

Effects of Concrete Conceptual Metaphor on People's Reasoning

Yixin Zhong^{1,a,*}, Jianhan Lin^{2,b}

¹Department of psychology, University of California Davis, Davis, 95618, United States

²SAS PX, Shanghai, 201106, China

a. zyxzhong@ucdavis.edu, b. Jianhan01PX2024@saschina.org

*Correspondence author

Abstract: In this work, the effect of metaphorical language on people's cognition about concrete events will be tested. In order to do so, the study will exploit the difference in metaphor use in describing the extent of a car crash to evaluate the framing effect of the word choice on people's perception of a concrete physical accident. In the experiment, participants will be randomly assigned to read two versions of texts about a car accident with only different metaphor usages to describe the extent of the car's windshield breakage. Then participants will be asked to answer three multiple-choice questions that can reflect participants reasoning towards the severity of the car accident they have read. This study predicts that participants who read the "milder" metaphor version will perceive the car accident less severely than those who read the "severer" metaphor version, which can prove the influence of metaphorical language on people's perception of concrete events.

Keywords: metaphorical language, cognition, concrete event, framing effect

1. Overview

According to the study done by Boroditsky and Thibodeau, metaphor can covertly frame people's reasoning of abstract concepts [1]. The proposed study will extend further from the study done by Boroditsky and Thibodeau, testing the influence of metaphors on people's perception of concrete events.

1.1. Specific Aims

To test whether the metaphor describing the extent of a car crash can have a framing effect on peoples' evaluation of this concrete physical accident.

1.2. Background

As a literary device, metaphor has been considered a non-academic technique used in literature and other forms of writing. However, starting from the late 20th century, researchers realized that metaphors could have other influences on areas such as the human mind. The investigation of conceptual metaphor's influence on the human mind started with the article written by George Lakoff and Mark Johnson in the *Journal of Philosophy*. In the article, they raise the idea of conceptual

metaphor [2]. They mentioned that despite being considered as 'irrational and dangerous' or merely as 'the result of some operation upon the literal meaning of the utterance,' metaphor is frequently used in everyday communication and thus shapes our human mind [2]. The essay specifically gives an example of 'argument is war'; when describing argument as 'war,' the metaphor directs the speaker's and listener's attention to the conflicting nature of the metaphor (Lakoff & Johnson 1980). The article then suggested that if there is a culture that uses the metaphor of 'argument is dance,' then they will focus on the favorable aspect of the concept of argument, viewing the concept differently (p.454-p.455). In other words, metaphor changes the concepts in the human mind by simplifying a complex concept. Thus, as stated by the article, people may have different understandings of a concept by using different conceptual metaphors because this usage of metaphors shapes people's understanding of different objects and people. If the theory is proven correct, metaphors truly shape how people relate the daily objects and people near them with words and thus shape people's minds.

Many studies previously designed experiments to test the hypothesis. For instance, a famous study by Paul Thibodeau and Lera Boroditsky (2013) studied the influence of metaphor on people's reasoning about crime [1]. The study asks participants to read two texts describing the crime in one city. The two texts are identical, except in one part where each of the two uses a distinct metaphor describing the crime—one text describes the crime in the city as a beast whereas the other describes the crime as a virus. The result is that when people read different texts, they give out different solutions to the crime problem. As people's choice of solution reflects their perception of the event, the study suggests that metaphors will affect people's reasoning in complex abstract concepts such as crime.

The study by Thibodeau and Boroditsky focuses specifically on metaphor's influence on people's reasoning on crime. The result successfully conveys that metaphor will influence people's perception of abstract concepts. However, it is not enough to test the theory that metaphor influences perception only by testing metaphor's influence on the perception of abstract concepts such as crime. Metaphor is also used to describe concrete concepts, such as 'your eyes are like stars' or 'the tree is like a giant.' If such a metaphor can shape people's conceptual system and thus their perception, it can supplement Boroditsky and Thibodeau's study's result.

Thus, the experimental proposal will design an experiment focusing on metaphors describing concrete concepts and their influence on human perception.

2. Proposed study: Can Metaphorical Framing Shape People's Perception of Concrete Physical Events?

The proposed study is mainly inspired by the previous study done by Boroditsky and Thibodeau. The previous study manifests the power of natural language metaphors on people's reasoning about a social issue—crime, an abstract concept that is hard to define [1]. Though the finding of this study fails to explain the linguistic relativity effect, it indeed indicates the potent metaphorical framing effect on people's reasoning: By "implicitly instantiating a representation of the problem in a way that steers us to a particular solution." (p.7) However, Boroditsky and Thibodeau's study only covers people's reasoning toward abstract concepts. To further investigate the metaphorical framing effect on reasoning, the proposed study will conduct an experiment to discover the effect on people's reasoning towards concrete physical events. Specifically, the proposed study will ask participants to evaluate the severity of a car accident after reading a fabricated story about that car accident using a metaphor that describes the extent of the car's windshield breakage. In the study, we will randomly assign participants to two experimental groups. The two groups will respectively read two versions of the story with the same content but only different in the usage of metaphor (a mild version and an extreme version). Afterward, we will evaluate participants' perceptions of the severity of the car accident they have read about by asking them to fill out the questionnaire with multiple choice

questions that can reflect participants' reasoning towards the severity.

3. Method

3.1. Participants

We will recruit 60 native language speakers, 30 male participants, and 30 female participants for this study. Participants' age will range from 16 to 40. Then we will randomly assign participants to the two experimental groups. A previous study has found that "the framing effect is sex-specific, varying according to the gender role in different task domains" [3]. Therefore, to eliminate the sex difference as a confounding variable act on metaphorical effect, we will assign 15 males and 15 females in both experimental groups equally.

3.2. Experimental Procedures

Participants in both experimental groups will be asked to read through a text about a car accident. The text will tell a story about a man who was drunk while still driving a car and was finally knocked into a tree. There will be two versions of text for each experimental group, and the only difference between the two versions is the usage of metaphor for describing the breakage of the car's windshield. The two metaphors are designed to different extents to indicate severity: A mild one and a more extreme one. To be specific, we will describe the status of the windshield as "the glass of the windshield was smashed into a jigsaw puzzle" in the mild version while describing the status of the windshield as "the glass of the windshield was smashed into grains of rice" in the more extreme version. After reading through the text, participants will be asked to fill out a questionnaire related to the text content. The questionnaire will include two sections. In the first section, participants are required to fill out their basic information about gender, age, and the length of driving experience. In the second section, participants are asked to answer three multiple-choice questions that can reflect participants' reasoning. Since we will not provide the answers to the question in our text, what participants choose will all depend on their reasoning towards the severity of the car accident they read. Elaborating on the three multiple choice questions we designed, the content of them will be: 1) What car speed do you think before it hits the tree? a.50km/h b.80km/h c.100km/h. 2) How many beer bottles do you think the man drank before driving? a.2 bottles b.5 bottles c.8 bottles. 3) How much percent of consciousness remained before the car hit the tree? a.20% b.50% c.80%.

3.3. Predictions

According to the results of Boroditsky's and Thibodeau's experiment, the usage of metaphor influences people's reasoning on abstract events [1]. Therefore, if the pattern in Boroditsky's and Thibodeau's experiment can also be applied to metaphors of concrete objects, we expect a similar pattern in this experiment. Specifically, participants reading text with a milder metaphor (the jigsaw puzzle metaphor) will rate the event as less severe than participants who read text including a more extreme metaphor (the grains of rice metaphor).

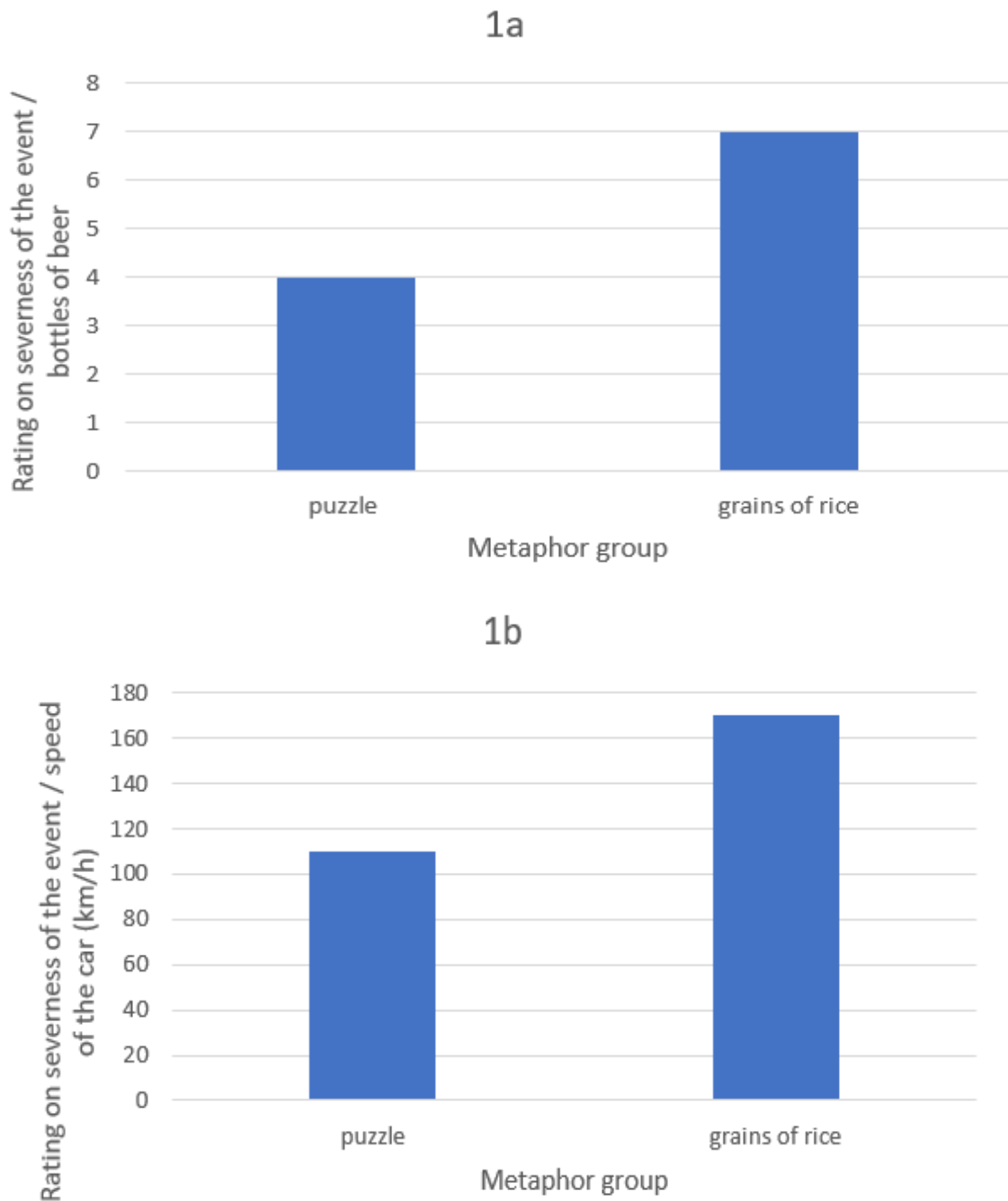


Figure 1a: Prediction on the rating of several beer bottles by different groups of metaphor.
1b: Prediction of the rating on the speed of the cars by different groups of metaphor.

4. Conclusion

The overall study is aimed to study the framing effect of metaphorical language on people's cognition towards concrete events that go beyond abstract concepts. Suppose the results of the proposed study follow the prediction and has a similar pattern to the study done by Boroditsky and Thibodeau. In that case, the study will conclude that metaphors of abstract and concrete concepts will influence people's reasoning, thus shaping the perception [1]. The study's result will then complement Boroditsky's and Thibodeau's experiment to support the theory that metaphors will shape people's

perceptions. Thus, if the results of the proposed study follow the prediction, it will have a significant implication on human perception—as a metaphor is applied to daily conversation, it may shape people's perception of ideas. Thus, different metaphors can be an indication of differences in cultures.

References

- [1] Thibodeau, P. H., & Boroditsky, L. (2013). Natural language metaphors covertly influence reasoning. *PLoS ONE*, 8(1). <https://doi.org/10.1371/journal.pone.0052961>
- [2] Lakoff, G., & Johnson, M. (1980). Conceptual Metaphor in Everyday Language. *The Journal of Philosophy*, 77(8), 453–486. <https://doi.org/10.2307/2025464>
- [3] Yunhui Huang & Lei Wang. (2010). Sex Difference In Framing Effects Across Domain. *Personality And Individual Differences*, 48(5), 649-653. <https://doi.org/10.1016/j.paid.2010.01.005>