

## Research Articles

# I Am Physically and Personality-Wise Warmer When Wearing Round Eyeglasses: Shape Priming Influences Personality Judgments and Estimated Temperature

Yasuto Okamura\*<sup>a</sup>, Mitsuhiro Ura<sup>b</sup>

[a] Graduate School of Psychology, Otomon Gakuin University, Osaka, Japan. [b] Department of Psychology, Otomon Gakuin University, Osaka, Japan.

## Abstract

Shapes are considered to be related to different personality traits, and particularly, in terms of metaphorical associations, the round shape has been related to the warmth trait, and the square shape to the competence trait. The present study used a pre-post design to replicate these associations. Moreover, it was investigated whether round shapes enhanced the estimation of physical warmth as suggested by contemporary debates on cross-modal correspondences. The results indicated that the round shape increased the perception of warmth ( $p = .004$ ) and the square shape enhanced the perception of competence ( $p = .025$ ), which confirmed round-warm and square-competent associations. Furthermore, estimates of the room temperature were higher in the round condition, compared to the square condition ( $p = .023$ ). The theoretical implications of these findings and directions for further research are discussed.

**Keywords:** metaphor, embodied cognition, warmth, competence, eyeglasses

Psychological Thought, 2019, Vol. 12(2), 176–184, <https://doi.org/10.5964/psyct.v12i2.361>

Received: 2019-03-15. Accepted: 2019-04-01. Published (VoR): 2019-12-09.

Handling Editors: Marius Drugas, University of Oradea, Oradea, Romania; Stanislava Stoyanova, South-West University "Neofit Rilski", Blagoevgrad, Bulgaria

\*Corresponding author at: 2-1-15 Nishiai, Ibaraki City, Osaka 567-8502 Japan. E-mail: [yasu0night.person@gmail.com](mailto:yasu0night.person@gmail.com)



This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License, CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

It has been assumed that shapes are related to various personality traits. In a classical study, [Lundholm \(1921\)](#) reported that angular lines were more likely to be associated with traits such as hard, harsh, and cruel and curved lines were more likely to be associated with traits such as weak, gentle, and mild. Other studies ([Berlyne, 1960, 1974](#); [Zhang, Feick, & Price, 2006](#)) showed that angular shapes were associated with traits that expressed energy, toughness, and strength, whereas rounded shapes were related to traits that expressed approachability, friendliness, and harmony. [Jiang, Gorn, Galli, and Chattopadhyay \(2016\)](#) found that circular brand logos activated softness, whereas angular brand logos triggered hardness. More recent research has indicated round-warm and square-competent associations. [Liu, Bogicevic, and Mattila \(2018\)](#), for instance, investigated the role of the shapes of displays in a restaurant on customer satisfaction and suggested that in busy settings, angularly shaped cues increased their satisfaction by perceiving competence of the service provider. On the contrary, in non-busy settings, circularly shaped cues enhanced their satisfaction via the perception of warmth of the provider. [Okamura and Ura \(2018a\)](#) confirmed that round eyeglasses increased the perception of warmth

and square eyeglasses enhanced the perception of competence. Okamura and Ura (2018b) examined the influence of drawing circles or squares on impressions of the interpersonal environment and demonstrated that drawing circles resulted in warmer impressions, whereas drawing squares resulted in more competent impressions. Moreover, these associations have been found not only in the perceptions of others but also in the self-perception (Okamura & Ura, 2017).

The round-warm and square-competent associations are also supported by conceptual metaphor theory (CMT; Lakoff & Johnson, 1980), which explains that abstract concepts (e.g., personality) are mapped onto concrete concepts such as shapes in human cognition. In fact, personalities are expressed by the words for shapes (e.g., *round* off one's corners; be there or be *square*). Kövecses (2005) suggested that actual linguistic metaphors were expressions of conceptual metaphors. Therefore, it is reasonable to assume that shapes and personality traits are associated. Such concrete-abstract associations have been documented by a growing body of research (see the review of Landau, Meier, & Keefer, 2010). At the same time, the correspondence between concrete concepts derived from different sensory modalities has been found in cross-modal processing (Spence, 2011). For example, Guéguen and Jacob (2014) showed that a red cup was evaluated as containing the warmest beverage through the association between color and physical warmth. Moreover, Blazhenkova and Kumar (2018) demonstrated nonarbitrary shape correspondences between angular, or curved shapes, and attributes of the five senses such as vision, audition, gustation, olfaction, and tactile sensation. The mechanisms that underlie cross-modal correspondences are still to be identified (Velasco, Woods, Marks, Cheok, & Spence, 2016). However, one possible explanation could be that the round shape is related to the estimation of physical warmth.

Based on these findings, the purpose of the current study was twofold. First, it was attempted to replicate and extend the knowledge on the round-warm and square-competent associations in a study designed to overcome a significant weakness of previous research. Various studies on embodied cognition (some of them are described below) have demonstrated the influence of sensations on cognitions and behaviors by focusing on opposite sensations such as warmth and coldness, or softness and hardness. However, these studies manipulated only one of the two opposing sensations, and therefore, it is difficult to conclude which sensation influenced higher order processing. For instance, Jostmann, Lakens, and Schubert (2009) found that participants that held a resume with a *heavy* clipboard judged the applicant to be a *more important* person. The authors suggested that the metaphor-consistent effect in this process is "IMPORTANCE IS HEAVY". However, it is also possible to construe the process in the reverse direction, such that participants holding a *light* clipboard judged the applicant to be *less important*. Such construal variations result from not setting a strict control condition. Various studies of embodied cognition contain the identical problem (e.g., Meier & Robinson, 2004; Williams & Bargh, 2008). The studies on the influence of shape priming on personality judgments have not resulted in any conclusions as to whether the round shape increases warmth perception or decreases competence perception or vice versa. Moreover, Honmoto, Yamamoto, and Sugamura (2014), for example, argued that a control condition with the medium temperature determined by using a thermometer is needed to control for the two experimental conditions of warmth and coldness in studies on the sensation of warmth. The current study was conducted with a pre-post design to investigate the direction of the influence to solve the problem of the experimental manipulation. It was hypothesized that a round shape would increase the warmth perception and a square shape would enhance competence perception through metaphorical associations.

The relationships between round shapes and warmth as a personality dimension, as well as physical dimension, were also examined. As mentioned above, round shapes are assumed to be associated with a warm personality. Moreover, [Hu, Li, Jia, and Xie \(2016\)](#) reported that behaving altruistically to others led to an increase in the estimate of physical warmth, suggesting the conceptual metaphor “SOCIAL WARMTH IS PHYSICAL WARMTH”. Taken together, these findings suggest that warmth as a personality variable, which is an abstract concept, could be associated with both round shapes and physical warmth, which are concrete concepts. It was hypothesized based on past research that the perceived warmth of the personality would mediate the relationship between round shapes and the estimate of physical warmth.

## Method

### Participants

The participants were undergraduate university students ( $N = 121$ , 51 men and 70 women; aged 18 to 22 years), who participated in exchange for partial course credits. Participants received a questionnaire and responded to it during a psychology class. Participants were informed that they could drop out of the study at any time they wanted during the survey. Moreover, their informed consent was obtained prior to the participation in the study.

### Experimental Stimuli

The 16-item Warmth-Competence Scale (see the [Appendix 1](#) for the complete scale) and the two photographs of round and square eyeglasses were used (see the [Appendix 2](#)).

### Procedure

Participants were randomly assigned to two conditions, round ( $N = 63$ ), or square ( $N = 58$ ) eyeglasses. In the pre-evaluation phase, participants responded to the 16-item Warmth-Competence Scale, which has 8 items assessing warmth and 8 items assessing competence. This scale was developed based on [Hofstee, de Raad, and Goldberg \(1992\)](#). In responding to the scale, the participants rated the extent to which statements such as, “I am interested in other people”, and “I learn quickly”, were applicable to them using a 5-point Likert scale ranging from 1 (*very inaccurate*) to 5 (*very accurate*). The items describing warmth and competence were arranged alternately in the scale. In the post-evaluation phase, the participants looked at a photograph of round or square eyeglasses for 30 seconds and carefully imagined wearing them. Then, they were asked to judge their own personality traits while imagining themselves wearing the eyeglasses using the 5-point scale of the Warmth-Competence Scale. In the post-evaluation phase, the order of items of the scale was reversed from the pre-evaluation phase. Lastly, the participants were asked to estimate the temperature of the room. We informed the participants in advance that room temperature at 7 am on the day of the study was in 11°C, as a clue for judging the current room temperature. The study was conducted at half-past twelve when the actual room temperature was 20.5°C.

## Data Analysis

Data analysis was conducted using HAD ver. 15.106, a free software program for statistical analysis (Shimizu, 2016).

## Results

An exploratory factor analysis of the responses to the 16-item, Warmth-Competence Scale, was conducted using maximum likelihood estimation and Promax rotation. According to the authors' theoretical perspective, it was assumed that the factor-structure of the scale would consist of two dimensions; warmth and competence. The results indicated a good fit to the data,  $\chi^2(89) = 221.52$ ,  $p < .001$ , CFI = .92, RMSEA = .08, AIC = 290.63. The two dimensions that were identified were interpreted as competence ( $\alpha = .86$ ) and warmth ( $\alpha = .89$ ). Of the 16 items of the scale, warmth and competence were each assessed by 8 items. Then, it was conducted a 2 (shape: round/square)  $\times$  2 (phase: pre-evaluation/post-evaluation)  $\times$  2 (dimension: warmth/competence) analysis of variance (ANOVA) with the shape of the eyeglasses as a between-participants factor, and phase and dimension as within-participants factors. The results indicated a main effect of phase,  $F(1, 119) = 101.09$ ,  $p < .001$ ,  $\eta_p^2 = .46$ , indicating that the participants recognized their characteristics more deeply in the post-phase ( $M = 3.67$ ,  $SE = 0.05$ ) compared to the pre-phase ( $M = 3.04$ ,  $SE = 0.04$ ). A three-way interaction,  $F(1, 119) = 7.36$ ,  $p = .008$ ,  $\eta_p^2 = .06$ , and a two-way interaction between shape and phase,  $F(1, 119) = 6.71$ ,  $p = .011$ ,  $\eta_p^2 = .05$ , and phase and dimension,  $F(1, 119) = 13.93$ ,  $p < .001$ ,  $\eta_p^2 = .11$ , respectively were also observed. Simple interaction effects were found between shape and phase,  $F(1, 238) = 3.93$ ,  $p = .049$ ,  $\eta_p^2 = .03$ , shape and dimension,  $F(1, 238) = 13.46$ ,  $p < .001$ ,  $\eta_p^2 = .10$ , and phase and dimension,  $F(1, 119) = 19.95$ ,  $p < .001$ ,  $\eta_p^2 = .10$ . A simple-simple main effects test revealed that participants in the round condition ( $M = 3.78$ ,  $SE = 0.10$ ) judged themselves as warmer than those in the square condition ( $M = 3.39$ ,  $SE = 0.10$ ) in the post-phase,  $F(1, 476) = 8.59$ ,  $p = .004$ ,  $\eta_p^2 = .07$ . Moreover, the participants in the square condition ( $M = 3.90$ ,  $SE = 0.10$ ) evaluated themselves as more competent than in the round condition ( $M = 3.59$ ,  $SE = 0.10$ ) in the post-phase,  $F(1, 476) = 5.05$ ,  $p = .025$ ,  $\eta_p^2 = .04$ .

A one-way ANOVA was also conducted with eyeglass shape as the independent variable and the estimated value of the room temperature as the dependent variable. The ANOVA indicated that the participants in the round condition ( $M = 18.32$ ,  $SE = 0.40$ ) estimated the room temperature to be higher than those in the square condition ( $M = 17.00$ ,  $SE = 0.41$ ),  $F(1, 119) = 5.27$ ,  $p = .023$ ,  $\eta_p^2 = .04$ . A one-sample t-test was also conducted to examine differences between the actual temperature (20.5°C) and the estimated temperature, which indicated significant differences in the two conditions, the round condition:  $t(62) = 5.72$ ,  $p < .001$ , the square condition:  $t(57) = 8.12$ ,  $p < .001$ .

Finally, a statistical mediation analysis (Mackinnon, 2008) was conducted with eyeglass shape as the independent variable, room temperature as the dependent variable, and estimated perception of warmth or competence perception about themselves as the mediator to test for direct or indirect relationships between shape, warmth and competence perception, with physical temperature. This indicated that shape was significantly related to the temperature (warmth:  $\beta = -.22$ ,  $p = .039$ , competence:  $\beta = -.19$ ,  $p < .043$ ), whereas the perception of personality was not (warmth:  $\beta = -.04$ , *ns*, competence:  $\beta = -.11$ , *ns*).

## Discussion

The results confirmed the first hypothesis that the round shape increased perceptions of warmth and the square shape enhanced perceptions of competence. This finding corroborated previous research (Liu, Bogicevic, & Mattila, 2018; Okamura & Ura, 2018b) by reinforcing the association: round-warm, square-competent.

However, the second hypothesis that the perceived warmth of the personality would mediate the relationship between the round shapes and the estimate of physical warmth was not confirmed by this study. Therefore, it is suggested that the round shape is directly connected to physical warmth. This is the first study to demonstrate cross-modal correspondences between shapes and physical warmth. The mechanism that underlies the metaphor-consistent effects of round-warm and square-competent associations is incompletely understood to date. The two possible explanations are showed hereby. One is Pinna (2011)'s explanation that round shapes may be a signal of warmth because the shape of the sun is round. Namely, the round shape is present in nature such that it is metaphor-consistent with warmth. On the contrary, square shapes are a consequence of the way in which four segments fit together, according to Gestalt principles of grouping and organization. Namely, they are a human invention and purely the creation of the human mind. Such images of these shapes are assumed to be the origin of the metaphorical associations.

The other is that the association is embodied. CMT refers to how abstract concepts such as psychological warmth or competence are grounded in physical constructs such as shapes or temperature. When we are embraced by our parents in our early childhood and feel psychological warmth, we simultaneously feel physical warmth (Ijzerman & Semin, 2009). Thus, the association between physical and psychological warmth is based on the co-occurrence. It is possible that the association between roundness and physical warmth comes from the same parent-child experiences. For instance, being held by mothers brings some gentle and soft sensual experiences which are definitely closer to round shapes (e.g., breasts) than the square ones which can be dangerous with their sharp corners. Future research should shed light on this matter.

In conclusion, the results of the present study indicate that the round shape enhances the perception of warmth and the square shape increases the perception of competence. Moreover, the study demonstrates cross-modal correspondences between shapes and physical warmth.

## Future Directions

This study has certain limitations that should be investigated. First, the temperature was estimated to be higher in the round than in the square condition, although it was estimated to be lower than the actual temperature under both conditions, suggesting that the “anchoring effect” (Tversky & Kahneman, 1974) might have influenced the estimate. The anchoring effect is the phenomenon in which an individual's decision tends to be biased towards previously presented information (Li et al., 2017). It was not expected that the participants would be able to estimate the room temperature without any cues, and therefore, they were informed about the temperature of the room in the morning. However, this initial cue might have functioned as an anchor. Moreover, the study was conducted in a group. Therefore, the estimation of temperature might have been influenced by the surrounding environment, such as the degree of group cohesiveness. It is suggested that this study should be replicated in the future in a strictly controlled laboratory setting to overcome these limitations.

## Funding

The authors have no funding to report.

## Competing Interests

The authors have declared that no competing interests exist.

## Acknowledgments

The authors have no support to report.

## References

- Berlyne, D. E. (1960). *Conflict, arousal, and curiosity*. New York, NY, USA: McGraw-Hill.
- Berlyne, D. E. (1974). *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation*. Washington, DC, USA: Hemisphere.
- Blazhenkova, O., & Kumar, M. M. (2018). Angular versus curved shapes: Correspondences and emotional processing. *Perception*, 47(1), 67-89. <https://doi.org/10.1177/0301006617731048>
- Guéguen, N., & Jacob, C. (2014). Coffee cup color and evaluation of a beverage's "warmth quality". *Color Research and Application*, 39(1), 79-81. <https://doi.org/10.1002/col.21757>
- Hofstee, W. K., de Raad, B., & Goldberg, L. R. (1992). Integration of the Big Five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology*, 63(1), 146-163. <https://doi.org/10.1037/0022-3514.63.1.146>
- Honmoto, S., Yamamoto, Y., & Sugamura, G. (2014). [A theoretical review of embodied cognition research involving skin sensations.] *Kansai University Psychological Research*, 5, 29-38. Retrieved from <http://hdl.handle.net/10112/10461>
- Hu, T. Y., Li, J., Jia, H., & Xie, X. (2016). Helping others, warming yourself: Altruistic behaviors increase warmth feelings of the ambient environment. *Frontiers in Psychology*, 7, Article 1349. <https://doi.org/10.3389/fpsyg.2016.01349>
- Ijzerman, H., & Semin, G. R. (2009). The thermometer of social relations: Mapping social proximity on temperature. *Psychological Science*, 20(10), 1214-1220. <https://doi.org/10.1111/j.1467-9280.2009.02434.x>
- Jiang, Y., Gorn, G. J., Galli, M., & Chattopadhyay, A. (2016). Does your company have the right logo? How and why circular-and angular-logo shapes influence brand attribute judgments. *The Journal of Consumer Research*, 42(5), 709-726. <https://doi.org/10.1093/jcr/ucv049>
- Jostmann, N. B., Lakens, D., & Schubert, T. W. (2009). Weight as an embodiment of importance. *Psychological Science*, 20(9), 1169-1174. <https://doi.org/10.1111/j.1467-9280.2009.02426.x>
- Kövecses, Z. (2005). *Metaphor in culture: Universality and variation*. Cambridge, United Kingdom: Cambridge University Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL, USA: University of Chicago Press.
- Landau, M. J., Meier, B. P., & Keefer, L. A. (2010). A metaphor-enriched social cognition. *Psychological Bulletin*, 136(6), 1045-1067. <https://doi.org/10.1037/a0020970>

- Li, J., Yin, X., Li, D., Liu, X., Wang, G., & Qu, L. (2017). Controlling the anchoring effect through transcranial direct current stimulation (tDCS) to the right dorsolateral prefrontal cortex. *Frontiers in Psychology, 8*, Article 1079. <https://doi.org/10.3389/fpsyg.2017.01079>
- Liu, S. Q., Bogicevic, V., & Mattila, A. S. (2018). Circular vs. angular servicescape: "Shaping" customer response to a fast service encounter pace. *Journal of Business Research, 89*, 47-56. <https://doi.org/10.1016/j.jbusres.2018.04.007>
- Lundholm, H. (1921). The affective tone of lines: Experimental researches. *Psychological Review, 28*(1), 43-60. <https://doi.org/10.1037/h0072647>
- MacKinnon, D. P. (2008). *Introduction to statistical mediation analysis*. New York, NY, USA: Lawrence Erlbaum.
- Meier, B. P., & Robinson, M. D. (2004). Why the sunny side is up: Associations between affect and vertical position. *Psychological Science, 15*(4), 243-247. <https://doi.org/10.1111/j.0956-7976.2004.00659.x>
- Okamura, Y., & Ura, M. (2017). The effect of the shape of eyeglasses on judgements of personality. *The European Proceedings of Social & Behavioural Sciences, 32*, 111-116. <https://doi.org/10.15405/epsbs.2017.11.11>
- Okamura, Y., & Ura, M. (2018a). Shapes of faces and eyeglasses influence the judgement of facial impressions in a metaphor-consistent manner. *Current Psychology*. Advance online publication. <https://doi.org/10.1007/s12144-018-9931-6>
- Okamura, Y., & Ura, M. (2018b). Draw squares, and you will discover that many competent and rigorous people are around you: Shape priming influences impressions regarding the interpersonal environment. *Psychological Thought, 11*(2), 106-111. <https://doi.org/10.5964/psyc.v11i2.290>
- Pinna, B. (2011). What is the meaning of shape? *Gestalt Theory, 33*(3), 383-421.
- Shimizu, H. (2016). An introduction to the statistical free software HAD: Suggestions to improve teaching, learning and practice data analysis. *Journal of Media, Information and Communication, 1*, 59-73. Retrieved from <http://jmicweblab.org/ojs/index.php/jmic/article/view/6>
- Spence, C. (2011). Crossmodal correspondences: A tutorial review. *Attention, Perception & Psychophysics, 73*(4), 971-995. <https://doi.org/10.3758/s13414-010-0073-7>
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131. <https://doi.org/10.1126/science.185.4157.1124>
- Velasco, C., Woods, A. T., Marks, L. E., Cheok, A. D., & Spence, C. (2016). The semantic basis of taste-shape associations. *PeerJ, 4*, Article e1644. <https://doi.org/10.7717/peerj.1644>
- Williams, L. E., & Bargh, J. A. (2008). Experiencing physical warmth influences interpersonal warmth. *Science, 322*(5901), 606-607. <https://doi.org/10.1126/science.1162548>
- Zhang, Y., Feick, L., & Price, L. J. (2006). The impact of self-construal on aesthetic preference for angular versus rounded shapes. *Personality and Social Psychology Bulletin, 32*(6), 794-805. <https://doi.org/10.1177/0146167206286626>

## Appendices

### Appendix 1: The 16-Item Warmth-Competence Scale

#### *Warmth*

1. Am interested in people.
2. Make people feel at ease.
3. Know how to comfort others.
4. Inquire about others' well-being.
5. Take time out for others.
6. Make people feel welcome.
7. Show my gratitude.
8. Make others feel good.

#### *Competence*

1. Learn quickly.
2. Use my brain.
3. Excel in what I do.
4. Do things in a logical order.
5. Come straight to the point.
6. Seek explanations of things.
7. Need things explained only once.
8. Believe in a logical answer for everything.

### Appendix 2: Experimental Stimuli



Figure A1. Photographs of round and square eyeglasses used in the study.

## About the Authors

**Yasuto Okamura** is a doctoral student of the Graduate School of Psychology, Otemon Gakuin University, Japan. He is interested in metaphor and embodied cognition. He is also interested in the effects of eyeglasses on facial impressions.

**Mitsuhiro Ura** is a Professor of the Department of Psychology, Otemon Gakuin University, Japan. He researches social psychology and focuses on social exclusion and dark triad.