exists for this term, namely "sit harness", and also another synonym, namely "climbing harness", but in the context of climbing this specification is redundant and climbers tend to use the term "seat harness" or simply the abbreviation "harness"; in Italian there is an orthographic variant “imbragatura bassa” (with the letter “g” instead of the letter “c”) and also the abbreviation “imbrago basso” which at the same time presents also an orthographic variant as the letter “c” is replaced by the letter “g”; finally, Spanish presents only a synonym, namely “arnés pélvico”.

Concerning the next triplet “locking carabiner” in English, “moschettone a ghiera” in Italian, and “mosquetón de seguridad” in Spanish, also in this case the most interesting fact regards the variation: the English term presents many synonyms, namely one orthographic variant “locking karabiner”, two abbreviations “locking crab” and “locking biner”, and also one standard synonym “locking climbing clip”; the Italian term presents the synonym “connettore a ghiera”, while the Spanish one presents the synonym “mosquetón con seguro”. Another type of locking carabiner exists, namely the pear-

shaped HMS locking carabiner, but as already mentioned, the number of hyponyms has been limited for the purpose of this project.

The next triplet that has been analyzed is “crash pad”, which in Italian is the same “crash pad” and in Spanish is “colchoneta”. Interesting to notice is that only the English term presents a derivative, namely the verb “to pad”, which is used when a crash pad is placed under a boulder to protect the climber in case of falling. In fact, this tool is used only in bouldering. Moreover, in Italian the anglicism “crash pad” has spread and it is used, even though the quasi-synonym “materassino” (mat) exists but is less used as it is a very general term that can refer to many other types of mats; while in Spanish the neologism “colchoneta” is used, but the anglicism “crash pad” also exists and it is often employed. Finally, in Italian also the abbreviation “pad” is used, as well as the orthographic variant “crashpad” (without the space between crash and pad); also in English the orthographic variant “crashpad” exists, and it presents a standard synonym, namely “bouldering mat”, while in Spanish the abbreviation “colcho” is very popular among climbers.

To continue, we have also analyzed the triplet concerning the “spring-loaded camming device”, which in Italian is translated as “friend” and in Spanish as “fisurero de levas”. Very interesting to notice in this case is the variation of the term. In English the full and complete form is “spring-loaded camming device”, but the most common and used term is “friend” and maybe this accepted meaning derives from the fact that this device helps climbers like a sort of friend, as it permits belaying where no fixed protections are present. Moreover, also the acronym “SLCD” exists, as well as the abbreviation “cams”. On the contrary, in Italian (always because of the inclination to acquire loans and borrowings from English) the most used term is “friend”, but also the synonym “cams” is used sometimes. Finally, in Spanish they prefer the term “fisurero de levas”, or also the synonym “fisurero de expansion por levas”, “empotrador de levas con muelle” and finally “friend”.

Another triplet that has been compared is “Gri-gri”. As it is the most common and used assisted-braking belay device produced by Petzl, a very famous climbing tools firm, the term is the same in the three languages. Being the proper noun of this device, in the same way as the Reverso that will be later explained, the term presents no translations or adaptations, but it has been borrowed as a loan. The operating principle of this device is

underlined in the terminological definition, and it is important to say that all languages also present an orthographic variant, namely Grigri (without the hyphen).

Moving on, we have examined the triplet “ice axe”, in Italian “piccozza” and in Spanish “piolet”. Even though it is a tool used only in alpinism or in ice climbing, we have decided to compile it anyway to explain at least the three most important tools employed in alpinism, namely "ice axe", "crampons" and "ice piton”. Interesting to notice is that the Italian term does not present synonyms as well as the Spanish term, while in English the “ice axe” can also be called “piolet”, like in Spanish. This is because Spaniards have borrowed the term from English, which similarly has borrowed the term from French, where it originated. However, English climbers prefer to use the English term instead of the borrowing. Many types of ice axes exist, but for the purpose of this thesis, we have decided not to add more hyponyms and stop at “ice axe”.

Another triplet that has been analyzed and that is used only in alpinism and ice climbing is “crampons”, which in Italian is translated as “ramponi” and in Spanish as “crampones”. Again, here it is interesting to underline the fact that the English term, as well as the Spanish term, derives from the French “crampon”, probably because they were invented or firstly used there. No synonyms exist and even in this case many types of crampons have been produced (hinged, semirigid, instep, approach crampons and so on), but we have decided to stop at the general term, without adding other hyponyms.

Furthermore, we have analyzed the triplet “portaledge”, which remains the same in Italian, while in Spanish the neologism “hamaca rígida” is used. The only interesting fact about this term is that Italian climbers employ the English word, which is in line with their tendency to borrow loans from the English culture. As a matter of fact, the first portaledge was invented in the US, when climbers were trying to ascend the peaks of the Yosemite National Park. While in Spanish the neologism “hamaca rígida” is preferred, even though the synonym “portaledge” exists, but it is less used. In contrast with Italian where this term has a feminine article (la portaledge), in Spanish a masculine article is employed (el portaledge).

Another triplet that has been examined is “fifi hook”. In Italian and Spanish, the term is the same, but abbreviated, namely “fifi” in both languages. There is not much to say about this triplet, apart from the fact that no etymology has been found for the term “fifi”. In addition, like other cases in this analysis, several types of fifi hooks exist (the

classic fifi hook, the adjustable fifi hook, etc.), but for the purpose of this project we have decided to stop at the general fifi hook, without adding more hyponyms.

To continue, we have analyzed the triplet “cord”, in Italian and Spanish “cordino”, but this term does not present particularly interesting characteristics. It is simply a piece of static rope that is used for a series of purposes and tasks, like an all-around tool. It is similar to the runner (or sling), but they are not the same object.

Concerning the triplet “runner”, which in Italian is “fettuccia” and in Spanish “cinta”, interesting to notice is its variation. It is like the cord in terms of usage, but it is different regarding the material used for its production (webbing vs. nylon). The Italian term does not present synonyms, while in English “sling” is also used. In Spanish there are two synonyms, namely “anillo” (as many runners are tied into loops) and “anillo de cinta”.

Moreover, we have analyzed the triplet “daisy chain”, a tool employed mainly in aid climbing. In Italian the equivalent is “daisy chain”, therefore Italian climbers use the loan word from English and no synonyms exist. While in Spanish the equivalent is “probador”, but there are two synonyms, “cabo de anclaje” and again the loan “daisy chain”, even though it is less employed. Interesting to notice, in English there is also the derivative verb "to daisy chain", but it refers to a different concept and to a different domain (electronics). Finally, the alternative form with the hyphen is also used, namely "daisy-chain".

In the next triplet, which is “mechanical ascender” in English, “bloccante” in Italian and “bloqueador mecánico” in Spanish, variations are evident. Interesting to notice, the synonym "Jumar", which is used in all three languages as a loan, derives from the two Swiss inventors of this tool, namely Adolph Jusy and Walter Marti: the name was created by joining the first syllable of the two, namely "ju" + "mar". Moreover, in Spanish the derivative verb “jumarear” is also used and it obviously derives from the term “jumar”. Regarding other synonyms, in Spanish there is the abbreviation “bloqueador” and “puño de ascension”. In Italian we also found the more common “maniglia”. And in English exists the synonym “jug”, but also the abbreviation “ascender”.

The next triplet is “chalk”, which presents some very particular characteristics. First of all, in Italian the equivalent translation and the most used by climbers is “magnesio”, but other two ways exist to call this substance, namely “carbonato di magnesio” and

“magnesite”. In the climbing world these three terms are used as synonyms, while the abbreviation “magnesio” and “magnesite” could be quasi-synonyms of “carbonato di magnesio”. This is because “magnesite” is, in truth, a mineral from which magnesium carbonate is extracted. Therefore, in the field of mineralogy this term could be hyponym and at the same time holonym of “carbonato di magnesio”. For what concerns “magnesio”, actually it is a type of metal and an element of the periodic table. However, among Italian climbers these three terms are equally used, with the exclusion of the full scientific form that is less employed compared with the other two. For these reasons, we have considered them as quasi-synonyms and not as hyponyms or holonyms. Concerning Spanish, “magnesium carbonate” is translated as “carbonato de magnesio”, but also in this case this is not the most used term, it is the scientific way to call it. Spanish climbers prefer the abbreviation “magnesio” and consider it as a synonym. In truth, this is a quasi-synonym, because, as already explained, “magnesio” is a metal of the periodic table, and “carbonato de magnesio” is a chemical compound obtained from magnesite. In contrast with Italian, where “magnesite” is used as a synonym, in Spanish “magnesita” is not employed in the climbing environment. Differently from the other two languages, in English "chalk" can be considered as a quasi-synonym of magnesium carbonate (the proper scientific term), as chalk also refers to the white chalk used to write on blackboards, but it is the most common word to describe it. "Magnesium" is not used in this case because it refers to the white-silver metal (Mg).

Moreover, there is not much to say about the following triplet, “nut”, in Italian “dado” and in Spanish “empotrador”. Many types of nuts exist, but for the purpose of this project we have decided to stop at the general "nut", without adding other hyponyms. Interesting to notice, English and Spanish climbers prefer the abbreviation: “nut” instead of “wired nut” and “empotrador” instead of “empotrador pasivo”. While Italian climbers sometimes use the anglicism “nut” as a synonym.

The following triplet is “copperhead”, which is used invariably in the other two languages as a loan. It is simply one of the most common types of nuts but present a softer metal. In English it is also used the abbreviation “head”, and the more general term “malleable hardware”. In Spanish the synonym “plomo” is used, but only if the copperhead is made of lead (the translation of “plomo”). In Italian there are no synonyms.

Regarding the next triplet, namely “twin ropes”, which in Italian is “corde gemellari” or “corde gemelle” and in Spanish “cuerdas gemelas”, there is not much to say. This tool is simply one of the three main types of climbing ropes, and its distinctive trait is that twin ropes must be always used in pair, and they must be clipped together through the same carabiner. No particular variations are present.

To continue, we analyzed the triplet “ice screw”. In English there is also the synonym “ice piton”, while in Italian the equivalent term is “chiodo da ghiaccio”, even though the more accurate term is “vite da ghiaccio”, as the “ice piton” was invented before the “ice screw” and was employed by pounding the piton into the ice (ice screws are conversely screwed into the ice by rotating them). However, among Italian climbers the term “chiodo da ghiaccio” is more used and it is for this reason that we have decided to compile the terminological entry “chiodo da ghiaccio” and have identified “vite da ghiaccio” as a synonym. Finally, in Spanish the equivalent term is “tornillo de hielo”, but a morphosyntactic variant exists, namely “tornillo para hielo” (“para” instead of the preposition “de”).

The next triplet that has been highlighted is “hook”, which in Italian is “gancio” and in Spanish “gancho”. Many types of hooks exist (such as bat hooks, Talon hooks, camming hooks, etc.), but we have decided to analyze only hooks in general (in the following terminological entry) and the Fifi hook as the only type of hook because it is the most used and employed. In Italian there is also the synonymic variation and anglicism “skyhook”, but it is not employed very often. Moreover, in Spanish there are two variations, namely “uña” (nail) and the English loan “hook”, even though the latter is the less preferred given that Spaniards are prone to create neologisms instead of using loanwords.

To continue, we have analyzed the triplet “assisted-braking belay device”. This is a category of belay devices that encompasses many types of these belay devices, but as already said before, we have decided to add only the hyponym “Grigri”, that is the most common and popular type of assisted-braking belay device, leaving out the other (such as the Trango Vergo or the Edelrid Eddy). In Italian the equivalent is “freno automatico”, which presents the synonym “freno bloccante”, while in Spanish the equivalent is “asegurador autofrenante”, but there are many other ways to call it, such as “asegurador/dispositivo con frenado asistido” and “dispositivo de freno autobloqueante”.

In English there are no synonyms, and these devices are used mainly in gym climbing, aid climbing and sport climbing, as they permit to belay only the first member of the rope party and not the second or the third, and it is not recommended for rappelling during multi-pitch routes.

Then, we have analyzed the other type of belay devices, namely “aperture belay devices”, in Italian “freno non automatico” or “freno dinamico” and in Spanish “asegurador tubular manual” or “aparato de abertura”. These devices, in contrast with assisted-braking belay devices, are used in multi-pitch routes and generally permit belaying. Among the types of this tool, some are used not only for belaying, but also for rappelling (such as the Reverso, the figure eight and the tubular device); others are exclusively employed for rappelling (such as the plate), and others are also used for belaying two followers at the same time (within the analyzed tools, only the Reverso fulfills this function).

Regarding the triplet “descender”, in Italian “discensore” and in Spanish “descensor”, we have used the definition of “aperture belay device” presented above and added some specifications. This because many types of descenders are also used as belay devices and vice versa (the Reverso, the figure eight and the tubular device are used for both rappelling and belaying, therefore they are descenders, but at the same time also a type of aperture belay device, while the plate is used only as a descender). Interesting to notice, the English term “descender” also presents two synonyms, “abseil device” and “rappel device”.

Moving on, we have analyzed the triplet “plate”, which in Italian the equivalent is “piastrina” and in Spanish “placa”. Actually, the plate could also be used to belay one or two seconds, but it must not be used to belay the leader of the rope party. For this reason, we have decided to add the term "plate" as the hyponym of "descender", and not as the hyponym of "aperture belay device". In fact, climbers prefer using the plate only as a descender and employing another tool (such as the Reverso from Petzl) to belay the leader and one or two seconds. Furthermore, the English term presents the synonym “guide plate” and “multiuse plate”.

Then, we have underlined the most important fact about the following triplet, namely “figure eight”, in Italian “otto” and in Spanish “figura ocho”. It is essential not to confuse the figure eight as a descend/belay device with the figure eight knot (often called

simply eight), which is a type of knot that is tied through the belay loop of the seat harness. Finally, in English and in Spanish the abbreviation (“eight” and “ocho”) is often used by climbers.

Regarding the triplet “tubular device”, which in Italian is translated as “secchiello” or “tuber”, and in Spanish “tubo”, “cesta” or again “tuber”, the only thing to say is that many types of tubular devices exist; in general each climbing firm produces several models of tubular devices (for example the Verso from Petzl, not to be confused with the Reverso, or the Black Diamond ATC). However, as already said before, for the purpose of this project we have decided to stop at “tubular device” without adding more hyponyms of the numerous types of this device.

The next triplet “ring bolt” is one of the most complicated and interesting among all terminological entries. Firstly, Italian and Spanish climbers in contrast with English climbers differentiate between two types of ring bolts, namely the “Spit” in Italian and the “Espit” in Spanish, and the “Fix” in Italian and the “parabolt” in Spanish. Probably because the Spit has been gradually substituted by the Fix, which is its upgrade, English climbers just use the term "bolt" to refer to both tools (in contrast with Italians and Spaniards, who differentiate between them). Actually, the Spit and the Fix are not so different in their features and functions: they are both types of rock pitons (and consequently types of artificial anchors), they both have a screw that is pounded into the rock, and they both cause the screw to expand into rock when pounded, guaranteeing their endurance. The differences lie in the fact that the Fix uses a longer screw compared to the Spit, and that for the Spit the hole is drilled directly with the screw of the tool, while for the Fix the hole is drilled with the drill tip. For these reasons, for Spit and Fix in Italian, and for Espit and Parabolt in Spanish, in English there is just one way to call them: ring bolts. Therefore, for each terminological entry the corresponding one in English will be "ring bolt" twice. Probably English climbers differentiate the two by using their diameters: as the book "Mountaineering: the freedom of the hills" explains, "be especially wary of 1/4-inch bolts, which were placed primarily in the 1960s and 1970s. Bolts measuring 3/16 to 1/2 inch in diameter have been used since the mid-1980s and is now the standard. Standard metric bolts are 10, 12 and 14 mm in diameter". Given this definition and given that the Fix have a longer screw compared to the Spit and are their upgrade, maybe 1/4-inch ring bolts are effectively the Spit, and the longer one the Fix.

Other important facts to notice, in Italian the hypernym of “Spit” is “chiodo a perforazione” (perforation piton), but it could also be an “expansion bolt” like in Spanish, where “Espit” and “parabolt” are hyponyms of “anclaje de expansion” (expansion anchor). In fact, to place a bolt the rock has to be drilled and then the screw is pounded into the rock, and it expands into the hole. The same applies to the fix/parabolt. Moreover, in Italian it is important not to confuse the noun “fix” with the verb “to fix” which is also used in Italy with the neologism “fixare” (in a computer technology environment it means “resolve”, “find a solution”, “fix a problem”). Finally, interesting to underline, in Spanish the term “parabolt” derives from the firm that developed this type of ring bolt, the English company “Parabolt”.

The following triplet is related with the latter, namely “glue-in bolt”, which in Italian is “fittone resinato” and in Spanish “anclaje químico”. They are related with “bolts” because the “glue-in bolt” is a type of bolt. The difference with ring bolts is that glue-in bolts are fixed into the rock hole by using a special and certified kind of adhesive resin. They are used and found mainly in sport-climbing and aid-climbing routes. Interesting to notice, in Italian the “fittone resinato” is a type of “chiodo a perforazione” (perforation piton) like the “spit” and the “fix”, but it is not a type of expansion piton like the other two. Whereas, in Spanish it is important to underline that the hypernym of “anclaje químico” (glue-in bolt) is “clavo de roca” (rock piton) and not “anclaje mecánico/de expansion” like the “espit” and the “parabolt”, because the “anclaje químico” does not expand into the rock hole like the other two, but it is fixed with special resins.

Moving on, we have analyzed the triplet “Reverso”, which is the same also in Italian and in Spanish, as the Reverso is the most common and popular type of belay/rappel device produced by Petzl, therefore this term has no translations, but has been borrowed as a loanword. The Reverso, in contrast with the Verso (always produced by Petzl), permits to belay the leader, but as well as one or two seconds. The Verso only permits to belay the leader of the rope party and to rappel, but it must not be used to belay one or two seconds. In each of the three languages there are no synonyms, but the orthographic variant “REVERSO” (in caps lock).

Concerning the next triplet, “rock piton” in English, “chiodo da roccia” in Italian and “clavo de roca” in Spanish, very important to notice is that the category "rock piton"

includes two other hyponyms: crack pitons (generally called pitons) and bolts. The same applies for the other two languages. In Italian, "chiodo da roccia" includes "chiodo a perforazione" and "chiodo da fessura"; in Spanish "clavo de roca" includes "clavo plano" (or simply pitón) and "anclaje mecánico/de expansión". Another interesting fact is that in English and Italian the "glue-in bolt", namely "fittone resinato" in Italian, are hyponyms of "bolt", namely "chiodo a perforazione", while in Spanish "anclaje químico" (the equivalent of glue-in bolt) is not the hyponym of bolt (anclaje de expansión/mecánico), but of "clavo de roca" (rock piton). This becuase Spaniards prefer the category "de expansión" (expansion), rather than "a perforación" (perforation), but the glue-in bolt does not expand into the rock: conversely, it is fixed by using chemical resins, therefore it is not a type of expansion bolt. For these reasons, "anclaje químico" is the hyponym of "clavo de roca" and not of "anclaje de expansión".

The following triplet that we analyzed is “crack piton”, which in Italian is “chiodo da fessura” and in Spanish “clavo plano”. In English, the term "crack piton" is one type of rock pitons alongside bolts. Therefore, "rock piton" is the hypernym of "crack piton". However, most climbing websites and manuals as well as climbers tend to use the term "rock piton" or simply "piton" as the synonym of "crack piton". For these reasons, we have decided to identify "rock piton" as quasi-synonym and hypernym of "crack piton". The same applies also to Spanish and Italian. In the latter language, climbers prefer the term “chiodo da roccia” or simply “chiodo” instead of “chiodo da fessura” and use it as a synonym of “chiodo da fessura”, and also Spaniards prefer the term “clavo de roca” or simply “piton” and use it as a synonym of “clavo plano”.

Moving on, always regarding pitons, we have underlined the triplet “bolt”, which in Italian the equivalent is “chiodo a perforazione” or “chiper”, while in Spanish the equivalent is “anclaje de expansion” or “anclaje mecánico”. Interesting to notice, all three languages present different terms concerning bolts: English use the general term "bolt", Italians use the term "chiodo a perforazione" (perforation piton) while Spaniards prefer the term "anclaje de expansión" (expansion anchor). All languages conceive this concept in a slightly different way, from a slightly different point of view.

With this last triplet we have officially finished the triplets about climbing tools (38 in total). Now, we will continue the analysis by underlining and highlighting the most important features and characteristics of climbing techniques.

### 5.3 Analysis of climbing techniques triplets

The first technique that we analyzed is “smearing”, which in Italian is “aderenza” and in Spanish “pisando”. Important to notice, while in English and in Italian the term used is a noun, in Spanish climbers prefer the verb “pisar”, especially with the gerund “pisando”. Moreover, interesting to underline, only in English this term presents a synonym, namely “frictioning”, which resembles the idea of applying adherence and friction between the sole of the rock shoe and the wall.

Always concerning footwork technique, we have decided to analyze the other fundamental skill used by climbers, i.e., “edging”, in Italian “appoggio taglio” and in Spanish “canteo”. Among Italian climbers, apart from the term “appoggio taglio” some derivative forms exist, such as “tagliare l’appoggio”. Furthermore, in Spanish is very important not to confuse this noun with the first-person singular of the verb “cantear” which is namely “yo canteo”. Actually, this term derives from the noun “canto”, which in Spanish is also the edge of the shoe (“canto de la suela”).

Moving on from footwork techniques, the next triplet is “placement exchange”, which in Italian the equivalent is “sostituzione” and in Spanish is “cambio” (de mano o pie). This basic technique is employed both for feet and hands. There is not much to say about this technique, apart from the fact that in Spanish the abbreviated form “cambio” is often used, while the full form “cambio de mano o pie” is less employed.

To continue, we have analyzed the triplet “matching”, in Italian “accoppiamento” and in Spanish “compartir”. We have noticed that this technique, which consists in matching two feet or two hands together in the same hold, in English is represented by a verb (gerund) or an adjective, in Italian by a noun, and in Spanish by a verb. Apart from this feature, this technique is straightforward and does not need further explanations (just be wary of the fact that all three terms in the respective languages are polysemic and acquire different meanings in different contexts).

In addition, we have decided to analyze the triplet “liebacking”, which in Italian is “Dülfer” and in Spanish “bavaresa”. As already said before in the previous chapter, very interesting to notice is the fact that in Italian the equivalent of “liebacking” is “dülfer”, therefore this term derives from the climber who invented the technique (Hans Dülfer). However, in Spanish the equivalent is “bavaresa” probably because Dülfer climbed a long part of his life in the Bavarian Alps and was an active member of the Munich alpinists

group, thus in this case the term derives from the region where Dülfer developed this technique for the first time (Masciadri 1989, p.83). Moreover, in Italian the term “Dülfer” is masculine if employed as “il movimento Dülfer” (Dülfer move), while it is feminine if used as “la tecnica Dülfer” (Dülfer technique), but we have decided to compile the terminological entry with the feminine, as the form “la Dülfer” is much more popular among Italian climbers.

To continue, the next triplet is “jamming”, in Italian “incastro” and in Spanish “empotramiento”, which is another crack climbing technique like the previous one. Interesting to notice, all three terms are also used with their derivative forms, namely three verbs, “to jam”, “incastrare”, and “empotrar”.

Moreover, we have also analyzed the triplet “resting”, which in Italian the equivalent is “riposo” and in Spanish “descanso”. This is a very intuitive technique, as it simply consists in outstretching the arms to rest the muscles. There is not much to say about this triplet, apart from the fact that also in this case many derivates verbs are used, such as “to rest”, “riposare”, and “descansar”.

Furthermore, regarding the triplet “crossover”, which in Italian the equivalent is “incrocio” and in Spanish “cruce”, there are few things to say. This is a simple technique which consists in crossing feet or hands to grab a better hold. Interesting to notice, in Italian and Spanish is often used the derivative verb of “incrocio” and “cruce”, namely “incrociare” and “cruzar”, while in English the term “crossover” is used both as a noun or verb depending on the context.

Moving on, we have analyzed the technique “traversing”, in Italian “traversare” and in Spanish “travesía”. Concerning Italian, in the climbing context “traversare” also means undergoing a path, a route that connects two or more points far away from each other of a mountain or of a mountain chain (translated from Treccani). However, in this case we have decided to analyze only the meaning of “moving sideways on a rock wall”. Moreover, in Spanish the term “travesía” is polysemic and encompasses a wide number of different meanings depending on the context (for example, when flocks are moved outside their hometown, or when the wind blows sideways, or also the area where the traverse happens, and so on) (Diccionario de la Lengua Española). Finally, if in Italian and English the verb “traversare” and “traversing” is used, but also the derivative form

with the noun, such as “fare un traverso/una traversata” or “hand traverse”, in Spanish only the noun is employed, thus the most common collocation is “hacer una travesía”.

To continue, we have decided to analyze the term “down-climbing”, in Italian “dearrampicare” or “disarrampicare”, and in Spanish “destrepar”. Interesting to notice, in Italian the two terms are not present in dictionaries, but on the official website of Treccani there is a discussion about the possibility to insert “disarrampicare” into dictionaries. Thus, Treccani opts for the latter, while among Italian climbers the term “dearrampicare” is very popular and it has the same meaning, but different suffix. Moreover, in English the most common way among climbers is to use this term as a noun, but also the verb "to down climb" exists (even though it is less used). Concerning Spanish, like for the Italian language, the term “destrepar” is not present in dictionaries, but it is used and employed by Spanish climbers. For this reason, we have decided not to add the etymology and the pronunciation of this term as we were not able to find them. The definition instead has been taken from the book “Montañismo. La libertad de las cimas". The noun “destrepe” also exists, but it is less used compared to the verb.

Other two important, fundamental and basic climbing techniques are “belaying” and “rappelling”. Belaying is the technique that permits to stop the fall of a climber, therefore is the most important as it can save lives. In Italian the equivalent is “assicurazione”, while in Spanish is “aseguramiento”. All three languages use the noun, but the derivative verb as well (belay - belaying/to belay; assicurazione – assicurare; aseguramiento – asegurar). Concerning the term “rappelling”, in Italian “discesa in corda doppia” and in Spanish “rápel”, there is not much to say apart from the fact that is a very important technique as it permits climbers to descend the route when no trails or paths are present to come back to the starting point. The Spanish and English terms are very similar between them, while the Italian term is a specification of the activity. Finally, very interesting to notice, the English and Spanish terms derive from the French term "rappell/rappeler", while the Italian one is completely disconnected from these two.

Moving on from these two triplets we have analyzed the other two important climbing techniques, namely “flash climbing” and “on-sight climbing”. To “flash” a route is to climb to the top on the first attempt; however, it technically implies that you have some pre-existing knowledge regarding the climbing route; on the other hand, an on-sight climb is carried out when climbers, without any previous advice or information from their

friends or fellow climbers, lead climb to the top of a route on their first attempt. These two terms in Italian are “arrampicata flash” and “arrampicata a vista”, while in Spanish “escalada flash” and “escalada a vista”. Concerning variations, there are many synonyms in all three languages, which are mainly abbreviations of the full form (“flash” – “on-sight” in English; “flash” – “a vista” in Italian and Spanish). Regarding derivatives, in many cases the derivative verb is also used: for example, “to flash climb” in English, “arrampicare in flash” in Italian, and “flashear” in Spanish (clearly an adaptation from the English term).

To continue, we have highlighted the triplet “dynamic move” or “dyno”, which is another climbing technique. In Italian the equivalent is “lancio”, while in Spanish is “lanzamiento”, but two synonyms exist, namely “movimiento dinámico” and “lance” which is an abbreviation. This technique consists in making a lunge, almost a jump, that permits climbers to reach farther holds that could not be grabbed using static moves. Important to underline, in English no derivative forms exist, while in Italian and Spanish the derivative verb is also used, such as “lanciare” in Italian and “lanzar” in Spanish.

Then, we have analyzed the next triplet, “mantel”, “caricamento” in Italian, and again “mantel” also in Spanish. The Spanish term derives from Latin, but also from the English one, probably because this technique was invented in an English-speaking country. In fact, Spaniards called this technique “paso de armario” o “mostrador” (wardrobe/counter/desk) because of the similarity with the moves you will do to climb onto it, but in the last few decades the adaptation of the English term “mantel” acquired always more popularity and nowadays is very common in Spain. As a matter of fact, “mantel” in Spanish can be translated as “repisa”, which is the mantelshelf or mantelpiece of a fireplace. Moreover, in Italian the term “caricamento” is used, but also another synonym, namely “mano-piede”, which is almost more used and popular than the first one.

Moving on, we have examined the triplet “undercling”, in Italian “rovescio” and in Spanish “agarre invertido”. This technique consists in your hands (palms up) pull outward beneath a flake or lip of rock while your body leans out and your feet push against the rock. In Spanish and Italian, the term is a specification of the type of hold that is used to carry out this technique. In fact, among Italian climbers “rovescio” is not only the technique, but also the type of hold that must be grabbed using the thumb and feet pushing

against the rock wall. This phenomenon derives from the fact this technique is manly used to overcome roofs and these types of holds are generally found on overhangs.

To continue, the next triplet is “drop knee”, which in Italian is “lolotte”, while in Spanish is “bicicleta”. In English this term is a specification of the movement the climber has to make in order to carry out this skill, namely dropping and rotating the knee and the hip inward to maintain stability. In Italian what is probably the French name of this technique is used, i.e., “lolotte” (in French, it derives from the verb “lolotter”), while in Spanish the equivalent of the same term is “bicicleta”, probably because the rotatory movement of the leg resembles the movement a biker makes while riding a bike.

Furthermore, we have analyzed the triplet “stemming”, which in Italian is “opposizione” and in Spanish “oposición”. There is not much to say about these terms, apart from the fact that the verb "to stem" also exist, but in this context, it is mainly used as a noun, or as a verb with the -ing form. This technique is used generally in chimneys or in dihedrals.

Finally, we have analyzed the last triplet about climbing techniques, which is also the last triplet of this analysis, namely “down-ward pressure”, in Italian “pressione verso il basso”, and in Spanish “presión hacia bajo”. The English and Spanish terms have been found on books and the definition has been taken and reformulated. For the Italian language, no definition has been found for this term nor online nor in books, but we are certain that this is the correct way to call it, as it is used among Italian climbers (probably the abbreviated form “pressione” is more used). For this reason, we have decided to produce our definition based on the English and Spanish definitions, as well as on our knowledge about climbing.

This analysis of the most important and fundamental climbing tools and techniques concludes this project. The final conclusions and last considerations are presented in the next section, as well as the table containing the definitions for all the triplets that we analyzed.

# 6. Conclusions

This project is now concluded and all concepts that have been analyzed can be found indexed in alphabetical order in a table right after these conclusions. On the left side of the table concepts are indexed and written in English, and we have decided to use this language as it is the writing language of this project and for its international significance, but as concepts are universal and language independent, we could also have used Italian or Spanish. While on the right side of the table the natural language definition of each concept is found, and also in this case it has been written in English. As already said before, for viewing and consulting the Spanish and Italian definitions, as well as the complete terminological entries for the three languages, it is mandatory to access the FAIRterm web application (a password is required) or to request for the TBX or TSV file, that is only downloadable through the FAIRterm dashboard. However, in contrast with English definitions, the Italian and Spanish ones which are present in the software are not intensional, but standard definitions that have to be simplified and converted into terminological definitions as it has been done for the English ones. Unfortunately, time and space did not let us to carry out also this task, but it is undoubtedly a first point of departure to expand and enlarge this project in the future, but it has laid the first foundations for a full terminological termbase about the world of climbing that is missing or has been done superficially and only for one language. In fact, we have found online some glossaries about mountains and alpinism, but they are far away from being recognized as reliable terminological resources. Moreover, we have focused on general rock-climbing tools and techniques, but the domain of analysis encompasses more specific gear used by advanced and expert climbers and many more different types of climbing. In the future, another task to complete this project and to achieve a full-termbase not only about rock climbing, but about the complex world of climbing, could and should be to add all those tools, techniques and sub-disciplines that have been left out for a matter of time. It is for these reasons that the title of this thesis is “towards” a trilingual termbase, as to clarify that the project is preliminary and that could be expanded. The ultimate aim and objective of this thesis is to create a terminological resource that could help not only climbers and experts in the field to communicate between them avoiding misunderstandings, but also to help translators. As a matter of fact, when the

three stories about climbing have been translated for the thesis (Triennale), having the possibility to access a termbase like this would have helped significantly for the task of finding the equivalent of a specific Spanish climbing term in Italian. Thus, this project has also been created with the intention to provide translators of mountain and alpinism books, manuals and reports a sound resource that could ease their task. And one of the most important traits of this resource is that it has been built always taking into account multidimensionality: for the production of this project, we have always used at the same time both a linguistic and an extra-linguistic approach, taking into consideration the conceptual, as well as the lexical dimension. Therefore, semasiology and onomasiology are both employed simultaneously. Regarding the methodology that has been used, it is the same as the preliminary project in Spanish and Italian that has been produced for the final exam of the course held by Federica Vezzani: after terms had been extracted from books, online websites and the three corpora created on Sketch Engine, concepts have been found by a process of inference; then, concepts have been organized into concept systems and terms into lexical networks, both made with Miro; furthermore, for each term in each of three languages representing the same concept, a terminological entry has been compiled on FAIRterm, and finally, as already mentioned, a table with the concept and its definition in English has been produced.

Therefore, this almost one year-long project is not finished, but temporarily stopped and we hope that in the future it could be expanded and resumed as not many terminological projects about climbing have been carried out in the academic environment. In fact, this project has undoubtedly some academic limits, such as the fact that some tools and techniques have been left out, and that the definitions in Italian and Spanish are not intensional. As a consequence, this thesis could be enlarged in the future, aiming at the creation of potentially three terminological bilingual dictionaries (English-Italian, Spanish-Italian, and Spanish-English) or a sound trilingual electronical termbase, but these tasks do not exclude the idea to collaborate with other linguists with the objective to add other languages. Obviously, to reach this point it is essential to transform the Italian and Spanish definitions into intensional ones. To conclude, not only the tools and techniques that have been excluded should be added in the future, but also the other types of climbing that have not been considered or that have been analyzed only superficially.

## Annex: Table of concepts (concept + natural language definition in English)

| CONCEPT | NATURAL LANGUAGE DEFINITION (ENGLISH) |
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| <Aider> | Aiders, called webbing ladders or *etriers*, are climbing tools usually employed in pairs in aid climbing that allow the climber to step up from one placement to the next when they are clipped to a piece of protection, and are long enough to permit the climber to reach the bottom step of the higher ladder when testing aid placements |
| <Aperture belay device> | Aperture belay devices are a type of cone-shaped or square tube belay device such as the Reverso from Petzl, the figure eight, and tubular devices used not only for belaying, but also for rappelling, which provide a V-shaped and/or ridged opening through which a bight of rope is pushed and then clipped into the locking carabiner on the belay loop of the seat harness through a wire loop |
| <Assisted-braking belay device> | Assisted-braking belay devices such as the Gri-gri from Petzl are specialized devices popular for gym, sport, and aid climbing consisting of an internal cam that locks down on the rope when it suddenly accelerates in a fall, creating a braking force that is not dependent on resistance from the belayer's grip, and with a release mechanism, a lever that allows controlled rappelling or lowering of a climber on top-rope, but they cannot be used to rappel on two strands, hence they are not suitable for alpine climbing |
| <Belaying> | Belaying is a fundamental technique for climbing safety which provides a system of using a rope to stop a fall by safely control the enormous energy that a falling climber generates, and consists of a rope that runs from a climber to another person - the belayer - who is ready to stop a fall using a method of applying a stopping force to the rope and an anchor strong enough to resist the fall |
| <Bolt> | Bolts are types of rock pitons generally fixed into the rock on established routes, especially on sport-climbing and aid-climbing routes, as well as in climbing gyms and crags, and they present bolt hangers which allow carabiners to be attached to bolts |

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| <Chalk> | Chalk, also known as Magnesium Carbonate or with its formula MgCO3, can improve a climber's grip, especially in hot weather, by absorbing sweat and it is available as loose powder or as crushable block, either of which climbers usually carry in a chalk bag, but it is also available contained inside mesh balls (refillable) that allow smaller amounts of chalk to sift out into the chalk bag and minimize spillage |
| <Climbing shoes> | Climbing shoes or rock shoes should fit snugly to allow dexterity, they have flexible uppers, plus smooth, flexible soles and rands of sticky rubber, which create excellent friction when weighted on rock and allow purchase on angles and nubbins |
| <Copperhead> | Copperheads, also called with the more general "malleable hardware" or simply with the abbreviation "head", are a type of passive removable protection designed to hold weight by pounding the soft head of the piece into the irregularities of the rock, they have a sleeve, called a ferrule, of copper or aluminum and the "head", swaged to one end of a short cable that has a clip loop swaged at the other end |
| <Cord> | The cord is a piece of static rope used for several purposes, generally made of nylon, its length varies, its diameter ranges within 4 and 8 mm and when it is relatively long (about 6 meters) and used as a way to equalize two or more anchor points it is called cordelette |
| <Crack piton> | Crack pitons, or simply pitons, were commonly used in mountaineering through the 1970s, but are rarely used today, because placing and removing them scars the rock, thus modern pitons are made of hardened chromium molybdenum steel or titanium alloys that rather than molding to cracks the way the older malleable pitons did, they are more unyielding, force the crack to their form and present an eye where the carabiner can be clipped |
| <Crampons> | Crampons are a set of metal spikes essential for alpinism and technical ice climbing that strap on over boots to penetrate hard snow and ice where boots soles cannot gain sufficient traction, and the early-model 10-point crampon was eclipsed in the 1930s by the 12-point crampon, with two horizontally or vertically oriented forward-slanting or "front" points, which reduce the need for step-cutting and permit front-pointing up steep snow and ice |

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| <Crash pad> | Crash pads are essential pieces of kit for minimizing the risk of injury when bouldering made of an internal foam padding and by combining different degrees of hardness, these offer outstanding cushioning properties and long-term dimensional stability with the outer casing made from ballistic nylon and a versatile carrying system with length-adjustable shoulder straps, aluminum buckles and rope handles |
| <Crossover> | The crossover is a footwork and handwork climbing technique which consists in crossing one foot in front of the other to occupy a small spot on the hold while the first foot moves off that hold to another; for example, right foot is on a hold, left foot crosses in front of the right and presses down, left foot presses on the hold while right foot readies for next hold, and finally right foot shifts to next hold (the same applies also to hands) |
| <Daisy chain> | Traditional daisy chains are sewn slings with multiple loops - formed by stitching - every 8 to 15 cm, one end is girth-hitched to the harness while the other end is attached to the aider with a carabiner and they are used as tethers to keep new placements and aiders attached to the lead climber, thus they are an integral part of the jugging setup and the sewn loops are also used to shorten the daisy chain when it is used in the jugging mode |
| <Descender> | Descenders, also known as rappel or abseil devices, all operate by applying varying degrees of friction to the rope with the two strands at the rappel anchor inserted into the rappel device, which is then clipped with a locking carabiner to the climber's harness, in much the same way as for belaying and during the rappel, the bends in the rope that pass through the device and around the locking carabiner apply friction, magnifying the force exerted by the climber's braking hand which can control the speed of descent and allow the rappeler to halt the descent at any time |
| <Down-climbing> | Efficient down-climbing is a technique useful on many alpine climbs, sometimes faster, safer, or easier than rappelling, which may provide another retreat option when necessary, and on low-angle rock it is carried out by facing outward for the best ability to see the route when down-climbing, keeping hands low and using down-pressure holds whenever possible |

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| <Downward-pressure> | The downward-pressure is a climbing technique that consists in placing fingertips or the palm, side, or heel of the hand on the hold and pressing down; the climber usually pulls down on a hold from above and then puts downward-pressure on it after having moved above it |
| <Drop knee> | The drop knee is a technique that involves heavily weighting the outside of one foot, with the opposing foot stemmed against another hold, in order to generate body tension and this position entails swiveling the corresponding hip towards the wall and torquing the knee downwards (hence the name) |
| <Dynamic move> | The dynamic move or dyno is another option for overcoming a long reach, which consists of a lunge or simply a quick move before the climbers loses the balance, thus before making a dynamic move the climber must calculate and accept the consequences of failure, as if a dynamic move fails, a fall is likely |
| <Edging> | Edging is one type of footwork techniques where climbers weight the edge of the shoe sole over the hold by using either the inside or outside edge, but they usually prefer the inside for greater ease and security, the ideal point of contact may vary, but generally it is between the ball of the foot and the end of the big toe and if the heel is higher than the toes edging provides greater precision but is more tiring |
| <Fifi hook> | The fifi hook is girth-hitched to the harness with a sling that reaches 2 to 4 inches away from the harness after the girth hitch is tied, it is used to hook into a placement and to hold the climber's body weight and using a fifi hook helps conserve energy when aid climbing steep routes, including roofs by allowing climbers to rest on placements |
| <Figure eight> | The figure eight is a rappel device (descender), but at the same time also a belay device that can be used with dynamic ropes (single, half or twin) to belay the leader, in top-rope, or to rappel, it must be employed with a carabiner that has a locking gate (for example, an oval or HMS carabiner) and it works by inserting the rope loop into the dedicated hole, wrapping it around the device, attaching the device to the carabiner through the connection hole and then fastening the sleeve on the locking gate |
| <Flash climbing> | To “flash” a route is to climb to the top on the first attempt, but it technically implies that the climbers has some pre-existing knowledge |

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| | regarding the climbing route that can come from various sources, such as the climbing partner who gave advice before beginning the route, read up on the route via a guidebook, or simply watched a climber ahead to learn from their mistakes |
| <Glue-in bolt> | The glue-in bolt is a type of bolt and consequently a type of artificial anchor, but in contrast with ring bolts, they are placed into the rock by drilling and then by using certified types of chemical resins that fix the bolt into the hole and it is composed of a shaft, an eye, a connecting ring, a belay and lower-off ring, and a belay and lower-off connector |
| <Gri-gri> | The Gri-gri is the most common type of assisted-braking belay device designed for gyms and crags produced by Petzl used for belaying both lead and top-rope climbers, thus it is a belay device that must be clipped to the belay loop of the harness, it is composed of a steel cam-assisted blocking, aluminum side plates, a friction plate and a reinforced ergonomic nylon handle that allows to easily unblock the rope and lower someone, and the progressive control of rope feed provides a smooth and comfortable descent |
| <Half ropes> | Half ropes are a type of climbing rope: used in double rope technique, they are made of kernmantle and composed of a core (kern) of braided or parallel nylon filaments encased in a smooth, woven sheath (mantle) of nylon, they are recommended for trad climbing, mountaineering and long rock routes where abseil descents are required, they present the mark/label of the number 1/2 enclosed in a circle at the end of the rope, and must all pass the standards of and be approved by the UIAA, as well as by the European CEN |
| <Helmet> | (Climbing) helmets help protect the head from rockfall, from gear dropped by climbers above and from hitting hard surfaces such as rock or ice, they are lightweight and ventilated, and they have a thick, hard outer shell, usually ABS plastic, covering a small bit of polystyrene foam combined with a suspension system |
| <Hook> | Hooks come in many shapes, they are commonly used to grip ledges or small holes, are typically made of chromium molybdenum steel for strength and curved for stability and they are used for body weight only, thus by their nature are almost never left behind as protection and are employed by attaching a sling to them by feeding a tie-off loop through |

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| | from the front until the knot jams and the sling should hang from the rock side of the hook, with the knot on the other side |
| <Ice axe> | The ice axe, or piolet, allows climbers to venture onto all forms of snow and ice and the main parts of an ice axe include the head, which presents a carabiner hole used to attach the ice-axe leash, the pick, curved or drooped, the adze, the shaft, and the spike |
| <Ice screw> | Ice screws are made from steel, aluminum, or titanium alloy, they come in a variety of lengths ranging from 10 to 22 centimeters and they include hangers with knobs, which make placement, clipping, and removal almost effortless |
| <Jamming> | Jamming is the basic technique of crack climbing which works by placing a hand or foot just above the constriction of a crack, then turning the foot or flexing the hand so that it snugly in contact with both sides of the crack and while moving up on a jam, maintain the jammed position by using down-pressure |
| <Liebacking> | The classic lieback technique uses hands pulling and feet pushing in opposition as the climber moves upward in shuffling movements, and it is used to climb a crack in a corner, a crack with one edge offset beyond the other, or along the edge of a flake by grasping one edge of the crack with both hands and lean back and to the side, away from the crack, on straightened arms, but at the same time pushing the feet against the opposite wall of the crack |
| <Locking carabiner> | With a sleeve that covers one end of the gate to minimize accidental opening, locking carabiners provide a wider margin of safety for rappelling, belaying, or clipping in to anchors and most of them have a sleeve that screws over one end of the gate, while others have a spring that automatically rotates the sleeve into place whenever the gate is closed, rather than the climber having to screw it down |
| <Mantel> | The mantel is a specific use of the down-pressure technique which lets climbers use hand-down pressure to get their feet up onto the same hold that their hands are using when no useful handholds are available higher and it is carried out by walking your feet up the rock as you grip the ledge until you can place both hands flat on the ledge, palms down, then raise your body up onto stiffened arms, lift one foot up onto the ledge and stand up reaching for the next handholds |

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| <Matching> | Matching is a footwork and handwork climbing technique carried out by sharing the hold by matching feet, moving one foot to the very edge of the hold to make enough room for the other and the same applies also to the hands: to match hands, move one hand to the very edge of the hold to make room for the other hand |
| <Mechanical ascender> | Mechanical ascenders, often referred to as jugs or jumars, are used for ascending fixed ropes and for hauling bags up big walls by employing a cam, which allows them to slide freely in one direction on a rope and to grip tightly when pulled in the opposite direction, but they also have a trigger or locking mechanism to keep them from accidentally coming off the rope and in addition to the main opening at the bottom of the ascender, which is used as the primary attachment point, additional carabiner holes at the top and the bottom of the ascender come in handy for a number of purposes |
| <Nut> | Nuts, also called stoppers or wired nuts, fit rock cracks and come in a wide variety of shapes and sizes, but most have a generally wedge-shaped appearance, they are narrower at the base than at the top, which lets them slip down into a constriction, and most nuts are slung with wire cable, which is much stronger than cord or webbing of the same size |
| <On-sight climbing> | On-sight climbing is a climbing technique when climbers, without any previous advice or information from their friends or fellow climbers, lead climb to the top of a route on their first attempt and the purest form of on-sighting occurs when you know nothing about a route, and this usually happens by choosing a route at random, climbing the wrong route by mistake, or putting up the first ascent of a route that's never been climbed before |
| <Placement exchange> | A placement exchange is carried out when a climber needs to move one foot onto a small hold already occupied by the other foot or one hand onto a hold being used by the other hand and this technique is carried out by making an intermediate move using a poorer, even marginal hold to get the one foot off the good hold long enough for the other one to take it over, or hop off the hold while replacing one foot with the other (an intermediate move can be made to trade hands, much as might be done in exchanging feet) |

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| <Plate> | The plate, also called guide plate or multiuse plate, is a multipurpose hot-forged aluminum plate for use with single, double and twin ropes, the most common is the Gigi plate by Kong, its main applications are self-locking belaying for one or two seconds and abseiling and the central rib acts as a fulcrum on the connector and allows the recovery of two people, even secured to ropes of different diameter, either simultaneously or separately (it must not be used to belay the leader of the rope party) |
| <Portaledge> | A portaledge is a lightweight cot that provides a place for climbers to sleep on a big wall without having to reach a natural ledge, it can be folded up and hauled with the haul bag, it can also be equipped with a rain fly to provide protection in a storm, but climbers must always be anchored directly to the rock, not to the portaledge |
| <Quickdraw> | Climbers use quickdraws, also called extenders, to attach their rope to pieces of protection when lead climbing and they consist of two carabiners connected by a textile sling |
| <Rappelling> | Rappelling is the technique of descending an anchored rope by using friction to safely control the rate of descent and safe rappelling can be achieved only by using a trustworthy anchor, a rope, a rappel method for applying friction to the rope, a belay/rappel device, carabiners, slings, and the person rappelling |
| <Resting> | Resting is a climbing technique generally employed with handholds that are at about head height if it is necessary to hang straight-armed for a rest, which is less tiring than hanging from bent arms and it is carried out by lowering the center of gravity by bending the knees or leaning out away from the rock |
| <Reverso> | The Reverso produced by Petzl is a versatile, lightweight belay/rappel device for use with one or two rope strands which has the ability to belay a second climber from the anchor and V-shaped friction grooves enable controlled braking, it is employed for single or multi-pitch climbing and mountaineering and it allows you to belay your climbing partner, rappel, and use Reverso mode to belay one or two seconds, but remind to always keep a hand on the brake side of the rope |
| <Ring bolt> | Ring bolts are most commonly seen in sport-climbing areas, but they may also be found on traditional or aid-climbing routes and they consists |

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| | of bolt hangers that allow carabiners to be attached to bolts, but be especially wary of 1/4 inch bolts, which were placed primarily in the 1960s and 1970s, while bolts measuring 3/16 to 1/2 inch in diameter have been used since the mid-1980s and are now the standard |
| <Rock piton> | Rock pitons are used in aid climbing and can be divided into two big categories: crack pitons, or simply pitons, and bolts; the firsts are placed and pounded into natural rock cracks during the route, while the seconds are fixed into the rock by drilling a hole |
| <Runner> | Loops of tubular webbing, called runners or slings, are among the simplest pieces of climbing equipment and among the most useful, even though webbing does not have dynamic characteristics, and standard single runners require 1.5 meters of webbing, but after being sewn or tied into loops, the standard length become 0.6 meters |
| <Seat harness> | The seat harness is a fundamental climbing tool with properly fitted, adjustable and padded leg loops, a belay loop, gear loops, a padded waist belt and harness buckles, which rides snugly above the hip bones yet transfers the force of a fall over the entire pelvis and provides a comfortable seat during rappelling, and climbers at either end of a rope tie into the harness with a knot |
| <Single rope> | The single rope is a type of dynamic rope used alone in single form as the name suggests, it is made of kernmantle and composed of a core (kern) of braided or parallel nylon filaments encased in a smooth, woven sheath (mantle) of nylon, it is designed for rock climbing, best suited to relatively straight pitches and routes that do not require an abseil descent, it presents the mark/label of a number 1 enclosed in a circle at the end of the rope and must pass the standards of and be approved by the UIAA, as well as by the European CEN |
| <Smearing> | Smearing (or frictioning) is one type of footwork techniques mainly employed in slab or friction climbing where the foot points uphill, with the sole of the shoe "smeared" over the hold, while on lower-angle rock climbers may not need to use an actual hold, but only achieve enough friction between sole and rock and it is carried out by flexing the ankle (and lowering the heel), which may increase the surface area of contact between sole and rock, giving maximum holding power, or by leaning away from the rock |

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| <Spring-loaded camming device> | The spring-loaded camming device, called Friend, SLCD, or simply cams, is a type of active removable protection with four lobes that rotate from one or two axles connected to a trigger mechanism on a stem, and when the trigger is pulled, the lobes retract, narrowing the profile of the device for placement in a crack or pocket, but when the trigger is released, the lobes open up against the sides of the rock; a runner or sling on the other end of the device permits to connect a carabiner |
| <Stemming> | Stemming is a valuable counterforce technique employed in climbing rock chimneys or dihedrals that lets climbers support themselves between two spots on the rock and it often provides a method of climbing steep rock where no holds are apparent, simply by pressing in opposing directions with the feet or with a hand and a foot |
| <Traversing> | Traversing, namely going sideways across a section of rock, calls for a wide variety of climbing techniques such as side pulling, liebacking, and stemming, while a good balance as well as being aware of the center of gravity are especially important during traverses, which climbers usually face with their feet pointed away from each other |
| <Tubular device> | The tubular device, also called tube or tuber, is one of the most common belay device used to belay the leader (but not one or two seconds) and to rappel, and it is a passive belay/rappel device with no moving parts grew out of the original Sticht Plate and it works by creating friction by running the rope through a small slot around a carabiner and back out the slot; the tube shape of the device allows for sharp bends in the rope's path, increasing friction and control, helps dissipate heat, and allows for the use of channels |
| <Twin ropes> | Twin ropes are made of kernmantle and composed of a core (kern) of braided or parallel nylon filaments encased in a smooth, woven sheath (mantle) of nylon and present the requirement to clip both ropes every time, thus they are used together as part of a twin-rope system and have generally a smaller diameter compared to single ropes, they present the mark/label of two overlapped circles enclosed in another circle at the end of the rope and must pass the standards of and be approved by the UIAA, as well as by the European CEN |
| <Undercling> | The undercling is a climbing technique which consists of your hands (palms up) pull outward beneath a flake or lip of rock while your body |

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| | leans out and your feet push against the rock, thus your extended arms pull while your feet push, creating a counterforce and both hands can undercling at the same time, or one hand can undercling while the other uses a different type of hold |

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All websites and webpages used as a reference for the definitions and contexts in FAIRterm have not been added here, but can be found and consulted on the Web application or by requesting the TBX file.

## iv. Italian abstract


La seguente tesi si basa sulla produzione di una banca terminologica preliminare trilingue in italiano, inglese e spagnolo sull'arrampicata e più nello specifico sull'attrezzatura e le tecniche utilizzate dagli scalatori di tutto il mondo. Il progetto è iniziato già durante il secondo anno di Magistrale quando, dopo aver frequentato il corso di terminografia orientata alla traduzione tenuto dalla Professoressa Federica Vezzani (in seguito mia relatrice), è stato presentata all'esame una relazione terminologica in italiano e spagnolo proprio sull'arrampicata che è stata il fondamento e il punto di partenza per sviluppare questa tesi, ampliando di fatto la relazione prodotta durante il corso. Per il progetto portato all'esame, era stato prodotto un sistema concettuale in merito all'attrezzatura d'arrampicata, accompagnato anche da due reti lessicali, una in italiano e l'altra in spagnolo sempre sui materiali, oltre a due corpora creati su Sketch Engine e utilizzati come forma di controprova per confermare l'esistenza, la frequenza e l'utilizzo di termini specifici trovati nei numerosi libri e manuali d'arrampicata. Infatti, essendo

uno scalatore ormai da molti anni, le conoscenze pregresse riguardanti il mondo dell'arrampicata, così come i volumi comprati e consultati hanno aiutato moltissimo non solo per cercare e trovare determinati termini, ma anche per capire minimi dettagli e comprendere sottili differenze tra attrezzi simili, passaggio fondamentale per la scrittura delle definizioni intensionali e per la creazione delle gerarchie nei sistemi concettuali e nelle reti lessicali. Questa tesi si basa proprio su questo progetto realizzato durante il corso, che ne è stata la fonte di ispirazione e il punto di partenza. Avendo portato come tesi triennale la traduzione dallo spagnolo all'italiano di tre racconti di montagna scritti in tre secoli diversi (da fine 800 a inizi anni 2000), durante le lezioni in Università è stato deciso di creare il progetto finale in lingua spagnola proprio grazie alle conoscenze pregresse non solo come scalatore, ma anche come linguista avendo già lavorato con lo spagnolo all'interno di questo particolare dominio di analisi. Dopodiché, la decisione di aggiungere la lingua inglese e di rendere il progetto trilingue è stata abbastanza scontata, visto che anche per l'arrampicata l'inglese rappresenta la "lingua franca" e moltissime attrezzature e materiali moderni e contemporanei sono stati sviluppati da aziende inglesi e si diffondono nel mondo degli scalatori attraverso prestiti, calchi, anche se non mancano i neologismi, soprattutto per la lingua spagnola. Avendo preso la decisione di aggiungere la lingua inglese al progetto, abbiamo deciso di conseguenza di scrivere anche tutta la tesi in inglese, vista non solo l'aggiunta di questa lingua alla tesi, ma anche per la sua valenza e importanza internazionale che potrebbe rendere questo progetto più accessibile a livello accademico e aumentarne la visibilità.

Tutto il lavoro si sviluppa sull'applicazione di un approccio sia onomasiologico che semasiologico, ricercando la multidimensionalità e analizzando sia la dimensione concettuale che quella linguistica. Infatti, ispirandoci alla relazione prodotta da Rute Costa e Claudia Santos nel 2015 *Domain specificity: Semasiological and onomasiological knowledge representation* nel quale viene proposto appunto l'uso di una metodologia mista per la rappresentazione delle conoscenze terminologiche così come la caratterizzazione dell'approccio sia onomasiologico che semasiologico, abbiamo organizzato tutta la tesi su questa doppia metodologia complementare. Quindi, il lavoro e il processo di estrazione terminologica e di rappresentazione della conoscenza in merito all'arrampicata si è tutto sviluppato tenendo in considerazione sia gli aspetti lessicali che quelli concettuali, utilizzandoli e analizzandoli sempre contemporaneamente.

Nel primo capitolo, completamente teorico, abbiamo deciso di parlare della terminologia e della terminografia in generale, facendo una rassegna non solo di come queste due discipline si sono evolute nel tempo, ma anche delle loro teorie fondamentali che stanno alla base di tutti i lavori e progetti terminologici. Nel primo sottocapitolo abbiamo parlato della storia della terminologia, affrontando la sua nascita e la sua imposizione nel tempo come disciplina autonoma, così come lo sviluppo della terminografia intesa come disciplina legata alla terminologia, ma allo stesso tempo diversa. Infatti, la terminologia si intende come una serie di designazioni e di concetti che appartengono allo stesso dominio o oggetto di studio, mentre la terminografia è rappresentata da un lavoro terminologico (che si basa sulla sistematica raccolta, descrizione e rappresentazioni di concetti e delle loro designazioni) che ha l'obiettivo di creare e mantenere le banche dati e le risorse terminologiche. Sempre in questo primo sottocapitolo viene delineata anche la fondamentale e pioneristica teoria di Wüster, la *General Theory of Terminology* (anche conosciuta con l'acronimo GTT) che ha di fatto segnato l'ufficiale nascita di questa disciplina come disciplina autonoma e non come sottocategoria di altre discipline. Nella seconda sezione del primo capitolo invece, viene spiegata l'interdisciplinarità della terminologia, perché pur essendo stata riconosciuta come disciplina autonoma e staccata dalle altre, allo stesso tempo presenta moltissime influenze con altre materie, come la linguistica, la lessicologia e la lessicografia. Anche per questo sottocapitolo abbiamo usato come principale riferimento bibliografico (tra i tanti) il saggio scritto da Rute Costa nel 2013 *Terminology and Specialised Lexicography: two complementary domains*, che analizza proprio questo aspetto interdisciplinare e di complementarità. Nella terza sezione invece, vengono spiegate le principali dicotomie nel mondo della terminologia, ovvero quella tra lingua generale e lingua di specialità, e quella tra termine e parola. In generale, dato che le unità lessicali non sono infinite, a volte le parole possono acquisire un doppio obiettivo e sono usate come termini nelle lingue di specialità, ma visto che semanticamente e formalmente non sono così diverse, l'aspetto che distingue maggiormente il termine dalla parola è che i termini, al contrario delle parole, designano concetti di un particolare dominio specialistico. Quindi i termini si possono usare solo se chi parla possiede la conoscenza sufficiente per comprendere il loro ruolo all'interno di un sistema concettuale. Nella quarta sezione del primo capitolo vengono invece gettate le basi teoriche dei concetti e delle caratteristiche, così come della

semasiologia e dell'onomasiologia. Per quanto riguarda i concetti, intesi come unità di conoscenza create da un'unica ed esclusiva combinazione di caratteristiche secondo l'ISO 1087:2019, essi permettono di rappresentare oggetti o gruppi di oggetti, sono espressi mediante designazioni linguistiche e non linguistiche oppure da definizioni, sono connessi da relazioni concettuali e organizzati in sistemi concettuali che si basano sulle relative relazioni. Le caratteristiche invece, vengono utilizzate per identificare e analizzare i concetti, ma anche per produrre i sistemi concettuali e le definizioni, dato che l'insieme delle caratteristiche che formano il concetto rappresenta di fatto l'intensione del concetto, mentre l'insieme degli oggetti che sono stati concettualizzati rappresenta invece l'estensione del concetto. Nella parte finale di questo sottocapitolo si parla di semasiologia e onomasiologia, aspetti già affrontati e spiegati poco sopra. La penultima sezione riguarda invece le relazioni concettuali e le definizioni. Le prime sono intese come relazioni tra concetti e non tra termini o tra termini e concetti e di fatto, i concetti non sono classificati come superordinati, subordinati o coordinati di per sé, ma sempre in merito alle relazioni tra di essi in un sistema gerarchico (ISO 704:2022). Mentre le seconde sono definite come le rappresentazioni di un concetto attraverso un'espressione che lo descrive e che lo differenzia dei suoi concetti correlati. È proprio per questo motivo che la definizione deve includere le caratteristiche essenziali di un concetto, ma allo stesso tempo deve omettere quelle che non sono necessarie, ed è questa la differenza fondamentale tra una definizione terminologica e una definizione/descrizione enciclopedica. Esistono due tipi principali di definizioni, quelle estensionali e quelle intensionali, ma noi abbiamo deciso di usare e di produrre solo definizioni intensionali, ovvero quelle che trasmettono l'intensione di un concetto esprimendo il suo concetto generico più immediato assieme alle sue caratteristiche delimitative con l'obiettivo di fornire solamente le informazioni necessarie per identificare un concetto e per distinguerlo da altri. Nel sesto sottocapitolo abbiamo affrontato invece la questione della multidimensionalità, che è di fatto quel fenomeno di classificazione che si verifica quando più di una caratteristica può essere utilizzata per distinguere due o più oggetti, e quindi quegli oggetti possono essere classificati in più di un modo, in più di una dimensione; quando un oggetto può essere classificato e appartiene a più di una dimensione allora è detto essere multidimensionale. Infine, nell'ultima sezione del capitolo abbiamo affrontato brevemente la terminologia sportiva e le sue caratteristiche principali, essendo

l'arrampicata una disciplina sportiva sempre più popolare, che è diventata sempre più conosciuta al mondo grazie ai media e alle nuove competizioni mondiali come i campionati organizzati dall'ISFC (International Federation of Sport Climbing, nata nel 2006) e l'introduzione dell'arrampicata come disciplina olimpica alla Olimpiadi di Tokyo 2020.

Nel secondo capitolo invece, viene presentato il dominio di analisi del progetto, ovvero l'arrampicata, più precisamente l'arrampicata su roccia. Infatti, all'interno di questa disciplina esistono molti tipi di arrampicata diversi (come l'arrampicata su ghiaccio, quella mista, il dry-tooling, il deep water solo, etc.) e ogni variante utilizza gli stessi attrezzi di base, ma diversi materiali specifici per quella particolare tipologia di scalata. Inoltre, esiste anche il mondo dell'alpinismo (per non parlare di quello dello scialpinismo), che generalmente si differenzia dall'arrampicata perché si basa sulla progressione su pendii innevati o ghiacciati e di solito si avvicina più ad un'impegnativa camminata in salita piuttosto che all'arrampicata vera e propria, ma, nonostante ciò, può comunque essere intenso come un tipo di arrampicata perché l'obiettivo è sempre quello: raggiungere la cima di una determinata montagna. Vista la grande varietà di discipline diverse e di conseguenza anche di attrezzature specifiche per ogni tipologia, abbiamo deciso di concentrarci sul dominio dell'arrampicata su roccia, non solo perché era anche l'oggetto di studio della relazione prodotta per l'esame, ma anche perché è il tipo di arrampicata più famosa e popolare. Sta di fatto che, se anche avessimo voluto aggiungere tutti i tipi di arrampicata e tutte le attrezzature utilizzate, le tempistiche e lo scopo di questo progetto di tesi magistrale non ci avrebbero permesso di finire in tempo, ma questo è sicuramente un buon punto di partenza futuro per continuare ad ampliare questo lavoro. Nella prima sezione del secondo capitolo viene presentata una breve rassegna sulla storia e sull'evoluzione dell'alpinismo e dell'arrampicata, partendo proprio dagli albori della civiltà e spiegando l'emblematica vicenda di Ötzi, per arrivare fino alla conquista delle vette in epoca moderna e contemporanea. Poi, nel secondo sottocapitolo abbiamo delineato i diversi tipi di arrampicata, sottolineando ciascuna caratteristica fondamentale e le loro differenze con le altre discipline. Prima di tutto abbiamo diviso il mondo dell'arrampicata in due parti essenziali: l'arrampicata libera e l'arrampicata artificiale. Quest'ultima consiste nell'usare attrezzi e materiali artificiali per progredire lungo la parete, mentre la prima si basa sulla scalata utilizzando solo le proprie abilità e capacità

fisiche, ma si usano ovviamente attrezzi come la corda e le protezioni (moschettoni, rinvii, assicuratori, freni e discensori) per garantire sicurezza in caso di caduta. Dopodiché, all'interno della categoria dell'arrampicata libera troviamo moltissimi altri tipi di arrampicata come l'arrampicata sportiva, in palestra, l'arrampicata tradizionale (o trad), il boulder e addirittura il free-solo che consiste nello scalare da solo e senza corda, cosa che lo rende il tipo di scalata più pericoloso e azzardato tra tutti. Procedendo alla terza sezione, abbiamo presentato i principali tipi di attrezzature e materiali utilizzati dagli scalatori. Essendo che l'ultimo capitolo si dedica completamente e nel dettaglio all'analisi dell'attrezzatura d'arrampicata, abbiamo deciso di trattare solamente gli attrezzi più importanti e fondamentali come le scarpette, la corda, l'imbrago, il casco, i moschettoni e più in generale i freni assicuratori, le protezioni e gli ancoraggi, che permettono di legare la corda ed impedire che uno scalatore cadi durante un'eventuale caduta. Importante sottolineare che la maggior parte dell'attrezzatura tecnica è soggetta agli standard e alla normativa imposta dalla UIAA (*Union internationale des associations d'alpinisme),* così come a quella della CEN (*Comité Européen de Normalisation)* se il prodotto è stato fabbricato all'interno dell'Unione Europea o se destinato alla vendita nell'UE; in questo modo un'azienda per commercializzare un materiale d'arrampicata deve per forza produrlo seguendo delle determinate regole di produzione che ne garantiscano la sicurezza e la qualità. Nella sezione 2.4 abbiamo invece trattato le tecniche d'arrampicata, dando molto spazio alle due tecniche più importanti per gli scalatori, ovvero l'assicurazione e la discesa in corda doppia. La prima permette di fermare la caduta di un compagno di cordata attraverso l'uso di una corda, un freno (o assicuratore), un ancoraggio dove legarsi mentre si assicura e chiaramente l'abilità dell'arrampicatore che deve essere pronto a fermare la corda con la mano. La seconda invece consiste nello scendere una parete dopo averla scalata scorrendo lungo le corde verso il basso quando un sentiero per tornare alla partenza non è presente; per svolgerla correttamente servono un ancoraggio, una corda e un materiale che applichi frizione alla corda durante la calata, ovvero gli assicuratori/discensori. Per concludere il secondo capitolo, abbiamo aggiunto una piccola sezione sulle scale di difficoltà in arrampicata, che sono molte e usano diversi metodi di classificazione come la scala UIAA, la francese, il sistema decimale dello Yosemite (YDS), la Sherman V-scale per il bouldering, etc. Per esempio, la scala UIAA usa i numeri romani, quella francese i numeri arabi accompagnati dalle lettere "a, b, c" a

seconda della difficoltà, mentre quella YDS utilizza sempre i numeri arabi, ma se quella francese va dall'1 al 9, quella dello Yosemite spazia dal 5.2 al 5.15 (sempre accompagnato dalle lettere "a, b, c".

Dal terzo capitolo in poi, la tesi diventa molo più pratica rispetto ai primi due capitoli prettamente teorici, e viene delineata la metodologia e l'approccio terminologico utilizzato per produrre concretamente il progetto. Nel terzo capitolo, infatti, vengono gettate inizialmente le basi teoriche dei sistemi concettuali e delle reti lessicali, i primi definiti come una serie di concetti organizzati e strutturati in uno o più dominii correlati secondo le relazioni concettuali esistenti tra i suoi concetti, e questi sistemi devono basarsi sull'analisi di un particolare dominio di studio per poi strutturarli grazie a una serie di operazioni come l'analisi dell'estensione e dell'intensione del concetto, le sue relazione e la posizione che occupa nel sistema. Le seconde invece rappresentano le relazioni tra termini trovati ed estratti dai testi e si basano su un approccio puramente linguistico. Nel secondo sottocapitolo abbiamo invece spiegato come funziona Miro, il programma che abbiamo utilizzato per produrre i sistemi concettuali e le reti lessicali sull'arrampicata, aggiungendo anche una serie di immagini per spiegare meglio come si utilizzano determinate funzionalità. Utilizzato da più di 60 milioni di persone al mondo, permette di creare in modo rapido e veloce non solo sistemi concettuali e reti lessicali, ma anche diagrammi, tabelle e workflows che sono modificabili anche da più persone a distanza, permettendo di collaborare allo stesso progetto contemporaneamente. Dopodiché, siamo tornati a trattare un aspetto teorico nella sezione 3.3, ovvero la teoria della terminologia dei corpora, intesi come una collezione di dati in lingua naturale che possono essere usati per molte attività come l'analisi dei testi, la terminologia, la traduzione, etc. Di fatto il corpus è un insieme di testi autentici che sono stati raccolti in formato elettronico seguendo una serie di criteri specifici, e tutti si basano sull'estrazione automatica dei termini (ATE) che permette di estrarre automaticamente da centinaia e migliaia di testi una lista di termini candidati che il linguista andrà ad analizzare e a controllare. Poi, nel sottocapitolo seguente abbiamo descritto il funzionamento e le caratteristiche del software Sketch Engine che abbiamo utilizzato per creare ed analizzare i tre corpora utilizzati nel corso di questa tesi, uno per ogni lingua di lavoro. Questo programma, sviluppato da Adam Kilgariff nel 2003, si è imposto negli anni come uno tra i migliori per la produzione e l'analisi dei corpora attraverso l'impiego di una serie di algoritmi che permettono di

svolgere operazioni complesse in modo automatico, tra cui la funzione Word Sketch che permette di consultare il comportamento grammaticale e di collocazione di un termine specifico, oppure la funzione Concordance, che permette di vedere la "keyword in context" (KWIC), ovvero il termine selezionato, all'interno del suo contesto nella frase, etc. In ogni caso, anche in questo sottocapitolo abbiamo aggiunto delle immagini per spiegare meglio le varie funzionalità del software, mentre le caratteristiche specifiche dei tre corpora prodotti sono state delineate nel quarto capitolo. Nell'ultima sezione del terzo capitolo abbiamo invece spiegato il funzionamento del software FAIRterm. Per la compilazione delle schede terminologiche è stato usato proprio questo programma, sviluppato da Federica Vezzani e Giorgio Maria di Nunzio (docenti presso l'Università di Padova), e basato sul paradigma e la terminologia FAIR (*Findability, Accessibility, Interoperability, Reusability*). L'obiettivo è quello di fornire un paradigma per organizzare i dati terminologici seguendo i principi FAIR dell'ESOC (*European Open Science Cloud Association*) che si basa sull'ISO TC/37 SC/3 e punta a risolvere il problema della strutturazione e standardizzazione dei dati, così come dei termbase e delle banche dati terminologiche. Anche per questo programma abbiamo deciso di aggiungere delle immagini per spiegare determinate funzionalità.

Nel quarto capitolo inizia il lavoro pratico di strutturazione e sviluppo del termbase e vengono spiegate e delineate le caratteristiche principali dei corpora prodotti: infatti, il lavoro pratico è cominciato proprio con la creazione e gestione su Sketch Engine di tre corpora sull'arrampicata, uno per ogni lingua di lavoro. Questi sono stati usati per trovare e confermare l'esistenza di termini specifici sul dominio di studio, anche se la maggior parte delle volte è servito più come controprova per l'effettivo utilizzo di termini già trovati in precedenza sui libri di arrampicata, ampiamente consultati e visionati. Per quanto riguarda i dati specifici, il corpus in italiano contiene 394.998 tokens, 335.484 parole, 18.667 frasi, 9.899 paragrafi e 222 documenti, quello inglese 287.088 tokens, 247.467 parole, 16.490 frasi, 8.175 paragrafi e 117 documenti, mentre quello in spagnolo 476.747 tokens, 416.346 parole, 24.846 frasi, 13.732 paragrafi e 232 documenti. Dopodiché, sempre nel quarto capitolo, vengono spiegati e rappresentati i sistemi concettuali (uno per l'attrezzatura e uno per le tecniche in lingua inglese) e le reti lessicali (sei in totale, due per lingua) prodotte con Miro.

Nel quinto e ultimo capitolo si trova invece l'analisi comparativa delle schede terminologiche compilate su FAIRterm; tutte le triplette di termini più interessanti e particolari prodotte nelle tre lingue di lavoro sono state analizzate, indicando e sottolineando le loro caratteristiche e differenze principali. Dopo aver prodotto e analizzato i sistemi concettuali e le reti lessicali per ogni lingua di lavoro, tutti i termini sono stati inseriti su FAIRterm e le rispettive schede terminologiche sono state compilate. Per ogni termine abbiamo riempito una serie di categorie come la parte del discorso, la pronuncia, l'etimologia, le note riguardo quello specifico termine (che possono aiutare il lettore o il traduttore), la definizione, l'analisi semica, i sinonimi, iperonimi, iponimi, meronimi, olonimi, le sue variazioni, abbreviazioni, acronimi, ma anche il suo utilizzo, quindi il suo dominio, registro, contesto ed eventuali collocazioni. Finita la compilazione di ogni termine per ogni lingua, abbiamo analizzato ciascuna tripletta di termini indicante lo stesso concetto.

Infine, in una tabella allegata in fondo alla tesi, sono stati messi in ordine alfabetico tutti i concetti (scritti in lingua inglese) con le loro definizioni intensionali e terminologiche in lingua naturale sempre in lingua inglese, mentre le definizioni e i termini in italiano e spagnolo sono accessibili solo dal sito web di FAIRterm o richiedendo il file TBX. Importante sottolineare che le definizioni in italiano e spagnolo non sono intensionali, ma in futuro se il progetto verrà ampliato, anche quelle verranno rese intensionali. Infatti, questo progetto getta le basi e le fondamenta per un lavoro futuro di ampliamento di questa banca terminologica sull'arrampicata, che non è ancora completa, ma si pone come punto di partenza per un lavoro terminologico su un dominio per il quale esistono davvero pochi studi, dizionari o glossari a riguardo.