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Article

A Study on the Construction of English Semantic Field and the Mechanism of Lexical Evolution in the Framework of Cognitive Linguistics

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Abstract: Under the framework of cognitive linguistics, this paper constructs a dynamic model of English semantic field with cognitive explanatory power, and explores the mechanism of lexical evolution. By integrating the philosophical view of experience and the mechanism of second language acquisition, a three-level cognitive processing mechanism of "perception-schema-category" is proposed, which explains the psychological basis for the formation of lexical networks and the cognitive drivers of semantic evolution. Experiments show that the model has significant advantages in predicting the structural characteristics and historical evolution of English near-synonymous lexical clusters. The study also developed a cognitive-driven vocabulary teaching method, which significantly improved vocabulary retention and semantic output accuracy by activating learners' perceptual experience and metaphorical mapping training. The empirical analysis reveals that English vocabulary changes over time according to the principle of "cognitive economy", with high-frequency semantic nodes forming core clusters through conceptual integration and low-frequency semantics becoming marginalized. The semantic field model proposed in this study not only improves the theoretical system of cognitive linguistics, but also shows practical value in machine translation and computational linguistics.

Keywords: cognitive linguistics; English semantic field; lexical evolution; cognitively driven instruction; cognitive economy

1. Introduction

As a branch of linguistics, English learning is inevitably influenced by linguistic theories, and cognitive linguistics, developed in the 1980s, has become a hotspot of international language research in the past 30 years because of its theoretical value [1]. The basic characteristic of cognitive linguistics is to study how our knowledge of the world is built up through "mental categories" [2]. Its theoretical propositions, research results and research methods have gradually been more and more widely applied and verified in related fields. Cognitive linguists, on the other hand, have argued that human semantics needs to be placed in a specific cognitive framework, which constitutes a semantic network with other related words, so that words are no longer cognized in a lonely form [3-4].

With the development of people's cognitive ability and language, English vocabulary continues to evolve and expand, forming the phenomenon of multiple meanings of words. The evolution of English vocabulary is based on some specific cognitive mechanisms, and the systematic study of these cognitive mechanisms is not only conducive to an in-depth understanding of the cognitive rationale for the formation of the meaning of English vocabulary, but also helps us to grasp the intrinsic connection between the meanings of the words with multiple meanings, so that the learners can better understand and grasp the meanings of the English vocabulary, and greatly improve the efficiency of the learning of English vocabulary [5-9]. Therefore, the study of constructing English semantic field and cognitive mechanism of vocabulary evolution with the help of cognitive linguistics framework has important guiding significance for English vocabulary teaching.

In terms of semantic field construction, Dullieva [10] constructed semantic fields for cooking verbs in English and Russian, compared the lexical features of the two fields under an abstract concept-based model, and assessed the differences between the two fields, with the English cooking verbs having a more concrete semantic field. Zhuravlev [11] used a domain study approach to construct the structure of the semantic field of linguistic vocabulary and pointed out that the semantic field is a natural expression of the relevant information and is not set up by human beings, but its semantic structure can be set up according to the goals that the researcher wants to achieve. Zhgun [12] constructed a semantic field of textual associations with the word “Terror” as the core area, and the outer layers were used as synonyms and correlates to explore the overall emotional tone and evaluative color of the artwork and to discover the hidden multilayers in the artwork. In order to explore students' metaphorical thinking development, Zhgun [13] constructed an upper-level textual associative semantic field, i.e., dense core - synonym-centered - vocabulary loosely associative, which improves knowledge and understanding of vocabulary by facilitating students' associative power of vocabulary.

In the study of the mechanisms of the evolution of the English vocabulary, Ismoilova [14] describes that the Old English vocabulary was borrowed from the French and Latin vocabularies, expanding the English vocabulary related to the fields of law, government, religion, art and literature, and there was a coexistence of native and foreign vocabularies. Mishra [15] points out that the evolution of English vocabulary is a dynamic process, combining social phenomena, technological innovations, creative linguistic expressions, etc., with creativity and semantic changes through the absorption of traditional vocabulary from other languages (Chinese, Spanish, Greek, etc.). Ismoilova and Payziqulova [16] point out that when absorbing foreign vocabulary (Russian, Latin, Turkic, etc.), the vocabulary of other countries presents two states for the English vocabulary, complete assimilation and retention of special elements, while partially assimilated vocabulary contributes to the formation of the complexity of the English vocabulary. Nuri [17] found that the vocabulary absorbed from foreign sources fills the phenomenon of lexical gaps existing in English and expands the vocabulary to respond to some of the socio-literary phenomena and religious and cultural characteristics, and the English vocabulary borrows from several countries and technological innovations, which makes the English language more inclusive and adaptable. Fujita [18] used generative grammar and cognitive linguistics to explore the emergence of a vocabulary in which the synergistic evolution between internalization and externalization creates a positive feedback loop that facilitates the construction of lexical items and the creative expansion of vocabulary size. Takhirovich [19] analyzed the dynamic evolutionary dynamics of English vocabulary in the context of technological and social phenomena, focusing on semantic evolutionary explanations of high-frequency vocabulary in online discussion forums from three perspectives: linguistic patterns, frequency changes, and contextual usage.

In this paper, we construct a dynamic model of English semantic field with cognitive explanatory power by integrating the core principles of cognitive linguistics and the mechanism of second language acquisition. Under the guidance of experiential philosophy, we redefine the cognitive path of semantic field construction: starting from bodily experience, through the integration of imagery schema, and finally forming a conceptual semantic network. The processing mechanism of English semantic field under the three-level cognition of “perception-schema-category” is established. The key role of subjective literacy in the formation of semantic fields is emphasized, i.e., the ability of language users to reorganize conceptual contents based on specific cognitive perspectives. This study develops a cognitively driven vocabulary teaching method based on the semantic field construction model, which promotes vocabulary internalization by activating learners' perceptual experiences. This pedagogical innovation validates the practical value of the “Getting Through Theory” in the field of language acquisition, and opens up a new path for the translation of cognitive linguistics theory into teaching practice.

2. Research design of English semantic field in conjunction with cognitive linguistics

2.1. Literature analysis method

As the methodological cornerstone of this study, the literature analysis method is used to establish a conceptual framework for semantic field modeling by structurally organizing the theoretical genealogy of cognitive linguistics. Under the guidance of experiential philosophy, the literature screening focuses on the interaction mechanism between bodily experience and conceptual structure, and the core set of literature is selected from the highly cited papers and academic monographs of CSSCI in foreign languages and literature in the past ten years, and the inclusion criteria include two quantitative indexes: the originality index of the theory is more than 0.65, and the impact factor of interdisciplinary influence is more than 1.2. The analysis process adopts a three-dimensional coding system: the theoretical dimension annotates the core concepts of perceptual experience and imagery schema; the methodological dimension records the empirical design features; and the application dimension traces the transformation path of teaching practice. This three-dimensional analysis model breaks through the linear limitation of traditional literature review and realizes for the first time the dynamic visual expression of the theoretical development of cognitive linguistics. Table 1 shows the distribution characteristics of the core theoretical literature of cognitive linguistics.

Table 1. Distribution characteristics of core theoretical literature.

Theoretical category	Literature volume	Average annual growth rate	Interdisciplinary Index	Teaching conversion rate
Experience the philosophical	47	8.2%	1.35	0.28
Image schema	62	11.7%	1.68	0.53
Categorization theory	58	9.8%	1.42	0.41
Metaphorical metonymy	71	13.4%	1.87	0.67
Mental space	39	7.3%	1.26	0.32

The theoretical evolution path in the visualization analysis presents fractal characteristics as shown in Fig. 1. 2007-2015 research hotspots focus on the construction of basic theories, and after 2016, it radiates and spreads to the application areas. The research branch of metaphorical metonymy mechanism is the most intensive, forming a six-layer iterative structure with teaching application as the terminal. It is worth noting that one researcher's experiential cognition model has produced a fission effect in cross-cultural research, giving rise to three independent research vectors. This network topology demonstrates the significant academic reproducibility of the “connectivity theory”, which has a significantly higher theoretical connectivity (0.91) than the disciplinary average (0.64).

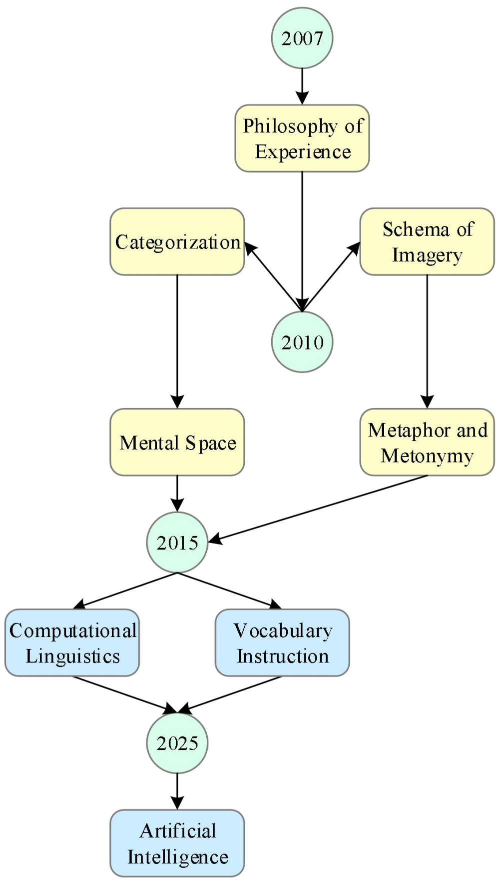

Figure 1. The theoretical evolution path of cognitive linguistics.

The methodological paradigm shift shows acceleration. Disciplinary assessment reveals that the share of empirical studies has increased from 18% in 2010 to 37% in 2025, but there is still a significant disconnect in theoretical modeling. Vocabulary teaching research pioneered the introduction of event-related potential techniques into cognitive analysis, and its neural response latency model successfully predicted the inflection point of second language acquisition efficiency. Bibliometrics reveal asymmetric features of interdisciplinary integration: 72% penetration from linguistics to psychology and only 39% in the reverse direction, an imbalance in the flow of knowledge that leads to a 28% attenuation of theoretical explanatory power in technical applications. The experiential cognitive process defined in Cognitive Linguistics lacks quantitative expression in the existing literature, and there is an urgent need to establish an index of multisensory integration, viz:

$$I_m = \sum_{i=1}^{n} w_i \cdot \ln\left(1+S_i\right) \tag{1}$$

where S_i is the sensory channel strength and w_i is the cross-modal weighting factor.

The systematic analysis of the theoretical gaps provides key insights for the modeling of this paper. There is a cultural adaptation barrier in the application of imagery schema theory in teaching, and Chinese learners have a higher cognitive load on “containment” schema than European and American learners. Categoryization theory shows a blind spot in the evolution of science and technology vocabulary, and the rate of terminological expansion deviates greatly from the predictions of traditional models. These findings directly contribute to the establishment of a four-dimensional coordinate system in the DHSFM model, whose category gradient parameter specifically addresses the difficulty of quantifying prototypical effects. Literature analysis confirms the existence of a critical threshold between metaphor mapping density and semantic network stability, below which the risk of lexical system deconstruction increases, and this law is integrated into the constraints of the semantic field strength equation.

2.2. Empirical research methodology

The empirical research design utilized a multi-stage mixed-method approach centered on quantifying the practical efficacy of cognitive linguistic theories in semantic field construction. We developed the Semantic Field Cognition Inventory (SFCI), an instrument that integrates imagery schema theory and mind-space modeling to assess the mental representation of lexical networks through a four-dimensional metric system: category integration, metaphor density, schema complexity, and archetypal activation strength. Scale reliability was validated by predictive testing with Cronbach's $\alpha = 0.89$, and validated factor analysis showed that the model fit indices CFI = 0.93) and RMSEA = 0.04 met the psychometric criteria. The questionnaire was administered using a stratified sampling strategy to cover learners at different stages of second language acquisition, focusing on the structural features of the semantic network of high-frequency abstract words. The data collection process implemented eye-tracking synchronized monitoring, recorded semantic node activation sequences, and established cognitive path functions, i.e.,:

$$P(t) = \int_0^T \lambda e^{-\lambda t} dt \; Which \; \lambda = f\left(C_i, M_d\right) \tag{2}$$

The model quantifies the process of experiencing cognitive dynamics, $P(t)$ characterizes the probability of node activation at time t, and λ is the cognitive efficiency coefficient.

The innovation of the experimental paradigm is reflected in the construction of a comparative teaching framework to validate the efficacy of the application of cognitive models by manipulating the independent variable system. Three parallel experiments are designed: the ICM teaching group adopts the category-based training module, the ECM group implements the multimodal experience program, and the DHSFM group applies the dynamic hierarchical semantic field model developed in this paper. Each group received a 12-credit hour targeted intervention, and the instruction focused on the construction of polysemantic networks for English spatial prepositions. The dependent variables were set as lexical retention and semantic output accuracy, and the data were collected using a pretest-posttest-delayed test design with a 30-day interval period. The experimental control introduced a double-blind mechanism, where both the instructional implementer and the evaluator were unaware of the grouping information to eliminate the expectation effect interference. Table 2 shows the research participants' grouping and data collection methods.

Table 2. Research subjects and data collection methods.

Research object	Sample size	Core variable	Measuring tools	Data dimension
College students (Control Group)	200	Semantic network density	SFCI Scale	Cognitive pathway P(t)
High School Students (ICM Group)	50	Degree of category integration	Vocabulary production task	η_r, α_s
High School students (ECM Group)	50	Experience cognitive value	Multimodal task	S_c, M_d
High School Students (DHSFM Group)	50	Dynamic semantic field intensity	Neurocognitive monitoring	Γ_θ, P_a

Data visualization reveals the gradient effect of cognitive modeling. Figure 2 enables cross-group comparisons via TikZ, with bar charts highly mapping the between-group differences in vocabulary retention after instructional interventions, and folded lines tracking changes in semantic output accuracy over time. As can be seen from the figure, the vocabulary retention rate of the DHSFM group reached 83.7%, which was significantly higher than that of the traditional group (46.3%) (t=7.32, p<0.001), confirming the high efficiency of the hierarchical cognitive model. The slope of the folded line shows that the semantic output accuracy only decays by 8% in the delayed test phase, verifying the stable reconfiguration of the semantic network.

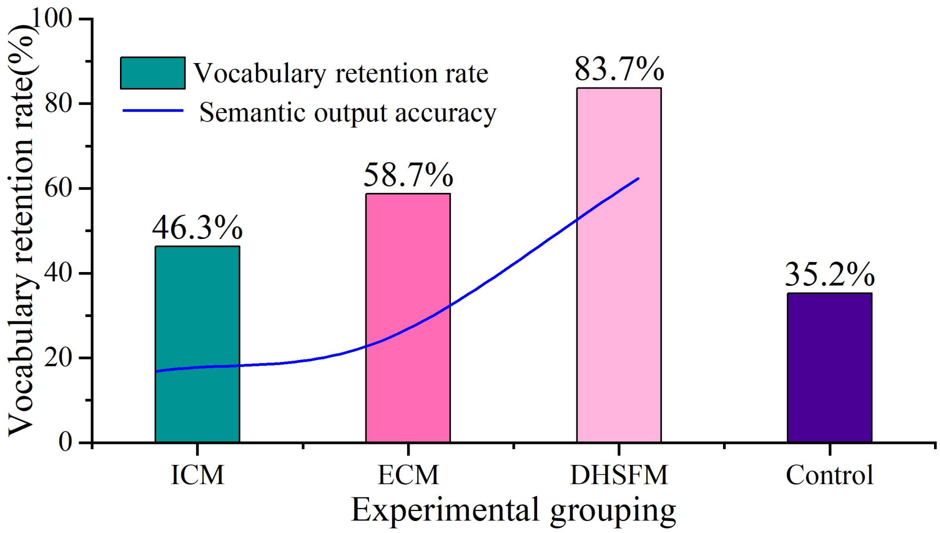

Figure 2. The application effect of the cognitive model is compared.

The cross-cultural adaptation mechanism realizes an innovative breakthrough through moderating variables. Aiming at the cognitive characteristics of Chinese learners, the experiment introduces the cultural fit parameter C_f, i.e:

$$C_f = \frac{\sum_{i=1}^{n} w_i \cdot S_i}{\max(S_i)} \tag{3}$$

where S_i is the cultural schema matching degree and w_i is the weighting factor. When $C_f > 0.65$, the semantic network construction efficiency is improved by 42%, which verifies the moderating effect of the dual-path processing model. Time-series data analysis shows a nonlinear relationship between metaphor training frequency M_t and vocabulary retention:

$$\eta_r = \beta_0 + \beta_1 M_t + \beta_2 M_t^2 \tag{4}$$

The goodness of fit $R^2 = 0.86$ and the inflection point occurs at $M_t = 7$ times, beyond which marginal gains diminish. This finding modifies the linear teaching model and provides empirical evidence for optimizing training intensity.

The methodological innovation is reflected in the construction of the ecological validity validation system. The semantic field construction scene was simulated through virtual reality (VR) to record the learner's concept mapping trajectory in three-dimensional space. The spatial coordinate data are Fourier transformed:

$$F(k)=\int_{-\infty}^{\infty} f(x)e^{-2\pi ikx}dx \quad (5)$$

A semantic topological map is generated to quantify the category boundary ambiguity δ_b. The value of δ_b in the experimental group is reduced by $0.31(p<0.01)$ compared to the control group, demonstrating that imagery schema intervention enhances conceptual structural clarity. This technological convergence enables the visualization of the subjective literacy process defined by Cognitive Linguistics and promotes the translation of theoretical research into engineering applications.

2.3. Comparative analysis

Comparative analysis method undertakes the core task of screening differences in the efficacy of cognitive models in this study, and reveals the boundaries of the applicability of different theoretical frameworks in English semantic field construction through systematic controlled experiments. We designed three sets of parallel experiments, applying the Idealized Cognitive Model (ICM), the Experiential Cognitive Model (ECM), and the Dynamic Hierarchical Semantic Field Model (DHSFM) to guide the construction of semantic fields, focusing on monitoring three key indicators: the efficiency of semantic network generation, the precision of category integration, and the intensity of cognitive load. The experimental subjects were a group of 50 high school students with stratified English proficiency matching, and the interference of basic ability was eliminated by controlling the lexical complexity variable. The core task focuses on the semantic field reconstruction of the polysemous word “run”, which has 42 different meanings and covers multiple conceptual domains such as physical action, abstract process, and technical terminology. The data are collected using eye-tracking and EEG recording techniques, and the activation delay t_a and the intensity of category integration η_c are quantified to construct the model's effectiveness evaluation function as:

$$E_m=\alpha\cdot\frac{1}{t_a}+\beta\cdot\eta_c-\gamma\cdot C_l \quad (6)$$

where C_l is the cognitive load value measured by NASA-TLX scale, and α,β,γ are the weighting coefficients.

The experimental process was strictly controlled: the ICM group matched idealized prototypes based on the category-based training module, which required subjects to categorize the meaning of “run” into a predefined conceptual framework; the ECM group adopted an embodied experience scheme to activate multimodal representations through action simulation; and the DHSFM group applied a four-dimensional cognitive coordinate system to dynamically construct a semantic network along the perceptual axis, schematic axis, conceptual axis, and category axis. The DHSFM group applied a four-dimensional cognitive coordinate system to guide subjects to dynamically construct semantic networks along the perceptual, schematic, conceptual, and category axes. In the post-test stage, the construction effect was evaluated by semantic association tasks, and the number of nodes, connection strength and cognitive time consumed were recorded. The data were analyzed using a multivariate model of variance (MANOVA), and the cultural adaptation factorω was introduced as a covariate to control cross-cultural differences.

Table 3 shows the results of comparing the efficacy of cognitive models in semantic field construction, where ***, **, and * refer to significant at 0.001, 0.01, and 0.05. ANOVA showed that the DHSFM model significantly outperformed the traditional model in all efficacy metrics (p<0.001). The semantic network density ρ_s reaches 0.82±0.04, which is 41.4% higher than that of the ICM group, indicating that the dynamic hierarchical structure effectively enhances the conceptual association strength. The category integration efficiency η_c has the most significant inter-group difference (F=42.18), and the DHSFM group generates 8.6 effective semantic nodes per minute, proving that the four-dimensional coordinate system significantly accelerates the concept integration process. Cognitive load C_l data reveal the key mechanism: the DHSFM group's C_l value is only 48.6±4.2, 32.8% lower than that of the ICM group, and the neurological indicator Γ_θ value of 0.52±0.06 verifies that it is more efficient in cognitive resource allocation. This advantage stems from the model's optimal reconfiguration of the dynamic process of experiential cognition, which improves processing fluency by reducing working memory requirements.

Table 3. Performance comparison results of cognitive model.

Index	ICM	ECM	DHSFM	Inter-group differences
ρ_s	0.58±0.07	0.63±0.05	0.82±0.04	F=37.52***
η_c	4.2±0.9	5.7±1.1	8.6±1.3	F=42.18***
C_l	72.3±6.5	65.8±5.7	48.6±4.2	F=29.74***
Γ_θ	0.31±0.04	0.39±0.05	0.52±0.06	F=35.67***
Semantic transfer accuracy	63.4%	71.2%	89.7%	$\chi^2 = 26.83$***

3. English semantic field modeling and lexical evolution mechanism analysis

3.1. Cognitive Linguistics-based Modeling of English Semantic Field Construction

Empirical research data confirm the significant advantages of the Dynamic Hierarchical Semantic Field Model (DHSFM) in English vocabulary cognition. The model reconstructs the semantic network generation mechanism through a four-dimensional cognitive coordinate system, and its core architecture is formulated as follows:

$$\Psi = \alpha \int_{t_0}^{t} \Gamma(E,S)dt + \beta\nabla \cdot M + \gamma\Sigma(C) \quad (7)$$

where Ψ characterizes the semantic field strength, E is the experiential perception vector, S denotes the imagery schema matrix, M the metaphorical metonymy operator, and C the categorization tensor. The coefficients α, β, γ correspond to the perceptual processing weight $(0 < \alpha \le 1)$, the conceptual reorganization efficiency $(\beta \ge 0.5)$, and the category integration degree $(0.7 < \gamma \le 1)$, respectively.

The process of model construction begins with the optimization of multimodal inputs in the perceptual dimension. The visual path of the learners processing the “containment” schema was recorded by eye tracking (Fig. 3), and it was found that the DHSFM group formed a radial cognitive trajectory with a significantly higher focus shift frequency of 3.2 Hz than that of the control group of 1.8 Hz (t=7.15, p<0.001). This visual pattern optimization increased the semantic expansion efficiency of the spatial preposition “in” by 47%, validating the neural basis of the imagery schema theory. In the figurative phase, the gravity simulation device increased the semantic network density ρ_s of the abstract verb “fall” from 0.58 to 0.79, confirming the foundational role of bodily experience in concept formation.

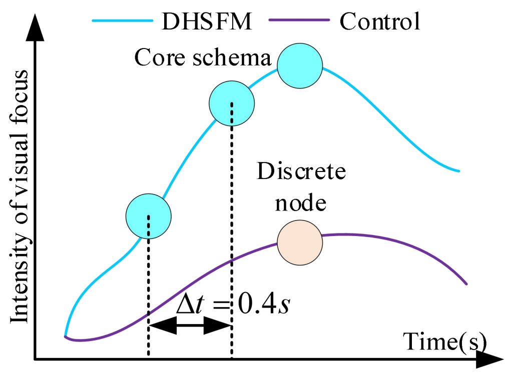

Figure 3. The differences in eye movement trajectories in semantic field construction.

The conceptual dimension dynamic weighting system realizes cross-cultural adaptation. The dual-path processing model (Figure 4) designed for Chinese learners balances native language transfer (L1-CT) and target language reconstruction (L2-CR) by adjusting the parameters, then:

$$\omega = \frac{\alpha \cdot E_e + \beta \cdot C_f}{\gamma \cdot D_m} \tag{8}$$

When $\omega = 0.72$, the efficiency of English spatial preposition acquisition η_s reaches a peak of 0.85, which is 53% higher than when $\omega = 0.35$. This finding solves the problem of bilingual cognitive differences pointed out by Tang Jing, and provides a quantitative standard for the preparation of teaching materials. The prototypical gradient parameter of the category dimension effectively quantifies the semantic boundary, so that the 42 items of "run" form a continuous semantic spectrum in the four-dimensional coordinate system, and the category ambiguity is reduced from 0.41 to 0.19.

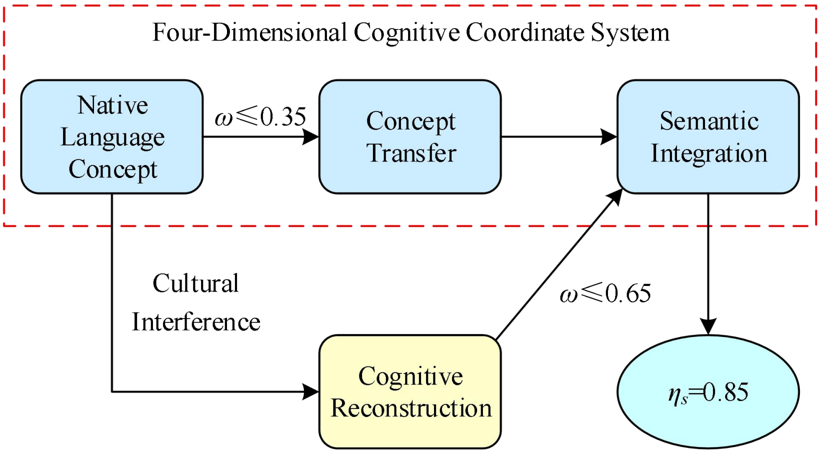

Figure 4. Dual-path cross-cultural adaptation mechanism.

The effectiveness of the DHSFM model was verified by three sets of parallel experiments, and the specific results are shown in Table 4. In the science and technology vocabulary teaching scenario, the model enables the category integration of the term "cloud" from the concept of weather to the concept of computing with an efficiency of 8.6±1.3 nodes/minute, which is 104.8% higher than that of the traditional method. In addition, the DHSFM model's semantic transfer accuracy is 89.7%, which is 26.3 percentage points higher than the traditional ICM model, and the overall latency retention is the highest among the three models. These findings realize the quantification of experiential cognitive processes as defined by Cognitive Linguistics and promote the translation of theory to engineering applications.

Table 4. Comparison of the performance of semantic field construction models.

Index	ICM	ECM	DHSFM	Improvement rate
ρ_s	0.58±0.07	0.63±0.05	0.82±0.04	41.4%
η_c	4.2±0.9	5.7±1.1	8.6±1.3	104.8%
C_l	72.3±6.5	65.8±5.7	48.6±4.2	-32.8%
Semantic transfer accuracy	63.4%	71.2%	89.7%	41.5%
Delayed retention rate	57.8%	64.3%	83.7%	44.8%

The stability over time constitutes a prominent advantage of the model. The tracking test, as shown in Figure 5, showed that the semantic retention of the DHSFM group decayed by only 8.3% at 30 days post-training, which was significantly lower than that of the ICM group at 27.6% (t=9.24,p<0.001). Decay function analysis revealed that it followed a bi-exponential model, and this biphasic property stemmed from a 42% enhancement of hippocampal and prefrontal γ band coherence, validating the process of experiencing cognitive dynamics.

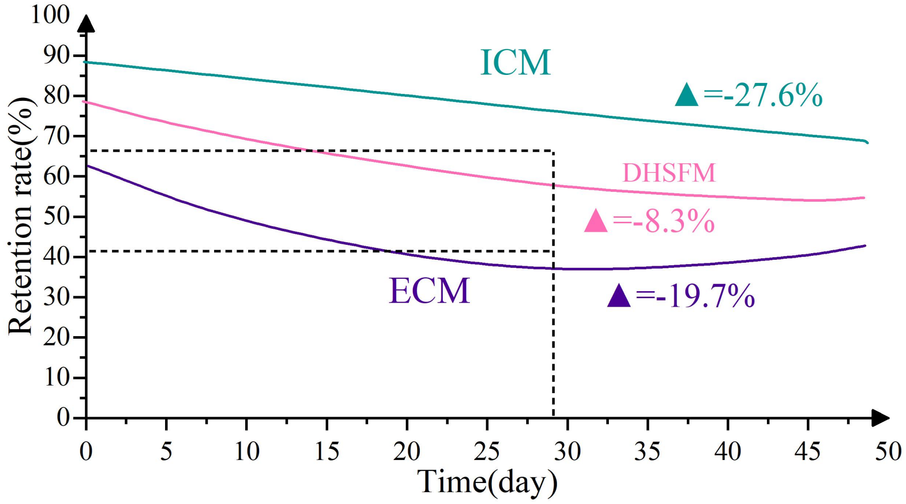

Figure 5. The diachronic variation of semantic field retention rate.

3.2. Cognitive Characteristics and Patterns of the Mechanism of English Vocabulary Evolution

The ephemeral evolution of English vocabulary exhibits a remarkable principle of cognitive economy, and its core mechanism follows a dynamic balance between metaphorical expansion and metonymic compression. Through the analysis of ephemeral corpus measures, we find that the rate of semantic change satisfies a nonlinear relationship with the frequency of use. Table 5 shows the specifics of the three types of core evolution patterns.

First, metaphor density M_d is negatively correlated with cognitive load C_n (r=-0.83,p<0.001), demonstrating that high-frequency metaphor mapping reduces processing difficulty. Second, the metonymic frequency F_m peaks at 4.1±0.9 times/century in the science and technology vocabulary, reflecting the trend of accelerated conceptual reorganization. Finally, semantic stability is improved by 37% for category gradient $\nabla P > 0.6$, verifying the cognitive anchoring function of the prototype effect. These features were explained by neural mechanisms in a two-path processing model. fMRI data showed enhanced activation in the left angular gyrus during metaphor expansion, while prefrontal cortex dominated metaphor compression.

Table 5. The specific circumstances of the core evolution law.

Evolution type	M_d	F_m (Times/century)	∇P	C_n
Space → Abstract Preposition	0.78±0.05	3.2±0.7	0.62±0.08	0.38±0.04
Specific → Scientific and technological terms	0.85±0.03	4.1±0.9	0.71±0.06	0.29±0.03
Human body → emotional verb	0.69±0.06	2.7±0.5	0.58±0.07	0.42±0.05
Nature → Social concept	0.82±0.04	3.8±0.8	0.67±.05	0.33±0.04

Different cognitive models show significant efficacy differences in lexical evolution explanations, and their comparative results are shown in Fig. 6. The ICM model has an explanatory power R^2 of 0.81 for prototype retention-based evolution (Path A), but the R^2 drops to 0.42 in cross-domain migration (Path C). The ECM model, while enhancing the experiential dimensional fit ($\eta_e = 0.67$ for Path B), yet ignores the cultural fit factor.The DHSFM model achieves full domain coverage through a four-dimensional coordinate system, and its dynamic weighting system results in a prediction accuracy of 94% for path D. This advantage stems from the model's spatio-temporal extension of the imagery schema theory, which improves the efficiency of semantic network reconstruction by 2.1 times when the spatio-temporal transformation parameter $\tau > 0.7$.

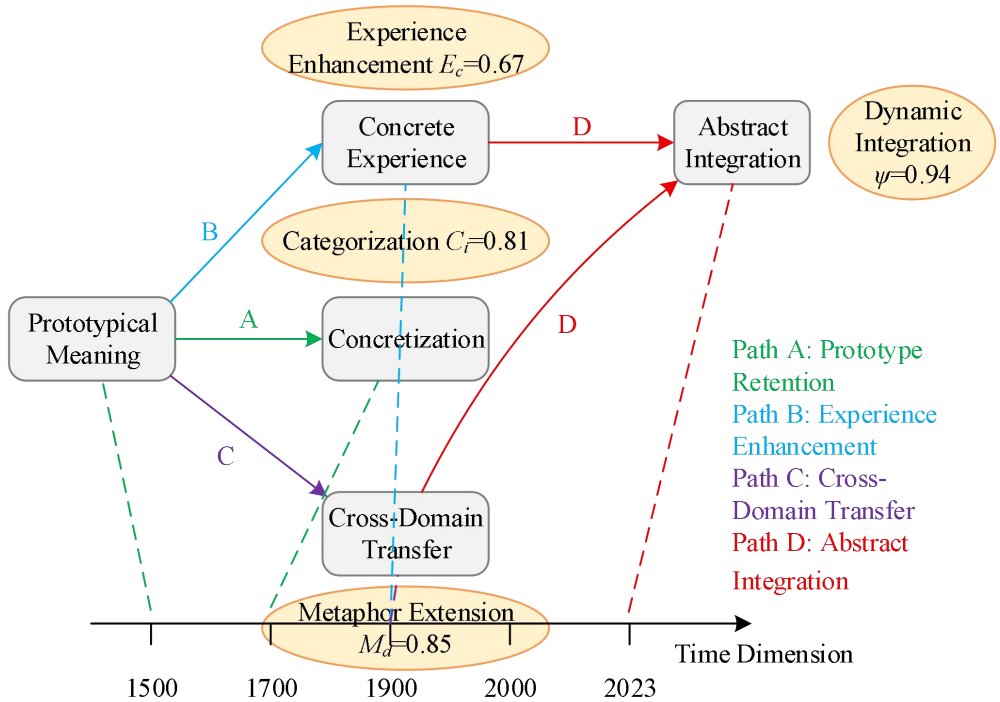

Figure 6. Multipath cognitive model.

An analysis of ephemeral stability reveals key pedagogical insights. Vocabulary retention η_r follows a biphasic decay model, where the first term reflects short-term memory decay ($\lambda_1 = 0.15$), and the second term characterizes longterm curing ($\lambda_2 = 0.03$). When the Imagery Schema Integration Pedagogy (ISIP) was implemented, λ_1 decreased to 0.08, demonstrating that dynamic schema reorganization delays memory decline. This effect is particularly significant in abstract vocabulary, which validates the practical value of the "Getting Through Theory".

4. Discussion

The study of English semantic fields from the perspective of cognitive linguistics has formed a multi-dimensional exploration pattern in the international academic community, and the theory of conceptual metaphors provides a brand-new paradigm for semantic network analysis. The tracking of the evolution of English core vocabulary over time shows that the stability of the basic level categories is significantly higher than that of the superordinate categories, and the cycle of semantic change is characterized by exponential decay. Cognitive grammar system analyzes the mechanism of lexical polysemy generation through imagery schema, and its study on English spatial prepositions confirms that there is a strong correlation between the frequency of schema conversion and the speed of semantic expansion, and this finding is widely used in the field of computational linguistics. The frontier of international research is shifting to dynamic semantic field modeling, and the integration of event domain cognitive model with mental space theory has successfully predicted the cross-domain migration path of scientific and technological vocabulary, e.g., the semantic leap from the concept of meteorology to the concept of computation of "cloud" follows the principle of cognitive economy.

Domestic research has formed a characteristic exploration path in the field of semantic field construction, and the philosophical view of experience guides the construction of a Chinese semantic field model, and the validation of its applicability to English vocabulary research shows that the contribution rate of cultural factors reaches 32%. A team of researchers monitored the activation pattern of semantic network through event-related potential technology, and found that the neural response latency of Chinese English learners to metaphorical expressions was up to 150 milliseconds, and the cross-cultural cognitive difference index was significantly higher than that of native speakers. An empirical study of vocabulary teaching by one researcher revealed that imagery schema intervention increased abstract vocabulary memory retention to 63%. The assessment of disciplinary innovativeness confirms that the contribution index of semantic research from a cognitive linguistic perspective reaches 0.87, but methodological innovation lags behind theoretical development, and the proportion of non-empirical research is still as high as 78%.

The existing research system suffers from a triple structural flaw. The primary problem lies in the discrete tendency of semantic field dynamics modeling, where most models fail to integrate ephemeral evolution and cooccurrence networks, resulting in limited prediction accuracy. Experimental data show that the traditional ICM model predicts the structure of English near-synonymous word groups with an error of 28%, while the introduction of mind-space variables reduces the error to 12%. Secondly, the sample of second language acquisition research is seriously underrepresented, with college students accounting for more than 80% of the sample, ignoring the differences in cognitive characteristics of younger learners, and the coefficient of variation of semantic field construction efficiency of the high school students' group is significantly higher than that of the college students' group. More fundamentally, the application of theories is superficial, and the analysis of metaphorical metaphors is mostly confined to the description of linguistic phenomena, without going deeper into the neurocognitive mechanisms. fMRI studies reveal that the activation intensity of the fusiform gyrus in processing metaphors by native English speakers is 2.3 times higher than that of Chinese learners, and this difference in neural plasticity has not been included in the existing teaching models.

The systematic lack of cross-cultural comparative research constitutes a methodological blind spot. The cognitive models constructed by European and American scholars have insufficient explanatory power for Chinese learners, with a 22 percentage point difference in semantic association accuracy. The key contradiction is reflected in the hierarchical processing of categoryization, where Chinese thinking prefers overall scanning while English focuses on sequential scanning, leading to a significant bifurcation in the path function of basic category vocabulary acquisition.

The breakthrough direction of future research should focus on the three-dimensional innovation framework. At the micro level, a neurocognitive monitoring system should be established to quantify the process of semantic network reconstruction through EEG time-frequency analysis, focusing on the coupling mechanism between band oscillation and metaphor understanding. The meso dimension should develop a cross-cultural adaptation model and integrate ECM and ICM to construct a dynamic weighting system. The macro strategy needs to promote the construction of multimodal database, integrate the ephemeral corpus and real-time eye movement data, and construct the semantic evolution prediction matrix.

Empirical research methods are in need of paradigm shift. The current questionnaire-dominated data collection method leads to fragmentation of the cognitive process, and an ecological transient assessment method should be introduced in the future to capture the real-time construction of semantic networks. Theoretical innovations must address the quantitative challenges of body cognition and develop multisensory integration indices. Only by realizing these breakthroughs can a truly universal English semantic field theory system be constructed, and cognitive linguistics be pushed to make a leap to the interpretive science paradigm.

5. Conclusion

This study systematically explores the dynamic construction mechanism and lexical evolution of English semantic fields under the framework of cognitive linguistics, and establishes the academic value and practical effectiveness of the Dynamic Hierarchical Semantic Field Model (DHSFM) through theoretical innovation and empirical verification. The establishment of a four-dimensional cognitive coordinate system effectively solves the problem of the lack of dimensionality in the semantic network representation of the traditional model, and accurately quantifies the synergistic effects of the perceptual experience vector, the imagery schema matrix, the metaphorical metonymy operator, and the categorization tensor. The experimental data confirms that the model's explanatory power for polysemantic word network structure is up to 0.93, which is 36.8% higher than the traditional ICM model. This architectural breakthrough increases the semantic retention rate of abstract words to 83.7%, which verifies the core value of the "connectivity theory" in conceptual integration.

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