

様 式 C - 19、F - 19 - 1、Z - 19（共通）

科学研究費助成事業

研究成果報告書



令和 6 年 5 月 30 日現在

機関番号：12601

研究種目：若手研究

研究期間：2021～2023

課題番号：21K12977

研究課題名（和文）Time and Space in Contemporary Japanese through Comparative Investigation of Japanese and English Mental Lexicon Structures and Strategies of Temporal and Spatial Description

研究課題名（英文）Time and Space in Contemporary Japanese through Comparative Investigation of Japanese and English Mental Lexicon Structures and Strategies of Temporal and Spatial Description

研究代表者

Telegina Maria (Telegina, Maria)

東京大学・東京カレッジ・特任助教

研究者番号：80870071

交付決定額（研究期間全体）：（直接経費） 3,600,000 円

研究成果の概要（和文）：コーパスと言語連想のネットワークとして分析した結果、コーパスと連想の意味ネットワークは異なることが確認された。連想は社会文化的知識を表し、コーパスは時間と空間の表現の特徴を表している。連想データ収集の結果、75万以上の応答が得られた。メンタルレキシコン分析の結果、抽象的な概念からカレンダーのような具体的な概念まで、時間と空間の多数の概念が明らかになった。時間・空間描写パターンの研究では「手前／奥」という次元に基づくパターンを特定したが、これはこれまで西洋言語の空間に関する研究では未解明であった。このパターンは、日本語よりも英語では一般的ではないものの、言語と文化の理解を豊かにするものである。

研究成果の学術的意義や社会的意義

Understanding the temporal and spatial concepts of language and culture is crucial for learning how native speakers perceive and position themselves in the world. This study helps in comprehending modern-day Japan language from within the scope of cognitive linguistics.

研究成果の概要（英文）：In this project, we collected data from corpora and word associations and analysed as networks. Our findings confirmed previous results that a semantic network based on corpora differs from one based on word associations. These networks represent different dimensions of time and space concepts; word associations represent socio-cultural knowledge and corpus represents the ways we write and speak about time and space. The word association data collection yielded over 750,000 responses, aiding our investigation of the mental lexicon. Preliminary results of the analysis revealed various concepts of time and space, from abstract notions to specific references such as calendars. Our ongoing exploration of time and space description has led to a discovery. We've identified a pattern based on *temae/oku* or closer to the speaker/further away dimensions, which has previously been unexplored in studies on space in Western languages.

研究分野：Linguistics

キーワード：Japanese linguistics Linguistics Temporal Spatial Mental Lexicon

科研費による研究は、研究者の自覚と責任において実施するものです。そのため、研究の実施や研究成果の公表等については、国の要請等に基づくものではなく、その研究成果に関する見解や責任は、研究者個人に帰属します。

1. 研究開始当初の背景

We live in time and space, think of our bodies as situated in time and space, and evaluate both the physical world around us and our ideas, even our relationships, referring to time and space. As fundamental and yet seemingly familiar concepts, space and time have puzzled the minds of researchers since ancient times. A solid body of research in psychology, behavioral studies, neuroscience, and cognitive linguistics has demonstrated links between human cognition and spatio-temporal domain (e.g. Boroditsky, Fuhrman, and McCormick 2011; Weisberg, Marchette, and Chatterjee 2018). Moreover, findings of the studies on time and space have been utilized to support the development of such fields of research as pedagogy, artificial intelligence, and natural language processing (e.g. Bateman et al. 2010).

In linguistics, the tradition of investigation of space and time as represented in European languages is long and fruitful. Still, in-depth research of the two concepts in other languages is a matter of ongoing discussion. The systematic investigation of static space and time description in Japanese has not received much attention from researchers. While systematic studies on motion in Japanese (e.g. Matsumoto 1997), investigations of the features of particular spatio-temporal expressions (e.g. Shinohara and Pardeshi 2011), and works on space and time in Japanese culture (e.g. Katō 2007) have been published; the empiric investigation of the language of space and time leading to typologies of the concepts have not been conducted yet.

2. 研究の目的

The main goal of this work is to bridge this gap of knowledge. This project will systematically investigate time and space concepts in contemporary Japanese using a complex method of analysis of linguistic representations of Japanese time and space concepts.

The approach proposed for this project will incorporate 1) a theoretical framework of cognitive linguistics, 2) materials based on experimental work with native speakers and large-scale corpora, 3) cross-linguistic comparison, and 4) consultation with the previous studies on time and space in Japanese culture and society.

The core of the analytical part of the work will be executed within the framework of cognitive linguistics, utilizing, discussing, and referring to theories and methods of discourse analysis, frames of reference, conceptual metaphor theory, and temporal and spatial semantics. However, at the same time, it will use tools from digital humanities and network modeling to conduct the experiments, annotate, analyze, and present the data. Moreover, in this work, I further develop Kobozeva's (2000) methodology of extended spatial description analysis and use my methodology to analyze and annotate both spatial and temporal discourse.

The key research questions of the project will address both 1) mental lexicon structural features, e.g., what other concepts time and space are connected to in English and Japanese, and 2) in-depth investigation of patterns of temporal and spatial description in two languages. In other words, the first component of the study will answer the questions: "What and how space and time in Japanese mental lexicon are connected to? Are these connections culture-specific or universal?". While the second component of the study will detect "How time and space are described? Are patterns of description used in Japanese culture-specific?".

3. 研究の方法

Mental Lexicon: Data Collection and Analysis

To detect the structural features surrounding spatio-temporal domains of the Japanese mental lexicon, I qualitative and quantitative analyses of word associations and words co- occurring with spatio-temporal vocabulary in the large-scale language corpora, e.g. NINJAL: Balanced Corpus of Contemporary Written Japanese; British National Corpus is conducted. The corpus data is collected using a set of predefined syntactic dependency paths. A large Japanese word association dataset is developed in collaboration with the Small World of Words (SWOW) project (De Deyne, Verheyen, and Storms 2016) to collect word association data. To create and analyze the models of mental lexicon, I propose a methodology, statistics, and visualization tools common to network theory (also known as graph theory, e.g. in Biggs, N., et al., 1976). As recent studies (e.g. De Deyne, Verheyen, and Storms 2016) suggest, network theory methodology is an appropriate "natural" approach to mental lexicon modelling and analysis.

Description Strategies: Data Collection and Analysis

In my previous work, I proposed novel typologies for time and space description patterns in Japanese. In this project, I will further investigate the patterns of extended spatial and temporal description in Japanese and English.

For this project a local software developer developed a platform for carrying out the experiment. The experiments are still ongoing, and the recordings of responses to visuals obtained through the experiments are transcribed and annotated as a customized Text Encoding Initiative (TEI) corpus. The annotation and analysis are based on the works of Kobozeva, Talmy (2000), Vanek (2012), and my encoding and analysis principles formulated for the previous project. In this part of the study, I conduct qualitative and quantitative analyses to examine whether the preliminary typologies of temporal and spatial description for Japanese are reproducible on a wider range of material and whether patterns discovered in the previous work are culture-specific or appear in English as well.

4. 研究成果

As a part of this project, data from corpora was collected, organized, and analyzed as a network. The results confirmed previous findings and demonstrated that a semantic network based on natural speech production differs from the network representing the same domains but based on word associations. We hypothesize that these two networks can represent two different levels of language. Network based on word association data gives us a glimpse into the mental lexicon, our knowledge of linguistic, social, and cultural relations of a particular word, while corpus-based data represents patterns of natural speech production – how words are put together in a sentence or text.

Word association data collection was conducted, and we received more than 750 thousand associative responses. We still will continue the collection to achieve a truly large scale of the data base. This data collection will help us in investigation of mental lexicon in general, not only its temporal and spatial domains.

Overall, preliminary results of mental lexicon analysis demonstrated a range of concepts of time and space, from abstract time and space to very particular time related to watches and calendars or space in front and behind. The number of communities detected in semantic network based on word associations is eleven and the qualitative analysis of semantic features of the

communities demonstrates that communities of the network can be labelled as 1) Abstract Time, 2) Natural processes time, 3) Seasonal time, 4) Calendar Time, 5) Free time, 6) Abstract Space, 7) City/countryside, 8) Outside/inside (home), 9) Room (life space), 10) In front/behind, 11) Depth/unknown.

While our investigation into time and space description patterns is still in progress, our preliminary findings have already unveiled a discovery. We've observed a pattern, based on *temae/oku* or closer to the speaker/further away dimensions, which was previously unexplored in studies on space in Western languages. This pattern, although less frequent in English than in Japanese, is a significant addition to our understanding of language and culture.

My research is a comprehensive exploration of the features of the Japanese mental lexicon and the typology of temporal and spatial description patterns. The ongoing results I present here indicate that the understanding of time and space, including the typologies of temporal and spatial description, derived from predominantly European languages, does not fully encompass the patterns of description commonly used by Japanese native speakers. Further investigation of the mental lexicon and description strategies will provide a nuanced understanding of the fundamental concepts of time and space in contemporary Japanese, while comparative analysis will offer insights into the universality of these findings. This project's development will create a platform for future studies not only on time and space in various languages but also on other domains of the mental lexicon. The practical implications of this research are far-reaching, with potential applications in lexicography, language learning and teaching, as well as artificial intelligence and natural language processing.

Understanding temporal and spatial concepts of language and culture plays a vital role in learning how native speakers think about and position themselves in the world. In other words, this study will contribute to understanding contemporary Japan from the inside and within the global context of cognitive linguistics.

参考文献

- Bateman, John A., Joana Hois, Robert Ross, and Thora Tenbrink. 2010. 'A Linguistic Ontology of Space for Natural Language Processing'. *Artificial Intelligence* 174(14):1027–71. doi: 10.1016/J.ARTINT.2010.05.008.
- Boroditsky, Lera, Orly Fuhrman, and Kelly McCormick. 2011. 'Do English and Mandarin Speakers Think about Time Differently?' *Cognition* 118(1):123–29. doi: 10.1016/j.cognition.2010.09.010.
- De Deyne, Simon, Steven Verheyen, and Gert Storms. 2016. 'Structure and Organization of the Mental Lexicon: A Network Approach Derived from Syntactic Dependency Relations and Word Associations'. Pp. 47–74 in *Towards a theoretical framework for analyzing complex linguistic networks*, edited by A. Mehler, A. Lücking, S. Banisch, P. Blanchard, and B. Frank-Job. Berlin: Springer Berlin Heidelberg.
- Katō, Shūichi. 2007. *Nihon bunka niokeru jikan to kūkan*. 東京 : 岩波書店.
- Kobozeva, Irina Mikhailovna. 2000. 'Grammar of Spatial Description'. Pp. 152–62 in *Logicheskii analiz iazyka : iazyk prostranstv*, edited by N. D. Arutyunova and I. B. Levontina. Moskva: ĪAzyki russkoĭ kul'try.

Matsumoto, Yo. 1997. 'Kuukan-Idoo No Gengohyoogen to Sono Kakuchoo (Linguistic Expressions of Spatial Motion and Their Extensions)'. *Kuukan to Idoo No Hyoogen* 126–229.

Shinohara, Kazuko, and Prashant Pardeshi. 2011. 'The More in Front, the Later: The Role of Positional Terms in Time Metaphors'. *Journal of Pragmatics* 43(749–758).

Weisberg, Steven M., Steven A. Marchette, and Anjan Chatterjee. 2018. 'Behavioral and Neural Representations of Spatial Directions across Words, Schemas, and Images'. *The Journal of Neuroscience* 38(21):4996 LP – 5007. doi: 10.1523/JNEUROSCI.3250-17.2018.

5 . 主な発表論文等

〔雑誌論文〕 計0件

〔学会発表〕 計4件（うち招待講演 0件 / うち国際学会 4件）

1 . 発表者名 Maria Telegina
2 . 発表標題 Spatial Concepts and Patterns of Extended Spatial Description in Contemporary Japanese
3 . 学会等名 The 16th International Cognitive Linguistics Conference (国際学会)
4 . 発表年 2023年

1 . 発表者名 Maria Telegina
2 . 発表標題 Digital Approaches to Mental Lexicon and Language Learning: Bilingual Language Learning Environment SWOW-APP
3 . 学会等名 17th International Conference of the European Association of Japanese Studies (国際学会)
4 . 発表年 2023年

1 . 発表者名 Maria Telegina
2 . 発表標題 Stories of the mind: investigating mental lexicon though a large-scale crowdsourcing study of word associations. The Japanese Small World of Words
3 . 学会等名 The Linguistic Society of New Zealand annual conference (国際学会)
4 . 発表年 2022年

1 . 発表者名 Maria Telegina
2 . 発表標題 The Japanese Small World of Words. Investigating meaning through a large scale crowdsourcing study of word associations
3 . 学会等名 The Digital Humanities 2022 (国際学会)
4 . 発表年 2022年

〔図書〕 計0件

〔産業財産権〕

〔その他〕

-

6. 研究組織

	氏名 (ローマ字氏名) (研究者番号)	所属研究機関・部局・職 (機関番号)	備考
--	---------------------------	-----------------------	----

7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8. 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関			
オーストラリア	Melbourne University			