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Конструирование пространственных отношений в научно-популярном документальном кинодискурсе

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Аннотация. В статье представлены методика и результаты анализа особенностей конструирования пространственных отношений в речевой модальности научно-популярных документальных фильмов на английском языке. Семантический и концептуальный анализ лексического состава начальных фрагментов научно-популярных фильмов позволил выявить состав и вариативность образ-схем, конструирующих пространственные отношения, которые в свою очередь описывают различные типы событий в научно-популярном документальном кинодискурсе.

Ключевые слова: образ-схема, пространство, научно-популярный кинодискурс, событие, речевая модальность, документальный фильм

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Original article

Relational Space Construal in the Cinematic Discourse of Science Documentaries

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Abstract. The paper presents the methodology and results of the study exploring spatial construal in the speech modality of science documentaries in English. The analysis of the semantic components and the conceptual structure of words in excerpts from popular science films has revealed the inventory and variance of image schemata which mediate relational space construal of different events in the cinematic discourse of science documentaries.

Keywords: image schema, space, popular science cinematic discourse, event, speech modality, documentary film

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INTRODUCTION

Space is naturally related to the visual modality in cinematic discourse and the construal of spatial relations is primarily explored in moving pictures [Coëgnarts, Kravanja, 2012a; Campbell, 2016]. Meanwhile, the importance of speech modality in spatial construal cannot be underestimated, especially in informative discourses, for instance, in popular science documentaries where the most relevant – scientific – information is conveyed via speech, although accompanied by visual images on the screen. Additionally, it is noticeable that the cinematic discourse of this type manifests a highly narrative nature [Campbell, 2016; Norris et al., 2005]; consequently, we expect that the construal of spatial relations serves the needs of stimulating narration, for example, providing for event sequencing and dynamicity.

To explore the construal of spatial relations as instantiated in the speech modality of popular science documentaries and referring to different types of events (for instance, environmental events or interpersonal interaction events), in this paper we employ the method of image schemata [Johnson, 1987], which has proved effective when applied to the studies of space [Киосе, 2023; Coëgnarts, Kravanja, 2012b]. To identify the image schema(ta) in a given lexical unit (or their combinations), we use the two-step procedure of lexical semantic and conceptual analysis [Беляевская, 2008; Бондарчук, 2016] and apply it to the initial excerpts from two popular science documentaries in English.

The research hypotheses are: 1) relational space construal displayed in image schemata manifests high variance providing mostly for discourse event sequencing and dynamicity rather than event organising; 2) the distribution of relational space image schemata is mediated by different event types. The study is structured as follows. First, we address the research framework on the discourse nature of popular science films and their event structure and the method of image schemata applied in this study to explore discourse event structure. Next, we introduce the research data and procedure. Following this, we present the results of the study and discuss them with reference to the event structure of popular science film discourse.

RESEARCH FRAMEWORK

The studies of popular science texts focus on the twofold nature of this type of discourse: it is essential that the presented information should be thoroughly and consistently explained, while a very effective way to facilitate understanding is to resort to narrative form [Campbell, 2016; Norris et al., 2005]. In popular science it is the "narrative of nature" that is in focus rather than the "narrative of science," which is attributed to science proper [Myers, 1990, p. 141–192]. Consequently, in popular science documentaries attention is drawn not so much to the different theories and ideas related to a subject, but rather to the subject itself although still presented through the lens of how scientists acquired this knowledge. This quest for ever more accurate understanding of the world around us is made evident in setting the epistemological goal of popular science films – to show "a union of man and technology in search of a "truth" about the historical world" (Moran, cited in [Campbell, 2016, p. 30])]. This interactive nature at the base of popular science accounts for three types of events: 1) *environmental events* (Event type 1) concern relations and interaction between objects in the world; 2) *human-environment interaction events* (Event type 2) refer to interaction between man as a cogniser and the environment as a cognised entity; 3) *interpersonal interaction events* (Event type 3) are connected with communicative events occurring between people. Therefore, we expect that these three event types will display specificity in relational space construal, which can be determined via image schemata analysis.

Among the image schemata which are related to space, Clausner and Croft distinguish the following: UP-DOWN, FRONT-BACK, LEFT-RIGHT, NEAR-FAR, CENTRE-PERIPHERY, CONTACT [Clausner, Croft, 1999]. Evans adds to this list the schemata STRAIGHT and VERTICALITY [Evans, 2007]. Following Hurtienne and Blessing, we include in this group the schemata SOURCE-PATH-GOAL and SCALE [Hurtienne, Blessing, 2007], which leads us to the following image schemata inventory: UP-DOWN, FRONT-BACK, LEFT-RIGHT, NEAR-FAR, CENTRE-PERIPHERY, CONTACT, STRAIGHT, SOURCE-PATH-GOAL, and SCALE. As can be seen, these image schemata are based on oppositions which are established every time an instance of an image schema occurs in a word or word combination [Cienki, 1997; Lakoff, Johnson, 1980]. These oppositions allow for interpreting the space schemata listed above as relational, as opposed to, for example, the image schema OBJECT, which naturally would evoke a certain spatial extension of anything construed as an object but not focus on the object's changing position in space or its relative position to other objects.

Identifying an image schema is a two-step analysis suggested in [Беляевская, 2008; Бондарчук, 2016] where the first stage involves the study of the semantic components of a lexical unit as derived from the analysis of its etymology as well as

its dictionary definitions. Based on the results of the first stage, we then identify the conceptual structure of a given lexical unit with reference to its contextual meaning, with the primary focus on semantic components referring to spatial relations or orientation in space.

RESEARCH DATA AND PROCEDURE

The analysed material comprises 169 clauses taken from the initial episodes in two films: "Tails You Win: The Science of Chance" (2012) and "Pop! The Science of Bubbles" (2013). These excerpts may be thought of as abstracts introducing the viewer to the topic of the film and outlining the main questions that will be covered in the remainder of the film. As the first step, the speech is divided into clauses (their total number was 169) and in each clause the event type (environmental events, human-environment interaction events, interpersonal interaction events) is identified. The next step involves splitting the clauses into single lexical units and each word undergoing the two-step semantic and conceptual analysis [Беляевская, 2008; Бондарчук, 2016]. There may be more than one instance of a space schema in a clause, nevertheless, for the quantitative analysis, any given image schema will be annotated only once per clause. To proceed, we employ the inventory of relational spatial image schemata UP-DOWN, FRONT-BACK, LEFT-RIGHT, NEAR-FAR, CENTRE-PERIPHERY, CONTACT, STRAIGHT, SOURCE-PATH-GOAL, and SCALE [Clausner, Croft, 1999; Hurtienne, Blessing, 2007; Evans, 2007]. Some of the most common language markers of relational space image schemata elicited at the first stage are: adverbs *up, down, away, down*; prepositions *to, towards, at, from*; adjectives and nouns referring to degree and extent, e.g. *great, height,* etc. Finally, descriptive and analytical statistical analyses are used to explore the image schemata distribution modulated by three event types.

Below, we demonstrate the research procedure.

The clause "Out at sea breaking waves generate huge plumes of bubbles…" (*Pop! The Science of Bubbles, 2013*) comprises ten words. In this clause several words impart a relational space schema:

The adverb ***out*** is used to speak "of motion or position beyond certain limits" [The Oxford dictionary of English etymology, 1966, p. 636]. It comes from Old English (henceforth referred to as OE) *ūt*, ultimately from Indo-European (henceforth referred to as IE) **ud* 'up, out, away' [Klein, 1971, p. 523]. Among the main meanings of the adverb, the Cambridge Dictionary[1] states its use "to show movement away from the inside of a place or container", while the Oxford Advanced Learner's Dictionary[2] (henceforth referred to as OALD) gives almost an identical definition except the fact that instead of the word 'container' it uses the word 'thing'. More relevant for us in this particular context is another definition of *out* as "a long or a particular distance away from a place or from land" [ibid.] with the Cambridge Dictionary giving a similar definition. The identified space image schemata are CENTRE-PERIPHERY, NEAR-FAR, SOURCE-PATH-GOAL, UP-DOWN.

The preposition ***at*** is derived from OE *æt*, further related to Latin *ad* meaning 'to, at, toward' [The Oxford dictionary of English etymology, 1966]. The first meaning provided in OALD[3] is as follows: "used to say where something / somebody is or where something happens", while the first dictionary entry for the preposition in the Cambridge Dictionary[4] focuses not on its use to introduce an element of event structure, but on the meaning of "… an exact position or particular place". Both dictionaries suggest the meaning of directionality for *at* ("in the direction of or towards somebody / something"[5], "in the direction of"[6]). The analysis allows us to identify the following space image schemata for this word: SOURCE-PATH-GOAL, NEAR-FAR.

To analyse the present participle ***breaking,*** we look at the origin and dictionary definitions of the verb *break*. This verb comes from OE *brecan,* from Common Germanic **brekan*, from IE base **bhreg-*, **bhrg-* [The Oxford dictionary of English etymology, 1966, p. 115]. Both OALD[7] and the Cambridge Dictionary[8] in their definitions focus on the meaning of severing into parts, as in: "to (cause something to) separate suddenly or violently into two or more pieces, or to (cause something to) stop working by being damaged" [ibid.], including the meaning of forceful action in OALD. Another important meaning is that of destroying or ending something, or coming to an end [ibid.]. When an object is broken, its parts are separated from each other (NEAR-FAR, CENTRE-PERIPHERY) and the resultant state is seen as the end of a path (SOURCE-PATH-GOAL).

The noun ***wave*** is etymologically related to OE *wagian* and Middle English *wawe* meaning 'sway to

[1]URL: https://dictionary.cambridge.org/dictionary/english/out

[2]URL: https://www.oxfordlearnersdictionaries.com/definition/english/out_1?q=out

[3]URL: https://www.oxfordlearnersdictionaries.com/definition/english/at?q=at

[4]URL: https://dictionary.cambridge.org/dictionary/english/at

[5]URL: https://www.oxfordlearnersdictionaries.com/definition/english/at?q=at

[6]URL: https://dictionary.cambridge.org/dictionary/english/at

[7]URL: https://www.oxfordlearnersdictionaries.com/definition/english/break_1?q=break

[8]URL: https://dictionary.cambridge.org/dictionary/english/break

and fro' [The Oxford dictionary of English etymology, 1966, p. 994–995]. The dictionary definitions from the Cambridge Dictionary[1] and OALD[2] are almost identical, suggesting the following: "a raised line of water that moves across the surface of the sea, ocean, etc." From this analysis two space image schemata can be distinguished for this noun, namely SOURCE-PATH-GOAL and UP-DOWN.

The verb ***generate*** is derived from Latin *generātus* 'to beget, bring forth, produce, generate', from *genus* 'birth, descent, race' [Klein, 1971, p. 307]. The dictionary definitions emphasise the causative meaning, as in "to produce or create something"[3] and "to cause something to exist"[4]; in addition, both dictionaries provide the meaning of producing energy. The etymology and dictionary definitions of the verb help us identify the following space schemata: SOURCE-PATH-GOAL, FRONT-BACK, and CENTRE-PERIPHERY.

The adjective ***huge*** takes its roots in Middle English *huge, hoge,* shortened from Old French *ahuge*, *akoge*, *ahoege* 'high', of unknown origin [The Oxford dictionary of English etymology, 1966, p. 451; Klein, 1971, p. 355]. The Cambridge Dictionary and OALD both provide the following definition: "extremely large in size or amount"[5], although OALD adds "great in degree" [ibid.]. The distinguished image schemata referring to space are SCALE and UP-DOWN.

The Oxford Dictionary of English Etymology gives the following meanings of the preposition ***of***: "expressing removal, separation, derivation, origin, source, spring of action, point of departure in time, cause, agent, instrument, material" [The Oxford dictionary of English etymology, 1966, p. 624]. The preposition comes from OE *of*, from Common Germanic adverb and preposition **ab*(*a*) deriving from IE **ap*, **apo* meaning 'away from, down from' [ibid.]. In Modern English the first meaning attributed to this preposition is that of possession, belonging, or origin[6]. Another meaning based on space relations is the following: "used to show the position of something/somebody in space or time" [ibid.]; "used in expressions showing position."[7] The space image schemata evoked here are SOURCE-PATH-GOAL, CENTRE-PERIPHERY, NEAR-FAR.

The noun ***bubble*** is a borrowing from Middle Dutch *bobble*. The Cambridge Dictionary defines ***bubble*** as "a ball of gas that appears in a liquid, or a ball formed of air surrounded by liquid that floats in the air"[8], while OALD adds to this: "...a ball of air inside a solid substance such as glass."[9] The basic space image schema for this noun is CENTRE-PERIPHERY.

As can be seen, out of ten words in the example clause eight express relational space schemata, most commonly SOURCE-PATH-GOAL (6 instances), CENTRE-PERIPHERY (5 instances), NEAR-FAR (4 instances). The remaining two words *sea* and *plume* may be thought of as instantiations of space in the form of objects (image schema OBJECT) but are not considered within relational space construal.

All the clauses in the excerpts were annotated following the described procedure. We finally obtained the data on the distribution of image schemata and identified the distributions in three sets referring to the three event types. Below, we present the distribution results.

RESULTS AND DISCUSSION

Figure 1 shows the distribution of each space image schema in the analysed clauses.

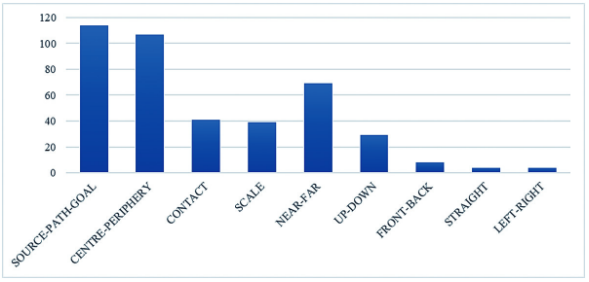

Fig. 1. Space image schemata in speech in popular science films

According to the diagram, the most common image schemata used in the two excerpts from popular science films are SOURCE-PATH-GOAL and CENTRE-PERIPHERY. Incidentally, a Paired samples t-test shows that these two schemata, as well as UP-DOWN, did not reveal significant differences in terms of differentiating between the three types of events. The results can be accounted for by the fact that these schemata are central to the way we interact with the world around us and perceive events, which complies with the idea of presenting scientific information in an effective way to facilitate understanding in a popular science film. The SOURCE-PATH-GOAL schema is essential to

[1]URL: https://dictionary.cambridge.org/dictionary/english/wave
[2]URL: https://www.oxfordlearnersdictionaries.com/definition/english/wave_1?q=wave
[3]URL: https://www.oxfordlearnersdictionaries.com/definition/english/generate?q=generate
[4]URL: https://dictionary.cambridge.org/dictionary/english/generate
[5]URL: https://dictionary.cambridge.org/dictionary/english/huge ; https://www.oxfordlearnersdictionaries.com/definition/english/huge?q=huge
[6]URL: https://dictionary.cambridge.org/dictionary/english/of ; https://www.oxfordlearnersdictionaries.com/definition/english/of?q=of
[7]URL: https://dictionary.cambridge.org/dictionary/english/of
[8]URL: https://dictionary.cambridge.org/dictionary/english/bubble
[9]URL: https://www.oxfordlearnersdictionaries.com/definition/english/bubble_1?q=bubble

the nature of interacting between objects in space, whereas the relations of CENTRE-PERIPHERY are connected to our conceptual positioning here and now and viewing the events as happening outside. On the other side of the scale are the image schemata STRAIGHT and LEFT-RIGHT both of which are used only in four clauses out of 169. This could be explained by their less obvious relevance for this type of discourse, as whether something is to our left or right is not likely to drastically change our perception, while with STRAIGHT it is usually its opposite – not-STRAIGHT – which is more natural in the world.

The results of a Paired samples t-test reveal that there are significant differences between the types of events in two image schemata – SCALE (Student's t-test (2) = 7.07, p=.033) and NEAR-FAR (Student's t-test (2) = 5.27, p=.034), while CONTACT (Student's t-test (2) = 3.90, p=.060), FRONT-BACK (Student's t-test (2) = 3.86, p=.061), STRAIGHT (Student's t-test (2) = 3.60, p=.069), and LEFT-RIGHT (Student's t-test (2) = 3.64, p=.068) demonstrate a certain tendency towards significantly differentiating between the event types. Consequently, our first hypothesis, claiming that relational space construal provides mostly for discourse event sequencing and dynamicity rather than event organising, has not been validated but specified. The image schemata distribution distinctions clearly manifest that spatial construal largely reflects the way we interact with the world around us and perceive events.

Figure 2 displays the event schemata distribution mediated by event type.

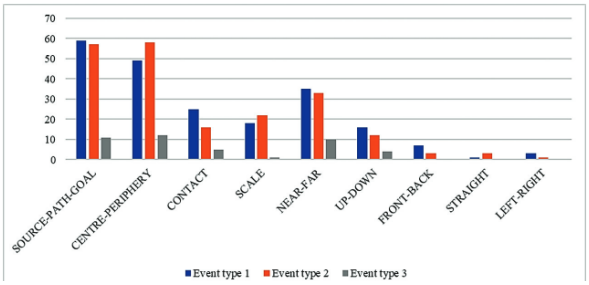

Fig. 2. Space image schemata distribution in three types of events

As can be seen, in 6 cases out of 9 it is Event type 1 which is construed with the help of space image schemata (SOURCE-PATH-GOAL, CONTACT, NEAR-FAR, UP-DOWN, FRONT-BACK, LEFT-RIGHT). Since events of the first type refer to events in the physical world as we see it, it seems only natural that they should be construed in terms of spatial relations. Whereas for Event type 2, referring to interactions between man and the environment, it is CENTRE-PERIPHERY, SOURCE-PATH-GOAL, SCALE, and STRAIGHT that are more common. This could be explained by the fact that the CENTRE-PERIPHERY schema evokes the 'me-first' orientation [Lakoff, Johnson, 1980; Johnson, 1987] which is used to ground the perceiver/cogniser in the centre and the world around him on the periphery. At the same time, SCALE and STRAIGHT are used to describe the degree or extent of something and the path of least resistance respectively, these meanings being important for the evaluation of the events of scientific endeavour. Below we will illustrate the finding with examples manifesting the determined distributions.

In the clause "…we **try to** have **things ready**" (*Tails You Win: The Science of Chance, 2012*) we deal with Event type 2 which is construed with the SOURCE-PATH-GOAL (conveyed by the infinitival particle *to* and the adjective *ready*) and CENTRE-PERIPHERY (instantiated in the words *try* and *things*) schemata. An event of the same type is expressed in "… we're **only just beginning to appreciate** the **potential of bubble science** (*Pop! The Science of Bubbles, 2013*) where the following space schemata can be identified: SOURCE-PATH-GOAL (in *begin, to, potential, of*), CENTRE-PERIPHERY (in *just, of, bubble*), SCALE (in *only, just, appreciate*), NEAR-FAR (in *of*), UP-DOWN (in *appreciate*). The clause "… **another disaster could hit at** any **moment**" (*Tails You Win: The Science of Chance, 2012*) conveys Event type 1 which is construed via the image schemata SOURCE-PATH-GOAL (in *hit*, *at*, *moment*, *could*), CENTRE-PERIPHERY (in *another*, *disaster, could*), CONTACT (in *hit*), SCALE (in *moment*), and NEAR-FAR (in *at*).

Events of the third type (interaction between people) are much less commonly construed with the use of space image schemata, which can be substantiated by Event type 3 significantly contrasting Event type 1 (Student's t-test (8) = 3.60, p=.007) and Event type 2 (Student's t-test (8) = 3.06, p=.016). The results show that the second hypothesis, claiming that the distribution of relational space image schemata is mediated by different event types, has been verified.

Overall, the quantitative results demonstrate the efficiency of the image schemata analysis in differentiating between the three event types, clearly illustrating, in particular, the central role of a cogniser in his / her opposition to the world and in evaluation of the events happening in it. The extensive reference to the tangible domain of space through image schemata is in accordance with the basic goal of popular science – to communicate scientific information in an effective way so that the wider audience may understand and appreciate the results of scientific inquiry.

FINAL REMARKS

The analysis of relational space construal in the speech modality of popular science documentaries with the use of image schemata showed that in conveying the interactive character of events, space image schemata essentially display the way we interact with the world around us and perceive events (since the image schemata SOURCE-PATH-GOAL and CENTRE-PERIPHERY prevail), which together with schemata of other groups, e.g. FORCE, MOTION, BALANCE, etc., provide conceptual ground for building complex meanings typically conveyed in scientific discourse. Relational space schemata are especially basic in popular science films since they are indispensable when describing the types of events involving interaction between objects in the world (environmental events), between man and the environment (human-environment interaction events), and between people as participants in communicative activities (interpersonal interaction events). Their significance in popular science films can be accounted for by the fact that spatial orientation is ubiquitous in our daily lives and the use of space image schemata is justifiable as a means to elucidate some of the most fundamental scientific observations. Since one of the main aims of popular science is to facilitate the comprehension of complex scientific information by lay audiences, film producers resort to the expository narrative type of discourse via the construal of relations between scientific objects and people interacting with these objects in space. As the next step in the study of space construal in popular science documentaries we shall analyse the way spatial relations are expressed in the visual modality. The results could enable us to establish the particularities of the two modalities in terms of their contribution to space construal, as well as their interaction in the discourse of a documentary film.

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