General Syntactic Principles and Lexical Semantic Shift:

Imagery – Topology Hypothesis

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Abstract

This research endeavors to develop comprehensive models for both syntactic construction and lexical semantic structures, grounded in the imagery-topology hypothesis. It delves into traditional complexities of lexicon and syntax, focusing on the dynamics of lexical semantic shifts and fundamental syntactic principles. This involves a meticulous corpus analysis, examining cross-linguistic lexical variations within the 'taste' semantic field and sentence structures. The findings suggest a broad consistency in sentence structures across languages, though marked syntactic variations arise from differing sentence container markers. The study's lexical semantic structure model reveals that basic and non-basic lexical meanings emerge from an interplay of physical, cultural, and individual dimensions. A comparative cognitive scale is instrumental in this model, particularly in clarifying semantic relationships against diverse cultural backdrop profiles.

Keywords: syntax; lexical semantics; metaphor; imagery; culture

1. Introduction

This study embarks on an exploration of lexical semantic shifts and general syntactic structure complexities, extending beyond the traditional confines of linguistics. It advocates for a multidisciplinary approach, integrating insights from cognitive and cultural linguistics, to lay a scientific theoretical foundation and devise reliable solutions.

Metaphorical and metonymic constructs are central to understanding semantic shifts, as outlined by eminent scholars (Zalizniak, Bulakh, et al., 2012; Robert, 2008). The role of metaphorical concepts in shaping general grammar construction is well-established (Lakoff & Johnson, 1980; Lakoff, 1987, 1990, 2014; Langacker, 1987, 1991; Talmy, 2000), as these underpin grammatical knowledge (Goldberg, 1992; Fillmore, 1985; Croft, 2001, 2005). This study examines lexical semantic structures and grammar construction through the prism of cognitive metaphorical mapping, bridging the real, linguistic, and mental worlds.

The omnipresence of metaphor in language and cognition is exemplified in the classic propositional structure "X is Y/X as Y" (Lakoff & Johnson, 1980, Lakoff, 1987; Kövecses, 2005, 2008, 2010; Sweetser, 1990; Fauconnier & Turner, 1998). Recent scholarly debate, however, challenges this perspective, giving rise to the attributive-category view (Glucksberg, 2008; Vervaeke & Green, 1997; Kennedy, Green & Vervaeke, 1993). This view posits that the source domain X is a member of a more generic and superordinate category Y (target domain) (Horvat, Bolognesi & Althaus, 2023). Scholars like Gentner (1983, 1993, 1997, 2008) and Keysar, Shen, Glucksberg, et al. (2000) have expanded this with their career of metaphor hypothesis, providing nuanced understanding of metaphorical expressions.

This research probes the metaphorical mapping from the physical to the mental world, as seen in the imagery-schema of typology (Lakoff, 1990) and categories (Rosch, 1978, 1999), and its linear linguistic expression. The challenge lies in aligning metaphorical mechanisms with general linguistic structure. This necessitates incorporating diverse fields to formulate a universal lexical and syntax mechanism for linguistic comprehension. Central research questions include: (1) Can principles of cognitive imagery of the physical world extend to sentence patterns to enhance comprehension? (2) What constitutes the micro-level content of lexical semantic structure?

This paper aims to construct models for syntactic construction and lexical semantic structures, focusing on types of mapping paths and internal semantic and cognitive structures. By adopting a micro-perspective, it explores the interrelation between metaphorical mapping, meaning shift, and

grammar construction.

The research contributes to integration theories, bridging cognitive and linguistic analyses. It offers two core models for universal syntactical construction and lexical semantic structures, grounded in the imagery-topology hypothesis. The structure of the paper includes a review of grammar construction theories (Croft, 2001, 2005; Fillmore, 1985; Goldberg, 1992), Tamly's Verb- or Satellite-Framed encoding (Talmy, 1991, 2000), and theories on semantic fields and primitives (Goddard, 2012; Wierzbicka, 1985, 2003). It then outlines the hypothesis and derived models, followed by a detailed research methodology, a discussion of findings, and a conclusion summarizing the research results.

2. Literature review

The introduction of concepts such as "imagery-schema," "the brain's sensory-motor system," and "mirror neurons" (Gallese & Lakoff, 2005; Lakoff, 1990) has been pivotal in underscoring the role of imagery in cognitive processing. These concepts lay the groundwork for understanding categorization, a fundamental cognitive function (Rosch, 1978, 1999), which is essential for the operation of the Imagery-Schema in the brain. The translation of these cognitive processes into linguistic forms as cognitive diagrams establishes a crucial link between the mental, real, and linguistic worlds. This nexus between imagery, categorized objects/events, relations, and linguistic symbols is instrumental in comprehending grammar construction and lexical semantic mechanisms.

1) Grammatical Mechanism

Investigating grammatical mechanisms requires an examination of language-specific descriptive categories (Beck, 2016) and comparative concepts (Haspelmath, 2010). The latter provides a cognitive lens for understanding grammar construction, as highlighted by renowned scholars (Fillmore, 1985; Langacker, 1987, 1991; Lakoff, 1987, 1990; Talmy, 1991, 2000; Croft, 2001, 2005). Beck (2016) emphasizes language-specific categories, highlighting unique linguistic features, while Haspelmath (2010) focuses on comparative concepts, enabling the analysis of grammatical phenomena across languages. These concepts form the basis of grammatical knowledge (Family, 2008). Construction grammar emerges from the mental representation of general grammatical knowledge, with radical construction grammar (Croft, 2001, 2005) offering a minimalist model of syntactic relations and functions, presenting a universal perspective (Croft, 2005). However, this often overlooks the detailed patterns of the imagery-schema in sentences.

Talmy's (2000) work on verb- or satellite-framed encoding of motion events is a cornerstone in understanding the role of verbs in grammar and cognitive grammar. This has been further developed by researchers (Zlatev & Peerapat, 2004; Zlatev, Blomberg, Devylder, et al., 2021; Blomberg, 2014, 2017; Naidu, Viswanatha, Zlatev, et al., 2018), leading to an expanded classification of motion events and their linguistic expression. These studies offer insights into the semantic roles of lexical items in sentence patterns and the construction of syntactic structures around key mapping nodes of actual events.

Talmy's concept of the "path of motion" and Lakoff's "action as motion" in the Event Structure provide a theoretical basis for analyzing general grammar from a cognitive perspective. Objects in the real world can be semiotically mapped onto the mental world, maintaining their semantic functions and relations in a linguistic form. This approach emphasizes the coherence of reality information and relationships in grammar construction, while acknowledging the unique characteristics of languages as cross-language markers.

2) Lexical Mechanism

Semantic shift is a key area in lexical semantics, involving studies on polysemy, synonymy, and other aspects. The concept of "sememe" (Wierzbicka, 1992, 2003) serves as a semantic unit for analyzing lexical meaning. However, in the same semantic field, lexical items exhibit different combinations of semantic atoms, indicating that simple categorization is insufficient for understanding lexical semantic shifts. Lakoff (1990) contrasts his views with Wierzbicka's regarding semantic primitives and their role in understanding basic and non-basic meanings of lexical items.

Semantic derivation is fundamental in semantic maps (Ritter & Kohonen, 1989; Koptjevskaja-Tamm & Maria, 2008), where classification of lexical items is crucial. Research by Goddard (2012) and others has explored various semantic domains, revealing the complexity of lexical semantic shifts. The context in which an object occurs generates attributes of concepts, leading to figurative or non-basic meanings. This highlights the importance of personal and cultural aspects in understanding lexical meaning shifts.

Lexical semantic structure, therefore, should be seen as a multidimensional, multilayered entity, derived from the imagery-schema mapping from the physical or cultural world. Traditional semantic analysis categorizes word meanings into distinct semantic fields, but this macro-level approach fails to address the complexity of whole lexical semantic patterns. Breaking down lexical

semantics into the smallest units ('sememe') does not fully resolve the challenge of comparing minimal lexical units. Metaphorical concepts are crucial for understanding lexical semantic patterns, as they allow for the comprehension of knowledge maps of the world. Semantic shift and parallelism can be analyzed using scale measurement tools, rooted in the "Imagery-Schema" provided by neuroscience research (Gallese & Lakoff, 2005).

3. Hypothesis and Models

Basic Hypothesis: Imagery – Topology Hypothesis

Lakoff (1990) advanced the notion that spatial relations are a fundamental biological capacity in humans. The existence of 'mirror neurons' (Tendahl & Gibbs, 2008; Gallese & Lakoff, 2005; Lakoff, 2014) facilitates the mirroring of real spatial environments, providing the conditions for mental construction via 'mental imagery' or the 'brain's sensory-motor system' (Gallese & Lakoff, 2005; Lakoff, 2014). From a linguistic perspective, the topology of the mental world, derived from the real world, fundamentally influences the relationships among lexical items or linguistic symbols. In turn, language offers insights into the image-schema of the real world.

This framework is underpinned by essential cognitive functions of humans, including categorization, metaphorical mapping, topology, and semiotics. Categorization, a primary cognitive activity (Rosch, 1999), conceptual mapping reflects mirror neuron functionality, and linguistic symbols facilitate the transformation of thought into shared, communicable, and analyzable information, thus contributing to the evolving human encyclopedia of knowledge (Fairclough, Jessop, Sayer, 2002). Lakoff's Invariance Hypothesis (1990) and the typology within it suggest that image-schema structures of motion and event strongly represent real-world mapping in mental imagery. Under the frameworks of typology and prototype categorization, there is a transformation from a complex multidimensional representation of the real world to a simplified two-dimensional/ one-dimensional image-schema in languages.

The Basic Hypothesis of this paper posits that grammar construction and lexical semantic structure are contingent on the imagery-topology function of metaphorical mapping and the categorization function at the cognitive level. This process involves the conceptual representation of real-world information through imagery, transitioning from a multidimensional topology to a simplified linear form. This transition enables the representation of the real world's system in a semiotic form, complete with meaning and distinct markers.

Model 1: Syntactic Construction Model

In Lakoff's Invariance Hypothesis (1990) and conceptual metaphor theory (Lakoff & Johnson, 1980; Lakoff, 1987, 1990, 2014), the metaphorical concepts of "Event as Action" and "Action as Motion" are crucial, influencing syntactic construction in linguistic analysis. Building on Talmy's theory (1991, 2000) and expanded by others (Zlatev, Blomberg, Devylder, et al., 2021), the integration of syntax with metaphorical cognition is key in constructing a multidimensional analytical framework for comprehensive grammar patterns.

This model, grounded in previous theoretical developments, has a broad scope of application, analyzing underlying principles. In the Invariance Hypothesis, "Event as Action" and "Action as Motion" suggest that motion is a fundamental cognitive component of a sentence. "Trajectory," functioning akin to "Motion," is central to this model, linking various Containers (ContainerLinker). The foundational terms include the "Participant Container" and "Surrounding Container" with "Trajectory" for basic sentence information, and the "Modifier" for specific information based on container content (e.g., adjectives, adverbs, descriptions of motion or action). For representing cross-linguistic distinctions, "Container Marker" functions similarly to overt morphology in traditional grammar (prepositions, conjunctions, and other closed words). The terms "Container" and "Container Linker" represent language topology, forming a grammar construction. "Marker" pertains to language-specific descriptive categories (Beck, 2016), appearing as partial overt morphology. Notably, syntactic differences between languages, such as Chinese, English, and Russian, are highlighted by variations in spatial and temporal prepositions, which are referred to as 'markers' in this context.
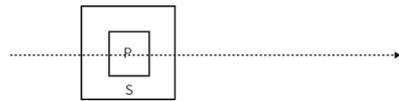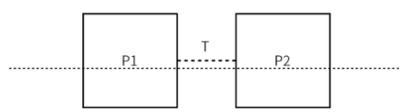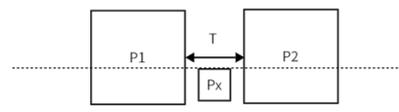
Table 1: Components of the Grammar Construction Model

Basic information – Container/Linker	Syntactic Function	Specified information – Modifier	Overt Morphology
Trajectory Dimension – **Container Linker (T)**	predict	**Specified Trajectory Dimension (MT)** *(description of motion or action: path, direction, boundary)*	prefix/suffix of verbs copular verbs action verbs motion verbs
Participant Dimension – **Participant Container (P)**	subject object	**Specified Participant Dimension (MP)** *(description of objects)*	singular and plural forms qualifiers adjectives cases (genitive, instrument)

Surroundings Dimension – **Surrounding Container (S)** (omissible)	attribute complement clause	**Specified *Spatial* Dimension (MSS)** *(identification of spaces)*	closed words: preposition, conjunction, etc.
		Specified *Temporal* Dimension (MTS) *(identification of time)*	closed words: preposition, conjunction, etc.

Building upon the intricate relationship among Trajectory, Participant Container, and Surrounding Container, the Syntactic Construction Model delineates three core pattern types. These patterns are systematically presented in Table 2, offering a clear illustration of their distinct features and interconnections.

Table 2: Imagery – Topology of the Grammar Construction Model

Types	Imagery-Topology	Subtypes	Examples
1	No destination Trajectory	P – S	Он[P] дома[S]. (He at home) 他[P]在家[S]。 (He at home)
		P – T – S P – S – T	Он[P] учится[T] дома[S]. (He is studying at home) He[P] is studying[T] at home[S]. 他[P]在家[S]学习[T]。 (He at home is studying)
2	Nonobvious Trajectory: Linking Verb/Omit (Like metaphorical proposition)	P – (T)– P	Time[P] is[(T)] money[P]. 时间就是金钱。 Время[P] –[[(T)] Деньги[P].
3	Normal Trajectory (Force From one domain to others)	P – T – P – P	He[P] gave[T] her[P] a gift[P]. Он[P] дал[T] ей[P] подарок[P]. (He gave her present.) Он[P] ей[P] дал[T] подарок[P]. (*He her gave present.) 他[P]给了[T]给她[P]（一个）礼物[P]。 (He gave her present.)

Model 2: Lexical Semantic Structure Model

The semantic interpretation of a lexical item is profoundly connected with its conceptualization as an object. Consequently, the conceptual diversity of the item dictates its semantic complexity in the semiotic domain. Contemporary neuroscience research, particularly focusing on the brain's sensory-motor system and 'mirror neurons' (Gallese & Lakoff, 2005), posits that language serves as a symbolic manifestation of the physical world, imbued with associated values, and simultaneously as an outcome of mental processes. This perspective underpins the bifurcation of the lexical semantic field into concepts pertaining to the real world and those originating in the mental world, in alignment with the conceptual metaphorical mapping view (Lakoff, 1990). The former category includes objects or events within the physical domain, observable through sensory perception, and culturally constructed images (such as dragons, witches) whose prototypes stem from tangible real-world entities. The latter category encompasses the cognitive domain's content, acting as parameters for the physical realm's concepts. It is imperative to acknowledge that these parameters are multimodal, with their value influenced by individual perceptual and emotional variances. As cognitive development advances, concepts become more nuanced and scientifically grounded. For analytical purposes, however, there is a necessary reduction to a one-dimensional scale in the human cognitive world, as illustrated in Table 3. This simplification facilitates the comparative analysis of complex cognitive concepts.

Table 3: Categorization of concepts of lexical items

REAL WORLD	MENTAL WORLD
Object Space – visual objects (e.g., person, cat, table, ground, etc.)	**Perceptional & Emotional Space** – initial stage of cognition (e.g., hot, bitter, hate, etc.)
Object Extensional Space – cultural images from visual objects (e.g., ghost, dragon, etc.)	**Conceptual Space** (scientific terminology) – advanced stage of cognition (e.g., category, relation, force, motion, etc.)
Event Space – dynamic process of visual objects (e.g., dissolve, fire, rain, etc.)	**Scale Linear** (measuring tool) – dimension reduction of cognition (e.g., less, more, better, worse, etc.)

Rooted in the Topology-Imagery Hypothesis, the lexical semantic mechanism encompasses a spectrum of lexical meaning patterns that span both linguistic and cognitive layers, as illustrated in Figure 1 and Table 4. The linguistic semantic layer bifurcates into two principal dimensions: the basic semantic dimension, which includes the objectual and core properties of objects, and the

additional (non-basic) semantic level that integrates cultural and individual dimensions. Notably, this layer exhibits a progression from non-deliberate to deliberate metaphor, traversing physical, cultural/collective, and individual dimensions.

From a lexical conceptual standpoint, the semantic scope of a lexical item undergoes shifts: the cross-cultural general concept of the word, the intra-ethnic or group-specific concept, and the individualized concept, which is linked to embodied and conceptual systems. The individualized level encompasses ontological properties shaped by cultural history or memory. The higher cognitive layer, as detailed in Table 4, provides a more profound understanding of conceptual content.

Activating different segments within the lexical framework is crucial for elucidating meaning within specific contexts (Robert, 2008). To summarize, the Lexical Semantic Structure Model (Figure 1) is predicated on a fundamental assertion: the semantic precision of a lexical item, especially in application within a specific context, is contingent on the accuracy of the item's conceptualization. This conceptualization is significantly influenced by both the physical and cultural environments, and is intricately linked with the development of individual cognitive systems, encompassing perceptual and conceptual frameworks.
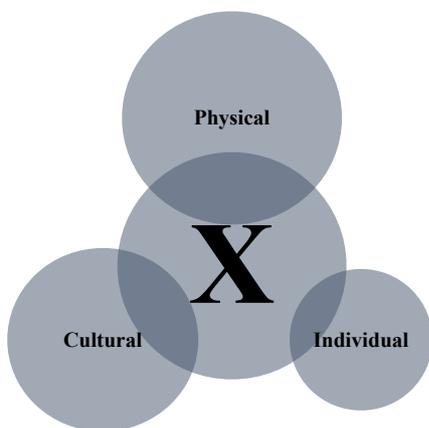

Fig. 1. Linguistic Layer of *Lexical Semantic Structure Model*

Table 4: Components of Lexical Semantic Structure Model

Linguistic Level	Lexical Meaning	Scope	Dimension
	Basic Meaning	worldwide/groups	**Physical dimension**

	Non-basic (Figurative) Meaning	nation/group individual	**Cultural dimension** **Individual dimension**
Cognitive Level	Objects/Events in the real world Cognition in the mental world		

In the realm of traditional lexical semantic analysis, particularly within the "taste" semantic field, the term "bitter" can be deconstructed into elements such as "taste sensation" and "acrid." This deconstruction follows a multifaceted framework where, at the linguistic level, "bitter" is represented as a composite of physical, cultural, and individual elements: {bitter} = {[physical: taste sensation] + [cultural: unpleasant] + [individual: associated memories]}. At the cognitive level, it encompasses various meanings beyond the word "bitter" itself.

In the Emotioncy Type framework (Pishghadam, Jajarmi, Shayesteh, 2016), the lexical item "bitter" encompasses diverse domains of perception, leading to varied concepts and usage frequencies among individuals. This illustrates that lexical items simultaneously occupy multiple dimensions at both linguistic and cognitive levels. Taking "candy" as an example, it may simultaneously exist in physical, cultural, and individual dimensions, associated with emotions (e.g., happiness), perceptions (e.g., sweet or overly sweet), and scientific knowledge (e.g., monosaccharides, polysaccharides). Gallese & Lakoff (2005) highlight that language is inherently multimodal, integrating various interconnected modalities such as sight, hearing, touch, and motor actions. When engaging in comparative analyses with other lexical items, it becomes essential to conduct dimension reduction, which includes examining aspects like the positive affect degree of words. Over the course of personal experiential sensory and cognitive development, the conceptual space of an item expands, incorporating broader dimensions of 'emotioncy' (Pishghadam, 2016, 2020) and a wider array of concepts related to the lexical item. Consequently, due to their multidimensional complexity, lexical items exhibit a rich diversity and complexity in their semantics. This complexity is not just a feature of the lexicon but a reflection of the intricate interplay between language, cognition, and individual experiences.

Model 3: Cultural Analysis Model of Language

Language, deeply influenced by its linguistic environment, derives profound meaning from the

cultural milieu of national groups. This influence includes various factors such as social differentiation (age, gender, and other social backgrounds) (Eckert, 2012; Roberts, 2008). An individual's understanding of the world through their senses is a pivotal aspect of their mental world (Pishghadam, et al., 2016; Pishghadam, et al., 2020). Pishghadam's six-level emotioncy matrix is instrumental in illustrating the degree of world comprehension, which significantly diversifies concepts in the mental world and language expression. Consequently, a cultural analysis model of language, depicted in Figure 2, is proposed. This model, while not accounting for individual 'emotioncy' differences, is associated with a collective cultural profile.

It is important to clarify that this model does not advocate the Sapir-Whorf hypothesis (Whorf, 1997, 2012) nor align entirely with Pishghadam's relativism regarding lexical meaning. Although lexical meaning varies among individuals, a general trend toward convergence and more precise, scientific language use is evident, influenced by cultural interactions in a globalized context. Therefore, the cultural analysis focuses on the communal characteristics of expression.

As shown in Figure 2, the model comprises three layers. The superficial layer includes tangible artifacts and creations, perceivable through the senses (Spencer-Oatey & Franklin, 2012), predominantly related to expressions. The intermediate layer involves conceptual elements within the cognitive domain, and the deep layer corresponds to the cultural background, forming the linguistic expressions' environment. The language environment includes both relatively stable components like geography and dynamic factors such as the economy and politics. Table 5 illustrates the cultural evaluation of lexical items, involving the assessment of emotion degree as positive, negative, or neutral, or applying graded evaluations like -1, 0, 1. For sentences, the measurement tool reflects differences in grammar construction, as per the syntactic construction model, which identifies three types of general containers. The differentiation in cross-language expressions is noticeable in container markers, as exemplified by the frequency of location container markers in Russian compared to Chinese.

The model for text analysis, although not extensively discussed in this paper, can be differentiated based on the theory of optimal relevance in relevance theory (Wilson & Sperber, 2006; Carston, 2006). This approach considers the scale for texts, taking into account the relevance and contextual implications of linguistic expressions.
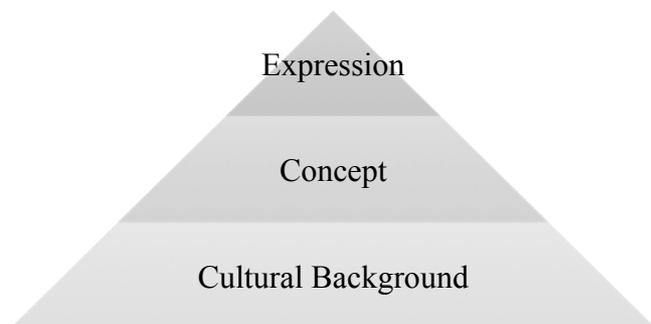
Fig. 2: Cultural Analysis Model of Languages

Table 5: Description of the Cultural Analysis Model of Languages

Level	Subtype	Lexicon/phrase	Sentence	Text
Language	**Unties**	**lexical item/phrase**	**sentence**	**sentences/paragraphs**
	Structure	Lexical Semantic Structure	Syntactic Structure	Information Structure
Concept	**Concepts & Scale**	**Quantity Degree** (Emotion: Positive+/Negative-/Neural |) **Quality Degree** (Span: 0~5)	**Container Construction** (Containers & Container Markers)	**Degree of Relevance** (Inference Information)
Cultural Background	**Factors**	Customs, Politics, Society, Religion, Geography, Environment		

4. Method

4.1 Corpus collection

To ensure the richness of the corpus, the research incorporates data from various sources, including electronic dictionaries, paper dictionaries, and authoritative corpora in the linguistic field.

Table 6. Lexical Resources and Corpora Utilized for Chinese, English, and Russian Languages

	Dictionaries	Corpus

ZN	Han Ci (Online dictionary) (http://www.hydcd.com/) Xiandai Hanyu Cidian = Contemporary Chinese Dictionary. Commercial Press, 2005.	BLCU Corpus Center, BCC (http://bcc.blcu.edu.cn/)
EN	Collins online dictionary (https://www.collinsdictionary.com/us/) Youdao (E-dictionary)	Corpus of Contemporary American English, COCA (https://www.english-corpora.org/coca/)
RU	Большой Китайско-русский Словарь, БКРС (E-dictionary: Comprehensive Chinese-Russian Dictionary) (https://kartaslov.ru/)	Национальный корпус русского языка, НКРЯ (National Corpus of the Russian language) (https://ruscorpora.ru)

4.2 Corpus description/coding

Categorization of Collected Sentences: The primary task involves categorizing sentences based on model-specific characteristics. This categorization process includes:

● Identifying the number of containers in a sentence.

-Marking lexical items related to Trajectory Containers.

-Identifying and annotating lexical items that function as Container Markers.

● Classification of Lexical Items in the 'Taste' Semantic Field: This step focuses on the lexical semantic structure model and encompasses several sub-tasks:

-Performing a frequency analysis of the top ten expressions within the corpus, aiming to compare the occurrences of basic and non-basic meanings, as well as to analyze the proportion of figurative meanings.

-Categorizing and tagging the non-basic meanings based on domains in metaphorical concepts (e.g., X is Food; {X} = {life, people, feeling, thought}).

-Utilizing the cognitive level scale from the model for cognitive measurement. This involves tagging associated emotions with symbols (Positive marked as "+", Negative marked as "-", and neutral emotions marked as "|").

-Conducting a count of emotion markers for each lexical item and comparing the proportions of different emotional connotations associated with the same lexical item.

1) Syntactic Containers with Markers

Table 7: Examples of Sentence Description

Sentence Type	Expression	Container	Trajectory	Container Marker
1	I[P] don't have[T] time[P]. P – T – P	2	(don't) have	
1	У меня[S] нет[T] времени[P]. S – T – P	2	(нет)	y
1	我[P]没有[T]时间[P]。 Wo mei you shijian. P – T – P	2	(没) 有	
2	Life[P] is[T] journey[P]. P – T – P	2	is	
2	Жизнь[P] — это [(T)] путешествие[P]. P – (T) – P	2	—	
2	生命[P]就是[T]旅程[P]。 Shengming jiu shi lvcheng. P – T - P	2	是	
3	I[P] will give[ST] you[P] time[P]. P – T – P – P	3	(will) give	
3	Я[P] дам[T] тебе[P] время[P]. P – T – P – P	3	дам	тебе
3	我[P]给[T]你[P]时间[P]。 Wo gei ni shijian. P – T – P – P	3	给	

2) The conceptualization of X as food

Table 8: Cross-Linguistic Comparison of Literal and Figurative Meanings in Taste-Related Lexical Items Across Chinese, Russian, and English

literal explanation in E-dictionary	ENGLISH	CHINESE	RUSSIAN
having a taste like that of a lemon or fruit that is not ready to eat	sour/acid	酸 suan	кислый
containing, or tasting as if it contains, a lot of sugar	sweet	甜 tian	сладкий

having a strong, unpleasant taste	bitter	苦 ku	горький
having a strong taste because spices have been to flavor it	spicy	辣 la	острый
containing or tasting of salt	salty	咸 xian	солёный

Life is Food

TASTE	CHINESE	RUSSIAN	ENGLISH
sour/acid	寒[酸]落魄的生活 (-)	[кислая] жизнь (-)	a situation turns sour (-) sour mood (-)
sweet	[甜]蜜的生活 (+) [甜]美的生活 (+)	[сладкая] жизнь (+)	sweet spot (+)
bitter	[苦]涩的生活(-) 艰[苦]的生活(-)	[горький] опыт (-) [горькая] доля (-) [горькая] судьба (-)	a bitter pill (for sb) (to swallow) (-) to/until the bitter end (-)
spicy	[辛]酸的生活(-)	[острый] момент (-) [острое] положение (-) (критический, катастрофичный)	
salty	平[淡]的生活(|) 不咸不[淡]的日子(|)	[пресная] жизнь (|)	
taste	生活的[酸甜苦辣] (|) 生活的[味道] (|) 有[滋]有[味]的生活 (+)	[вкус] жизни (|)	first [taste] of live theatre (|)

People is Food

TASTE	CHINESE	RUSSIAN	ENGLISH
sour/acid	衣着寒酸 (-) 穷酸的人 (-)	[кислый] толстяк (-)	a [sour] face(-)
sweet	甜妹子 (+)	[сладкий] ребёнок (+) 可爱的宝宝	a [sweet] man (+) [sweet] tooth (|)
bitter	愁眉苦脸的人 (-) 苦行僧 (|)	[горькие] сирота (-)	[bitter] enemies (-)
spicy	身材火辣的人 (+) 辣妹子 (+) 心狠手辣的人 (-) 毒辣的人 (-)	[острый] умом человек (+)	[hot] girl (+)
salty			doctor worth his or her [salt] (+) the [salt] of the earth (+)
taste			

Feeling is Food

TASTE	CHINESE	RUSSIA	ENGLISH
sour/acid	[酸]楚 (-) 心[酸] (-)	[кислый] смех (-) [кислое] лицо (-) [кислый] взгляд (-) [кислое] настроение (-)	sb. said sourly (-)
sweet	心里[甜]滋滋的 (+)	[сладкая] улыбка (+)	sweet smile (+)
bitter	愁眉[苦]脸 (-) [苦]恼 (-) 痛[苦] (-)	[горькое] ощущение (-) [горький] смех (-)	bitter about sth. (-) bitter tears (-)
spicy	心里热[辣][辣]地 (-) [辛]苦 (ǀ)	[острое] ощущение (ǀ) [острая] боль (-)	
salty		работа [солона] (-)	
taste			a taste for reading (ǀ)

Thought is Food

TASTE	CHINESE	RUSSIAN	ENGLISH
sour/acid	[酸]溜溜的话 (-)	[кислые] слова (-)	acid tongue (-) acid remarks (-)
sweet	[甜]言蜜语 (+)	[сладкие] речи (+)	sweet nothings (+) romantic words (+)
bitter	吐[苦]水 (-)	[горькое] воспоминание (-) [горькая] весть (-)	a long and bitter dispute (-) bitter complaints (-)
spicy	辛[辣]的讽刺 (-) 毒[辣]的话 (-)	[острый] ум (+) [острый] язык (-) [острая] шутка (+)	spicy gossip (ǀ)
salty	[咸]嘴[淡]舌 (-)	[солёные] слова (+) [солёный] анекдот (+) [солёные] шутки (+)	salty language (ǀ)
taste	其[味]无穷 (+) 耐人寻[味] (+)	общение по [вкусу] (ǀ)	tasteless remark (-)

4.3 Results

Basic vs Non-Basic Meaning (Figurative Meaning) (Fig. 3 – Fig. 7)
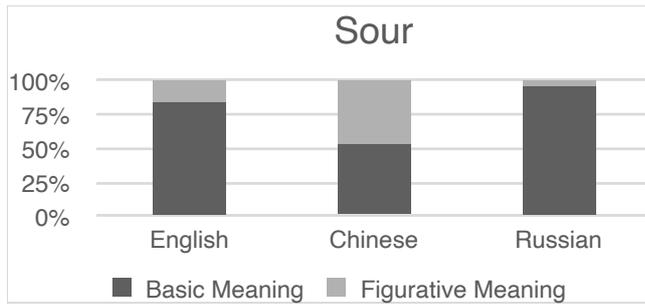
Fig.3. Distribution of Basic and Figurative Meanings of the Term "Sour" Across English, Chinese, and Russian
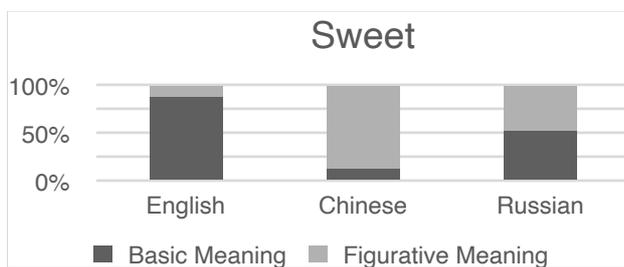

Fig.4. Distribution of Basic and Figurative Meanings of the Term "Sweet" Across English, Chinese, and Russian
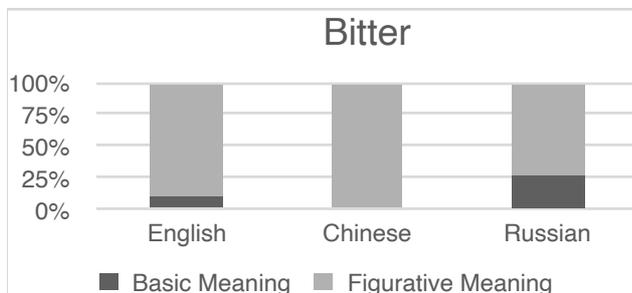

Fig. 5. Distribution of Basic and Figurative Meanings of the Term "Bitter" Across English, Chinese, and Russian
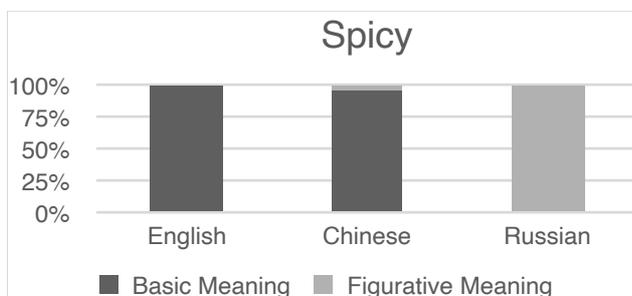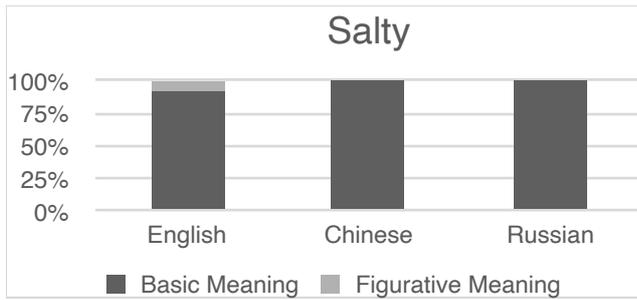

Fig. 6. Distribution of Basic and Figurative Meanings of the Term "Spicy" Across English, Chinese, and Russian

Fig. 7. Distribution of Basic and Figurative Meanings of the Term "Salty" Across English, Chinese, and Russian

The frequency of lexical items within the "taste" semantic field demonstrates notable variation across different languages. According to the semantic lexical model, language expressions can be categorized into basic (literal) and non-basic (figurative) meanings. The proportions of these meanings also exhibit significant disparities across languages. For instance, in both Chinese and English, the term "bitter (苦的 kude, горький)" related to taste has a relatively high incidence of non-literal usage. In Russian, the taste-related term "spicy (辣的 lade, острый)" shows a notable proportion of figurative usage (Figures 8-12).
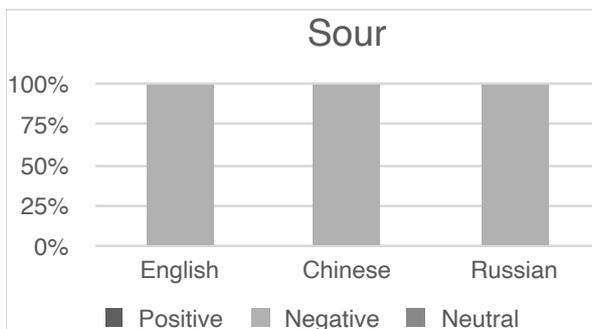
Fig. 8. Distribution of Positive, Negative, and Neutral Connotations of the Term "Sour" Across English, Chinese, and Russian
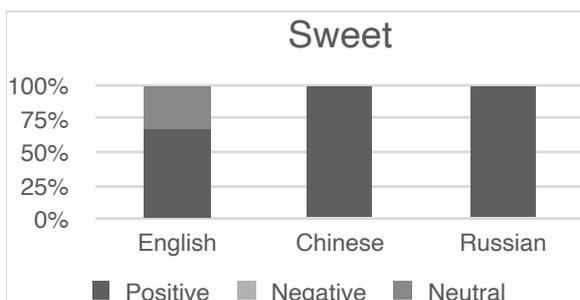
Fig. 9. Distribution of Positive, Negative, and Neutral Connotations of the Term "Sweet" Across English, Chinese, and Russian
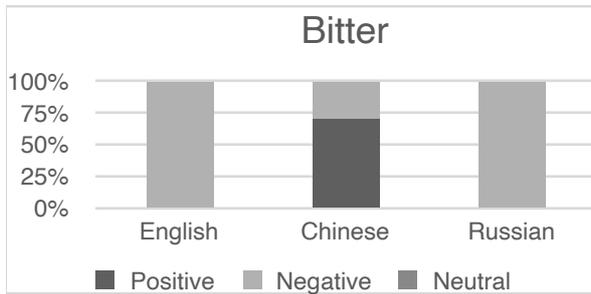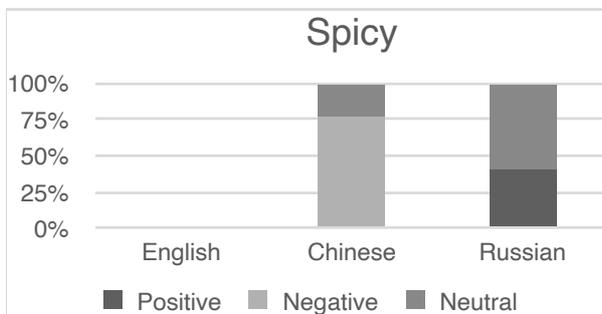

Bitter

Fig. 10. Distribution of Positive, Negative, and Neutral Connotations of the Term "Bitter" Across English, Chinese, and Russian

Spicy

Fig. 11. Distribution of Positive, Negative, and Neutral Connotations of the Term "Spicy" Across English, Chinese, and Russian
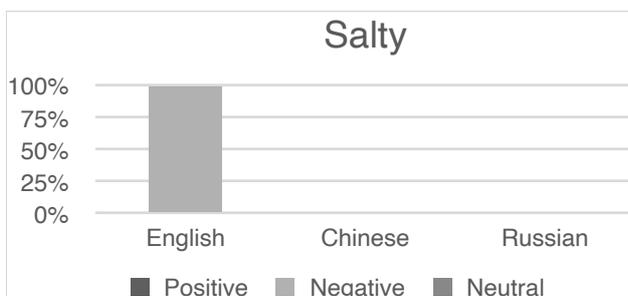

Salty

Fig. 12. Distribution of Positive, Negative, and Neutral Connotations of the Term "Salty" Across English, Chinese, and Russian

From a cognitive standpoint, it is feasible to apply psychological measures to analyze language at a conceptual level. Take, for instance, the metaphorical concept "Thought is Food." This framework reveals significant differences in the degree of "positive emotion" associated with various interpretations of "Thought" across different languages. When categorizing these interpretations based on the degree of positive emotion, a pattern emerges across the three languages: sweet [thought] is perceived most positively, followed by salty [thought], spicy [thought], acid [thought],

and lastly, bitter [thought], which is perceived least positively.

5. Discussion

5.1 Summary of results

Fig. 13. Emotion Scale: From Negative to Positive
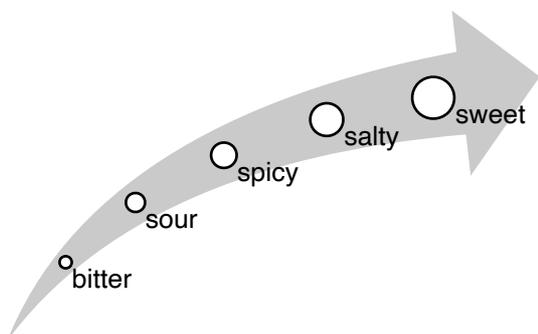
The Emotion Scale, ranging from negative to positive (as depicted in Fig. 13), captures a crucial dimension of lexical concepts—emotional scale—in the intrinsic disparities of figurative meaning. This scale is instrumental in understanding semantic correlations and disparities within a given semantic domain. Within the same domain, lexical items related to taste, for example, can be decomposed into smaller conceptual units collectively comprising [taste] + [associated positive emotion degree]. Additionally, the varying expressions of differentiated concepts using identical lexical items among individuals can be elucidated through the theory of 'Emotioncy' (Pishghadam, Jajarmi, Shayesteh, 2016), which intertwines with individual perception. However, this representation doesn't fully capture the entire lexical semantic pattern. The associated positive emotion degree primarily reflects group-level lexical concepts, indicating that the Lexical Semantic Model integrates both collective and individual levels. Data gathered through frequency-based methods from corpora predominantly depict the collective level and are less effective in reflecting individual differences.

An analysis of container markers in English, Chinese, and Russian sentences reveals both similarities and differences. Each language categorizes information based on metaphorical concepts, with notable differences in container type, container marker, and container linker (trajectory). In languages like English and Chinese, the trajectory information (container linker) is determined by word order, while in Russian, it is dictated by cases and container markers.

These discrepancies are not just a result of linguistic and cognitive differences but are also deeply ingrained in philosophical ideologies. Chinese philosophies like Confucianism and Taoism highlight the unity of nature and humanity, with less focus on "human-centric" thinking. In contrast, Western philosophy often emphasizes the division between "human and nature" and "subjective and objective," resulting in more frequent use of prepositions indicating location in English compared to Chinese. Additionally, English has undergone simplifications in many markers to facilitate cognitive economy.

However, these linguistic differences do not necessarily corroborate the Sapir-Whorf Hypothesis, which attributes language differences to cultural disparities. Language differences are not solely derived from cultural distinctions, though culture does influence language form markers. This influence is evident in the varying number of markers across languages. Nonetheless, the unmanifested markers are also based on real-world relation mapping, maintaining invariant content while undergoing formal variation under the influence of culture. This complexity underscores the nuanced interplay between language, culture, and cognition in shaping linguistic expression.

5.2 Evaluating the Three Models

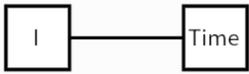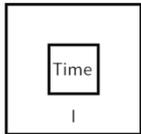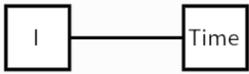### Model 1: Syntactic Construction Model

This model adeptly accommodates variations in sentence markers used to convey similar information across diverse languages. Grounded in the metaphorical concepts of "Event as Action, Action as Motion" (Lakoff, 1990), it posits that all information about real-world events can be metaphorically rendered within the imagery-schema of "Motion". In this framework, "motion" functions as a container linker, connecting the object information containers of the real world, thus synthesizing a comprehensive imagery-schema for event information – a pattern fundamental to general grammar construction.

Traditional grammatical knowledge is typically dissected into atomic units (Croft, 2005). In contrast, contraction grammar seeks to distill primitive image-schemas of general grammar. Radical construction grammar, on the other hand, embodies syntactic relations and relevant roles within its grammatical structure (Croft, 2001, 2005), advocating a nonreductionist theory of syntactic representation (Croft, 2005). However, construction grammar, while encapsulating some general principles or incorporating partial imagery (as in Tamly's Theory), often falls short of forming a relatively complete imagery of an event.

This backdrop underscores the need for a new perspective in the construction of grammar, emphasizing the significance of general patterns. The proposed model endeavors to present a relatively complete general grammar construction pattern. Concurrently, it acknowledges and highlights the differences and diversities between languages, as well as the nuances of container markers, thereby offering a more nuanced and comprehensive approach to understanding and analyzing grammatical structures across languages.

Examples:

Event: Somebody – Time

Expression	Imagery of the Model	Container Type	Trajectory/ Specified Trajectory (T/ST)	Marker
I[P] don't have[T] time[P].		3	ST: Direction (Time to Me)	No
У меня[S] нет времени[P]. (*At me[S] not time[P].)		1	No Obvious Destination Trajectory	a lexical item "y"
我[P]没有[T]时间[P]。(I[P] don't have[T] time[P].)		3	ST: Direction (Time to Me)	No

In the context of English and Chinese, the trajectory is articulated through the lexical item "have (don't have)" or "有 (没有)", effectively linking two containers: one for a person and another for an abstract concept. In Russian, a singular, expansive container represents location, encompassing a sub-container for the abstract concept of time, with a distinct container marker "y," denoting a spatial container.

Model 2: Lexical Semantic Structure Model

This model's multidimensional approach provides a fundamental pattern for lexical meaning, highlighting the close relationship between semantic shift and lexical cognition. The linguistic level

of the model addresses the fundamental multidimensional classification of semantics, while the cognitive level delves deeper into lexical cognition.

Examples: Phrases with the word "Bitter"

- In Chinese: 辛[苦]工作 xinku gongzuo (hard work)

- In Russian: [горькое] ощущение (bitter feeling)

- In English: [bitter] tears

In the semantic field of "feeling," the same lexical item "taste" manifests diverse emotional nuances due to cultural history. In China, under Confucian influence, "diligence" is valorized, and "xinku (hard work)" is positively connoted. In contrast, in English and Russian, this taste is associated with negative emotions. These distinctions, deeply rooted in religious and philosophical perspectives, are reflected in language. Additionally, individual perceptions determine the context and motivation for using this lexical meaning.

Model 3: Cultural Analytical Model

A key distinction, apart from social background influences (Labov et al., 2011; Burnett, 2019), is the variance in "emotioncy" (Pishghadam, 2016, 2020). This leads to conceptual disparities, particularly in human-environment relations. Chinese philosophies like Confucianism and Taoism, which emphasize the unity of nature and humans, contrast starkly with Western thought. These philosophical elements are discernible in both grammar construction and shifts in lexical meaning.

For comprehensive analysis, it's essential to evaluate and compare concepts within the same dimensional scale, whether applied to lexical items or sentences. According to the current analytical model, expressions diverge due to the influence of the language environment, encompassing customs, politics, society, religion, and geography. Distinctions in lexical units stem from cultural history and collective memory, while sentence structure variations are influenced by philosophical factors, evident in the choice of containers and container markers. In syntactic construction, Chinese spatial markers are fewer compared to English and Russian. Even in similar expressions, contextual markers in Chinese may be omitted.

5.3 The Nature of issues

Lexical semantics, as Hudson (1981) argues, are limited in conveying detailed information, necessitating exploration into semantic shifts over time and context. Semantic evolution typically unfolds in two directions: broadening and narrowing. However, their impact on lexical meaning comprehension is bound by the cognitive development and usage processes of the community. This necessitates an examination of polysemy in lexical semantics, distinguishing basic and non-basic meanings at the foundational linguistic level, often influenced by shared ethnic cultural memory and history. The concept of a universal semantic sememe, as proposed by Wierzbicka (1995; 2003), aids in-depth word meaning analyses, providing a guiding framework. Nonetheless, a clear depiction of lexical comparisons and semantic patterns remains elusive for language learners and speakers. The Lexical Semantic Structure Model offers a structured approach for semantic patterns with a cross-linguistic function. At a higher cognitive level, variations in lexical item concepts are systematically evaluated through an abstract concept scale.

Syntactic complexity often manifests as perceived arbitrariness. However, cognitive grammar theories (Langacker, 1987, 1991; Lakoff, 1987; Gallese & Lakoff, 2005; Goldberg, 1992; Talmy, 1991, 2000) alleviate this complexity. The metaphorical mapping of the real world (Lakoff & Johnson, 1980) contributes to the semantic relations of sentence construction (Langacker, 1987, 1991). Talmy's theory (2000) and radical construction grammar (Croft, 2001, 2005) offer valuable insights into grammar construction, exploring the relationship between linguistic structure and conceptual representation. Focusing on motion trajectories, the classification of trajectories linked to containers, or the classification of events in the real world, is crucial. This conceptual mapping provides a basis for understanding linguistic encoding of events. Containers encompass visual objects and surroundings, often with specific modifiers for precision. This approach addresses syntactic arbitrariness, highlighting language systematicity. It is crucial to recognize that, even in cross-linguistic comparisons, syntactic variations are prevalent. These differences can be primarily attributed to variations in container markers—key elements that define how languages encode information. Such variations not only highlight the distinctiveness of each language but also underscore the remarkable diversity and richness of linguistic expression. This diversity reflects the intricate and multifaceted nature of language, demonstrating how linguistic structures are shaped by a myriad of cultural, historical, and cognitive factors. Understanding these syntactic nuances is essential for a comprehensive analysis of language, revealing the depth and complexity inherent in human communication.

6. Conclusion

In cross-linguistic studies, traditional language-specific descriptive categories demonstrate considerable variability. The pursuit of a universally applicable comparative concept is vital in the realm of grammar knowledge. The development of a Grammar Construction Model, grounded in the Imagery-Topology Hypothesis, has substantially mitigated the complexities inherent in cross-language comparisons. Within the unique cultural environments of different languages, variations in cognitive development and identification emerge, manifesting as differences in syntactic markers.

The context-dependency of lexical items often leads to divergent semantic shifts and maps. This divergence is intensified by the richness of polysemy, adding layers of conceptual complexity to the comprehension of lexical meanings. To navigate this complexity, the Lexical Semantic Model operates on dual levels, based on the Imagery-Topology Hypothesis of lexical concepts. At the foundational linguistic level, lexical semantics bifurcate into a universally recognized physical dimension, anchored in the natural sciences, and a cultural and individual dimension, emanating from collective or personal experiences and memories. Progressing to the cognitive level, these dimensions are methodically scaled to a one-dimensional level, simplifying cross-linguistic comparative dimensions and thereby aiding in comprehensive lexical semantic comparisons.

The diversity of socio-cultural phenomena, shaped by cultural history and influenced by cultural contact, is mirrored in the breadth and diversity of linguistic variations. Language, through its semiotic expressions, acts as a mediator in these diverse contexts. Acknowledging and valuing this diversity and differentiation is crucial for understanding and fostering cultural inclusivity. Within the Cultural Analysis Model, cultural differences are quantitatively or qualitatively scaled based on specific activated aspects derived from the Imagery – Typology Hypothesis. This scaling process aims not for cultural assimilation but rather for a deeper appreciation of cultural nuances. In a globalized context, cultural variations are likely to persist and even strengthen their inclination towards inclusivity.

Future research, expanding the comparison of 'container makers' across a broader spectrum of languages, promises to yield more comprehensive data for general grammar construction, further enriching the field of linguistic studies.

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