

The Consistency Between Vertical Gestures and Emotional Valence has an Impact on the Vocabulary Learning of Dutch in Chinese Native Speakers

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Abstract. Research on embodied cognition indicates that spatially congruent actions help in the acquisition of vocabulary knowledge, but it is unknown whether it is enough to use just a minimal pointing gesture to make one activate metaphorical mapping between vertical space and emotion valence. In the present study, we offer an experiment that aims to investigate the effect of gesture–valence congruency on the learning of Dutch vocabulary words for native Chinese speakers. Participants will have to learn sixteen new Dutch nouns that are associated with positive or negative valence Chinese words. They will be divided into three groups based on the congruency of the pointing gesture used (metaphorically congruent, metaphorically incongruent, or control condition). The measure of success will be recognition accuracy of the learned words. It is hypothesized that there will be maximum recognition accuracy in the congruent group, medium accuracy in the control group, and minimum accuracy in the incongruent group. Thus, the proposed study is the continuation of previous works in the field of embodied metaphors.

Keywords: embodied cognition, conceptual metaphor, gesture–valence congruency, vertical pointing gestures, L2 vocabulary learning

1. Introduction

1.1. Overview

According to the card-placing experiment [1], congruent or discongruent-metaphor gesture respectively have a positive or no impact on the learning of a second language. The proposed study will use pointing gestures instead of placing movements to provide a further and more convenient way to second language acquisition.

1.2. Specific aims

- (1). To check whether metaphorical congruency between the direction of a simple vertical pointing action and the emotional valence of a word affects L2 vocabulary learning.
- (2). To test whether simple directional pointing can substitute for the physical displacement of learning materials in engaging the space–valence relationship during word learning.

1.3. Background

There is a systematic connection between the positive and negative meanings and vertical space: positive meanings are usually associated with the upper part, and negative – with the lower. The concept metaphor theory explains the phenomenon due to directional metaphors such as "good is up" and "happiness is up". According to this theory, the abstract emotional valence is constructed on the basis of the regular bodily and spatial experience [2]. The behavioral research on this topic is also consistent with this approach: if the emotionally charged words are presented vertically corresponding to their meanings, processing of such words would be more efficient; simultaneously, vertical actions corresponding to emotional valence can help to retrieve memories of the same valence [3, 4]. Similar consistency effects are also shown in research of Chinese emotional words. Recently, there was a study that showed that compared to the horizontal one, the connection between emotions and vertical space is stronger [5, 6]. Thus, vertical actions can serve as a meaningful cue in encoding positive and negative meanings.

Gestures are one of the possible ways in which such a connection might influence vocabulary acquisition. By connecting the word and its meanings via gestures, the learner creates additional visual and motoric cues for embodied retrieval of the meanings rather than purely verbal-based ones [7]. Indeed, the use of gestures corresponding to the meanings of words during second language acquisition usually helps to remember the words better than the words without gestures [8]. In their research, Huang et al. [9] found that gestures helped L2 vocabulary acquisition when they were sufficiently distinct and the number of words to be learned was limited. The results of these experiments suggest that gestures are not required to visually represent the meaning of the object or word. What is important is that learners should create stable connection between actions and their meanings in order for gestures to help in vocabulary acquisition.

Not all gestures, however, lead to the same degree of learning effectiveness. According to García-Gómez et al. [10], gestures consistent with the meaning of words may be helpful in foreign languages' vocabulary recognition accuracy, while meaningless gestures and inconsistent gestures hinder effective learning. Gestures also provide long-term memory benefits in children's L2 vocabulary learning of both concrete and abstract words [11]. Recent meta-analysis shows that observing gestures can be as effective as performing them for L2 vocabulary learning, even though the estimated effects vary significantly across studies [12]. Thus, it can be concluded that what is crucial about gestures is not whether the learner performs the action but whether the action is consistent with the meaning being learned. This fact will be important for this research because pointing gestures are not iconic gestures that represent the meanings of the words. Their meaning depends on the metaphorical connection between vertical space and emotions' valence.

Casasanto and de Bruin [1] conducted a study to test the hypothesis that this metaphor could affect the learning of new vocabulary. The native Dutch speakers who participated in the experiment had to learn meaningless words with positive or negative meanings and place the word cards on the upper or lower shelves. As a result, when the placement direction was consistent with the metaphor (positive words on the upper shelf and negative words on the lower one), the performance of the

participants in memorizing was better, and when it was inconsistent, their memory performance was lower compared to the baseline condition when all the cards were left lying on the table. Simply saying the Dutch words "up" and "down" without performing the corresponding actions also did not have the same effect. Researchers suppose that actions which were consistent with the valence of the word could activate the matching spatial schema and enrich the semantic encoding, while inconsistent actions could introduce conflict to the encoding process. The study demonstrates that even when actions are not directly expressing the literal meaning of the words, clear spatial actions could still influence vocabulary learning.

This interpretation clearly connects the theory of embodied metaphor and gesture-based vocabulary learning. When the vertical direction of the gesture activates the emotional valence schema, similar to the meaning of the word, the action provides an additional retrieval path for the word, consistent with its meaning. When the direction of the gesture conflicts with the meaning of the word, it competes with the language meaning and interferes with encoding. With this "promotion-interference" logic, this study has to set up a baseline condition, which is the flat gesture. With the help of this baseline condition, it is possible to separate the effect of promotion, which consistent gestures bring, and interference, which inconsistent gestures provide. Hence, the aim of this study shifts from a general question, "Can body movements generally improve memory?", to a more specific one: "Does a simple directional gesture have enough metaphorical meaning to affect second language vocabulary learning?"

Currently, this question is not answered because the original experiment by Casasanto and de Bruin [1] included several factors other than gestures. Moving and categorizing cards involved a large-scale movement of the arm, changing the position of the object and its visible final position. All these actions could be potential factors that influence memory. Also, the participants of this study were native Dutch speakers and were learning meaningless words. Recent research proved that pointing gestures do not necessarily facilitate learning. Janjić et al. [13] found that observing an instructor's pointing gestures and gaze did not improve L2 vocabulary learning in adults. However, the pointing cues in this study were static, were performed by the teachers, and mainly served to direct the learner's attention to some particular object. Therefore, it is not yet clear whether such gestures could affect the word encoding process when learners themselves perform the dynamic upward or downward pointing gestures and the direction of the movement is consistent with the metaphorical emotional valence of the word.

The current study is designed to fill this gap by having native Chinese speakers learn real and previously unfamiliar Dutch nouns. Each Dutch word is paired with its Chinese meaning. Participants will be divided into three groups: metaphorically consistent pointing, metaphorically inconsistent pointing and flat gesture baseline group. In all three groups, the language materials will stay on the screen at the same position. The learning effect will be measured by conducting the immediate Dutch-Chinese meaning recognition test. If the accuracy rate in the metaphorically consistent condition is higher than in the baseline condition, and in the inconsistent condition is lower than in the baseline condition, this means that simple, autonomous pointing gestures are enough to activate the vertical space-emotional valence mapping. Otherwise, if there will be no difference among the three conditions, it will prove that simple pointing may not be enough to affect learning and learning effect may need more complicated components of action, such as moving the object to a particular spatial position.

Research Question: To what extent does the congruency between vertical pointing gestures and emotional valence influence immediate L2 vocabulary learning among Chinese learners of Dutch?

Sub-question 1: Do metaphor-congruent gestures (upward for positive words and downward for negative words) improve vocabulary recognition accuracy compared with a no-gesture baseline condition?

Sub-question 2: Do metaphor-incongruent gestures (downward for positive words and upward for negative words) impair vocabulary recognition accuracy compared with the baseline condition?

2. Hypothesis

The hypothesis is that the congruency between motor direction and emotional valence facilitates the encoding of L2 vocabulary by simulating the embodied space, such as valence associations. When facing discongruency, it will give no impact or even be negative on L2 acquisition. If a simple pointing gesture is sufficient to activate the relevant spatio-motor representation, then the metaphor-congruity effect will emerge even without physically moving the learning material.

3. Methods

We adopted the paradigm established by Casasanto and de Bruin [1], with Dutch words and Chinese words serving as control stimuli. We will select sixteen Dutch nouns, half of which carried positive valence and the other half negative valence. We will use the vocabulary corresponding to their Chinese translations. Candidate items will be screened for Dutch word frequency using SUBTLEX-NL [14] and for emotional valence using Dutch word norms [15]. All participants were native-Chinese-speaking adults.

The experiment consisted of two phases: a learning phase and a test phase. In the initial learning block, participants learned the definitions of eight Dutch words, followed by an item recognition accuracy memory test. This learn-test procedure was then repeated for another set of eight Dutch words, with stimuli counterbalanced across blocks.

Within each block, half of the Dutch words were paired with positively valenced Chinese definitions, and the other half with negatively valenced definitions. At the start of the learning phase, all participants were instructed that they would be learning vocabulary from Dutch, each carrying distinctly positive or negative connotations. Unlike previous experimental designs, we incorporated deictic gestures (Deictic pointing gestures are spatial-directing pointing movements, here used to instantiate abstract conceptual metaphors) to prime conceptual metaphors. Each flashcard was presented for six seconds; distinct from previous experimental paradigms, upon its appearance, participants were required to perform an upward-pointing or downward-pointing gesture corresponding to the positive or negative valence of its associated definition.

Participants would be randomly allocated evenly across three experimental groups: the metaphor-congruent condition, where participants pointed upward for positive words and downward for negative words; the metaphor-incongruent condition, where participants pointed downward for positive words and upward for negative words; and the baseline condition, in which the gestural movements were flat gestures to rule out general motor-response influences arising from vertical arm-motion itself.

The test began immediately after the learning phase. On each trial, a Dutch word appeared at the centre of the screen for six seconds. Two previously learned Chinese words, the target and a distractor, were then shown on the left and right, with their positions counterbalanced across participants. Each Chinese word served once as the target and once as a distractor. The target and distractor had the same emotional valence in half of the pairs and different valences in the remaining half. This procedure followed the method used by Casasanto and de Bruin [1].

4. Prediction

Based on Casasanto and de Bruin's [1] findings, we expect recognition accuracy to be significantly higher than the baseline in the metaphor-congruent condition and significantly lower in the incongruent condition.

Figure 1 shows the predicted pattern, with baseline accuracy falling between the two pointing conditions. Such a result shows that pointing in a direction that matches a word's emotional valence can help learners encode the vocabulary. A mismatch between gesture and valence, however, may interfere with this process.

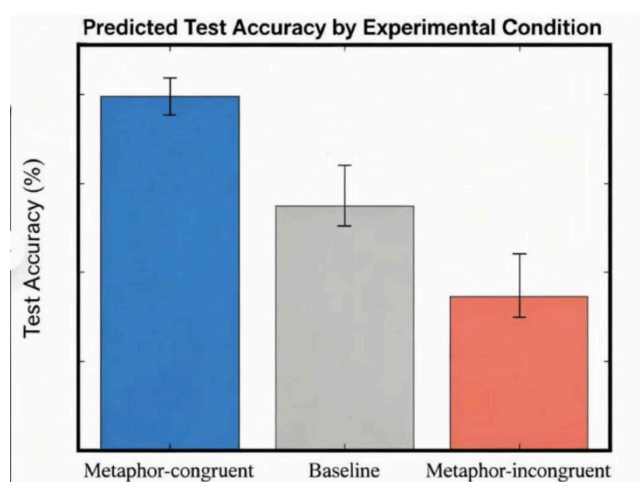


Figure 1. Schematic representation of the predicted immediate vocabulary recognition accuracy across the three experimental conditions

Figure 2 illustrates the alternative pattern expected if vertical pointing gestures do not influence vocabulary learning. Similar recognition accuracy across the three conditions would indicate that simple pointing is insufficient to activate the space–valence association during vocabulary encoding.

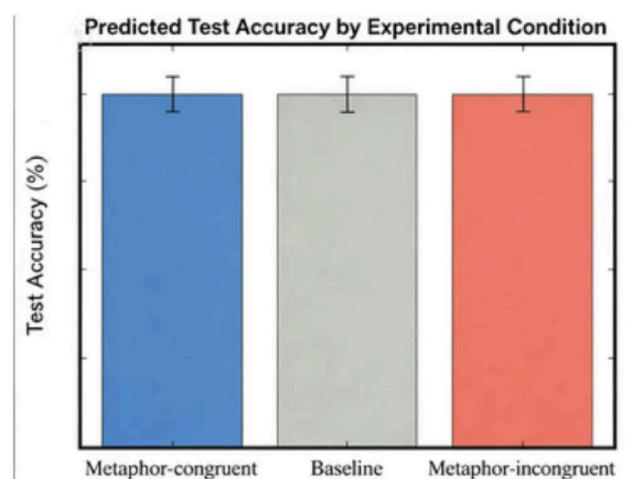


Figure 2. Predicted immediate vocabulary recognition accuracy under the null hypothesis across the three experimental conditions

5. Discussion

If the metaphor-congruent group achieves higher recognition accuracy than the incongruent group, pointing alone may just be enough to engage the GOOD-IS-UP/BAD-IS-DOWN mapping during L2 acquisition. The cards remain in place, allowing the study to extend Casasanto and de Bruin's [1] work to a gesture that does not involve moving the learning materials. The baseline comparison would help clarify what accounts for the difference between these groups. With congruent pointing producing accuracy above baseline and incongruent pointing falling below it, the pattern would suggest that matching gestures do help learning, while mismatched gestures introduce some interference.

The theoretical interest lies in how pointing relates to meaning. Whereas an iconic gesture depicts some aspect of a word's meaning, upward or downward pointing draws on a metaphorical association between space and emotional valence. Evidence that this association affects recognition would connect embodied metaphor research with work on gesture-supported L2 vocabulary learning. Simple directional gestures might also be useful for teaching emotionally valenced words, although their classroom value would need further testing beyond the small stimulus set and laboratory setting used here.

A lack of significant difference between the two gesture groups would require a different interpretation. It would not, by itself, undermine the GOOD-IS-UP/BAD-IS-DOWN metaphor, but could suggest that pointing alone is insufficient to influence learning in this task. Casasanto and de Bruin's [1] procedure involved reaching to move a card, with kinesthetic feedback accompanying a change in the object's location. Some of these features may be important for the learning effect. A null result could therefore help clarify the conditions under which the metaphor influences vocabulary learning.

A follow-up study could compare congruent and incongruent pointing with congruent card placement, using flat gestures as the baseline condition. If only card placement improves learning, physically moving the cards or receiving richer motor feedback may be necessary for the effect. Similar benefits from the two congruent conditions would suggest that movement direction itself may explain the improvement. This design would help clarify whether relocating the learning materials contributes to learning beyond what a directional gesture can achieve.

Since the recognition is tested immediately after learning, an advantage for congruent pointing tells us little about how long the benefit lasts. Testing participants a day or a week later would help determine how it persists. The findings would also be limited to emotionally valenced nouns; in fact, the same pattern cannot be assumed for neutral vocabulary. Future studies could keep on comparing these word types and explore whether movements other than pointing influence learning.

The proposed study thus asks whether a minimal directional gesture is enough to engage an embodied space–valence metaphor during word learning. Both the predicted pattern and a null result could help identify which aspects of action matter for metaphor-based learning, providing a basis for further work on the relationship between conceptual metaphor and language acquisition.

6. Conclusion

To conclude, the current paper offers an experimental study to test the hypothesis concerning the influence of the relation between vertical gestural pointing and emotional valence of words on L2 vocabulary acquisition of Dutch by native Chinese learners. The experimental design controls for the influence of the movement of word cards, allowing the differentiation between the role of gesture orientation and physical movements. The expected result is that the congruent condition will

show higher recognition accuracy in comparison with the incongruent condition and baseline. If there is no difference between groups, the results will prove that richer sensorimotor information is needed. In this way, the current paper establishes some boundary conditions of embodied metaphor effects, providing a ground for further research into delayed retention, neutral words, and use of gestures in classrooms.

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