How Are New Metaphors Created? Evidence From Chinese English Learners

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Abstract
For years, Conceptual Metaphor Theory has been a cornerstone in metaphor research. However, recent findings in psycholinguistics and neurocognitive science reveal that the creation of novel metaphors is more complex than previously understood. This study conducted a metaphor completion experiment with 60 Chinese university students to examine their metaphor production capabilities. We built a metaphorical corpus containing 170,000 words produced by native English speakers and utilized MIP (VU) and Wmatrix for comparative analysis. The findings are as follows: (1) Second language learners' metaphor production is primarily influenced by cognitive patterns rather than linguistic proficiency, leading to distinct differences in semantic categories and source domains compared to native speakers; (2) The novelty of metaphors is inversely correlated with second language learners' mastery of basic semantics, suggesting that novelty alone is an insufficient criterion for assessing metaphor quality; (3) Contrary to previous research, mental metaphors exhibit a bidirectional mapping process. Additionally, second language learners demonstrate both conceptual and grammatical asymmetry within a hierarchical metaphor network, even while being influenced by mother tongue transfer. These findings challenge traditional evaluation standards in language teaching and emphasize the need for refined criteria to assess metaphor quality, which could enhance metaphor recognition and creation in machine learning and AI language models. Furthermore, exploring the cognitive mechanisms and interlanguage differences in metaphor creation can improve concept teaching and facilitate cross-cultural metaphorical communication.

Keywords: Novel Metaphor, Metaphor Production, Second Language Acquisition, Mental Metaphor

Introduction

Metaphors are essential in both everyday communication and cognitive processing, as they allow individuals to conceptualize abstract ideas through familiar experiences. Since the introduction of Conceptual Metaphor Theory (Lakoff & Johnson, 1980), metaphor has been recognized not only as a linguistic phenomenon but also as a reflection of deeper cognitive structures. While metaphor comprehension has been widely studied, the production of metaphors, especially by second language (L2) learners, remains less explored. This study investigates how Chinese English learners generate metaphors, particularly focusing on their ability to produce novel metaphors. The study aims to identify the cognitive and linguistic processes involved in metaphor creation in L2 contexts, shedding light on how learners navigate the challenges of cross-cultural communication.

Literature Review

Metaphor production in L2 contexts involves complex cognitive and linguistic processes that go beyond mere language proficiency. Lakoff and Johnson's (1980) Conceptual Metaphor Theory argues that metaphors are formed through mappings between a source domain (a concrete concept) and a target domain (an abstract concept), helping individuals understand abstract ideas through more familiar experiences. However, L2 learners often face challenges in producing culturally appropriate metaphors due to metaphorical transfer from their native language (Littlemore, 2010). This phenomenon can result in metaphors that are semantically or culturally incongruent with those of native speakers, reflecting the learners' reliance on their first language's conceptual structures.

Research indicates that metaphor production is influenced by cognitive patterns shaped by cultural experience. While L2 learners may have the linguistic tools to generate metaphors, their cultural and cognitive backgrounds play a significant role in the process (Casasanto & Bottini, 2014). For instance, novel metaphors—those that break away from conventional mappings—require more than just language proficiency; they demand a deep understanding of both linguistic and cultural nuances in the target language. Studies show that L2 learners often demonstrate asymmetries in their conceptual and grammatical structures when creating metaphors, suggesting that the production of metaphors reflects not only linguistic transfer but also cognitive constraints.

Metaphors are crucial in cross-cultural communication, as they reveal how different cultures conceptualize the world. While certain metaphors, like "TIME IS MONEY," may be common in English, L2 learners may face difficulties producing similar metaphors due to differences in cultural and cognitive frameworks (Kövecses, 2005). Success in metaphor production depends on the learners' ability to align their output with the target culture's metaphorical system, making metaphor competence both a linguistic and cultural skill. While much research has focused on metaphor comprehension, there is still limited understanding of how L2 learners create metaphors, particularly novel ones. This study aims to address this gap by examining the cognitive and cultural factors that influence metaphor production in Chinese English learners.

Methodology

Participants

The study involved 60 first-year English majors from Nanjing University of Aeronautics and Astronautics. All participants were native Chinese speakers learning English as their second language (L2). They were selected through random sampling to ensure representativeness and consistency in their language proficiency, with the group being at a similar intermediate level of English competence. Participants were briefed on the purpose of the experiment and signed consent forms prior to taking part. The participants' linguistic backgrounds were carefully screened to ensure that they had similar exposure to English instruction, thereby controlling for potential external variables that could affect their metaphor production.

Materials and Stimuli

The primary experimental task involved a metaphor completion test, specifically designed to elicit novel metaphor production from the participants. A total of 16 metaphor prompts were used, each designed to stimulate creative metaphor generation by leaving key portions of sentences incomplete for the participants to fill. These prompts included everyday and abstract concepts such as "tree," "money," "fear," "sea," and "death," which have been shown in previous research to generate high metaphor output among L2 learners. Each prompt was carefully selected and reviewed for clarity and suitability for the language proficiency level of the participants.

Prior to the main experiment, two rounds of pilot testing were conducted with 40 students who were not part of the final experiment. This pilot phase allowed for the adjustment of prompt difficulty and ensured the reliability of the test items in stimulating metaphorical thinking.

Procedure

The experiment was conducted in a controlled classroom environment to minimize external distractions. Each participant was provided with a printed booklet containing the metaphor completion tasks. Instructions were given orally and in writing, emphasizing that the participants should complete the sentences with creative, meaningful metaphors. Participants were encouraged to use their imagination but were cautioned to avoid literal translations from Chinese.

Each participant was given 60 minutes to complete the 16 prompts. The order of the prompts was randomized across the booklets to avoid sequence effects that might influence participants' responses. Throughout the process, participants worked independently under supervision to ensure that the data reflected their own individual thinking.

Data Collection and Analysis

Following the experiment, all responses were collected and digitized. The metaphorical expressions generated by participants were analyzed using two key tools: the MIP(VU) and Wmatrix. MIP(VU), developed by the Pragglejaz Group (2007) and Steen et al. (2010), was used to identify and categorize the metaphors in each participant's response based on their basic and contextual meanings. Wmatrix, a corpus analysis tool, was employed to conduct

semantic tagging and frequency analysis across the data sets, comparing the L2 learners' metaphorical output to established metaphorical norms in native English speakers.

To establish a baseline for comparison, a metaphorical corpus containing over 170,000 words produced by native English speakers was constructed using online texts. This corpus allowed for a direct comparison between the metaphors produced by L2 learners and those commonly used by native speakers in similar contexts.

The analysis focused on three key areas: the novelty of metaphors, source domain selection, and the appropriateness of metaphor use in context. Novel metaphors were identified based on their deviation from conventional metaphorical expressions, with particular attention paid to metaphors that demonstrated creativity but may have lacked cultural or linguistic appropriateness in English.

Discussion

Judgment of Novel Metaphor

The identification of novel metaphors is a key aspect of this study. Based on previous research, this study defines novel metaphors according to the following criteria:

a) Absolute Novelty: A metaphor is considered absolutely novel if its metaphorical meaning is not recorded in authoritative dictionaries of the target language and has not yet been established as a conventional metaphor through long-term use.
b) Relative Novelty: A metaphor is considered relatively novel if its metaphorical meaning is infrequently used within the target language community and lacks widespread recognition.

If a metaphor meets either of these criteria, it is classified as a novel metaphor. The specific evaluation can be referenced in Table 1.

Table 1: Criteria for Determining Absolute and Relative Novel Metaphors

	Absolute Novelty	**Relative Novelty**
Meaning	It was never said before, but now someone has said it	Others haven't said it; "I" say it this way
Question	How metaphors evolve over time	How metaphors spread across cultures
Evolution Process	Horizontal axis: semantic shifts in historical development	Vertical axis: semantic enrichment across linguistic differences
Opposite	Conventional metaphor	Literal expression
Judging Principle	No overlapping semantic domains	Low frequency of usage
Examples	1) The stock market keeled over. 2) Her tragic death punched everyone in the stomach.	1) Personality is an iceberg. 2) Life is a box of chocolate.

To quantify the occurrence of novel metaphors, the researcher used Wmatrix to analyze the frequency of semantic domains for each target word, comparing them to the corresponding frequencies in a native speaker corpus. The top 10 high-frequency semantic domains were selected, and their relative frequencies were compared with those in the native speaker

corpus. When the proportion of a semantic domain in the L2 learner corpus was higher than in the native corpus (overuse), it was marked with a "+"; if lower (underuse), it was marked with a "-".

Since novel metaphors are fluid and difficult to define by a specific value, a threshold was set for identification. Through data processing, it was found that marking a semantic domain as novel when its relative frequency (Q2) was less than 0.3% in the native speaker corpus could capture 4-6 novel metaphors for most themes, representing about 50% of the high-frequency domains. This threshold was thus used as a stable indicator of novel metaphor frequency. Topics with fewer novel metaphors indicated weaker creative performance by L2 learners, especially when high-frequency semantic domains overlapped heavily with the target word's basic meaning.

Patterns of Novel Metaphor Creation

L2 learners often tend to produce metaphors similar to conventional expressions in their native language, such as "TIME IS MONEY." Since the concept of time is inherently metaphorical and based on the projection of other conceptual domains, its source and target domains are relatively fixed, making it difficult to express time clearly without metaphors (Guyan, cited in Michon et al., 1988). When metaphors are closely tied to basic semantic structures, the novelty of the metaphor tends to decrease.

From a psychological perspective, traditional metaphor relationships are often the first stimuli activated in metaphor networks (Danesi, 2000). To create more novel metaphors, divergent thinking is necessary. This supports the idea that emotions, more than actions, lead to richer metaphorical expressions (Liu & Shi, 2013). The study also reveals that L2 learners, influenced by native language conceptual transfer, generate metaphors that differ significantly from those of L1 speakers, especially in culturally rooted topics. While this may result in more novel metaphors, it also highlights cognitive differences between language communities, posing challenges for cross-cultural communication (Littlemore & Low, 2006; Xu & Wang, 2019).

Table 2: High-Frequency Semantic Domains and Novel Metaphors for *Moon*

Semantic Domain	**F**[1]	**LL**[2]
Food*	23	0.26 +
Kin*	12	0.14 +
Residence*	14	0.16 +
Sad*	11	0.13 +
Relationship: Intimacy and sex*	10	0.11 +
Arts and crafts	32	0.37 +
Sailing, swimming, etc.*	20	0.11 +
Participating*	0	0.11 +
Light	86	0.99 +
Shape	48	0.55 +
Judgement of appearance: Positive	79	0.91 +
Religion and the supernatural	101	1.16 +

Note. *: Entries with this mark are marked as novel metaphors in this study.

[1] F: Frequency in the native language corpus.
[2] LL: Log-likelihood cut-off values.

As shown in Table 2, taking "Moon" as an example, the metaphor production of L2 learners is largely linked to the Mid-Autumn Festival, while L1 speakers emphasize the relationship between moon phases and time. This indicates that L2 learners' metaphors are influenced by cultural background, focusing on festival customs and cultural symbolism, whereas L1 speakers reflect different semantic structures. According to linguistic relativity, the differences in metaphor production between L1 and L2 speakers are at least partially due to their varying linguistic and cognitive structures. This supports the cognitive linguistic view that metaphor is not just a linguistic tool but a cognitive mechanism.

Table 3: High-Frequency Semantic Domains and Novel Metaphors for *Red*

Semantic Domain	**F**	**LL**
Interested/excited/energetic	73	0.82 +
Temperature: Hot / on fire	157	1.77 +
Anatomy and physiology	179	2.02 +
Violent/Angry	64	0.72 +
Relationship: Intimacy and sex	50	0.56 +
Happy*	13	0.15 +
Entertainment generally*	22	0.25 +
The universe	49	0.55 +
Time: Period	65	0.73 +
Objects generally	50	0.56 +

In contrast, Table 3 shows that while "Red" is also culturally significant in Chinese tradition, L2 learners did not produce metaphors similar to L1 speakers. This may be due to the strong emotional connections of the word "Red," overshadowing its cultural symbolism (such as New Year, celebrations, and wealth). In other words, emotional factors can have a stronger influence on novel metaphor creation than cultural factors, suggesting that cognitive patterns play a dominant role in L2 learners' creation of novel metaphors.

Overall, the ability of L2 learners to create novel metaphors is not low, which contradicts some earlier studies but aligns with Li's (2015) findings. L2 learners often produce metaphors that conflict with traditional conceptual categories. According to CMT, this suggests that metaphor transfer (or projection) does not rely on conceptual similarity but on the contributions of created or context-dependent features. Additionally, L2 learners tend to use material attributes for concrete topics and social attributes for abstract topics, highlighting the cognitive features of the target domain (Li, 2015). From a pragmatic perspective, the meaning of metaphors derives from their communicative function and their ability to shape thought and behaviour. Thus, instead of traditional structured writing, activities like "word chaining" and dialogic exercises may improve L2 learners' ability to create novel metaphors. Li (2020) also noted that more complex sensory experiences and abstract emotions lead to more divergent thinking, contributing to the creation of novel metaphors.

Open Strategies and Novel Metaphor Creation

L2 learners tend to create novel metaphors from source domains with clear semantic stances, indicating that more open word choice strategies can stimulate higher linguistic creativity. Compared to traditional conservative strategies, open strategies encourage L2 learners to break conventions and produce unique metaphorical expressions. Li (2020) suggests that when participants express distinct intentional attitudes, they tend to create novel metaphors, which Han & Wang (2011) interpret as highlighting new emergent meanings.

To foster L2 learners' ability to produce novel metaphors, it is essential to stimulate their critical thinking and encourage them to view metaphorical relationships from different perspectives. Additionally, learners should be encouraged to use the target language in innovative ways, extracting metaphors from different semantic positions and creating new form-meaning pairings. This training not only enhances learners' linguistic creativity but also helps them use metaphors more flexibly in cross-cultural communication.

Impact of Language Proficiency on Metaphor Production

Previous research has shown disagreement regarding the relationship between second language acquisition and metaphor production, particularly in terms of the influence of language proficiency and cognitive patterns. Chiappe & Chiappe (2007) argue that both cognitive ability and language proficiency influence metaphor generation. A comparison with native English speakers reveals that, although lower-proficiency participants may be constrained by their language skills, the primary difference in metaphor production lies in cognitive patterns rather than purely language abilities. This does not suggest a lack of metaphor production capacity but highlights a cognitive "gap" in cross-cultural communication.

However, lower language proficiency does affect metaphor production, which aligns with the findings of Azuma (2005) and Wei (2015). L2 learners tend to use superordinate terms in their metaphors, with generalized and broad vocabulary lacking specificity and precision. In contrast, native speakers more often use subordinate terms, which are more concrete and detailed, allowing for richer metaphorical expression. This can be explained by Prototype Theory and Basic Level Category Theory. L2 learners are still grasping basic conceptual structures in English and rely more on central prototypes, while native speakers have a more nuanced understanding of categorization, enabling them to create more specific and detailed metaphors.

Lexical Complexity and Register Construction

L2 learners display a richness in semantic domains for metaphor production, but their lexical complexity is lower than that of native speakers, indicating that their semantic networks are still developing. From a grammatical perspective, L2 learners predominantly use noun-based metaphors, resulting in more static descriptions, unlike Chinese, which is a verb-oriented language. In contrast, native speakers use a higher proportion of verbs, adding dynamism and reflecting physical experiences in their metaphors.

This difference aligns with Halliday's (1994) theory of Grammatical Metaphor, where varied expressions of meaning are key features of metaphor. L2 learners may prefer noun-based metaphors due to familiarity, avoiding the subtle differences between English verbs. For instance, in negative semantic domains, L2 learners often use "Monster" instead of more specific animals, echoing similar findings by Wei (2015), who also noted the frequent use of compound metaphors by foreign participants. Although language factors may not directly cause significant differences in semantic domains, they influence discourse coherence and contextual appropriateness. Danesi's (1992) concept of "conceptual fluency"—the ability to match surface structures of a language with its underlying conceptual framework—is especially relevant here, highlighting differences in metaphor source selection and semantic stances between L2 learners and native speakers.

Source Domain Selection in Positive and Negative Metaphors

By categorizing metaphors into positive (optimistic) and negative (pessimistic) themes based on semantic prosody, we found that L2 learners produce more diverse source domains in positive-themed metaphors, but their output tends to be more fragmented and lacks clear prototypes. This weakens the thematic relevance and contribution compared to L1 speakers. This pattern suggests that L2 learners' metaphor production aligns more with Radial Category Theory (RCT), where the semantic activation model resembles a network of points with no obvious central prototype.

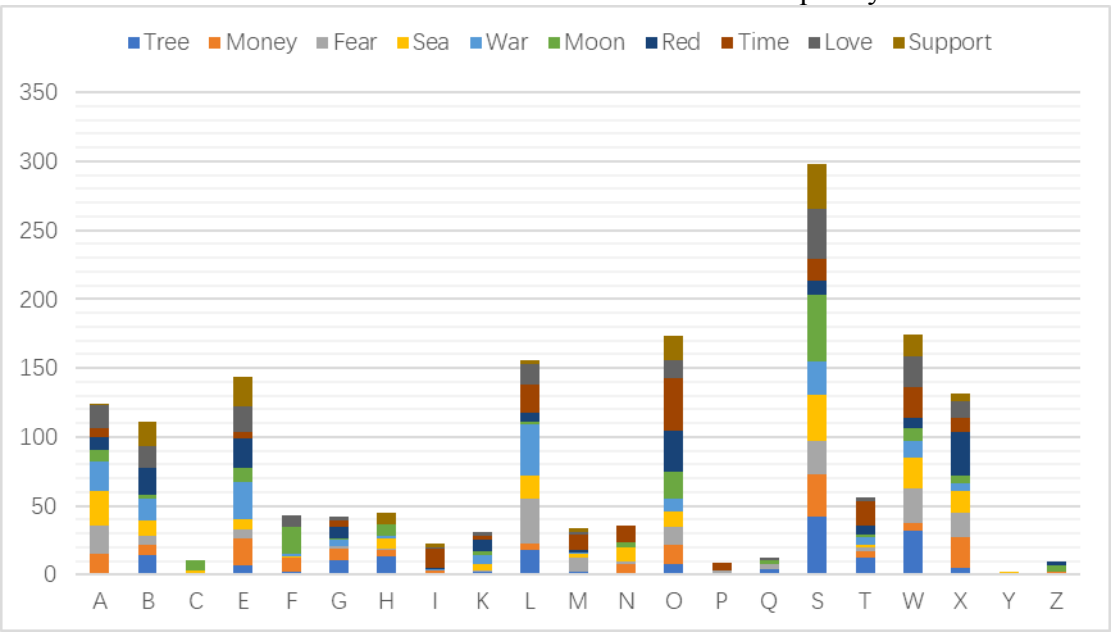
Conversely, in negative-themed metaphors, L2 learners demonstrated more systematic source domain selection, with stronger family resemblances between semantic categories. This indicates that when expressing negative emotions or content, L2 learners activate similar semantic domains. This finding supports the Connectionism model in neuroscience, where the activation of different stimulus nodes is interconnected, and psychological representation follows a hierarchical pattern (Cameron, 1999).

Li (2015) explained that this phenomenon may be linked to L2 learners' vocabulary categorization abilities or the specific concepts activated during metaphor production. In negative themes, L2 learners tend to use overlapping source domains, resulting in a homogeneity that limits the distinction of the target domain's uniqueness. This over-reliance on negative imagery suggests a lack of vocabulary in relevant semantic fields, making it difficult for readers to differentiate the nuances of their descriptions. This also reveals a common issue of Source-Target Asymmetry in L2 learners' metaphors, especially regarding metaphor directionality, where this asymmetry becomes more apparent.

Frequency Analysis of Semantic Domains

By integrating the source domains of all target words, a visual representation can be created, as shown in Table 4.

Table 4: Bar Chart of Semantic Domain Frequency



By integrating the source domains of all target words, a bar chart was created to visualize the frequency of semantic domains used by L2 learners. The results show that L2 learners' high-frequency source domains are closely related to daily life, emotions, personal experiences, and social interactions. These choices align with the embodied cognition theory, which suggests that metaphorical mappings are rooted in physical experiences and human knowledge. However, while L2 learners demonstrate variety in their source domain selection for positive themes, their metaphors tend to be more fragmented and lack the clear prototypes found in L1 speakers' metaphors. This suggests that their metaphorical expressions, while diverse, may lack the thematic coherence seen in native speakers.

In contrast, L2 learners' metaphors in negative themes show greater consistency, with higher overlap in source domain selection. This indicates that when dealing with negative emotions, L2 learners activate more uniform cognitive patterns, resulting in similar metaphorical expressions to L1 speakers. Emotional metaphors, in particular, show a high degree of cognitive alignment with native speakers, supporting the idea that shared human experiences play a key role in metaphor production. These findings suggest that L2 learners' metaphor creation is influenced by both cognitive and cultural factors, with emotional content providing a stronger foundation for metaphorical coherence.

Multidimensional Metaphor Quality Assessment Framework

Based on the previous findings, L2 learners exhibit unique characteristics in their metaphor production, which has laid the foundation for a new multidimensional metaphor quality assessment framework. This new framework aims to provide a more comprehensive evaluation of L2 metaphor production, addressing the limitations of traditional single-dimension approaches (such as focusing solely on language accuracy). The proposed framework evaluates metaphors on dimensions such as novelty, appropriateness, and cultural relevance, grounded in CMT, and considers cognitive, linguistic, and pragmatic aspects.

Traditional metaphor assessments often emphasize grammatical correctness or vocabulary usage, overlooking the creativity and conceptual depth of metaphors. Our findings suggest the need for a system that assesses both grammatical accuracy and the cognitive and cultural structure of metaphors. Given that L2 learners' metaphorical mapping is influenced by both their native and target languages, a multidimensional approach is crucial for capturing the full scope of their metaphor production. This framework will also serve as a theoretical basis for validating and testing in subsequent experiments.

Conclusion

This study has explored the distinctive features of metaphor production in L2 learners, highlighting the cognitive, linguistic, and cultural factors that shape their creative output. By proposing a new multidimensional metaphor quality assessment framework, we aim to provide a more holistic approach to evaluating metaphor use, one that accounts for novelty, cognitive complexity, cultural relevance, and pragmatic appropriateness. This framework not only addresses the limitations of traditional assessments but also helps to deepen our understanding of how metaphors function as bridges between languages and cultures.

As metaphors are not merely linguistic expressions but windows into the mind, they allow us to navigate the abstract and give form to the intangible. In the words of Lakoff and Johnson, "we live by metaphors"—they are the silent poets of our thoughts, shaping the way we

understand the world and each other. Through this research, we hope to continue uncovering the intricate beauty of metaphoric thought in second language learners, enriching the dialogue between language and cognition.

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