

Medical Students' Moral Concept of Cleanliness Metaphor and Its Impact on Moral Judgment

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Abstract

To explore the moral concept of moral purity metaphor and its impact on moral judgment in medical students through two experiments, in order to effectively reduce the cognitive bias caused by moral purity metaphor in medical students and provide effective methods. Experiment 1 used computer programming E-Prime 2.0 to design a process and explore the moral reaction time of medical students after the activation of clean images; Experiment 2 adopts a behavioral experiment to further explore the influence of the moral cleanliness metaphor on medical students' judgment of moral dilemma stories after its initiation, based on Experiment 1. The results of Experiment 1 indicate that there is a metaphorical representation of moral purity among medical students; The results of Experiment 2 indicate that after the hospital environment is cleaned up, medical students have a more rigorous judgment of moral dilemma stories. Therefore, we need to pay attention to the cognitive bias caused by the activation of clean metaphors in special student groups on moral judgments, in order to reduce the adverse effects of clean metaphors on the real doctor-patient relationship.

Keywords

Medical students, Moral concept, Clean metaphor, Moral judgment.

1. Introduction

Morality involves all aspects of people's lives, is the most commonly used code of conduct, and is also a topic that people constantly explore. The exploration of moral concepts has existed since ancient times, and since the emergence of metaphorical cognitive perspectives, there have been many new explorations into the understanding of abstract concepts such as moral concepts. Lakoff et al. extended metaphor from a linguistic perspective to a cognitive perspective based on a comprehensive analysis of language data, proposing the metaphorical cognitive viewpoint that people's conceptual systems are also based on the development of metaphor, opening the prelude to research in the field of metaphorical cognition [1]. The essence of metaphor is for individuals to construct and represent abstract and unfamiliar target domain concepts using concrete and familiar origin domain concepts generated by the interaction between the body and the environment [2]. The origin domain emphasizes concrete and perceptible cognitive domains, while the target domain is abstract and difficult to directly perceive cognitive domains. In short, metaphor emphasizes the interaction between individuals and the outside world, which helps people to understand abstract and generalized concepts from concrete and familiar feelings and connect them into metaphorical representations, which is beneficial for individuals' cognitive processing.

Based on the metaphorical cognitive perspective, researchers have proposed the embodied cognition theory [3], emphasizing that individual cognition is not only closely connected to the brain, but also to the human body and its environment. The human brain's perception originates from the body, and bodily perception interacts with the environment, forming a

cognitive system. Therefore, embodied cognition is a new research trend from the perspective of cognitive science psychology [4], and conceptual metaphor has developed on the basis of embodied cognition. Conceptual metaphor emphasizes the use of concrete source domain concepts to represent abstract target domain concepts [5-7]. Based on this, abstract moral understanding also requires the understanding of bodily experience, such as "up" being moral and "down" being immoral [6-7]; Black is associated with immorality, and white is associated with immorality [8-9]; The connection between fragrance and morality [10], the connection between odor and immorality, etc. However, existing research focuses on the connection between cleanliness and morality, such as language expression that is close to virtue. For example, research has found that after unethical behavior is initiated, people have a higher demand for clean items, resulting in the "Macbeth effect"; There are studies exploring the connection between cleanliness and morality from different experimental paradigms [11]; In addition, numerous studies have found that activating the clean metaphor can affect moral judgment [5-7]. However, some studies have found that there is controversy over the repeatability verification of the moral cleanliness metaphor, and the influence of individual differences among participants is significant [4]. For example, some studies have found that after copying moral or unethical content, students from two different majors have a higher desire for clean items, and the connection between engineering students is more significant, which may involve different majors' aversion sensitivity. Moreover, most of the existing research on moral conceptual metaphors is based on laboratory environments, lacking exploration of ecological validity in real-life situations, and has little significance for promoting real-life situations.

Based on this, explore the representation of the moral concept of cleanliness metaphor among medical students who are more sensitive to clean environments. And in a more authentic and effective hospital clean environment with higher levels of involvement and familiarity, the impact of medical students' clean metaphor on moral judgment, as well as providing effective operations to reduce medical students' moral cognitive biases.

2. Experiment 1: Representation of Medical Students' Moral Concepts and Clean Metaphors

Experiment 1 explores the connection between medical students' concepts of cleanliness and morality, that is, after the activation of clean images, medical students judge moral words faster than neutral words.

2.1. Participants

44 medical students were randomly selected from a certain medical college, including 23 males and 21 females, with an average age of (19.55 ± 0.66) years.

2.2. Experimental Materials

Clean image startup type: Select existing research on natural environment clean images [5], select 15 images, including common clean images of natural environments. The clean environment pictures of the hospital were taken from the internet, and 30 medical students were asked to evaluate the cleanliness and familiarity of 15 hospital pictures. A 9-point rating was given, with 1 being very dirty and 9 being very clean. The average score for the cleanliness of real pictures was 8.32 ± 0.97 significantly higher than 5, $t(29)=18.73$, $p<0.01$; familiarity with images scored 9 points, with 1 indicating complete unfamiliarity and 9 indicating complete familiarity with the design. The score for the cleanliness of real images (7.08 ± 1.92) was significantly higher than 5, with $t(29)=5.95$, $p<0.01$; indicating that hospital clean environment images not only make students familiar and immersive, but also provide a clean experience for medical students, which can be used as experimental materials.

Vocabulary type: Extracting 20 moral words from previous studies [12]; Neutral words were also selected from 20 existing studies, including 'end' and 'slow'.

2.3. Experimental Design and Procedure

2 (Image type: natural clean images, hospital clean images) $\times$ 2 (Vocabulary type: moral words, neutral words) Two factor mixed design, with image type as inter subject variable and vocabulary type as intra subject variable. The reaction time of vocabulary classification judgment is the dependent variable.

Using E-Prime 2.0 design process, randomly divide medical students into two groups, pay attention to the fixation point "+" on the screen for 500ms, randomly display clean images for 3000ms, and then quickly classify the words that appear. Press the "F" key for moral words and the "J" key for neutral words. Then an empty screen appears for 500ms, entering the next trial. Medical students are limited to 3000ms for vocabulary judgment, resulting in incorrect judgments beyond the time mark. Considering the speed and accuracy of medical students, the flowchart is as follows:

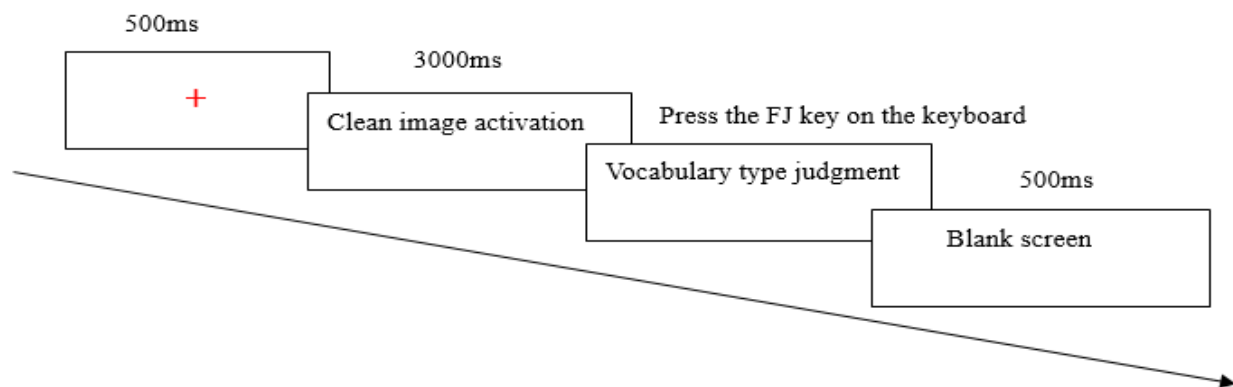


Figure 1. Flowchart of Experiment 1

2.4. The results of Experiment 1

The judgment reaction time of 44 medical students was entered into SPSS 21.0 for processing, and the specific results are shown in Table 1.

Table 1. Reaction time for vocabulary classification judgment ($M \pm SD$) (ms)

Image startup type	Vocabulary Type	
	Moral Words	Neutral vocabulary
Clean hospital environment startup	695.034 $\pm$ 80.790	764.970 $\pm$ 84.733
Clean start of natural environment	775.840 $\pm$ 115.231	806.910 $\pm$ 119.512

Using the reaction time of medical students as the dependent variable, conduct a mixed design analysis of variance with 2 (image type: natural environment clean group vs hospital environment clean group) $\times$ 2 (vocabulary type: moral words vs neutral words). The results showed that the main effect of image type was significant, with $F(1, 42)=4.34$, $p<0.05$, $\eta^2=0.09$. The reaction time of medical students to vocabulary classification under hospital cleanliness is significantly faster than that under natural cleanliness; The main effect of vocabulary type is significant, with $F(1, 42)=45.39$, $p<0.01$, $\eta^2=0.52$. There is a significant difference in the

reaction time of medical students in judging vocabulary types; The interaction between image types and vocabulary types is significant, with $F(1, 42)=6.72$, $p<0.05$, $\eta^2=0.14$. The simple effects test showed that after hospital cleaning, participants' reactions to moral words were significantly faster than neutral word judgments, with $F(1,42) =45.59$, $p<0.01$; after natural cleaning, participants' reactions to moral words were faster than neutral word judgments, with $F(1,42)=8.22$, $p<0.05$.

2.5. Discussion on Experiment 1

The results of Experiment 1 indicate that medical students' judgment of moral words is significantly faster than that of neutral words, whether it is the start of hospital clean environment or natural environment clean environment. The results indicate the existence of metaphorical representation of moral concept cleanliness. Moreover, compared to the natural clean environment start-up, medical students' judgment of moral word reactions is more significant under the hospital environment clean start-up, indicating that in certain hospital work scenarios, medical students' moral cleanliness metaphorical associations are more significant. This also supports previous research that found that students in professional and technical fields have different levels of aversion sensitivity. Based on previous research findings, the concept of clean activation of morality: the consistency effect of metaphor emphasizes that clean activation of moral representation, individual metaphors tend towards moral direction, making moral connections tight and reaction time faster; Secondly, in previous daily expressions, people have become accustomed to linking cleanliness with morality, and in terms of consciousness, they tend to associate the two, following previous research. Furthermore, religion regards cleanliness as a tool for purifying morality, while Christianity emphasizes "baptism" and Buddhism emphasizes the connection between cleanliness and morality at a deeper level of consciousness.

3. Experiment 2: The Influence of Moral Concept Cleanliness Metaphor on Moral Judgment

3.1. Experimental objectives and hypotheses

Experiment 2 explores the impact of moral concept cleanliness metaphor on moral judgment, assuming that medical students' moral judgment becomes stricter after the moral cleanliness metaphor is activated.

3.2. Participants

Randomly select another 46 college students (25 males and 21 females) who did not participate in Experiment 1, with an average age of 21.61 years ($SD=0649$). Participants were selected from Experiment 1.

3.3. Experimental Materials

Picture of hospital clean environment: same as Experiment 1.

Moral dilemma stories: Select 6 moral dilemma stories from existing research [13]. The selection of materials was revised and adapted based on previous experimental materials, and the word count was controlled in advance.

3.4. Experimental Design and Procedure

The experiment used a single sample t-test, with the independent variable being the subjects who initiated the clean environment in the hospital, and the dependent variable being the rating score of the moral dilemma story.

Firstly, inform the medical students to conduct recall and judgment together after the experiment, and ask the participants to present 15 pictures (pictures of clean hospital

environment) in memory before having a recognition task. In fact, there was no task recognition, only the participants were asked to pay attention to the pictures. Following that, six moral dilemma stories were judged with a 9-point rating, where 1=very unethical and 9=very ethical.

3.5. Experiment 2 Results and Analysis

The single sample t-test showed that the participants' ratings of moral dilemma stories were significantly lower than 5, $t(1,45)=-5.28$, $p<0.01$ (5 means that hospital cleanliness start-up had no significant impact on moral judgment). This indicates that medical students' moral evaluations tend to lean towards the moral side after the hospital environment cleanliness start-up, meaning that moral judgments are more stringent.

3.6. Discussion on Experiment 2

The results of Experiment 2 found that after the hospital's clean environment was activated, medical students' moral judgments shifted more towards the moral side, and their moral judgments became more stringent. This indicates that in a clean hospital environment, the metaphor of clean ethics can affect the moral judgment of medical students and cause certain cognitive biases. Therefore, in a clean hospital environment, medical students will have higher moral standards, making it more difficult for them to perceive the pain and difficulties of patients, and unable to demonstrate humanistic care for them. This will lead to moral deviations and exacerbate the tension in doctor-patient relationships.

4. Conclusion

The metaphorical connection between clean start and moral concepts is influenced by numerous factors, among which individual differences are also important influencing factors [4]. Previous research has focused on the college student population, but lacks research on special group objects, especially medical students who are more sensitive to cleanliness. Therefore, this study explores the medical student population with stricter environmental cleanliness requirements. For the medical student population, hospitals have a higher sensitivity to cleanliness, which leads to a higher lower limit of cleanliness and increased familiarity with cleanliness. They are more likely to be associated with moral concepts after cleanliness is initiated. Based on this, exploring the special group of medical students is not only an in-depth exploration of the influencing factors of past moral cleanliness metaphors, but also has important guiding significance for reality, making medical schools pay more attention to the role of environmental sanitation construction in their own classrooms and internship classrooms.

Previous studies have mostly relied on laboratory environments for clean start, with little attention paid to real-life scenarios with high ecological validity. For example, some studies have explored [13], that people can stimulate environmentally friendly travel consumption by strengthening their own cleanliness. The experiment has expanded the practical application of embodied metaphors, providing practical guidance for the promotion of green and environmentally friendly lifestyles. Therefore, based on the previous natural clean environment start-up, this study also explores the impact of clean start-up on medical students' involvement in hospital environments. The results of Experiment 1 show that whether it is hospital clean environment or natural environment clean start-up, medical students' judgment of moral words is significantly faster than neutral words. When the metaphorical representation of medical students' cleanliness and moral concepts is consistent, and after the hospital environment clean start-up, medical students' reaction to moral words is more significant than that of natural environment clean start-up. This indicates that the metaphorical connection of medical students' moral cleanliness is more significant and stronger in hospital work scenarios with higher involvement. Not only did it further explore the impact of the

degree of involvement in clean initiation on the moral cleanliness metaphor, but it also expanded the moral concept of cleanliness metaphor to more realistic ecological contexts, extending the guiding application of moral concept metaphor to reality.

Previous studies have shown that compared to other moral materials, metaphors have a more significant impact on moral dilemma judgments [5] [14]. Therefore, this study adopts a moral dilemma story. Experiment 2 found that after the clean environment was activated, medical students' judgment of moral dilemmas became more stringent, consistent with previous studies [15] [16]. This result has important reference significance for practical medical work. A clean hospital environment will automatically stimulate medical students and doctors' moral concepts and clean metaphors, thereby affecting cognitive biases in patients' moral judgments. Especially when facing moral dilemmas, such as economically disadvantaged patients hoping for hospital fee reductions, medical students or doctors' moral judgments will be more stringent, making it difficult to empathize with patients' difficulties, and even becoming more indifferent, resulting in a series of adverse doctor-patient relationships, and even affecting treatment options and treatment effectiveness. Therefore, the negative effects brought by the clean metaphor need to be taken seriously by medical colleges and hospitals, and breaking the cognitive bias of moral concepts and clean metaphors on moral judgments is the demand and direction for the practical promotion of moral metaphors in the next stage.

References

- [1] Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*[M]. London: University of Chicago Press.
- [2] Barsalou, L. W. (2008). Grounded cognition[J]. *Annual Review of Psychology*, 59(1), 617-645.
- [3] Ye Haosheng, Su Jiajia, Su Dequan. (2021). The Meaning of the Body: Emotional Theory from the Perspective of Generative Theory. *Journal of Psychology*, 53 (12), 1293-1404
- [4] Xu Ziyang, Su Jiajia, Ye Haosheng The Bidirectionality and Problems of the Mapping Mechanism of Embodied Moral Metaphors: Reflections on the "Repeatability Crisis" Based on the Embodied Effect [J] *Psychological Exploration*, 2022, 42 (05): 387-394
- [5] Ding Fengqin, Sun Yishu, Zhao Huiying The Bias of Metaphorical Mapping of Moral Concepts in Cleanliness [J] *Psychological Development and Education*, 2022, 38 (03): 315-322 DOI:10.16187/j.cnki.issn1001-4918.2022.03.02.
- [6] Lu Zhongyi The Psychological Height of Morality: An Embodied Cognitive Study of the Vertical Spatial Metaphor of Moral Concepts [J] *Journal of Soochow University (Education Science Edition)*, 2021, 9 (04): 57-63 DOI:10.19563/j.cnki.sdj.2021.04.007.
- [7] Wang Congxing, Ma Jianping, Deng Jue, etc The depth of conceptual processing affects the level and orientation of moral concepts through metaphorical connections *Journal of Psychology*, 2020, 52 (04): 426-439
- [8] Zhang Jijia, Long Lujiao, Wang Ting, etc The Influence of Color Culture Differences on Moral Metaphorical Representation and Behavioral Choice in Black and White [J] *Guangxi Ethnic Studies*, 2021, (02): 70-81
- [9] Gong Mingjie, Zhou Jun, Gan Tian, etc The Influence of Color Background on Moral Judgment [J] *Applied Psychology*, 2021, 27 (02): 103-110
- [10] Ding Fengqin, Sun Yishu The characteristics, influencing factors, and future prospects of moral concept purification metaphor from the perspective of embodiment [J] *Psychological Science*, 2020, 43 (06): 1327-1332 DOI:10.16719/j.cnki.1671-6981.20200607.
- [11] Li Zhurong The psychological reality of the moral concept of purification metaphor [J] *Psychology Monthly*, 2020, 15 (04): 45+47 DOI:10.19738/j.cnki.psy.2020.04.023.

- [12] Ding Fengqin, Wang Ximei, Liu Zhao (2017). The metaphor of moral concept purification and its impact on moral concepts [J] *Psychological Development and Education*, 33 (6), 666-674
- [13] Cui, G. , Errmann, A. , Kim, J. , Seo, Y. , Xu, Y. Z. , & Zhao, F. (2019). Moral effects of physical cleansing and pro—envi ronmental hotel choices[J]. *Journal of Travel Research*, (1), 1-14.
- [14] Zhang Fenghua, Ye Hongyan (2016). The effect of "washing out": an analysis of the influencing factors on the different directions of moral judgment caused by the initiation of cleanliness [J]. *Psychological Science*, 39 (5), 1236-1241.
- [15] Zhong, C. B., Strejcek, B., & Sivanathan, N. (2010). A clean self can render harsh moral judgment[J]. *Journal of Experimental Social Psychology*, 46(5), 859– 862.
- [16] Huangfu, G. , Lv, F. , Sheng, C. , & Shi, X. (2017). Effect of workplace environment cleanliness on judgment of counterproductive work behavior[J]. *Social Behavior and Personality: An International Journal*, 45(4), 599-604.