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A Componential Analysis of the English Preposition "In" and the Chinese Preposition "Zai"

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ABSTRACT

Prepositions are essential linguistic elements that convey both grammatical and semantic functions, particularly in representing spatial and temporal configurations. However, they present significant challenges in second language acquisition, especially for Chinese learners of English. This study employs a componential analysis to investigate the semantic properties of the English preposition "in" and the Chinese preposition "zai" from a cognitive semantic perspective. Definitions of the two prepositions were systematically collected from authoritative English and Chinese dictionaries and analyzed based on semantic components, including force dynamics, ground and figure geometry, and containment configuration. The results reveal three shared semantic components between "in" and "zai," corresponding to spatial, temporal, and manner-based relations. However, distinct componential combinations emerged in the other definitions, with "in" showing 18 more uses than "zai." These differences highlight variations in construal and metaphorical extensions across the two languages. The findings indicate that the broader semantic range and increased metaphorical uses of "in" complicate English preposition acquisition for Chinese learners. The study concludes that effective teaching strategies should go beyond collocation-focused approaches and address the cognitive semantic differences between L1 and L2 prepositions. Enhancing learners' metaphor awareness and understanding of cross-linguistic conceptual frameworks can help bridge these gaps. The results offer theoretical insights into prepositional semantics and practical recommendations for improving EFL pedagogy.

Keywords: Cognitive Semantics; Spatial Relations; Temporal Relations; Construal; Cross-Linguistic Comparison

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1. Introduction

Prepositions are acquired rather late in the language-learning process for L1 learners, and they are reported to be one of the biggest challenges in second-language learning. However, native speakers rarely make any syntactic or semantic errors in prepositional phrases. Cooper explained this discrepancy by pointing out that an English preposition has complex markers in two aspects, including the grammatical aspect of function and relation with its objects, and the semantic aspect[1]. While speakers of the same language share an inventory of perceptions about a specific preposition based on their common cultural background, second language learners don't have this prescribed competence, thus facing cognitive and communicative barriers in understanding these prepositions.

This idea is widely accepted by cognitive linguists. Brugman and Lakoff, along with Lakoff and Johnson, proposed that preposition choice (e.g., "in" in the phrase "in trouble"), as a result of grammaticalization, reflects semantic refinement rather than a loss of meaning[2, 3]. To understand expressions like "in trouble," one must conceptualize "trouble" as a container within which the argument is situated. Such insights underline the phenomenon of language productivity, where closed-class prepositions enable the generation of unlimited prepositional phrases. For instance, the preposition "in" is compatible with physical objects such as "bus," abstract objects such as "mind," or gerund phrases such as "playing the music."

Talmy expanded on this by emphasizing the role of cultural perspectives in shaping the use of prepositions across languages. He found that *linguocultural preselection* (p. 231), the choice of one preposition over another depends on how the speaker schematizes the reality, leads to one possibility of conceptualization among other alternatives[4]. To take the vehicle as an example, English speakers schematize the relation between a passenger and a car as containment through an enclosure structure, and the relation between a passenger and a larger bus as one on top of the other. Native English speakers schematize a bus as a bigger container than a car, and a bus consists of a platform or a walkway in it. Cognitive semantics describes this relation by Figure and Ground, terms borrowed from Gestalt psychology. Figure means an object moving or located with respect to another object, which is the Ground. In English *linguocultural preselection*, the walkway is foregrounded as the Figure, while the cubic container functions as the Ground, providing the background for the spatial relationship being described.

The second line in **Table 1** is the respective French expressions of preposition + vehicle construction. The "in the car" English expression has two layers of meaning corresponding to two different expressions in French, i.e., the physical state of being inside of a car, and the means of travelling by car. When the verb "monter" is added, the means reading is removed, expressing the dynamic movement from outside to inside of the vehicle. The last column shows the difference between English and French *linguocultural preselection* in Figure-Ground schematization. Although the French word "voiture" is more commonly used to signify private motorized vehicles, it can also be used as a hypernym for any vehicle or carriage, such as a train. French speakers only highlight the sememe of the container in both cases without attention to the internal structure of a vehicle. In Chinese, the expressions have more complex syntactic structures because the part of speech becomes hard to categorize and the match of one meaning to one character or one word becomes hard to capture. "Shang" in "shang che" is clearly used as a verb, but this word is also a commonly used preposition in other cases, indicating "on". In the second column, "shang che" carries multiple meanings of Initial position: [+standing], [+outside]; Ending position: [+sitting]; Gravity: [-upward]; whereas in the third column, "shang che" expresses the meanings of Initial position: [+standing], [+outside]; Ending position: [-sitting]; Gravity: [+upward]. This semantic difference is unseen in the linguistic expression but prescribed by cultural background and signified by other situational markers in the context.

Table 1. The choice of prepositions showing the spatial relations between passenger and vehicle.

Languages	Examples		
English	in the car	get in the car	get on the bus
French	dans la voiture/en voiture	monter dans la voiture	monter dans le bus
Chinese	在车里 zai che li/乘车 cheng che	上车 shang che	上车 shang che

This is not but one example showing the complexity of prepositional expression across languages, but it provides a general hint about why prepositions are hard for language learners to properly acquire.

A large corpus of empirical EFL research has reported the misuse of English prepositions of adult learners under the transfer effect from their L1, e.g., Arab, Iranian, Turkish, Korean, Persian, and Spanish [5–10]. These studies uniformly reported misformation, addition, and omission as the three major types of errors due to the conceptual differences between L1 and L2. While these findings have drawn attention to preposition and collocation issues in language teaching, they have largely neglected the conceptual gap regarding the semantics of spatial prepositions across languages.

English preposition is an important closed-class element for describing spatial configuration and relations [4, 11, 12]. These configurations can be understood as image schemas, as proposed by Johnson [13], which are basic conceptual structures derived from our embodied experiences, such as perceiving the environment, moving our bodies, or experiencing force. Image schemas serve as foundational cognitive patterns, extending physical experience to abstract domains like language and metaphor. The use of prepositions demonstrates this kind of extension [14]. For instance, one can fall "in love" or get "into a mess". Talmy pointed out that spatial semantics, whether physically concrete or metaphorically abstract, can be conceptualized through four schematic systems: 1) geometric properties, referring to the spatial characteristics of the Figure and Ground, such as their shapes, boundaries, or sizes; 2) perspective point specification, describing the viewpoint or reference point from which the spatial relationship is perceived; 3) distribution of attention, highlighting which aspects of the Figure-Ground relationship are foregrounded or backgrounded in the conceptualization of space; and 4) Force-dynamics, explaining the interaction of forces between the Figure and Ground, such as causation, resistance, or enablement. Talmy's systems enlighten this study's componential analysis of the spatial preposition "in" by providing a reference list.

Previous cognitive semantic research of the preposition "in" uniformly considers the meaning of containing as the core meaning component. Leech describes x in y as "x is 'enclosed' or 'contained' either in a two-dimensional or in a three-dimensional place y" [15]. Miller and Johnson-Laird described this preposition in the format of "in(x, y), where a referent x is on a relatum y if: (INCL (x, REGION (SURF (y))) & SUPRT (y,x); otherwise go to: PATH (y) & BY (x,y)" [16]. Their formula added a second meaning component to that of Leech that in (x,y) represents a mean or an instrumentality besides the physical containing relation with surface contact.

Ferrando and Tricker went further and proposed a model of the preposition "in" [10]. They categorized the meaning of "in" into four groups, i.e., topological, functional, and force-dynamic configurations, and the combination of the three which they called conceptual schema. In this way, they moved beyond the geometric properties of objects from Talmy and put an emphasis on the meaning of dynamic movement in "in". By taking enclosure as the core meaning, they identified another three components of "in", including "inclusion", "motion from outside", and "landmark controls trajectory" which revealed the manner meaning of the preposition "in".

In parallel with the abundant in-depth study of the English preposition "in" from a cognitive scope, its counterpart in Chinese also received broad attention. However, pure semantic investigation is rarely seen. This is because the basic part of speech categories are understood differently in Chinese, a language without inflectional markers and clear word partition. Shen compared English and Chinese prepositions and indicated that both of them serve to introduce the related object (agent, recipient, patient, and instrument), place, time, etc. [17]. He also noted the frequent omission of prepositions in Chinese, where the meaning is complemented by the listener by conceptual accumulation of lexicons in mind. He roughly suggested considering "zai" as a Chinese counterpart of the English preposition "in" but avoided any specific statements because the idiomatic use of prepositions makes it hard to generalize. This rough equation is widely accepted by Chinese linguists.

There are two relevant landmark studies that thoroughly described the meaning of "zai" together with its grammatical features. The first one is the "zai+location" prepositional phrase analysis of Fan, where he described three semantic

roles of "zai" associated with three syntactic structures as follows: 1) indicating the location of the event under discussion through "in location + NP + VP", 2) the location of the act or the state through "NP + in location + VP", and 3) the destination of the act or the location of the state through "NP + VP + in location"[18].

Another landmark study is Jin on the prepositions of "zai" and "dang" for temporal expression[19]. Jin believed that "zai" must be used in collocation with other words to carry the meaning of temporal containing: "zai + x + shi", "zai + x + localizer" (e.g., "zai x qian", ahead of/before; "zai + x + li", in the period of). When "zai" is used to form temporal phrases, it is also found in the three types of syntactic structures as in the study of Fan[18]. The other preposition "dang" is used in more restricted situations where the temporal container is perceived as very complex or extremely short. Based on Jin's finding, it may be more reasonable to treat "dang" as the counterpart of English "on" or "at". "On" is commonly used before complex time such as a specific date (on the evening of May the first), or to indicate immediacy after something (e.g., On arriving home I discovered they had gone). "At" is often used before a point in time (e.g., at three o'clock).

To give a global look at the literature on the English preposition "in" and the Chinese preposition "zai", a few findings are generalized. Both prepositions involve spatial and temporal configurational meanings expressed by different syntactic structures. Containing and enclosure are their commonly reported semantic components. Both "in" and "zai" consist of static and movement meaning, therefore the Force-dynamic schema and selection of attention from Talmy provide a useful reference in considering which components should be included in the current analysis.

Despite these endeavours, a few research gaps in previous literature should be noted. So far, no complete semantic account or examples of the Chinese preposition "zai" have been provided. English scholars discussed the use of the preposition "in" from a cognitive semantic perspective, but no analysis was conducted to give a full account of "in" by integrating its core meaning of containing space and time, and its metaphorical extensions in other domains.

This research tries to fill these gaps by a componential analysis of prepositions "zai" and "in" across languages. It aims at finding the differences between the two, which may help explain the difficulty of the acquisition of English prepositions by Chinese learners. This study also focuses on identifying the core components and metaphorical components to explain specific kinds of errors produced by EFL Chinese learners.

2. Materials and Methods

This study employs a systematic componential analysis to compare the English preposition "in" and the Chinese preposition "zai." The methodology includes data collection, semantic categorization, and comparative analysis across languages. The following sections outline the materials, procedures, and methods of analysis in detail to ensure replicability.

2.1. Materials

The materials for this study were drawn from established dictionaries in both English and Chinese. For the English preposition, the word "in" was selected as the entry term, and its definitions were retrieved from five authoritative English dictionaries: *Oxford Dictionary of English*, *Oxford Advanced Learner's Dictionary* (8th Edition), *Oxford American Writer's Thesaurus*, *Collins Online Dictionary*, and *Merriam-Webster Dictionary*. Each definition was accompanied by one example sentence, illustrating its contextual use.

For the Chinese preposition, the entry term "zai" was examined using three major dictionaries: *Xiandai Hanyu Cidian (Modern Han Language Word Dictionary)* (7th Edition, pp. 1629–1632), *Hanyu Dazidian (Great Compendium of Chinese Characters)* (2nd Edition, pp. 449–450), and *Xinhua Dictionary* (10th Edition). In analyzing "zai," definitions were considered regardless of their grammatical categorization (e.g., verb, preposition, or adverb). This approach reflects the absence of clear part-of-speech distinctions in certain Chinese dictionaries and aligns with the study's focus on semantics rather than syntax. For instance, *Xiandai Hanyu Cidian* provides explicit part-of-speech classifications, while the other dictionaries do not prioritize such categorizations.

2.2. Data Collection and Analysis

The definitions of "in" and "zai" were extracted and catalogued to form the raw data. Common definitions across dictionaries within each language were aligned and organized according to their frequency of occurrence, while unique definitions were subsequently listed. This process resulted in a Chinese list comprising six definitions for "zai" and an English list consisting of 21 definitions for "in." Each definition was supplemented with an illustrative example sentence to provide contextual clarity.

The semantic analysis involved segmenting each definition into components based on Talmy's schematic systems, which include configurational structure, perspective, attention distribution, and force dynamics. Distinguishing pairs for the English preposition "in" were identified by substituting it with other prepositions such as "on," "at," "into," "under," "over," and "above." Similarly, distinguishing pairs for the Chinese preposition "zai" were generated by replacing it with prepositions or expressions such as "dang (at)," "yu (to/at)," "kao (by/through) + means," "yi (by/through) + manner," "yong (by/through + instrumentality)," and "weile (for)."

To ensure consistency and eliminate redundancy, overlapping semantic components were refined during the cross-review process. For example, the semantic component Figure: [animate/inanimate] (+/-) was excluded because it was already subsumed under the triad of [physical/temporal/abstract]. The final lists were consolidated into two comprehensive componential analysis tables, capturing the refined semantic structures of "in" and "zai."

2.3. Comparative Review

The componential tables for "in" and "zai" were then cross-reviewed to identify shared and distinct semantic components. Both prepositions exhibited common core meanings, such as containment and enclosure, while also reflecting unique semantic distinctions shaped by their respective linguistic and cultural contexts. This comparative analysis aimed to uncover the underlying differences that contribute to the difficulty of acquiring English prepositions for Chinese learners. By integrating missing and additional components, the study ensured a complete and accurate representation of the semantic structures of both prepositions.

3. Results

As is shown in **Table 2** and **Table 3**, generalized semantic components are organized under four categories. Force-dynamics is dependent on the pair of [dynamic/static] (+/-). Ground geometry has two pairs of variables, namely [boundary (+/-)] and [directionality (+/-)], and the triad of [physical/temporal/abstract]. Figure geometry consists of two pairs, i.e., Size: [small/point] (+/-) and [directionality (+/-)], and the triad of [physical/temporal/abstract]. Containing configuration is described by the degree of containing. Absolute containing means total inclusion of the Figure in the Ground in all dimensions and directions. Partial containment means part of the Figure resides outside of the Ground. In the last column, notes are provided regarding the selection of attention in conceptualizing each definition.

In **Table 1**, the sequence of the 21 definitions of the preposition "in" is based on their initial sequence and frequencies in the dictionaries. Most definitions are included in more than three dictionaries. The last three uses are only included once. The definitions listed on top are considered as more central and basic, while the last few definitions are more peripheral usage or involve metaphorical meaning.

For the two special use cases of "in", i.e., definitions 19 and 20, their Ground geometry meaning is marked as "sp", indicating a special physical object. Window and mirrors are flat substances that don't have an interior space in them. However, they have special physical properties that enable them to be related to as containers. A window is made of glass whose transparency permits the entering, staying, and passing of light. Thus, "in 19" special use allows "light in the window". When this use is fossilized, the meaning of window is extended. The window is used to refer to the shop window, which itself becomes a container. That explains the saying "There was a camera for sale in the window".

The mirror is a similar case. With the reflection of light, the mirror shares the semantic feature of a door, although the world behind it is only a virtual reality. Thus, the saying "looking in the mirror" is conceptualized as "looking into a door". In both special cases, the semantic components of a container of window and mirror are highlighted.

Table 2. Componential analysis of English preposition "in".

N.	Definitions	Examples	Force-Dynamics	Ground Geometry			Figure Geometry			Containing Configuration		Note
			[dynamic/static] (+/-)	[physical/tempo-ral/abstract]	[boundary (+/-)]	[directionality (+/-)]	[physical/tempo-ral/abstract]	Size: [small/point] (+/-)	[directionality (+/-)]	Degree: [abso-lute/partial] (+/-)	[space in-between (+/-))	
1	at a point within an area or a space	in Africa	-	p	+	-	p	+	-	+	+	
2	within the shape of sth; surrounded by sth	she was lying in bed.	-	p	-	-	p	+	-	-	-	Space
3	into sth as a result	He dipped his brush in the paint.	+	p	-	-	p	+	+	+	/	
4	entry, introduction, insertion, superposition, or inclusion	went in the house	+	p	+	-	p	+	+	-	+	D of F
5	during a period of time	in 2009	-	t	+	+	t	-	+	+	/	Proper temporal containing
6	After a particular length of time	to return in a few minutes	-	t	-	+	t	+	+	+	+	D of G & F
7	(used in negation or after first, last, etc.) for a particular period of time	I haven't seen him in years.	-	t	+	+	t	+	+	+	-	Proper Temporal containing
8	wearing with	dressed in their best clothes	-	p	+	-	p	+	-	-	-	Unsatisfactory containing
9	physical surroundings	We dance in the rain.	-	p	-	-	p	+	-	+	+	Satisfactory physical containing
10	a state or condition	I'm in love.	-	a	-	-	p	/	-	+	-	Proper mental containing
11	involved in sth; taking part in sth	act in a play	-	p	-	-	p	/	-	+	-	Proper Behavioural containing
12	sb's job or profession	He is in the army.	-	a	-	-	p	/	-	+	+	
13	quality	There is artistry in what he does.	-	a	-	-	a	-	-	+	+	
N.	Definitions	Examples	Force-dynamics	Ground geometry			Figure geometry			Containing configuration		Note
			[dynamic/static] (+/-)	[physical/tempo-ral/abstract]	[boundary (+/-)]	[directionality (+/-)]	[physical/tempo-ral/abstract]	Size: [small/point] (+/-)	[directionality (+/-)]	Degree: [abso-lute/partial] (+/-)	[space in-between (+/-))	
14	showing the language, material, etc. used	Say it in English.	+	a	-	-	a	-	+	/	/	Means
15	concerning sth	a country rich in minerals	-	a	-	-	a	-	-	/	/	Domain
16	while doing sth; while sth is happening	in planning public expenditure, it is better to be prudent.	-	t	+	+	a	+	-	+	+	
17	used to show a rate or relative amount, partition	a gradient of one in five	-	a	+	-	/	/	-	+	/	

Table 2. *Cont.*

N.	Definitions	Examples	Force-dynamics	Ground geometry			Figure geometry			Containing configuration		Note
			[dynamic/static] (+/-)	[physical/tempo-ral/abstract]	[boundary (+/-)]	[directionality (+/-)]	[physical/tempo-ral/abstract]	Size: [small/point] (+/-)	[directionality (+/-)]	Degree: [abso-lute/partial] (+/-)	[space in-between (+/-))	
18	indicating purpose	In attempting to save the child from drowning, she nearly lost her own life.	-	a	-	+	p	/	+	/	/	
19	[special use] behind: Something that is in a window.	The light in the window went out.	-	sp	-	-	p	+	+	/	/	Volume feature
20	[special use] mirror: the mirror shows an image of	I couldn't bear to see my reflection in the mirror.	+	sp	-	-	p	+	-	-	+	Volume feature
21	[special use] surface: If there is something such as a crack or hole in something, there is a crack or hole on its surface.	There was a deep crack in the ceiling above him.	-	p	-	-	p	+	-	-	+	

Note: "/" is applied when this component is not applicable or not in the scope of attention of conceptualization in the definition.

Table 3. Componential analysis of Chinese preposition "zai".

No.	Definitions	Examples	Force-Dynamics	Ground Geometry			Figure Geometry			Containing Configuration	
			[dynamic/static] (+/-)	[physical/tempo-ral/abstract]	[boundary (+/-)]	[directionality (+/-)]	[physical/tempo-ral/abstract]	Size: [small/point] (+/-)	[directionality (+/-)]	Degree: [abso-lute/partial] (+/-)	[space in-between (+/-))
1	the spatial location of a substance	Wo jintian bu zai changli. (I am not in the factory tonight).	-	p	+	-	p	+	-	+	+
2	having member-ship in a group	Zai dang (in the party)	-	p	+	-	p	-	-	+	+
3	indicating the time of an event	Shiqing fasheng zai qunian (It happened in last year).	-	t	+	+	t	-	+	+	+
4	showing a state or condition in a profession	Zai wei (in position)	-	p	+	-	p	-	-	+	-
5	indicating the range of an event	Zhejian shi zai fangfa shang haiyao yanjiu (This thing needs to be researched in the method).	-	a	-	-	a	-	-	/	/
6	indicating manner and means	Zai tade bangzhu xia (with his help)	+	a	-	-	a	-	+	/	/

When the Figure or Ground has the component of [+temporal], it also has [+directionality] because the flow of time is directional and irreversible. When the two pairs of components in the category of Containing configuration are all positive, the containing relation is regarded as satisfactory. The combination of ([+absolute], [-space in-between]) indicates proper containing, which means overlapping of Figure and Ground on point in both vertical and horizontal directions and in the temporal dimension. The combination of ([-absolute], [-space in-between]) suggests an exceeding of the contained, as is the case for "wearing with", one's foot and hands exceeding the clothes in exposure to the air. In these circumstances, if we exchange the Figure and the Ground, we may use other prepositions to describe their spatial relation, for example, "put on the clothes". The combination of ([/], [/]) means that the containing relation is not applicable to the definition, such as definitions 14 and 15. When "in" is used to introduce the means of an act or the range of domain for what is under discussion, the enclosure or inclusion meaning component of "in" is completely abandoned.

Chinese dictionaries provide much rougher definitions for "zai" than English dictionaries. Many of the definitions are associated with the verbal use of "zai". Only six prepositional definitions can be generalized. The omission of prepositions in Chinese is common and it may be one of the reasons for this dramatically smaller number of definitions than English. All six definitions are found in all three dictionaries, so we can say that they are core meanings of "zai".

4. Discussion

During the analysis, nine features are selected to describe the semantic components of a prepositional meaning. This allowed for the comparison of the similarity between "in" and "zai" in a given meaning by calculating their overlap of components, resulting in a Similarity Score (SS) ranging from 0 to 1:

0: Completely different.

1: Completely identical.

Calculation Principle

Comparison Unit: a prepositional meaning consisting of 9 semantic components. For example, the unit for "zai 1" or "in 1" could be represented as:

F-d: [-dynamic]; G: [+physical], [+boundary], [-directionality]; F: [+physical], [+small], [-directionality]; C: [+absolute], [+space in-between]

Formula

$$\text{Similarity Score} = \frac{2 \times \text{number of identical components}}{\text{number of components in Combination 1} + \text{number of components in Combination2}}$$

Three definitions of Chinese "zai" and English "in" have identical semantic components, with an SS of 1. The first one is "zai 1"- "in 1" which indicates the location of a substance within a spatial range. The second one is "zai 5"- "in 15" which indicates the scope of an event. The third one is "zai 6"- "in 14" that indicates the manner or means. Although these "zai"- "in" pairs have completely identical components, it is observed that the definitions of "in" in dictionaries tend to have narrower semantic scopes compared to their counterparts in "zai" because additional attention is emphasized, as shown by the notes in the last column in **Table 2**.

Furthermore, **Table 4** also lists three pairs of "zai" - "in" usages with an SS of 0.89, where only one component differs between the pairs. Notably, even with only one differing component, "zai" and "in" can occur in entirely distinct contexts in the two languages. For instance, in the second-to-last pair in **Table 4**, the only differing component is the size value in the Figure geometry dimension. However, "zai" in this case conveys a more metaphorical sense of membership or affiliation, whereas "in," with its Figure: size: [+small] component, is used in a more conventional locative context to denote spatial positioning.

Despite these similarities, the analysis shows significant differences in the distribution of physical, temporal, and abstract relations. English preposition "in" is used for relating physical Figure and Ground in 8 out of 21 definitions (38.1%), for temporal relations in 4 out of 21 definitions (19.1%), and for abstract relations in 9 out of 21 definitions (42.8%). On the contrary, the Chinese preposition "zai" features a 50% definition for realizing physical relations, 16.7% for temporal relations and 33.3% for abstract relations.

Table 4. Similarity of components of "zai" and "in".

N-Definition of "zai"	N-Definition of "in"	SS	Common Components	Different Components
1-the spatial location of a substance	1-at a point within an area or a space	1	F-d: [-dynamic]; G: [+physical], [+boundary], [-directionality]; F: [+physical], [+small], [-directionality]; C: [+absolute], [+space in-between]	/
5-indicating the range of an event	15-concerning something	1	F-d: [-dynamic]; G: [+abstract], [-boundary], [-directionality]; F: [+abstract], [-small], [-directionality]; C: [NA], [NA]	/
6-indicating manner and means	14-showing the language, material, etc. used	1	F-d: [+dynamic]; F-G: [+abstract], [-boundary], [-directionality]; F: [abstract], [-small], [+directionality]; C: [NA], [NA]	/
1-the spatial location of a substance	9-physical surroundings	0.89	F-d: [-dynamic]; G: [+physical], [-directionality]; F: [+physical], [+small], [-directionality]; C: [+absolute], [+space in-between]	Gzai: [+boundary]; Gin: [-boundary]
2-having membership in a group	1-at a point within an area or a space	0.89	F-d: [-dynamic]; G: [+physical], [+boundary], [-directionality]; F: [+physical], [-directionality]; C: [+absolute], [+space in-between]	Fzai: [-small]; Fin: [+small]
3-indicating the time of an event	5-during a period of time	0.89	F-d: [-dynamic]; G: [+temporal], [+boundary], [+directionality]; F: [+temporal], [-small], [+directionality]; C: [+absolute]	Czai: [+space in-between]; Cin: [/]

To better understand the difficulties Chinese learners face in conceptualizing metaphorical meanings when learning English, attention is focused on the differences between "in" and "zai" when they involve semantic components of an abstract value. A comparison of the six definitions of "in" and the 21 definitions of "zai" that include the components Ground geometry: [+abstract] and Figure geometry: [+abstract] reveals notable differences between English and Chinese. Among them, three definitions of "in" simultaneously include both abstract properties for the Figure and Ground:

"in 13" refers to an entity's quality, as in "There is artistry in what he does."

"in 14" indicates the language, material, or means used in an action, emphasizing the method, as in "The story was written in English."

"in 15" means concerning, with attention on the domain of an event, as in "This country is rich in minerals."

For Chinese "zai," two definitions simultaneously include both abstract properties for the Figure and Ground: "zai 5" indicates the range of an event, which shares the same semantic componential combination as "in 15." Their Similarity Score (SS) is 1. "zai 6" indicates manner or means, which is semantically identical to "in 14," this pair also results in an SS of 1.

At this point, the use of these two prepositions in English and Chinese demonstrates significant semantic overlap. However, this observation alone does not explain why Chinese speakers struggle to conceptualize the metaphorical meanings of prepositions in English. Further comparisons of definitions where "in" and "zai" include Ground geometry: [+abstract] and Figure geometry: [-abstract] reveal substantial differences.

Several definitions of "in" consist of this combination of abstract Ground geometry and non-abstract Figure geometry:

"in 10" is often used to describe being in a state or condition, such as emotional or psychological states: "in love/despair", physical conditions: "in pain/good health", social or situational conditions: "in crisis/trouble", and temporary states: "in use/preparation".

"in 12" refers to engaging in a job or profession, such as "in the army."

"in 17" shows a rate or relative amount, such as "a gradient of one in five."

"in 18" indicates purpose, as in "In attempting to save the child from drowning, she nearly lost her own life."

In contrast, this combination of Ground geometry: [+abstract] and Figure geometry: [-abstract] has no corresponding usage in the Chinese "zai." The four definitions of "in" mentioned above show an SS of 0.56 with "zai 5," and an SS of 0.33, 0.33, 0.33, and 0.56, respectively, with "zai

6." This poor similarity suggests that the Chinese typically employs grammatical or lexical means to express the meanings conveyed by these definitions of "in." For instance, the meaning of "in love" is commonly expressed in Chinese as "相爱 (mutually love)," which functions as a verb rather than a prepositional phrase. Such grammatical differences provide an explanation for the challenges Chinese learners face when attempting to grasp the metaphorical uses of English prepositions.

These differences suggest that "zai" has a narrower scope in temporal and metaphorical applications compared to "in," which may contribute to difficulties faced by Chinese learners in acquiring English prepositions. This idea aligns with findings from EFL research in various ways. First, metaphorical usage is a major type of prepositional error in production [20]. The lexical errors of Chinese EFL learners in production [20] have been statistically analyzed and 34 out of 323 error tokens were identified as a misuse of prepositions [21]. It was found that prepositions in idioms or particular phrases that carry relational meaning between abstract entities are hard for learners to acquire. The current research finding indicates that the proportion and variety of metaphorical use of English "in" and Chinese "zai" is different. This mismatch may increase the difficulty for Chinese learners to understand and produce prepositional phrases that contain abstract Figure and Ground.

Furthermore, the findings resonate with the work of Li and Cai [22], who observed that Chinese learners struggle to construct the principled polysemy network of prepositions. While learners often master the core meanings of prepositions, peripheral meanings, such as involvement in abstract domains or activities, remain difficult to acquire. This study underscores similar patterns, as the core semantic components of "in" and "zai" exhibit significant overlap in spatial and temporal containment, whereas peripheral definitions involve divergent componential sets and distinct construals.

From a theoretical perspective, the study highlights the importance of componential analysis in understanding cross-linguistic differences in prepositional semantics. The detailed comparison of "in" and "zai" demonstrates how cultural and cognitive factors influence the construal of spatial, temporal, and abstract relationships. This approach provides a systematic framework for examining other prepositions across languages and deepens our understanding of linguistic typology and conceptualization.

Pedagogically, the findings suggest that language instructors should emphasize metaphorical and abstract uses of prepositions in teaching English as a Foreign Language (EFL). Beyond teaching collocations, as suggested by Yuan [23], incorporating awareness of conceptual metaphors into the learning process has been shown to yield significant benefits. For example, a study on the application of conceptual metaphor to preposition learning [24] demonstrated that fostering learners' conceptual metaphor awareness enhances their ability to infer meanings, supports long-term retention, and facilitates the acquisition of nuanced prepositional uses. These findings align with the current study's emphasis on understanding the cognitive frameworks underlying prepositions and their metaphorical extensions.

Integrating these approaches, instructors could design multimodal teaching interventions that combine collocations with conceptual metaphors. This dual emphasis allows learners not only to understand prepositions in context but also to predict and internalize new senses through metaphorical extensions. Specific focus should be placed on peripheral meanings, which often pose greater challenges for learners. Additionally, tailored instructional materials, such as contrastive semantic exercises and visual aids, could help learners internalize the figure-ground relationships and conceptual schemas that underlie English prepositional use.

Building on the findings of this study, future research could explore several related areas. One potential area of exploration involves extending the componential analysis to other prepositional pairs across different languages. For instance, comparing English "on" or "upon" with Chinese "shang", or analyzing locative prepositions in languages with rich spatial systems, such as Korean or Finnish, could yield insights into how languages encode spatial relationships and metaphorical extensions. Investigating whether similar semantic dimensions, such as force-dynamics, containing configuration, or figure-ground relations, emerge universally across languages could contribute to typological and cognitive linguistics.

Another promising direction is examining how learners with diverse linguistic backgrounds acquire prepositions. While this study highlights challenges specific to Chinese learners of English, further studies could involve learners

from typologically distinct languages, such as Arabic, Spanish, or Japanese. Cross-comparing these learner groups would clarify whether difficulties with prepositional systems are primarily due to L1 transfer effects, cognitive universals, or teaching practices. Longitudinal studies could also track how learners' comprehension and production of prepositions evolve over time, particularly for abstract and metaphorical usages.

The findings of this study suggest that certain mismatches in semantic components, particularly in metaphorical extensions, could contribute to persistent learner errors. Future research could design targeted interventions, such as incorporating conceptual metaphor theory into classroom practice or leveraging visual-spatial tools to teach prepositions in context. For example, experimental designs might test the effectiveness of presenting prepositions through embodied experiences or gamified environments, where learners actively manipulate objects to represent spatial and abstract relationships.

Finally, future studies could integrate insights from fields such as psycholinguistics and computational linguistics. This study only briefly touches upon the selection of attention in conceptualizing certain prepositional meanings, particularly in cases where noticing differences in the figure or the specific forms of containing is crucial. However, a more in-depth componential analysis of attention was not conducted in this research. Future work could design schematic configurations of prepositions in visual form and use eye-tracking experiments to test how speakers with different linguistic backgrounds allocate attention while processing prepositions. Such research could further explain whether second-language learners adequately focus on the semantic components of prepositions, thereby providing valuable theoretical insights into the language acquisition process.

5. Conclusions

This study conducted a componential analysis of the Chinese preposition "zai" and the English preposition "in" from a cognitive semantic perspective, providing a detailed account of their core meanings and metaphorical extensions. The findings highlight the shared semantic components of spatial and temporal containment, as well as the divergences in their metaphorical uses. Specifically, three definitions of "zai" and "in" were found to share identical semantic components: "zai 1"-"in 1" (spatial containment), "zai 3"-"in 5" (temporal inclusion), and "zai 6"-"in 14" (manner or means). However, the remaining three definitions of "zai" and 18 definitions of "in" exhibited distinct componential combinations, reflecting differences in construal and conceptualization across these two languages.

The results support previous empirical findings from corpus-based studies on Chinese EFL learners, which suggest that first-language transfer contributes to prepositional misuses. This study advances this understanding by demonstrating how differences in construal and semantic componential combinations of "zai" and "in" may underlie these transfer effects. The findings suggest that cognitive semantic differences between L1 and L2 prepositions are critical in explaining learners' difficulties. These insights have important implications for language teaching and learning. While improving the teaching of prepositional collocations and contextual combinations is essential, this study emphasizes the need for English teachers to address the deeper cognitive and semantic differences between L1 and L2 prepositions. Enhancing learners' metaphor awareness and providing explicit instruction on the conceptual frameworks underlying prepositions may significantly improve their understanding and usage.

For future research, this study suggests extending the componential analysis to other prepositions, such as "on" and "shang," or to languages with diverse typological systems, to examine broader cross-linguistic patterns of spatial, temporal, and metaphorical construals. Additionally, studying how learners with different first-language backgrounds deal with semantic differences in prepositions could help determine whether such challenges are universal or language-specific. Finally, incorporating cognitive semantics into EFL pedagogy, such as through visual tools or experimental approaches like eye-tracking, could help improve prepositional instruction and deepen understanding of cross-linguistic semantics.

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Conflicts of Interest

The author declares no conflict of interest.

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