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RUNNING RABBITS AND SHOULDER MARKINGS: METAPHORICAL TERMS IN SPECIALIZED KNOWLEDGE

Ana Ostroški Anić

ABSTRACT

The role of metaphor as a basic cognitive mechanism in the construction and retrieval of specialized knowledge has been well studied within cognitive terminological theories (Faber, 2012; Tercedor Sánchez et al, 2012; Temmerman, 2000). However, the results of these analyses have mainly been applied in designing or improving terminological resources, leaving somewhat aside the impact metaphor has on bridging general and specialized knowledge, especially in the acquisition of new knowledge.

This paper discusses the role of metaphor as a cognitive process in the conceptualization of certain key concepts in the domain of aviation. A number of terms and their collocations that reflect metaphorical mappings from the source domains the HUMAN BODY and ANIMALS have been extracted out of a corpus of English aviation textbooks and manuals related to the field of air traffic management. Instances of metaphorical conceptual mapping are identified and analyzed both at the conceptual and terminological level.

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INTRODUCTION

The theory of conceptual metaphor has been widely researched in various fields of linguistics over the past thirty years because of its apparent simplicity allows for an explanation of fundamental human cognitive processes such as categorization and conceptualization. Metaphor provides insight into how we conceptualize one mental domain in terms of another, thus transferring experience and knowledge previously acquired and organized into another domain of human activity. A conceptual metaphor consists of two conceptual domains, usually an abstract and a concrete one, while the metaphorical linguistic expressions that reflect the conceptual metaphor in language belong to the language or terminology of the more concrete domain (Kövecses, 2010, p. 4).

The role of metaphor as one of the basic cognitive mechanisms in the construction and retrieval of specialized knowledge has also been extensively studied within cognitive terminological theories (Tercedor Sánchez et al, 2012; Ureña & Faber, 2010; Temmerman, 2000). The insights on metaphoric and metonymic dimensions of specialized knowledge concepts serve as proof that specialized knowledge domains are conceptualized in a manner similar to the cognitive structuring of our everyday knowledge. However, the role of metaphorical conceptual mapping on bridging general and specialized knowledge, especially in the acquisition of specialized knowledge, has been left somewhat aside.

Aviation English is one of the varieties of Languages for Special Purposes which requires its users to be fluent in the phraseology and terminology of the domain, but at the same time to reach a high level of knowledge of general English. An attempt of defining aviation lexical domains was made in the *Manual on the Implementation of ICAO Language Proficiency Requirements* (International Civil Aviation Organization, 2004), intended as a guidance material in developing an appropriate English language training curriculum for pilots and air traffic controllers. The somewhat random list of work related and priority lexical domains included in the Manual presents domains such as *animals and birds, causes and conditions, geography, topographical features, nationalities* or *perception, senses, numbers*, etc. (ICAO, 2004, p. 3-7). Although not explicitly included in the Manual's list, the human body has served as a fruitful source domain for metaphorical mapping and the creation of lexicalizations in various specialized domains, aviation being no exception. Some of the "work related topics" that the Manual does list, e.g. *behavior and activities, perception and senses* or *causes and conditions* are nevertheless closely related to the human body and the way it shapes embodied cognition (Lakoff & Johnson, 1999). This paper analyzes metaphorical expressions that are the realizations of conceptual mapping from the source domains of the human body and animals as two of the most common source domains in the creation of conceptual metaphor (Kövecses, 2010, pp. 18-19).

OBJECTIVE

The aim of the paper is to analyze metaphorical terms that exploit general language lexical units to designate certain key aviation concepts that are perceived according to their resemblance to either human body parts or various animals. The analyzed terms include single word metaphorical terms named after a general language lexical unit (*wing, tail, arm, rabbit*), and multiword terms in which general language lexical unit makes one element of the term or collocation (*butterfly tail, negative arm, downwind leg, heading bug*). Lexical units taken over from general language to designate concepts of a specialized domain are more likely to trigger the occurrence of metaphorical expressions in texts because they are usually polysemous words in general language, and their diversity in meaning is already the result of metaphorical extensions of some sort. Metaphorical motivation of many terms can be found in general or everyday concepts because experts

establish an analogy between a specialized concept that needs to be designated, and an already familiar concept in our environment (Ureña, 2011, p. 71).

METHODOLOGY

Since aviation is a very interdisciplinary field, this analysis takes air traffic management as the most representative part of aviation, with several of its domains (e.g. *airspace, air traffic, flight*) organized around concepts that are prototypical for the whole field. Corpus-based methods of extracting relevant metaphorical information have been applied, focusing on the application of a target domain oriented metaphor extraction using key terms and collocations.

A number of terms containing general language lexical units for body parts and certain animals are extracted out of a corpus of English aviation textbooks and manuals on the field of air traffic management, intended for training students or novice pilots. The list of extracted terms is complemented with manually selected terms from the *Aviation English Terms and Collocations* (Bratanić, Ostroški Anić & Radišić, 2010). *Sketch Engine* tools are used both for corpus compilation and for the analysis of the extracted data. After the term identification, concordances of these terms are then extracted, and identified as either literal or metaphorical lexicalizations.

HUMAN BODY AND ANIMALS AS SOURCE DOMAINS

If we understand metaphor as a cognitive mechanism that helps to structure human conceptual systems, one of its functions is to connect the cognitive structures of our general or everyday knowledge to conceptual structures of particular specialized knowledge domains. Metaphorical transfer between the source and target domains is constrained by our central knowledge of the source domain, and by the invariance principle (Lakoff, 1993; Ruiz de Mendoza, 1998). The metaphor MACHINES ARE HUMAN BEINGS thus shows that the conceptual mapping from the domain of the human body to the target domain of the aircraft systems preserves the topology of the source domain (*cylinder neck, hand pump, stressed skin, head of pressure, rotor head, venturi throat*).

The relationship between the two domains can be either of correlation or resemblance, which has an effect on the ontology of metaphors or the type of concepts connected as well as on the directionality, conventionality and grounding of conceptual metaphors (Stanojević, 2009). Grady (1999) distinguishes between two classes of metaphor: the resemblance class, and the correlation-based metaphors that include primary metaphors. Unidirectionality in the case of correlation metaphors means that the source domain is always a concrete one, while the target domain is abstract. It appears that most metaphors in the domain of air traffic management can be categorized as resemblance metaphors because both domains are concrete (e.g. MACHINES ARE HUMAN BEINGS, AIRCRAFT IS A BIRD). As opposed to correlation metaphors, resemblance metaphors allow for bidirectionality, meaning that the features of both domains can be projected in either direction (Grady, 1999, p. 96), i.e. they can be equally abstract or concrete (Stanojević, 2009, p. 348).

Ureña and Faber (2010) found that Grady's distinction between correlation and resemblance metaphors, as well as Lakoff's (1993) between conceptual-structural/conventional and image metaphors is lacking when it comes to the description of metaphors the basis of which is mental imagery. They propose a classification into resemblance and non-resemblance metaphors, with resemblance metaphors further

divided into static and dynamic. They conclude that instead of being classified as belonging to two different categories of image metaphors and behavior-based metaphors, resemblance metaphors should be considered as a graded category the members of which differ according to the dynamicity of their images (Ureña & Faber, 2010, p. 124).

Inanimate Objects Are Human Beings

The human body is without doubt a source domain that initiates conceptual mapping to various target domains, general and specialized knowledge alike. In the domain of air traffic management, several conceptual metaphors related to the human body can be observed, all of them belonging to a more general metaphor INANIMATE OBJECTS ARE HUMAN BEINGS. Thus we find linguistic realizations of the resemblance metaphor MACHINES ARE HUMAN BEINGS in which the parts of the human body – both external and internal – are mapped onto the structure of machines: *body of an airplane, body station, nose of the aircraft, venturi throat, hand controls, aircraft skin, stressed skin, cylinder head, pitot head, rotor head, cylinder neck*, etc. Machines and automatic systems are often attributed features and qualifications of a living being, as in the following examples of metaphorical constructions that show how the function of a body organ is mapped onto the function of a machine, and how activities typical of humans are mapped onto the machine's activity or behavior:

- (1) TCAS is designed to **provide** a set of **electronic eyes** (...)
- (2) (...) ATC will **keep an electronic eye on them** (...)
- (3) The **heart** of the airspeed indicator is a **diaphragm** that is **sensitive to** pressure changes.
- (4) Movement of the aneroid element is transmitted through gears to the **three hands** that **indicate** altitude.

Terms designating certain aerodrome surfaces (*runway shoulders, taxiway shoulders, shoulder markings, apron*) or aerodrome facilities (*pier finger terminal*) can be said to be metaphorical expressions for the metaphor AERODROME IS A HUMAN BEING. A *pier finger terminal* is a type of the terminal configuration that resembles the position of fingers on the hand, so there is a static image evoked by this metaphorical term. *Runway shoulders* and *taxiway shoulders* can also be considered instances of an image metaphor because they are based on resemblance in shape. *Shoulders* are paved parts of runways and taxiways that provide additional area in case the aircraft veers off the runway, but are also used for the passage of maintenance and emergency vehicles. Their primary function is, however, to prevent blast and water erosion of the central area of runways and taxiways. Just as shoulders on the body act as joints of arms and the upper part of the human body, runway shoulders connect the runway to the rest of the movement area and provide additional support to the main part or the body of the runway. Therefore the resemblance to the shoulders on the body is not on shape only, but in the function as well, which makes this image metaphor not prototypical.

Parts of the air traffic pattern (*departure leg, base leg, upwind leg, downwind leg, crosswind leg, final leg*) and holding pattern (*inbound leg, outbound leg*) are all designated by terms containing a polysemous general language lexical unit *leg*. In specialized communication metaphor and metonymy also serve as crucial mechanisms that lead to the creation of meaning specializations of a certain word, as can be seen in other collocations with *leg*: *overwater leg, navigation leg, landing gear leg, RNAV leg, or straight leg*. While the first group of terms refers to *leg* in the meaning of a part of the traffic pattern and holding pattern (i.e. segments of air traffic), *overwater leg, navigation leg* and *RNAV leg* use the term *leg* in the meaning of a segment of

flight. General language units that are used as terms or parts of terms in a terminology of a certain specialized domain carry the polysemous meaning over from the general language.

Animals in aviation

The lexical domain of animals has a particular role in the conceptualization of certain concepts in aviation, especially in the designation of parts of machines and technical concepts in general. Animals are an important part of the natural environment in which airports and their infrastructure is usually located, and as such they create a basis for the metaphorical description of many concrete concepts in the field of aviation.

Metaphors involving mappings from the domain of animals are clearly all resemblance metaphors, but some of them are more image, and others more behavior-based metaphors. The terms *airspeed bug*, *heading bug*, *bear paws*, *butterfly valve* or *butterfly tail* evoke mental images of a bug or a butterfly because they resemble them in shape. The terms *wing* and the *tail of the aircraft* evoke more dynamic images, and the resemblance with a bird is not merely based on shape, but also on behavior and function. The metaphor AIRCRAFT IS A BIRD is thus a dynamic resemblance metaphor according to the classification by Ureña and Faber (2010), both a behavior-based and function-based metaphor. The aircraft acts as a bird because it can fly, and the aircraft's wings and the tail have the function of generating lift and keeping the aircraft aloft in the same way they serve birds in flight.

Other examples of expressions based on image metaphors are the terms *squirrel cage rotor* and *dog-tooth clutch*. A *dog-tooth clutch* is a type of a dog clutch that "provides non-slip coupling of two rotating members" (Manual transmission, n.d.), the teeth of which resemble dog teeth. The *squirrel cage rotor* is a rotor of an AC induction motor, and it is a term widely used in engineering. All constructions with a *squirrel cage* have a cylinder mounted on a shaft, resembling a cage for catching squirrels or other small animals. The term *running rabbit* or simply the *rabbit* is a colloquial term referring to bluish-white sequenced flashing lights installed along the approach lights on the runways of many large airports. The term was derived because of the lights' rapid flashing that gives an effect of a white ball of light travelling towards the runway threshold about once per second. The mental image of a rabbit is evoked because of the color of the lights, but also because of their movement speed. This resemblance metaphor cannot therefore be classified as either image or behavior-based metaphor, and should be best described as a dynamic resemblance metaphor.

CONCLUDING REMARKS

Based on the examples of metaphorical linguistic expressions extracted for this analysis, metaphors involving terminological realizations referring to the lexical domains of the human body and animals mostly belong to the resemblance class of metaphors. Although not of the same relevance, both the motivation for correlation and resemblance metaphors can be regarded as experiential motivation. Without being able to rely on our experience, we could not have been able to recognize and establish resemblance in form, color or function between source and target domain elements. When specialized communication is analyzed, the interlinguistic and interdomain variation of metaphors and metaphorical motivation is less due to cultural differences, but rather more to differences in the conceptual systems of domains in question. Aviation is more a multicultural professional community with prescribed set of rules and customs applying to all of its members than it is a community of different multicultural practices based on individual languages and

cultures. What makes the mappings from the domain of the human body applicable to all specialized domains is the universal experiential motivation that relates our body to the environment. Although animals create rather a homogenous lexical domain, the members of the domain are, however, very dependent on the culture a lexical domain is set in, and on a particular environment surrounding the professional community using this specialized language. In that sense it is a domain more restricted by our cultural experience as well as by our physical environment.

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^{††} A more detailed inventory of domains characterizing the day-to-day communication of pilots and air traffic controllers is provided in Appendix B, Part II.

^{†††} According to standard practice, the names of all metaphors are written in capital letters.