When Endpoint Meets Endpoint:
A Corpus-based Lexical Semantic Study of Mandarin
Verbs of *Throwing*

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ABSTRACT

Since verbal semantics began to receive much attention in linguistics research, many interesting findings have been presented regarding the semantic structure or meaning contrasts in the lexicon of Chinese [cf. Tsai, Huang & Chen, 1996; Tsai *et al*, 1997; Liu, 1999, etc]. Adopting a corpus-based approach, this paper aims to further study and fine-tune Mandarin verbal semantics by exploring the lexical information specific to verbs of throwing, with four pivotal near-synonomous members: *TOU* (投), *ZHI* (擲), *DIU* (丢), *RENG* (扔). To account for their semantic differences, two kinds of 'endpoints' are distinguished: the *Path-endpoint* (i.e., the Goal role) vs. the *Event-endpoint* (i.e., the resultative state). These two variables are crucial for cross-categorizing the four verbs. Although the verbs all describe a directed motion with a Path in their event structure, they differ in their lexical specifications on participant roles and aspectual composition. *TOU* and *ZHI* have a specified Path-endpoint while *DIU* and *RENG* do not specify a Path-endpoint. Moreover, *TOU* and *ZHI* can be further contrasted in terms of the spatial character of the Path-endpoint they take: *TOU* selects a spatially bounded Path-endpoint while that of *ZHI* is unspecified in this regard, as manifested by the fact that *TOU* collocates most frequently with a CONTAINER-introducing locative. On the other hand, *DIU* and *RENG* can be further differentiated in terms of event composition: only *DIU*, not *RENG*, allows an aspectual focus on the endpoint of the event contour (the Event-endpoint) since it manifests a resultative use. The observed distinctions are then incorporated into a representational paradigm called the Module-Attribute Rep-resentation of Verbal Semantics (MARVS), proposed in Huang & Ahrens [1999].

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Finally, conclusions are drawn as to the most effective approach to lexical semantic study of Mandarin as well as theoretical implications in general.

Keywords: Mandarin verbs, Lexical semantics, Verbs of throwing, Event-endpoint, Path-endpoint

1. Introduction

This work presents a corpus-based approach to the lexical semantic study of a particular class of Mandarin verbs - verbs of *throwing*. In order to account for the observed differences in use patterns among the verbs, the notion of 'event focus' with its implication on 'event-structure attributes' is introduced in this paper. It aims to show that a semantically-constrained framework of event structure is needed to make sense of the crucial distributional facts in lexical differentiation.

1.1 Verbal Semantics

A recent focus of linguistic studies has been lexical semantics, especially verb meanings. Being the most essential part of the lexicon, verbs provide the key to studying the nature of lexical knowledge as well as sentence processing. Most lexical semantic studies on verbs share a common assumption that *the syntactic behavior of a verb, especially its argument expression, is determined by the meaning of the verb* [Pustejovsky 1995, Levin 1993, Atkins and Levin 1991, Atkins *et al.* 1988, etc.]. However, two issues still need to be further explored: 1) what exactly makes up verbal semantics? 2) how exactly can the differences in argument expression be attributed to lexical semantic features? Instead of looking for alternation patterns that are class-dependent, this study focuses more on corpus-based morpho-syntactic behavior as an indicator of lexical-semantic differences.

From the perspective of Chinese linguistics, previous studies on the Mandarin verb system have attempted to categorize verbs into classes with respect to general semantic types [e.g. 'active' vs. 'stative', Chao 1968], argument structure [Her 1990, Tsao 1996], or a hybrid of event types and thematic roles [CKIP 1988]. Given the typological and parametric variations among languages, some of the frameworks used for English cannot be readily transferred to Chinese. Liu [1996b] found that a purely alternation-based approach, such as that of Levin 1993, may not be adequate for categorizing and describing Mandarin verbs. A more **semantically constrained** system is indeed needed for natural language processing purposes. This study, thus, aims to provide detailed analysis of finer semantic distinctions as preparation for a complete representation of Mandarin verbal meanings.

1.2 Corpus-based Study of Near-Synonyms

In response to the need of fine-tuning verbal semantics, Tsai, Huang, and Chen [1996] presented an interesting work on differentiating a pair of near-synonyms - *gaoxing* (高 興) 'happy, glad' and *kuaile* (快樂) 'happy, joyful'. These two verbs are semantically similar but syntactically distinct in many respects. By examining the correlation between their syntactic behaviors and lexical semantic properties, Tsai et al. showed that the syntactic contrasts can be systematically explained with two semantic features: <±control> and <± change-of-state>. The same account can also be extended to the semantic distinction of near-synonym pairs in English and French.

Adopting a similar approach, Liu [1999] examined another interesting set of near-synonymous verbs - *jian* (建), *gai* (蓋), and *zao* (造), roughly glossed as 'to build'. The three verbs are supposed to be prototypical transitive verbs involving creation of physical entities, but corpus data show that they have very little in common. Their distinct morphosyntactic behaviors provide revealing indications of their distinct lexical properties. Framing their differences based mainly on a cognitive-semantic perspective, the study showed that verbs may share the same cognitive schema but profile different event focus, incorporate various degrees of object specification, and map onto varying constructional frames due to distinct event structures and argument saliency.

As part of a long-term project on the lexical semantic study of Mandarin verbs, the present work extends the research frontier to a new semantic field with four contrastive near-synonyms - *TOU* (投), *ZHI* (擲), *DIU* (丟), and *RENG* (扔), all glossed as 'to throw'. It is believed that only a comprehensive corpus-based study on these verbs can render significant contrasts that help to differentiate their unique meanings.

1.3 Focus of the Paper

The four verbs of throwing are generally viewed as belonging to the same semantic field [Grandy 1992], representing prototypical transitive verbs that 'instantaneously cause ballistic movement by imparting a force' [Levin 1993]. However, as near-synonyms, they are bound to involve certain contrast sets [Grandy 1992], and the verbs have not been adequately examined in terms of their contrastive semantic properties. Adopting a goal similar to that of some lexicographers as well as linguists [e.g., Levin, 1993; Atkins and Levin, 1991; Atkins *et al.*, 1988], this study attempts to establish semantic-syntactic interdependences by observing the morphosyntactic behaviors of the verbs displayed in a large corpus. Their distributional patterns in the corpus help reveal the semantic features inherent in their meanings. For the four verbs of throwing, except for their common transitive use, they display quite different association patterns: *TOU* and *ZHI* form a

subgroup and differ from *DIU* and *RENG* in at least two respects:

- Both *TOU* and *ZHI* may take a Goal as the direct object, but *DIU* and *RENG* do not (e.g. *TOU- lan* (投籃) 'to shoot the basket', *TOU-hu* (投湖) 'to throw (oneself) into the lake'; *ZHI- di-you-sheng* (擲地有聲) 'to throw (something) to the ground with a thump').
- *DIU* and *RENG* form typical V-V compounds with V1 (Manner) or V2 (Result)[1], while *TOU* and *ZHI* do not seem to form these compounds (e.g. *luan DIU/RENG* (亂丟／扔) 'to recklessly throw (something)', *DIU/RENG diao* (丟／扔掉) 'to throw away).

Moreover, further contrast can be found within the same group. Although both specify a Path-endpoint, *TOU* selects a *spatially bounded* Path-endpoint, but *ZHI* does not. This is evident from the fact that when occurring with a locative phrase, about 76% of the occurrences of *TOU* take *ru* (入) or *jin* (進) 'into' as the locative; that is, *TOU* collocates most frequently with a CONTAINER-goal while the majority (87%) of the occurrences of *ZHI* is followed by *xiang/chou/wang* (向／朝／往) 'toward', which indicates that the path of *ZHI* is not specified for spatial boundedness. As for the other pair, *DIU* and *RENG* can be further differentiated based on their aspectual specifications: *DIU* may be used to describe the endpoint of an event, i.e., the resultative state of *DIU* , while *RENG* does not have a stative use. The observed distinctions are then represented from the viewpoint of a recently proposed framework that takes event-structure attributes as the primary defining mechanisms for lexical semantic contrasts [Huang and Ahrens 1999, Huang, Liu and Tsai 1999]. It is through the characterization of eventive information that the verbs studied here can be best differentiated (details in Section 4).

1.4 The Data

The data for the analysis presented in this paper come from a Mandarin corpus, the Sinica Corpus, which is the largest balanced corpus of both written and spoken contemporary Mandarin, containing a total of 5 million words and developed by the CKIP group at Academia Sinica, Taiwan. The relevant data were extracted from the corpus by means of a key-word search with 30 additional words on either side. The total number of occurrences of each verb follows:

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[1] While the grammatical category of the elements expressing Manner and Result may be controversial, we take them as verbs here, assuming that the issue of their grammatical status may not be crucial to the argument.

TOU: 556   *ZHI*: 303

DIU: 268   *RENG*: 77

Following the above background introduction, section 2 in this paper outlines the preliminary contrast that exists among the four verbs. Section 3 then details their distributional differences. Section 4 establishes a systematic representation of the semantic distinctions. Finally, section 5 concludes with a discussion of the significance of this work.

2. Preliminary Observation: *TOU* vs. *DIU*

As members of the near-synonym set pertaining to the action of 'throwing,' the four verbs *TOU, ZHI, DIU,* and *RENG* display quite different morpho-syntactic patterns, despite their semantic class membership. Conceptually and theoretically, each group of near synonyms constitutes a contrast set that is a component of a semantic field [Grandy 1992]. The purpose of comparing their behavior is, then, to locate the linguistic relation that defines the contrast.

2.1 Interpretational Distinction between *TOU* and *DIU*:

By encoding a ballistic movement, the four verbs can potentially be associated with a Path contour which ideally contains a start-point, a trajector, and an endpoint [cf. Lakoff 1987]. The major difference among the verbs lies exactly in their inherent specification of the Path: they highlight various facets of the path. Our initial observation starts with the different interpretations that *TOU* vs. *DIU* may render when followed by the same object-theme, forming a V-O compound. As shown in (1) below, *TOU-qiu* (投球) and *TOU-piao* (投票) may differ completely from *DIU- qiu* (丟球)/*DIU-pia* (丟票) in terms of manner and directionality:

   (1) Interpretational Differences between *TOU-QIU* (投球) and *DIU-QIU* (丟球):

	MANNER	DIRECTIONALITY
TOU-QIU	carefully targeting	toward a single and precise direction
DIU-QIU	randomly throwing	no specific direction

2.2 Distinction in Path-Endpoint

The second observation concerns the semantic role of the direct object following *TOU* or *DIU*, which is termed the Path-endpoint. By *Path-endpoint*, we refer specifically to the semantic role generally and loosely termed the Goal, which marks the final point of a trajectory inherent in a directed motion [cf. the case study of English 'over' discussed by Lakoff (1987)]. There are two sets of evidence that show that *TOU* is lexically specified with a Path-endpoint. First, in term of compounding, examples in (2) below illustrate that only *TOU* may take a Path-endpoint as its direct object, not *DIU*:

> (2) *TOU* with Path-endpoint:
>
>   a. *tou-lan* 投籃   'to shoot a basket'
>   *tou-hu-zhi-jin* 投湖自盡   'to throw oneself into a lake'
>   *tou-gong* 投共   'to defect to Communist China'
>   *tou-qi-suo-hao* (投其所好)   'to please someone by satisfying his wishes'
>   b. ***diu-lan*** 丟籃   'to shoot a basket'

The possible compounding of *TOU* with a Path-endpoint indicates that the final point and the direction of the motion plays a more salient and central role in the meaning of *TOU* than in that of *DIU*. The verb *DIU*, on the other hand, is typically modified by manner adverbs or resultatives that highlight the lack of directionality:

> (3) Typical Manner-modifier or Resultative-Complement with *DIU*:
>
>   a. luan-diu 亂丟 'to mindlessly throw (something somewhere)'
>   b. diu-diao 丟掉 'to throw (something) away'

Secondly, while Path-endpoint is not marked in the case of *TOU, DIU* tends to take an overt marker introducing a Path-endpoint. *DIU* occurs far more often than TOU (43% vs. 26%) with an additional locative marker (e.g. *ru* (入) 'into,' *xiang* (向) or *wang* (往) 'toward,' *zai* (在) 'at,' *dao* (到) 'to'), thus overtly introducing a Path-endpoint. In other words, if the Path-endpoint in the event of *DIU* is expressed, it tends to be overtly marked with a locative phrase:

> (4) Overt Marking of Path-endpoint:

	Occurrence with Post-verbal Locatives
TOU	26% (147 out of 556)
DIU	43% (116 out of 268)

2.3 Tentative Hypothesis

From the above discussion, we may conclude with a tentative hypothesis that *TOU* and *DIU* differ in their lexical specification of a Path-endpoint; that is, *TOU* is inherently specified with a Path-endpoint, but *DIU* is unspecified in that regard.

(5) Major Distinction between *TOU* and *DIU*:

TOU-verbs	Path-Endpoint Specified	(+ Path-endpoint)
DIU-verbs	Path-Endpoint Unspecified	(- path-endpoint)

In the next section, we will group the other two verbs, *ZHI* and *RENG*, according to the behavior of *TOU* vs. *DIU.*

3. Observation on *ZHI* and *RENG*

Having laid out the major difference between *TOU* and *DIU*, we may proceed to examine the other two verbs: *ZHI* and *RENG*. Basically, it is found that *ZHI* is similar to *TOU* while *RENG* is similar to *DIU.*

3.1 Properties Shared by *ZHI* and *TOU*

Like *TOU*, *ZHI* may also take a Path-endpoint as its direct object:

(6) *ZHI* with a Path-Endpoint:
    a. *zhi-di-you-sheng* 擲地有聲
      ZHI-ground-have-sound
      'throwing (something) to the ground with a thump'
    b. *leiqiu-zhi-yuan* 壘球擲遠
      softball-ZHI-distant place
      'softball-throwing'

In view of the fact that in the case of *ZHI*, the path-endpoint can also serve as the direct object, we assume that *ZHI* can be paired with *TOU* as they both take a Path-endpoint as an essential participant role. As verbs of directed motion, both *TOU* and *ZHI* are inherently specified not just with a trajectory-path, but more specifically, with a Path-endpoint.

3.2 Properties Shared by *DIU* and *RENG*

On the other hand, the verb *RENG* behaves more like *DIU* since *RENG* cannot be compounded with a Path-endpoint but may form a typical V-V compound with V1

(Manner) or V2 (Result), which implies a lack of directionality:

(7) *RENG* with modifiers that lack directionality:
    a. <u>luan</u>-reng 亂扔   'to mindlessly throw (something) in all directions'
    b. reng-<u>diao</u> 扔掉   'to throw (something) away'.

Furthermore, when followed by a locative, *TOU/ZHI* occur predominantly with *ru/jin/xiang/chao/wang* (入 / 進 / 向 / 朝 / 往), which are strongly direction-oriented, but *DIU/RENG* occur more commonly with *zai/dao* 在 / 到 , which are less specific in directionality. As shown in the highlighted portions in (8) below, taken together, over 90% of the uses of *TOU/ZHI* take a directional locative:

(8) Locative Markers Prefacing the Path in *TOU/ZHI* vs. that of *DIU/RENG*

	Directional Locatives *ru/jin/xiang/chao/wang* (入, 進, 向, 朝, 往)	Non-directional Locatives *zai/yu/dao* (在, 於, 到)
TOU	**89%**	10%
ZHI	**94%**	6%
DIU	42%	**58%**
RENG	43%	**57%**

Therefore, summing up the above discussion, we conclude that *ZHI* belongs to the *TOU*-group since both are [+ Path-endpoint]; *RENG* belongs to the *DIU*-group since both are [- Path-endpoint].

(9) Tentative Conclusion: *TOU/ZHI* vs. *DIU/RENG*

TOU/ZHI	Path-endpoint specified, strongly directional
DIU/RENG	Path-endpoint unspecified, non-directional

Having discussed the shared properties for the two groups of verbs, we will proceed to indicate the finer distinctions between the verbs in the same group.

3.3 Fine Distinctions between *TOU* and *ZHI*

When taking into consideration the spatial character of the Path-endpoint, we find that *TOU* and *ZHI* are associated with different locative markers that characterize different spatial boundaries of the Path-endpoint. In the corpus, we find that *TOU* occurs predominantly (76%) with a container-introducing locative, *ru* (入) or *jin* (進) 'into,' which manifests a bounded, container-type Path-endpoint. The verb ZHI occurs predominantly (87%) with *xiang* (向), *chao* (朝) or *wang* (往), all meaning 'toward,' which simply indicates a directed path with no further specification of the shape of the

endpoint, as shown in (10):

(10) Locative Markers Typically Following *TOU* vs. *ZHI*

	ru/jin (入/進) 'into'	*xiang/chao/wang* (向/朝/往) 'toward'	*zai/yu* (在/於) 'at'	*dao* (到) 'to'
TOU	**76%**	13%	10%	1%
ZHI	6%	**87%**	6%	0%

Another interesting difference between *TOU* and *ZHI* is that *ZHI* often occurs as the second verb in a cognate V-V compound, indicating that the event of *ZHI* is categorially less-marked and lexically less-specified with manner (since the first verb in the cognate V-V compound is more manner-specific), as shown in (11):

(11) *ZHI* as the default V in cognate V-V compounds all meaning 'to throw':
      a. *tou-zhi*   投擲
      b. *reng-zhi*   扔擲
      c. *diu-zhi*   丟擲
      d. *pao-zhi*   拋擲

The above observation concerning the morpho-syntactic differences between *TOU* and *ZHI* seems to point to a finer distinction: *TOU* is semantically more loaded, with a further specification of the spatial boundedness of its Path-endpoint, while *ZHI* is lexically less informative, as summarized in (12):

(12) Tentative Conclusion (Lexical-semantic Distinction between *TOU* and *ZHI*):

TOU	+ Path-endpoint; + Spatially bounded
ZHI	+ Path-endpoint

3.4 Fine Distinctions between *DIU* and *RENG*

Although both *DIU* and *RENG* are not lexically specified with a Path-endpoint, they differ significantly in another respect, i.e., the coding of an Event-endpoint. By *Event-endpoint*, we refer to the final state resultative of a given activity-event. The most salient difference in their use patterns is that *DIU*, but not *RENG*, displays a causative-intransitive use, which profiles the endpoint of the event, a resultative state:

(13) Causative-intransitive Use of *DIU*

    w*ode gangbi diu/*reng le.* 我的鋼筆丢 /* 扔了 .

    'My pen is lost.' (= 我的鋼筆掉了 .)

The possible inclusion of an Event-endpoint in the use of *DIU* gives rise to the potential ambiguity of (14a):

(14) Interpretational Differences:

    a. *wo diu le yi-zhi gangbi.* 我丢了一支鋼筆 .

    ■ 'lost'   (inchoative, stative, +result, -control)[2]

    ■ 'thrown away' (completive, active, -result, +control)

    b. *wo reng le yi-zhi gangbi.* 我扔了一支鋼筆 .

    ■ 'thrown away' (completive, active, -result, +control)

Given its stative use, the verb *DIU* may occcur as the resultative complement in a Verb-Resultative compound:

(15)   *wode gangbi gao-DIU/*gao-RENG le.* 我的鋼筆搞丢 /* 搞扔了 .

    'My pen got lost.'

We see that *DIU* is polysemic with two meaning facets. Besides its use as an activity verb, it can also be used as an achievement verb. The main reason is that *DIU* lexically specifies an Event-endpoint, thus allowing the focus to be on the ending state of the event. We now draw the conclusion that *DIU* differs from *RENG* in that it allows aspectual emphasis to be placed on the Event-endpoint:

(16) Distinction between *DIU* and *RENG*

DIU	+ Event-endpoint
RENG	- Event-endpoint

So far we have mentioned two types of endpoints: *Path-endpoint* vs. *Event-endpoint. Path-endpoint* marks the final point of a trajectory-path in ballistic motion, which coincides with the semantic role Goal. *Event-endpoint,* on the other hand, is relevant to the final point of an event contour, usually indicating a resultative state.

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[2] Following Smith [1991], the difference between *inchoative* and *completive* is mainly aspectual: *inchoative* refers to a change of state or the starting point of a new event; *completive* describes an event as it is completed. The stative vs. active distinction concerns kenesis in general, as explained by Chao [1968]. The feature *control* concerns volitionality of the subject.

These two types of endpoint are crucial for fine-tuning the lexical semantics of the four verbs studied here.

3.5 Distinctions Based on the Two Types of Endpoint

As a near-synonym set, the four verbs *TOU , ZHI, DIU, RENG* demonstrate a two-way contrast in terms of their specification of Path-endpoint and Event-endpoint:

(17) The Distinction based on Path-Endpoint vs. Event-Endpoint

	TOU	*ZHI*	*DIU*	*RENG*
Path-Endpoint	+; bounded	+	-	-
Event-Endpoint	-	-	+	-

It is clear from (17) that while both *TOU* and *ZHI* is lexically specified with a Path-endpoint, only *TOU* requires a *spatially bounded* path-endpoint. As for *DIU* and *RENG*, their lexical meanings are not sensitive to the encoding of a Path-endpoint; instead, they can be further distinguished in terms of their lexical specification of an Event-endpoint.

4. Verbal Semantics as Eventive Information

The observed differences as outlined in (17) above can be viewed from a more general perspective proposed in Huang and Ahrens [1999], in which verb meanings are described in terms of structural and attributive distinctions. They argue that all grammatical information is encoded in the lexicon, and that verbs express eventive information. Each verbal sense is then taken to be a unique event structure (see 4.2 below for details). The framework makes use of the concept of an event *focus* to identify different event types, as explained and illustrated in 4.1 below.

4.1 Event Focus

A (prototypical) verb is used to describe an event, and its lexical meaning specifies the possible scope of events it can describe. Following Smith's [1991] proposal of viewpoint focus in her account of verbal aspects, an *event focus* is taken to be a conceptual and cognitive profile that allows meaning extensions within the scope of lexical specification. The notion of event focus is as important as that of event components. A typical example can be found in the following case of 'building' verbs: *jian* (建) vs. *gai* (蓋). The two synonomous verbs seem to have the same event components, yet they have different event focuses. The verb *jian* allows an intransitive use with the Theme being the subject, thus highlighting the Event-endpoint [cf. Liu 1999; Huang, Liu and Tsai 1999]. Thus, in

(18b) below, only *jian* can be used:

(18) a. *gongren zhengzai jian/gai fangzi.* 工人正在　建 / 蓋　房子 .
          workers DUR JIAN/GAI house
          'The workers are building the house.'

   b. *Na-dong fangzi jian/*gai yu 1888 nian.* 那棟房子　建 /* 蓋　於 1888 年 .
       That-CL house JIAN/*GAI in 1888 year
       'That house was built in 1888.'

Given its lexical specification, the verb *jian* is capable of describing an event of building from the perspective of its completion. This is why *jian* is allowed in (18b), where the focus is on the ending state of the event, i.e., the Event-endpoint.

4.2 A Representational Framework: MARVS

As mentioned above, a representational scheme called the Module-Attribute Representation of Verbal Semantics (MARVS) was proposed as the basis for verbal semantic description and representation [Huang and Ahrens, 1999]. It characterizes verb meanings in terms of modular and attributive distinctions: information pertaining to the aspectual composition is represented as the Event Module, and any event-internal specifications are coded as Inherent Attributes; information pertaining to participant roles is coded as the Role Module, and further specifications on a particular role are coded as Role-Internal Attributes. Below is a more detailed explanation of the four components of the model:

- **Event Module:** properties pertaining to the aspectual composition of the event(s). Five atomic event structures are distinguished ; they are Boundary [.], Punctuality [/], Process [/////], State [___], and Stage [^^^^]. The combination of these atomic event structures renders 12 different event types.
- **Inherent (Event-internal) Attributes:** attributes referring to the semantics of the event itself, such as Control, Change-of-state, etc.
- **Role Module:** properties referring to focused (though not necessarily obligatory in its predicate argument structure) roles of the event, such as Agent, Theme, Instrument, Manner, Goal, etc.
- **Role-Internal Attributes:** attributes referring to the internal semantics of a particular focused role (of the event), such as Factive, Generic, Volition, Affectedness, etc.

4.3 Lexical Distinctions Redefined as the MARVS Representation

The distinctions among the four verbs, *TOU, ZHI, DIU,* and *RENG* can be re-defined and represented within the proposed MARVS framework:

● In terms of the Event Module, all four verbs describe an activity with a starting point, but only **DIU** is specified with an Event-endpoint, represented as a bounded process [●///// ●].

● In terms of the Inherent Attributes, *TOU/ZHI* behave differently from *DIU/RENG* in that the events of *TOU/ZHI* are highly directional while *DIU/RENG* is underspecified in terms of directionality.

● In terms of the Role Module, *TOU/ZHI* can both take a Path-endpoint as the direct object while the role of a Path-endpoint is not salient in the meaning of *DIU/RENG*.

● With regard to Role-internal Attributes, *TOU* casts a further specification on the spatial characteristics of the Path-endpoint: it has to be bounded as a container.

Below is a schematic MARVS representation of the lexical distinctions among the four verbs:

(19) MARVS Representation of the Semantic Differences among Verbs of Throwing

Module/ Attributes	*TOU*	*ZHI*	*DIU*	*RENG*
Event Module	Inchoative Process ● /////	Inchoative Process ● /////	Bounded Process ● ///// ●	Inchoative Process ● /////
Inherent Attributes	+ Directional	+ Directional	- Directional Endpoint-focused	- Directional
Role Module	+ Path-endpoint	+ Path-endpoint	- Path-endpoint	- Path-endpoint
Role-Internal Attributes	Spatially-bounded			

5. Conclusion

The set of four Mandarin near-synonyms studied here serves to illustrate a newly developed framework for Mandarin lexical semantic studies. It also raises several important questions concerning the proper approach to lexical semantic research:

● While some works on English verbal semantics [e.g. Levin 1993, Atkins and Levin 1991, Atkins *et. al.* 1988] have concluded that diathesis alternations are most useful in identifying crucial semantic-syntactic interdependencies, such an approach may not be adequate when applied to Mandarin, given that Mandarin is relatively flexible in argument placement. The findings of this study seem to indicate that V-O compounding in Mandarin is an important clue for delimiting lexical meanings.

● Given that a Mandarin-specific framework is needed, this study may be taken as a pilot effort in searching for the most suitable and effective approach to studying of the Mandarin verbal system. The model of event-structure information as proposed above help to identify and represent the crucial semantic factors that are syntactically relevant.

● Viewed in a more general context, this work may help to illustrate several theoretical and methodological points. First, corpus data and computation may reveal some important generalizations that might not be available from elicited data only. In other words, semantic distinctions may not be easily captured if corpus-based, discourse-triggered syntactic patterns are ignored. Secondly, semantic distinctions may have various event-structure facets, which can be best understood if event focuses and event types are taken into consideration. Finally, the clustering of morpho-syntactic patterns with lexical-semantic characteristics proves to be fruitful in differentiating near-synonyms as well as in systematically disentangling the complex interaction between syntax and semantics.

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