Collocations and aviation terms: a bilingual Portuguese-English study based on corpora

As colocações e termos da aviação: um estudo bilíngue português-inglês com base em corpora

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Abstract: Collocations have a great potential to the understanding of meanings, senses and concepts of words or terms they compound. In this article, we studied the collocations of the terms "segurança" in Portuguese, and "safety" and "security" in English, in aviation language. Our aims were to search for a better understanding of the studied conceptual units, and to offer a discussion about the role of collocations in Terminology. We built two comparable corpora containing around 120,000 words each, one with Portuguese texts from the Brazilian National Civil Aviation Agency and the Brazilian Air Force, and another one with English texts from the International Civil Aviation Organization. We focused on the main collocations of the three terms in Portuguese and in English. The theoretical frame we adopted was the Communicative Theory of Terminology (Cabré, 1999) and we used the techniques of Corpus Linguistics (Tagnin, 2010, 2013; Berber Sardinha, 2004) to design our methodology, assisted by the software WordSmith Tools, version 6.0. (Scott, 2012). We found noun and adjective collocations, and mainly uses referring to zeal, care, protection and threat. The study is addressed to professionals, teachers and translators who make use of aviation language.

Keywords: Aviation English; Terminology; Corpus Linguistics; Collocations.

Resumo: As colocações têm um grande potencial na elucidação de significados, sentidos e conceitos das palavras ou termos a que compõem. Neste artigo, analisamos as colocações dos termos "segurança" em português e "safety" e "security" em inglês, na linguagem da aviação. Nossos objetivos foram buscar uma melhor compreensão dessas unidades conceituais e trazer uma discussão sobre o

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TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
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papel das colocações na Terminologia. Compilamos dois *corpora* comparáveis com aproximadamente 120.000 palavras cada, um de textos em português (Agência Nacional de Aviação Civil; Força Aérea Brasileira) e outro de textos em inglês (Organização de Aviação Civil Internacional). Enfatizamos as principais colocações dos três termos nas duas línguas. Utilizamos como base teórica a Teoria Comunicativa da Terminologia (Cabré, 1999) e como referencial metodológico a Linguística de *Corpus* (Tagnin, 2010,2013; Berber Sardinha, 2004), além do programa *WordSmith Tools* version 6.0 (Scott, 2012) para obtenção dos dados. Os resultados mostraram colocações nominais e adjetivas, e seus usos se referiram principalmente a zelo, cuidado, proteção e ameaça. Este estudo é direcionado a profissionais, professores e tradutores que fazem uso da linguagem da aviação.

Palavras-Chave: Inglês para Aviação; Terminologia; Linguística de *Corpus*, Colocações.

1. Aviation language and cultural aspects of the studied terms

Whatever aviation professionals' mother tongue may be, there is no doubt that the English language will be of most crucial importance to them. Ever since the 1940's, Airlines in the United States had an average of two million passengers a year. According to Crystal (2003: 99), the claims to impose a "língua franca" on aviation were obvious, and even more obvious that this language would be English, for either allied war leaders and the main aircraft manufactures as well as most post war pilots were speakers of this language.

In terms of publications which dictate procedures, regulations and the horizons that conduce operations ever since the end of World War II, the English language collects the aviation terminology (Bocorny, 2011: 968).

As a cabin crew member and teacher of English as a foreign language, I could empirically realize Aviation professionals in Brazil have some difficulties in dealing with certain aspects of language variations. When managing the subject of "segurança" which in English, due to cultural aspects, has two equivalents (safety and security), it drew my special attention, for, to some groups of professionals as well as to translators, using one form or the other

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

seemed to be confusing and required a closer look, in order to provide evidence leading to accuracy.

When addressing Portuguese and English as a linguistic pair, the frequent use of English loan words is perceived among aviation professionals (Foreign English users), as well as common mistakes, doubts, and ambiguities[2] , in the sense of "a situation or statement that is unclear because it can be understood in more than one way" (CAMBRIDGE, 2021) which justified the referred terms as object of study. With regards to ambiguities in Terminology:

> The presence of ambiguity and vagaries in some meanings and usages of terms – derive from several cultural and contextual changes which have been occurring with the emerging of new concepts and new perspectives on the field (PASIN; DELGADO; FISCHER, 2015: 34).

Considering the need to observe and identify the concepts of the studied terms, based on communicative aspects, the research proposal lays in obtaining data to contribute to a better understanding of these similar terms by examining their collocates, in the safety and security subareas, directing professionals of the field and translators, regarding eventual translation problems in the Portuguese to English translation direction.

Monolingual dictionaries of English or bilingual dictionaries of English-Portuguese, Portuguese-English, in general, approach the words "safety" and "security" as synonyms, bringing important information, although not sufficient to disguinguish them, as in the case of the Cambridge International Dictionary of English (2021):

> safety n. a state in which or a place where you are safe and not in danger or at risk.
> security n. protection of a person, building, organization, or country against threats such as crime or attacks by foreign countries.

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[2] Cambridge Dictionary, available at:
<https://dictionary.cambridge.org/dictionary/english/ambiguity>. Access on: May. 20, 2021.

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

In consultation on a bilingual production, both words are translated into Portuguese as "*segurança*" (Houaiss, 2002) and it does not seem to offer evidence to help the language user with which one to choose, since they are presented in a similar way.

The limitation and vagueness about the demonstrated definitions may cause interferences regarding the accurate comprehension, and point out to a linguistic research viability, towards qualitative understanding of the contextual real use of the referred items observing their collocations, in order to avoid mistakes, concerning their senses, due to the fact that in English, the theme "segurança" is expressed by two different forms.

The translation act should take into consideration the involved cultures, the translation direction, and it is dependent on the communications intended, as well as other aspects. The very own nature of each linguistic code results in different solutions, unparalleled and not mirrored, according to the direction of the translation act in question (Aubert, 1993: 34). Each case is an individual situation which demands an individual solution, once language pairs may not be compatible with one another in some or several aspects, in terms of lexis, grammar and other variations.

In the matter of the languages involved in the translation activity:[3]

> It would perhaps be appropriate to admit, at first, that the concept of world perspective, in its customary meaning, is a vague idea, if not a precise definition, at least sufficient notional delineation to validate an argument. As understood here, a particular world perspective corresponds to a range of representations of reality, which privileged but not exclusively, are attached in the structure and in the use of a certain language (Aubert, 1993: 35)[4].

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[3] The original citations mentioned in this article in different languages, other than in English, have been translated into this language by the author, and are originally included in the corresponding footnotes.

[4] Original: "De início, competiria, talvez, admitir que o conceito de visão de mundo, na sua acepção corriqueira, é algo vago, requerendo, se não uma definição precisa, ao menos um delinear nocional suficiente para fundamentar uma argumentação. Tal como entendida aqui, uma determinada visão de mundo corresponde a um conjunto de representações da realidade que, privilegiada, mas não exclusivamente, encontram-se entremeadas na estrutura e no uso de determinada língua" (Aubert, 1993: 35).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

Taking into consideration the scholar's view, in the domain of Portuguese and English as a linguistic pair in translation, the world perspective which is in the English language, regarding the safety and security themes, is distinct and seems to be more complex (in terms of quantity) than the world perspective in Portuguese, once the translation is expressed through a single polysemic term, in the case of Portuguese and in two terms, in the case of English.

Additionally, according to Azenha Junior (2010: 46), "terms involve perspective movements which vary from culture to culture"[5]. Thus, we may assume that as such, the terminological case of the cultural distinction between the pair we are dealing with, with regards to the concepts involved, should be treated and analyzed based upon the set of perspectives observed in the source culture where the referred terminology occurs.

2. Theoretical frame

In this section, we present the theoretical bases we adopted in order to build this study. We refer to conceptual units in Terminology, the concept and categories of collocations, and the *Corpus* Linguistics to obtain the data for our analyses.

2.1. Terminological theories: some considerations

In the history of Terminology, among several frames, we may highlight two main theories, which have supported and serviced studies regarding the science of terms: The General Theory of Terminology (GTT), developed by the Austrian engineer Wüster (1931); and the Communicative Theory of Terminology (CTT), stablished by the Catalan Cabré (1999). Both theories have

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[5] Original: "Os termos incluem deslocamentos e perspectiva que variam de cultura para cultura" (AZENHA JUNIOR, 2010: 46).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

played important roles in providing studies with scenarios to improve the way we see and treat the vocabulary of specialized languages.

The GTT offered a great contribution mainly to the standardization of terms in a period when professionals did not have any or very little basis towards verbal and symbolic designations of concepts in their areas, although, according to Gaudin (1993: 27) "where Wüster strictly separates lexicon and grammar, showing interest exclusively in the term..."[6], the static trait of terms in this view has not proved to be very efficient disregarding the context and the concept based on the discourse.

The CTT, on the other hand, takes into account the dynamic performance of the concepts. According to Cabré (1999), Terminology integrates linguistic, cognitive and social aspects in the communication of specialized languages. The theory considers the context and the discourse in order to comprehend, as we have mentioned in item 2.1, the environment where conceptual units are *activated* and where they operate.

On the whole, the CTT aims to describe:

> ... in a formal, semantic and functional way units which may acquire terminological value, coping with how they are activated and explain their relations with other types of designations from the same or distinct systems, in order to expand knowledge about specialized communication and the units used in them (CABRÉ, 1999: 124)[7].

In this concern, Terminology must take into account the several aspects of specialized languages, starting from the assumption that, although the terminological unit is the representation of the concept, it does not function in an isolated way. The processes of *diving* into its environment, considering what is being said, by whom, to whom, at which level of expertise, and the conventional uses adopted by communities (professionals) is imperative. Only

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[6] Original : "Là où Wüster sépare strictement lexique et grammaire pour ne s'intéresser qu'aux termes..." (GAUDIN, 1993: 27).

[7] Original: "...formál, semántica y funcionalmente las unidades que pueden adquirir valor terminológico, dar cuenta de cómo lo activan y explicar sus relaciones com otros tipos de signos del mismo o distincto sistema, para hacer progresar el conocimiento sobre la comunicación especializada y las unidades que se usan en ella" (CABRÉ, 1999: 124).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
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then, shall we be effective to access the concept involved in a given designation.

Thus, Godoy (2019: 67) refers to the CTT as "a language-base descriptive terminological theory which favors the communicative and pragmatic aspects of lexicons and the specialized languages"[8] In this sense, we adopted this theory in our study, considering the prominent role of communication as authentic events.

2.2. Terms and conceptual units

In the environment of translating and dealing with foreign languages it is very common to talk about meanings of words, of expressions, sentences, etc., in the field of general languages. When working with specialized languages, however, we must keep in mind that we are handling concepts. That is, in Terminology (the discipline that studies the specialized languages) a concept is expressed through a *term*.

The term is "the verbal designation of a general concept in a specific domain"[9] (ISO 1087, 1990: 7). In the matter of words and terms, Cabré (1999a: 123)[10] claims that we ought to understand the term as a word which is activated by its pragmatic conditions of appropriateness of a type of communication. Thus, either to natives or to non-natives of a certain language, comparing a word in its general uses to a situation when it is considered a term, activated by its function belonging in a specialized language, a closer exploration of uses and senses it may provide is required.

With regards to the morphosynctactic and lexical-semantic structures of terms, according to Barros (2004: 100), based on ISO 1087 (1990: 7), a term may be simple, when it has one root, and compound, when it has two or more

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[8] Original: "A TCT é, portanto, uma teoria terminológica descritiva de base linguística que privilegia os aspectos comunicativos e pragmáticos dos léxicos e das linguagens especializadas" (Godoy, 2019: 67).

[9] Original: "Désignation verbale d'un concept général dans un domaine spécifique" (ISO 1087, 1990: 7).

[10] Original: "Unidades léxicas activadas singularmente por sus condiciones pragmáticas de adecuación a um tipo de comunicación" (Cabré, 1999a: 123).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

roots. In aviation language, for example, both "safety" and "safety management program" are considered terms. In both situations, regardless of the number of elements represented in a term, it concerns what we refer to as a terminological unit.

In previous studies, Costa (2017, 2020) identified the concepts observed in the simple terms *segurança*, "safety" and "security" in aviation terminology. In this article, we focused on obtaining and categorizing the most frequent terminological units derivative of these simple terms expressed along with their collocations.

2.3. Collocations and their relation with conceptual units

Considering our objectives in this study, we must present one concept we base ourselves on, in order to evaluate the terminological units we have obtained: collocation:

> ... is a property of language whereby words are not randomly distributed across texts, but occur close to certain preferred words partners (or 'collocates'), a relationship refined according to their particular roles in each textual domain, genre and text type (RENOUF; BANERJEE, 2007: 419).

Tagnin (2013; 63) refers to collocations, adding that certain words seem to combine with each other, naturally, with no apparent explanation, whereas in certain cases, words associate with one another for having a connection in real life. Thus, these combinations and connections are subjected to closer examinations in order to understand the new meanings they result, and the new or specific concepts they designate in the case of terminology.

Concerning the categories of collocations, Tagnin (2013: 64,65,68) explains the differences and we highlight three types hereafter:

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
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a) adjective collocations are structured by an adjective + noun. As an example, we may indicate *dangerous goods* referring to any air-transported load which may cause damage to people, property, environment and safety in aviation;

b) noun collocations are formed by two nouns. *Safety culture* exemplifies the set of procedures and behavior adopted by aviation professionals in order to maintain free from risk operations.

c) verb collocations refer to nouns which naturally co-occur with certain verbs. Thus, saying that "birdstrike *puts in jeopardy* landings and take-offs in aviation everyday" shows a typical risk for those moments in air operations.

It is important to note that prepositions are a common particle present in collocations and that is going to depend on individual cases which we deal with, in the results section of this article. The above-mentioned categories of collocations shall be used to classify the conceptual units we have found (section 4).

Godoy (2019: 101) highlights *collocation*, *complex term* and *phraseological unit*, and we may include the *compound term*, are distinct classifications used in different theoretical approaches to address the same linguistic expression. As we see it, in this study we adopt *collocation* to represent the terminological unit compounded by a base element and its modifier(s), and its variety of categories as explained above.

In relation to the semantic field of the studied terms, we associate this concept to the area of aviation intersecting *segurança*, "safety" and "security", which, through the identification of their collocates should assist us to indicate their meanings and uses, relating them to the subareas of the specialized language in the domain of aviation and the referred fields.

> As a combination of lexicon-semantic frameworks and methodologies that are applied to most steps of terminology work, Lexical Semantics for Terminology deals with the authentic use of terms in textual corpora, it addresses issues of polysemy and

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

identifies patterns of combinatorics (called "combinatorics") that contribute to the meaning of terms (Peixoto; Pimentel, 2020: 12).

Thus, the approach put here to analyze the aviation collocates belongs to this group of descriptive research in terminology, based on communicative aspects observed in the context and discourse identified in our corpora, as to be reflected in the obtained collocations, since the concepts activated in terminological units depend on the environment the manifest.

2.4. Corpus linguistics

The Corpus Linguist Halliday (1992) refers to what he calls the *Discipline* of Corpus Linguistics (CL) as an area of studies which sees language as a probabilistic system. It focuses on languages by observing and describing them, according to the frequencies they appear in corpora by analysing linguistic *performance* in real use, opposing to linguistic *competence*. This source of texts is used by analysts to generate linguistic evidence to be used in different studies. CL is a methodology of investigation that is computer-assisted. Data are selected and inserted by the corpus linguist, who analyses them according to the parameter they insert in the software (keywords, collocates, n-grams, etc).

The definition of corpus as "-an electronic and meticulous compilation of (samples of) texts which naturally occur with the objective to represent a certain language or some of its specific aspects in order to enable a previously established analysis" (Tagnin, 2012: 27)[11] suits us well to represent the specialized language of aviation and to obtain the data we intended to analyse in this study, due to the nature of the employed corpus. By specialized corpora we mean authentic material produced by specialists, as we explain in the methodological section.

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[11] Original: "...uma compilação eletrônica e criteriosa de (amostras de) textos que ocorrem naturalmente com objetivo de representar uma dada língua ou algum de seus aspectos mais pontuais de forma a possibilitar uma análise previamente delineada" (Tagnin, 2012: 27).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

Corpus-based studies make use of different varieties of corpora. For this article, we used comparable corpora, which, according to Tognini-Bonelli (2001: 7), are selected to be similar samples of their respective languages, excluding translated texts. Viana and Tagnin (2011: 358) refers to this type of corpora as bilingual or multilingual comparable *corpora* "composed of two or more subcorpora containing original texts in their respective languages"[12]. Thus, in this study, we adopt the term comparable corpora to refer to a selection of original texts in Portuguese and a selection of original texts in English.

In the area of Terminology, there seems to be an agreement that comparable corpora are capable of offering the appropriate representativeness.

> This is mainly due to the fact that it is expected they depict the authentic usage of the language. In order to be comparable, the texts must account for the same technical areas, the same periods of time and belong in the same textual typologies (TAGNIN, 2012: 171).[13]

In order to obtain data, CL is assisted by software capable of exploring corpora containing large amounts of texts. Among the different software available for this purpose, we selected the *WordSmith Tools*. Developed by Mike Scott (1996) at the University of Liverpool, United Kingdom, this software offers varied tools. In this research, we used the utility *collocates* and the tool *concord*, which have the respective functions:

> The list of collocates is displayed clicking on the button *Show Collocates* at the task bar (...) Total column: the total of occurrences of the collocate around the searching word. It is the sum of *Left, Right* and * columns. (BERBER SARDINHA, 2004: 109).[14]

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[12] Original: "*corpus* composto por dois ou mais *subcorpora* com textos originais nas respectivas línguas" (VIANA; TAGNIN, 2011: 358).

[13] Original: "Isto se deve principalmente porque espera-se que eles retratem o uso autêntico da língua. Para serem comparáveis, os textos devem cobrir as mesmas áreas técnicas, os mesmos períodos de tempo e pertencerem aos mesmos tipos textuais" (TAGNIN, 2012: 171).

[14] Original: "A lista de colocados é mostrada clicando no botão *Show Collocates* na barra de tarefas (...) Coluna Tota: o total de ocorrências do colocado ao redor da palavra de busca. É a soma das colunas *Left, Right* e *" (BERBER SARDINHA, 2004: 109).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

> This tool produces concordances or lists of occurrences from a specific item (referred to as searching word or node, which may be formed by one or more words) accompanied by the text around it (cotext) (Berber Sardinha, 2004: 106).[15]

Considering our objectives, *collocates* was used to obtain the main collocates of the simple terms *"segurança"*, "safety" and "security", and *concord* was used to identify the concordance lines of the searched collocates, whereas in the studied corpora. The procedures are described in the following section.

3. Methodology

While searching for conceptual units in specialized languages, we should not disregard the fact that words and terms are all connected not only to one word on each side, but also to many others. It is imperative to widen our horizons and expect the units of meaning (and concept) to be more extensive and varied than it is realized in a single word (Sinclair, 2004: 39). Although simple terms are a reality, concepts are acquired through combinations which have the node as a starting point, connects to collocates and end up compounding terminological units.

In this study we used two comparable corpora, one in Portuguese, and another one in English. The material used in the Portuguese language corpus was captured from the National Civil Aviation Agency in Brazil and from the Brazilian Air Force. For the English language corpus, the texts were extracted from the International Civil Aviation Organization.

In order to maintain temporal and length balances, the texts were collected from 2005 to 2015 and the corpora had about 120,000 words each.

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[15] Original: "Essa ferramenta produz concordâncias ou listagens das ocorrências de um item específico (chamado palavra de busca ou nódulo, que pode ser formado por uma ou mais palavras) acompanhado do texto ao seu redor (o cotexto) " (Berber Sardinha, 2004: 106).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

The research focused on a specific section of aviation language, thus, in order to acquire texts in the desired area, the following key terms were searched in the websites: "*segurança*" as for Portuguese, "safety" and "security" as for English. For the English corpus, both terms and their texts were considered and extracted.

As an attempt to convey balance of the specialized studied languages, the selected material included aviation regulations, guidelines, news, procedures, courses and instructions.

After the compiling of the corpora, the software *WordSmith Tools* version 6.0 (Sᴄᴏᴛᴛ, 2012) was used to extract collocations and analyze data. Then we were able to observe the frequencies, and concordance lines.

We focused on the collocations and concordance lines, with the intent of providing a better understanding of the themes present in the subsection of aviation language along with the nodes "*segurança*", "safety" and "security" in Portuguese and English. Thus, we could analyse the uses and senses of the terms, as well as the context in which they occurred.

In order to identify the collocates, the search included up to five positions to the left and five positions to the right. The contexts presented were extracted using the *Concord* tool of the software and selected according to analysis of the relevance to demonstrate the senses and uses of the terms in the studied subsection of aviation language.

The order of the elements (left or right) which collocate with the terms, presented in the tables, was displayed according to the highest number of frequencies in the *corpora*.

In the task of obtaining equivalents among languages, comparable corpora may be quite expressive and effective to trace "the correlations that establish the boundaries of sets of functionally complete units of meaning in the two languages" (Tᴏɢɴɪɴɪ-Bᴏɴᴇʟʟɪ, 2001: 133). In other words, this kind of *corpora* is an important and rich source of information when establishing relations of meanings across languages, due to their perspectives, which comprise evaluations of equivalents based upon natural occurring textual

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

evidence from the viewpoint of discourse and context identified among the studied languages towards specific linguistic expressions and concepts or meanings the carry out.

4. Findings and discussion

In this section we present the obtained data, the analyses and the discussion of our results.

4.1. Data from the corpora

In respect with the frequencies of "*segurança*", "safety" and "security" in the corpus of Original Texts in Portuguese (OTP), and in the corpus of Original Texts in English (OTE), we present the following numbers:

Corpus of Portuguese	Corpus of English	
segurança	safety	security
970 occurrances	1,508 occurrances	122 occurrances

Table 1. Frequency information of the studied terms in the corpora. Source: Author (2020)

The observation of the frequencies and keyness of the terms in both corpora refer to how relevant they are in the subject matter of aviation language. When showing the key-words, we are able to have a better perception regarding what those documents are saying about the area, in this variety of specialized language in focus, since key-words tend to reveal the theme of the corpora. These data suggest topics in the field and may be understood as a starting point to observe the context involved in the field.

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

4.2 Collocations and concordance lines, and the discourse.

The next set of data we obtained was some of the most frequent collocates found in the corpora, attempting to convey a better understanding of what the terms refer to, in both languages, the categorization, as well as what their combinations express.

To select collocates, we considered items to the right and to the left of the terms, since they formed complete units of meaning and did not necessarily depend only on two parts. Some of them combine with articles and prepositions as well, which are hereafter presented in the concordance lines to be shown in item 4.2.2.

4.2.1 Collocates

a) Collocates of the term "safety", category and number of frequencies:

1- safety + management	noun collocation	380
2- aviation + safety	noun collocation	226
3- runway + safety	noun collocation	188
4- global + safety	adjective collocation	149
5- safety + global	adjective collocation	125
6- safety + oversight	noun collocation	104
7- safety + performance	noun collocation	93
8- safety + security	noun collocation	88
9- state + safety	noun collocation	85
10- safety + culture	noun collocation	82

Table 2: Main collocates of "safety" in the corpus of OTE. Source: Author (2020)

b) Collocates of the term "security", category and number of frequencies:

1- aviation + security	noun collocation	145
2- safety + security	noun collocation	88
3- security + facilitation	noun collocation	34
4- border + security	noun collocation	33
5- travel + security	noun collocation	33
6- security + management	noun collocation	27
7- security + oversight	noun collocation	26

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

8- security + measures	noun collocation	26
9- states + security	noun collocation	22
10- document + security	noun collocation	22

Table 3: Main collocates of "security" in the corpus of OTE. Source: Author (2020)

c) Collocates of the term *"segurança"*, category and number of frequencies:

1- segurança + operacional	adjective collocation	402
2- segurança + voo	noun collocation	95
3- segurança + aviação	noun collocation	94
4- segurança + aviação + civil	adjective collocation	78
5- desempenho + segurança	noun collocation	77
6- áreas + restritas + segurança	adjective collocation	65
7- gerenciamento + segurança	noun collocation	50
8- procedimento + segurança	noun collocation	49
9- defesa + segurança	noun collocation	39
10- organização + segurança	noun collocation	36

Table 4: Main collocates present in the corpus of OTP. Source: Author (2020)

Considering the base terms "safety", "security" and "segurança", the most frequent collocations showed a tendency to fit the category of noun collocates (safety management, aviation security, *segurança de voo*). We could also observe a few cases of adjective collocates (global safety, *segurança* operacional). It is also relevant to mention the case of "*áreas restritas de segurança*" which is formed by noun + adjective + preposition + base term, and although it has a first noun, we considered it an adjective collocation due to the specifier quality of the area in question.

In addition, we could notice cases of noun collocations in which the specifier noun is derivative of verbs, such as "safety management", "travel security" and "*organização de segurança*". For a better understanding of these collocations, we present them in context in the following section and in section 4.3.

4.2.2. Concordances lines

By using the Concord tool, the WST allowed us to take a close look at the concordance lines, and select contextual samples of the data we wanted

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

to analyze. The textual passages we present are intended to highlight the studied collocates of the terms "*segurança*", "safety" and "security" and to portrait the contexts where they occur, in order to assist us to identify their activated concepts in the referred specialized language.

a) Concordances with collocates of the term "safety":

N Concordance
1   should have knowledge of *safety management*, including the conduct of hazard identification
2   The outcomes of *aviation safety* may sometimes be related to occupational or workplace
3   to take initiatives to enhance *runway safety* through the establishment of runway safety
4   force was mandated to develop a *global safety* risk management framework that would make
5   staff, to carry out regulatory and *safety oversight* functions in an effective manner.
6   *Safety culture* and just culture are also leading indicators for which EUROCONTROL
7   be on the dashboard including *Safety Culture* progress on actions. The statistical information

Table 5: Concordance lines containing the main collocates of "safety". Source: Author (2021)

The selection of collocates displayed in the above table shows extra aspects of the term "safety". By collocating the term with "management", "runway" and "oversight", for example, we may assume respectively, senses of behavior and conduct, reference to a physical space, and care towards the aviation operations.

b) Concordances with collocates of the term "security":

N Concordance
1   responsible for the application of *aviation security* preventive measures at airports.
2   benefits from future travel documents through *Security and Facilitation* enhancement.
3   integrity of travel documents, *border security* and identity management remain an
4   travel documents and *border security* play in combating terrorism and trans-border crime
5   aspects of *aviation security* requirements, such as *security measures* for domestic

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

6	objective is to promote global *aviation security* through continuous auditing and
7	An ICAO Declaration on *aviation security*, unanimously adopted at the ICAO 37th

Table 6: Concordance lines containing the main collocates of "security". Source: Author (2021)

In the case of "security", its collocation in example 1 refers to the context of the airport and makes reference to prevention, thus, we associate "aviation security" to a scenario of an eventual need to avoid negative or dangerous events. In the third line "border" in association to "travel documents", along with the mention of "terrorism" in line 4 indicate a higher level of concern and risk.

c) Complementary cases:

N Concordance
1 ensuring regulatory oversight of *safety and security*, irrespective of any change in economic
2 Contracting State to provide *safety and security oversight* for its air operators and also
3 responsibility and accountability for *safety/security* can lead to uncertainty (see Circ 269,
4 and maintain a civil aviation *safety/security system* based on mutual trust and recognition

Table 7: Concordances containing passages with both terms in the same context. Source: Author (2021)

The above passages containing both "safety" and "security", complementing each other, seeks to comprise a wider view of both operational and structural nuances of aviation. Example 4, collocating the terms with "system", in a reference to "mutual trust" and the task to maintain civil aviation under the aspects of the two terms suggest the idea of safe condition and prevention altogether.

d) Exploring the term "*segurança*":

N Concordance
1 os assuntos ou eventos com implicações diretas ou indiretas para a *segurança operacional*.
2 organizacionais que impactam na *segurança operacional*, bem como suas interações

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

3   do simpósio teve como objetivo disseminar a *segurança de voo* em nível regional, incluindo
4   de avaliação de *desempenho da segurança operacional* é recomendável que a organização
5   da fauna dentro da área de *segurança aeroportuária*, e o poder público municipal
6   entrevista coletiva. A área de *defesa e segurança* foi apontada como um dos pontos
7   somente recuperada por *medidas* rígidas *de segurança* adotadas e exaustivamente
8   e Ações voltados para a *Segurança da Aviação Civil contra Atos de Interferência Ilícita*.

Table 8: Concordances with the main collocates of the term "*segurança*". Source: Author (2021)

Finally, when observing the concordances of the term "*segurança*" in Portuguese, similarly to the complementary cases in English (although expressed by a single term here), we notice the concepts identified in different examples complement each other. Whereas example 4 refers to the safe performance of aviation operations, concordance 8 relates to eventual crimes against aviation, and thus, "segurança" is associated to the term "security" and its concepts towards actions or measures of protection and defense.

4.3 Discussion of the findings[16]

The collocates of the term "safety" (table 2) and the examples displayed (4.2.2 a) show that the uses and senses of the term and the context regarding the theme refer to the well-being of all the involved elements in the flight operations. In example 1, this idea is clear when it is mentioned that "knowledge about safety management" is necessary to know how to conduct events or to identify risks. We may assume the context implies the circumstances of keeping the apparatus engaged to make the operations work properly in a way they preserve all parts. These aspects are reinforced in

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[16] Once our results comprise the data from the corpora, frequencies of terms, collocations, concordance lines and the semantic field of the findings we have decided to discuss the evidence in this separate section, assuming this organization offers a broader perspective of the article as a whole.

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

samples 2, 3 and 4, which refer to safety in the workplace, in the runway and specially the mention to "global safety". From this, we may understand that not only should the people, their health and condition be in an acceptable level of safety, but also the overall property and environment. Furthermore, the context showed caring, zeal, sense of preservation and caution.

Considering the terms "safety" and "security" in example 1 (4.2.2 b) a sense of precaution and preservation is noticeable, justified by the use of "aviation security preventive measures". It also implies and idea of prevention due to additional means and attitudes taken by institutions and organs which are responsible for providing passengers, cargo, airport and the aviation system with a secure environment to be conducted. The term "security" was associated with contexts of crime, law, threats, strategies and terrorism as well, which makes it likely to understand its uses related to defence, protection, "acts of unlawful interference" where there is a degree of intention or deliberation to cause harm.

In the case of the term "*segurança*" (4.2.2 d) which is intended to be equivalent to both terms "safety" and "security" in English, the collocates found in the corpus pointed out to a mixture of both cases in English and even considering that the three terms are polysemic, it became clear that in Portuguese, "*segurança*" carried a higher number of concepts. To illustrate this understanding, we may mention some cases of its collocations as "management or *gerenciamento*", "aviation/*aviação*", "performance/*desempenho*" among others not listed due to low frequency. The concepts observed in both occurrences of terms in English were present in the term occurrences in Portuguese.

Taking into consideration examples from 1 to 5, we realized the emphasis was given to maintain the air operations and their inner elements in a safe and regular or commonwealth function reflecting zeal, caring, concern, precaution and preservation. There was even a reference to caution around the airport areas due to a risk of what is known as "bird strike". Examples 6, 7 and 8, on the other hand, showed "segurança" with concepts of "security"

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

referring to the presence of felonious events as situations related to federal police, strict measures and acts of unlawful interference, respectively samples 6, 7 and 8.

It is relevant to mention that the English corpus showed 71 frequencies of "safety" and "security" (4.2.2 c) in the same context and always in this conventional order, used between the conjunction "and" or a bar (/). The examples brought these complementary cases mainly related to aviation regulations which refer to both contexts and as we see, these occurrences were associated to their uses altogether in a broader sense. In Portuguese this broader sense is sufficiently expressed by the single term "segurança" which, although it seems to be simpler, does not carry itself the specific natures of the English terms individually.

In summary, the collocations and concordance lines around the terms demonstrated their conceptual associations, due to uses and senses each term contained, in aviation language, according to the corpora.

To better synthesize the expressed concepts of the terms, the following table is presented:

safety	zeal, caring, guarding, prevention, precaution
security	prevention, precaution, protection, threats, punishment, intention to harm, defence, acts of unlawful interference
segurança	zeal, caring, guarding, prevention, precaution, protection, threats, punishment, intention to harm, defence, acts of unlawful interference

Table 9: Relation of concepts expressed by the terms "safety", "security" and "segurança". Source: Author (2020)

The samples of the collocations of the three studied terms are intended to provide clarity regarding their concepts, once these combinations with other items suggest a semantic correlation among these elements. As a relevant point of analysis, the collocates may function bringing additional meanings to the terms themselves which are added with extra evidence towards a better understanding. The exploration of concordance lines adds evidence to the terms, regarding their uses and senses, and it is a cornerstone

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

to comprehend the context of the subject which involved the subsection of safety and or security. Furthermore, in the case of Portuguese, "segurança", concerning the discourse of the United Nations International Aviation Organization and of the Brazilian official institutions in charge of regulations, guidelines, news, procedures, courses and instructions in English and in Portuguese.

5. Final comments

Upon additional consultation to the largest Brazilian Airlines, we learned that, since English is the "lingua franca" of aviation and used by a great deal of professionals in different positions, using the English forms as *loan terms* into Portuguese is frequent and conventional. In cases of translation, in their training centers, for instance, airlines tend to adopt "segurança operacional" for "safety" and "segurança de voo" for "security". This solution seems to work efficiently to the subjects of domain which are present in each formal discipline and area of activity.

Furthermore, we considered it relevant to mention a fact about the process of compiling the English corpus regarding the theme of security. Although the material on this specific subsection seemed to be sufficient and fruitful to our purposes, the texts about security were smaller in volume when compared to the ones about safety. The subject of security itself suggests technical secrets since it is related to aspects of protective strategies and procedures which might become ineffective if publicly revealed. For example, we could mention the case of Document 8973[17] which is restricted, i.e. not available for public access.

Nevertheless, it is relevant to register that concepts contained in terms are influenced by different variables, such as temporality, cognitive aspects,

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[17] The ICAO Aviation Security Manual (Doc 8973 – Restricted) assists Member States in implementing Annex 17 to the Chicago Convention by providing guidance on how to apply its Standards and Recommended Practices (SARPs).

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

conventionality of linguistic communities, among others, and thus, these concepts are subjected to shifts.

In this article, we proposed an investigation of the collocates of "*segurança*", "safety" and "security" in aviation language, and evidence has shown that a combination of precepts of the CTT (posing communication and context as sources of terminological data), and an evaluation of the cotext (in the sense of combinations of lexical items, as to reveal new and additional meanings) indicates effective potentialities for this kind of work. Thereby, this use of Cabré's theory, comprehending meanings of terms are relative, and the communicative scenario as "language in use" (CABRÉ, 1999 and 2003) allied to CL, as complementary theoretical and methodological frames, to search for units of meaning, considering words, and also terms, are all connected and related (SINCLAIR, 2004).

Studying collocations shows to be positive to understand the context and discourse of specialized languages since we have the opportunity to investigate the combinations of terminological units in real authentic communicative events. The exploration of collocates is intended to add evidence to differences, similarities and contrasts about the discourse and the matter itself in Aviation Language. In addition, collocations may offer evidence to develop definitions and contextual material in practical usage, bringing data to build terminographic materials for teaching, translating and expanding the knowledge of professionals, to find equivalents, in different areas through glossaries and dictionaries.

We expect our findings may shed light to the particularities of the studied terms, and assist our readers regarding the nuances their collocations potentially add to those terms, in a relation with the observed concepts, as well as to be aware of the role of cultural aspects reflecting the usage of lexical units. In addition, our results about collocations, as a source of linguistic data to lead to a better understanding of conceptual units related, are intended to broaden the discussion regarding collocations, as a way to

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

find out more information towards complex concepts, and may be replicated to research on other areas and terminologies.

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www.revistas.usp.br/tradterm

Appendix 1

This appendix contains an expanded version of the examples we used in order to analyse the concordance lines, which refer to the main collocates of the terms "safety", "security", both "safety" and "security" in complementary cases in English, and the term "*segurança*" in Portuguese.

a) Examples of collocates of the term "safety" in context

1- The personnel assigned to entity responsible should have knowledge of *safety management*, including the conduct of hazard identification, risk assessment and the implementation of appropriate mitigation strategies as well as occurrence reporting and analysis.

2- The outcomes of *aviation safety* may sometimes be related to occupational or workplace safety. As such, the organization should ensure that any relevant aspects of occupational/workplace safety (as with any other management systems) are integrated into Safety Management Systems SMS where appropriate.

3- The 37th Assembly Resolution 37-6 urged States to take initiatives to enhance *runway safety* through the establishment of runway safety programs, to prevent and mitigate runway accidents and serious incidents.

4- The task force was mandated to develop a *global safety* risk management framework that would make it possible to determine safe levels of operations in airspace contaminated by volcanic ash.

5- Scores refer to availability of sufficient number of qualified and trained technical staff, to carry out regulatory and *safety oversight* functions in an effective manner.

6- *Safety culture* and just culture are also leading indicators for which EUROCONTROL has developed measurement methods. Parallel to this effort and parallel to the mandatory reporting instituted by the application of

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

a voluntary reporting scheme created at European level, known as the EUROCONTROL Voluntary Accident and Incident Reporting scheme (EVAIR), which is open to Airlines.

7- Other components of safety may also be on the dashboard including *Safety Culture* progress on actions. The statistical information may need to be 'normalised' against the traffic flow or other system perturbations (new system upgrades, etc.).

b) Examples of collocates of the term "security" in context

1- The target population will be existing personnel at the supervisory level with the potential for promotion to the managerial level, and existing personnel at that level employed by the authority or organization primarily responsible for the application of *aviation security* preventive measures at airports.

2- ICAO has adopted the TRIP Strategy, that was endorsed by the ICAO General Assembly in October 2013, and its strategic framework for achieving maximum benefits from future travel documents through *Security and Facilitation* enhancement.

3- A key finding from the 9/11 Commission Report was that "for terrorists, travel documents are as important as weapons." The issuance and integrity of travel documents, *border security* and identity management remain an important and integral part of global counter-terrorism capacity-building efforts in furthering the objectives of the UN Security Council Resolution 1373 (2001).

4- Academia think tanks and the law enforcement community may need to explore the role that travel documents and *border security* play in combating terrorism and trans-border crime.

5- The documents cover many specific aspects of *aviation security* requirements, such as *security measures* for domestic operations, threat assessment, programs *airport security*, operator *security programs*, personnel background checks and selection, training and standard of performance,

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

certification of screeners, quality control programs as well as cooperation between States.

6- The objective is to promote global *aviation security* through continuous auditing and monitoring of Member States' aviation *security performance*, in order to enhance their *aviation security* compliance and oversight capabilities, by regularly and continuously obtaining and analysing data on Member States' aviation *security performance*, including the level of implementation of the critical elements of an *aviation security oversight system* and the degree of compliance of with standards.

7- An ICAO Declaration on *aviation security*, unanimously adopted at the ICAO 37th Assembly, places particular emphasis on the collection, analysis and timely sharing of information, and urges States to share best practices in areas such as *travel document security*, fraud detection and effective border controls.

c) Complementary cases

1- States must accept their primary responsibility for ensuring regulatory oversight of *safety and security*, irrespective of any change in economic regulatory arrangements. In this regard, the findings of the study could be useful to help enhance the awareness of States so that appropriate preventative or corrective measures may be developed and implemented.

2- The Chicago Convention and its Annexes require each Contracting State to provide *safety and security oversight* for its air operators and also surveillance of foreign operators that operate in its airspace.

3- In these circumstances, the questions of responsibility and accountability for *safety/security* can lead to uncertainty (see Circ 269, Implications of Airline Codesharing). Also, since such arrangements allow an operator to use the name or assume the public face of another carrier (e.g. in the case of franchising), the need to safeguard reputation in terms of service/safety quality have led to some regulatory action on *safety/security*.

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

4- The Chicago Convention and its Annexes provide the legal and operational framework for Contracting States to build and maintain a civil aviation *safety/security system* based on mutual trust and recognition. From a strict legal viewpoint, the system is designed to ensure that international civil aviation operates in a safe and secure manner independently of the air transport policy and economic regulations that Contracting States may follow.

d) Exploring the term "*segurança*"

1- ESTRUTURAÇÃO E ATRIBUIÇÕES DO GRUPO DE AÇÃO DE SEGURANÇA OPERACIONAL: criar um ambiente favorável e reconhecidamente não punitivo, que propicie os relatos (anônimos ou não) de todos os assuntos ou eventos com implicações diretas ou indiretas para a *segurança operacional*.

2- A organização deve considerar diversos fatores na descrição do ambiente operacional no qual desenvolve suas atividades/operações, como a identificação dos processos e procedimentos organizacionais que impactam na *segurança operacional*, bem como suas interações (ex.: gerenciamento, comunicação, execução, etc.).

3- De acordo com o Tenente-Coronel Aviador, a proposta do simpósio teve como objetivo disseminar a *segurança de voo* em nível regional, incluindo a multidisciplinaridade das áreas profissionais que interagem com o mundo da aviação.

4- Ao modelar e construir sua sistemática de avaliação de *desempenho da segurança operacional* é recomendável que a organização estabeleça a definição de *desempenho da segurança operacional* mais apropriada à sua realidade e política.

5- A interação entre o operador do aeródromo, responsável pelo monitoramento da fauna dentro da área de *segurança aeroportuária*, e o poder público municipal, responsável pelo controle e uso do solo, é de suma importância para reduzir os riscos de acidentes provocados pela colisão de aeronaves com pássaros.

TradTerm, São Paulo, v. 40, dezembro/2021, p. 347-377
Número Especial – Tradução e Cultura
www.revistas.usp.br/tradterm

6- No Centro Integrado de Segurança e Controle, na sede da Polícia Rodoviária Federal (PRF), a presidente e 15 ministros de Estado concederam entrevista coletiva. A área de *defesa e segurança* foi apontada como um dos pontos fortes no planejamento do torneio.

7- Num passado recente, a aviação civil internacional experimentou momentos de insegurança, os quais se refletiram em toda a economia mundial, bem como em uma queda de confiança no setor, somente recuperada por *medidas* rígidas *de segurança* adotadas e exaustivamente praticadas pela maioria dos Estados.

8- Desenvolvido por Empresas Aéreas, Operadores de Aeródromos, Departamento de Polícia Federal e pelo Departamento de Controle do Espaço Aéreo, definindo atribuições, procedimentos e medidas para serem desenvolvidas com o objetivo de garantir a eficácia dos Programas e Ações voltados para a *Segurança da Aviação Civil contra Atos de Interferência Ilícita*.

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