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研究課題名(和文) 第一言語および第二言語におけるメタファーの創造と解釈可能性に関する実証的研究

研究課題名(英文) An Empirical Study on the Creation and Interpretability of Metaphors in a First and Second Language

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研究成果の概要(和文)：比喩はある概念から意味的に離れた別の概念との関係を考慮することで、抽象的な概念を身体的、経験的な表現から理解する人間の重要な認知的能力である。本研究プロジェクトは、2つのモダリティ(言語的と絵画的)、日本語と英語における比喩を実験を通じて研究した。我々のプロジェクトは(1)実験参加者が、言語と画像で比喩をどのように生み出すか、(2)視覚的比喩が視聴者に与える影響を調べる、(3)直接的(非比喩的な)な文から創造的な文まで広範囲の文と、刺激としての製品イメージを用いた比喩の創造に対する反応時間を吟味した。4年で多様な実験を行い、成果を日本心理学会ほか国際会議と国際的研究雑誌に発表した。

研究成果の学術的意義や社会的意義

比喩の認知言語学理論は進んでいるが、実験を行い、客観的に比喩の効果を記述する研究は十分ではない。本研究の学術的意義は、実証的な方法で比喩を研究した、言語だけではなく、商業画像を用いて、比喩の効果をマルチモーダルの検証した、非比喩的-比喩間の対応ではなく、比喩表現が言語やあるいは画像に示す創造的側面、また比喩の被験者に与える心理的效果(我々がengagementと呼ぶ楽しさなど)をできる限り客観的に検証したことがあげられる。

我々は比喩の創造的側面に注目し、これが新しい方法で理解の境界、知識構造を拡張する可能性を客観的に検証して、人間の認知科学的、心理学的理解に貢献したものと信ずる。

研究成果の概要(英文)：Metaphor involves an important human cognitive ability to understand abstract concepts from their physical and experiential representations. This research explored metaphors across two modalities (language and painting) in Japanese and English, through various experiments. Our project explores (1) how participants produce metaphors in language and images, (2) the effects of visual metaphors on viewers, and (3) reaction times to the comprehension and creation of metaphors using product sentences, from simple to creative, and images as stimuli. During the four research years, we conducted various experiments, and presented the results at international conferences such as the Japanese Psychological Association and in international research journals.

研究分野：認知言語学、認知科学

キーワード：メタファー 認知言語学 実験心理学 比喩の創造性 エンゲージメント マルチモーダルの研究 比喩概念の生成

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。

アブストラクト メタファーは、人間の認識の重要な一部であり、言語、ジェスチャー、イメージなど多彩なモードのコミュニケーションに現れる。メタファーにより、私たちは、意味的には遠く離れがちな別の概念への関係を考えることにより、ある概念を理解することが可能となる。例えば、「創造的に考える」は比喩的には「箱の外で考える」と言える。創造性(creativity)は抽象的な用語であり、話者、社会、文化、時代により大きく変化する可能性がある。我々の研究プロジェクトはこの研究方針で、異なる二つのモダリティ（言語的と絵画的）、そして二つの言語（日本語と英語）を超えてメタファーを検討していた。

我々の研究プロジェクトは、日本語と英語における視覚的及び言語的メタファーについて、メタファーの解釈、生成、楽しさ(engagement)、理解度を検討するための、三つの実験を行った。以下に、各研究プロジェクトの主目的を示す：

- (1) 最初の研究プロジェクトでは、実験参加者が（言語的と絵画的の）異なるモードを超えてどのようにメタファーを作り出すかを研究した。これを研究プロジェクト1とする。
- (2) 2番目の研究プロジェクトは、視覚メタファーが見る者に与える効果を検討した。これを研究プロジェクト2とする。
- (3) 第3の、最後のプロジェクトでは、字義通りから高度に創造的な、広範囲な名詞文を解釈するための反応時間と、画像を刺激として用いて視覚メタファーの創造を研究した。これを研究プロジェクト3として、研究成果全体を以下で報告する。

1 . 研究開始当初の背景(Research background at the beginning of this study)

Metaphors are an important part of human cognition and appear in many different modes of communication such as in language, gestures, and images. It allows one to understand a concept through considering its relationships to another concept that tends to be semantically distant. For example, “thinking creatively” is metaphorically “thinking outside a box”. Creativity is an abstract term and likely varies greatly between people, societies, cultures, and time periods. To think creatively in the modern Western sense is to think unconstrained, without inhibitions or restraints. A box is a container and thus naturally provides restraint for the objects within it. Therefore, “to think outside the box” can be applied to creative thinking, since it requires one to push boundaries (e.g., the constraint of the box) and to extend knowledge structures (e.g., beyond the box) in new and yet discovered ways.

Our research project furthered this line of research by examining metaphors across two different modalities (verbal and pictorial) and across two different languages (Japanese and English).

2 . 研究の目的(Purpose of Research)

Our research project involved three experiments that explored metaphor interpretation, production, engagement, and comprehension with both visual and linguistic metaphors in Japanese and English. Below are the main objectives for each research project:

- (1) In our first research project, we explored how participants produce metaphors across different modes (verbal and pictorial) and this is referred to in this document as Research Project 1.
- (2) In our second research project, we looked at the effect visual metaphors have on the viewer and this is referred to as Research Project 2.
- (3) In our third and final research project, we examined reaction time to comprehend a range of nominal sentences that ranged from literal to highly creative and visual metaphor production using an image of a product as a prompt and this is referred to as Research Project 3.

3 . 研究の方法(Research Methods)

Research Project 1

In this project, the authors (Birdsell et al., 2019) investigated metaphor production and

interpretation using cross modal stimuli (verbal and pictorial). In this study, native Japanese participants viewed an abstract word in the textual mode, in the form of an incomplete copula metaphor (Friendship is ...), and then saw six images of concrete entities (castle, heater, colored pencils, etc.). They then chose one of these image concepts to complete the copula metaphor and then provided an interpretation of it.

Research Project 2

In a second study, the authors (Birdsell et al., 2022) conducted two experiments using sets of paired advertisements for the same product or social awareness campaign based on one of them being a visual metaphor and the other being a visual non-metaphor to explore if there was a visual-metaphor effect. In total, we used 14-paired advertisements (consisting of 28 images; one being metaphorical and the other non-metaphorical). In Experiment 1, participants (N = 79) rated these adverts based on three criteria, effectiveness, engagement, and a metaphorical framing effect along with an open-ended question. In Experiment 2, we used a similar design as Experiment 1, but slightly changed the material to include Japanese advertisements and removed the social awareness campaign items. So, in this version, there were 15-paired advertisements with 10 foreign ones and 5 Japanese ones. Similar to Experiment 1, participants (N = 75) rated these adverts based on three criteria, effectiveness, engagement, and a metaphorical framing effect along with an open-ended question. In addition, two additional variables were included in this experiment, comprehensibility and creativity.

Research Project 3

In the final study of this research project, there were two parts. In part one, the authors (Birdsell et al., 2023) developed 8 sets of 4 sentences with the same topic ranging from a literal definition (e.g., “Education is learning”) to a semantically distant and unconventional sentence (e.g., “Education is a teapot”). Participants responded on a keyboard with “L” for “I understand” or “A” for “I don’t understand” (this was reversed for half of the participants). Part two was a drawing experiment. Participants saw two examples of a visual metaphor (e.g., car tires blended with octopus tentacles, suggesting the powerful grip of the car tires) and then were shown two products (e.g., insect repellent and coffee) and were asked to draw a visual metaphor and interpret its meaning.

4 . 研究成果(Research Results)

Research Project 1

Using descriptive statistics, results indicate that there is a wide amount of variability among the selected responses by the participants. Secondly, we performed an analysis of the participants’ interpretations and identified three features of the source concept (e.g., the pictorial image) that they focused on when interpreting the metaphor: (1) external or systemic properties of the pictorial entity; (2) situational functions or actions performed on the entity; or (3) some form of introspection related to the entity.

Research Project 2

Results support the view that visual metaphors tend to be more engaging and perceived to be more creative. However, this does not always result in them being viewed as more effective adverts. For example, in experiment 1, using a one-way analysis of variance (ANOVA) we found engagement was the most common strength of the visual metaphor adverts showing significance for 9 of the 14 total adverts, effectiveness and metaphorical framing showed fewer cases of significance (4 and 6, respectively). In the second experiment, using a one-way analysis of variance (ANOVA) we found that visual metaphor adverts on the whole were rated as being more creative than equivalent non-metaphorical adverts. In addition, visual metaphor adverts as an aggregate scored higher for comprehensibility than the counterpart nonvisual metaphors. Similar to Experiment 1, we found a majority of visual metaphor

advertises to score significantly higher for engagement. Experiment 2 also showed a larger number of the adverts as being more effective and having a metaphorical framing effect than the paired non-metaphorical visual adverts. There was no difference between the foreign and non-foreign advertisement scores for comprehensibility.

Research Project 3

Results from the reaction time study (Birdsell et al., 2023) suggest that some conventional metaphors are as easily comprehensible as literal statements. On the other hand, incomprehensible sentences tended to be the most semantically distant ones (e.g., “Argument is a city map”, “Language is a folding fan” and “Friendship is a birdsong.”). In total, comprehensible sentences (N = 262, M = 3027 ms, SD = 1222 ms) were more common than sentences rated as being meaningless (N = 154, M = 4042 ms, SD = 2384 ms) and there was a statistically significant difference in reaction time $t(414) = -5.73, p = .000$ with a medium effect size ($d = 0.58$). Secondly, based on the groupings, SC (N = 208, M = 3062 ms, SD = 1779 ms) and SD (N = 208, M = 3743 ms, SD = 1780 ms), there was also a statistically significant difference in reaction time $t(414) = 3.9, p = .000$ with a small/medium effect size ($d = 0.38$). In sum, judging the meaningfulness of a sentence takes less time than judging it to be meaningless. In addition, semantically close sentences take less time than semantically distant ones.

In regards to the drawing experiment, two variables were used in the analysis: semantic distance and creative product analysis. Semantic distance, measured using SemDis (see Beaty et al., 2020), analyzed the distance between the two concepts, resulting in a mean score for each visual metaphor. For the creative product analysis, evaluators (N = 5) using a 5-point Likert scale subjectively measured the visual metaphors on novelty/originality, synthesis, and meaningfulness. These scores were aggregated, resulting in one score for creative product analysis. A Pearson correlation coefficient was computed to assess the relationship between semantic distance and creative product analysis. There was a positive correlation between the two variables, $r(25) = .501, p = .009$.

References

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5. 主な発表論文等

〔雑誌論文〕 計1件（うち査読付論文 1件/うち国際共著 1件/うちオープンアクセス 1件）

1. 著者名 Brian J. Birdsell, Natsuko Tatsuta, Hiroaki Nakamura	4. 巻 Proceedings of Paclic 33
2. 論文標題 Making Metaphors: A Quantitative Analysis of Metaphor Production and Interpretation in Japanese Using a Multimodal Task	5. 発行年 2019年
3. 雑誌名 Proceedings of the 33rd Pacific Asia Conference on Language, Information and Computation	6. 最初と最後の頁 361-373
掲載論文のDOI（デジタルオブジェクト識別子） なし	査読の有無 有
オープンアクセス オープンアクセスとしている（また、その予定である）	国際共著 該当する

〔学会発表〕 計4件（うち招待講演 0件/うち国際学会 3件）

1. 発表者名 Brian Birdsell、立田夏子、中村裕昭
2. 発表標題 好奇心とメタファー創造の関係
3. 学会等名 日本心理学会第84回大会
4. 発表年 2020年

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2. 発表標題 Ballpoint Pens and Hammocks: How Visual Metaphors Engage and Distract in Advertisements
3. 学会等名 The 11th Asian Conference on Psychology & the Behavioral Sciences (国際学会)
4. 発表年 2021年

1. 発表者名 Brian J. Birdsell, Natsuko Tatsuta, Hiroaki Nakamura
2. 発表標題 Making Metaphors: A Quantitative Analysis of Metaphor Production and Interpretation in Japanese Using a Multimodal Task
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4. 発表年 2019年

1. 発表者名 Brian Birdsell, Natsuko Tatsuta, Hiroaki Nakamura
2. 発表標題 Curiosity is [image]: A cross-linguistic Analysis of Metaphor Production and Interpretation Using a Multimodal Task
3. 学会等名 15th International Cognitive Linguistics Conference (国際学会)
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〔図書〕 計0件

〔産業財産権〕

〔その他〕

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6. 研究組織

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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
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