THE ROLE OF FORCE IN MANDARIN VERBS OF CUTTING[*]

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ABSTRACT

This study explores the semantic meaning of verbs of cutting in Mandarin; it also investigates whether the semantic component FORCE should be included in the denotation for distinguishing the fine-grained meanings among Mandarin verbs, including "*diāo, qiē, xuè(xiāo), duò, gē, kǎn, kē, jiǎn, pī* and *pǒ*", broadly subsumed under the category of the CUT action events in English. To probe this issue, an on-line questionnaire was used along with a corpus-based analysis of cutting verbs with the following results. Firstly, the most commonly-used implicit categories that Mandarin native speakers use are INSTRUMENT, FORCE, DELICATENESS, and RESULT (SEPARATION). Secondly, based on the frequency of the participants' chosen words on FORCE-related items, *kǎn* (100%), *duò* (89%) and *pī* (86%) are the top three verbs used with respect to the semantic feature of FORCE. Lastly, the corpus analysis supports the hypothesis of V-C complementary distribution in native speakers' usage. The preliminary findings support the usage-based view of language (Barlow and Kemmer 2000) and can shed light on the cognitive constraint that implicitly and regularly appears in speakers' resultative compound usages.

Key words: verbs of cutting, categorization, FORCE, VC complementarity

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1. INTRODUCTION

It is widely known that verbs lexicalize different meanings/nuances in linguistic forms (cf. Koenig et al. 2008; Rappaport Hovav and Levin 2010; Talmy 2000). Previous studies have focused on cross-linguistic comparisons along several dimensions (e.g., causative-inchoative alternation), but few studies have paid attention to language-specific fine-grained differences of verb meanings (cf. Enfield 2007). In Mandarin Chinese, there are many different *cutting*-related verbs, raising the question of how one could better capture the underlying differences among these verbs, such as *kǎn* 'chop', *jiǎn* 'cut with scissors', and *qiē* 'cut', by means of semantic components.

In this study, the investigation was focused on the fine-grained meanings (semantic components) of "verbs of cutting" in Mandarin. Adopting Goldberg's (2010) view that each word sense evokes an established semantic frame[1] (i.e., a profile frame + a background frame), I intend to determine how the notion FORCE (the delivery of *force*, which is crucially relevant to MANNER and RESULT category) influences native speakers' perceptual grouping (categorizing) of *cutting*-relevant events. The main hypothesis of this study is that FORCE[2] plays an important role in the speakers' categorization and differentiation of some verbs for cutting in Mandarin. Also discussed is whether the underlying semantic component FORCE should be included in the denotation for distinguishing the fine-grained meanings among Mandarin verbs, including "*diāo* 'engrave', *qiē* 'cut', *xuè/xiāo* 'pare/cut', *duò* 'chop', *gē* 'cut; slice', *kǎn* 'chop', *kē* 'cut; carve', *jiǎn* 'cut', *pī* 'hack' and *pǒ* 'cut open', which is roughly equivalent to or subsumed under the superordinate category of "Verbs of CUTTING" in English that are used to depict material separation or destruction of a variety of objects. These

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[1] According to Goldberg (2010:40), a word's semantic frame (what the word evokes) is composed of profile + background frame. A word sense's "profile" is what the word means/designates (asserts), while a word sense's "background frame" is what is taken for granted or presupposed.

[2] The concept of FORCE used in this study is different from the general idea of *force* in syntax (grammar). Here, FORCE is defined as *physical strength* equivalent to "the delivery of *force*" that should be part of the dimension of the so-called semantic category, MANNER.

verbs may be similar in many ways, but there are also distinct differences. The rationale for this study is that if semantic categories associated with everyday words are largely universal, the denotation of these words should be shaped or guided by perceptual cognition (e.g., culture-specific constraints, or a cultural unit of complex predicates). Therefore, the questions asked include:

(i) First, what are the criteria that native speakers implicitly use to categorize verbs of cutting in Mandarin? Are there any factors that underlie native speakers' conception of "cutting verbs" in general?
(ii) Second, is the semantic feature FORCE evoked when native speakers categorize cutting verbs into groups in Mandarin? How is the notion of FORCE varied in speakers' judgments of certain verbs of cutting?
(iii) Third, if (i) and (ii) are verified, then how do the idiosyncratic components (FORCE) of verb meanings constrain the combination of verbs and complements (VC) in Mandarin? Are certain complements used more often to specify the results of particular types of cutting events (VC structure)? In other words, is there any complementary distribution among resultative VC structures concerning cutting events?

Overall, this study explores the semantic (fine-grained) differences among individual cutting verbs in Mandarin, with the aim to find out why speakers tend to use *pǒ-kāi* 'cut-open; cut open' and *kǎn-duàn* 'chop-broken; cut into two' to describe cutting events rather than **pǒ-duàn* 'hack-broken' and **diāo-duàn* 'carve-apart' in Mandarin. I aim to show that the salient semantics (e.g., INSTRUMENT or MANNER) of Mandarin cutting verbs play a role in the participants' categorization task (which cutting verbs the speakers would use in a similar way or think of as similar), which also indirectly constrain the combination of verbs and complements in describing events involving material separation (destruction).

This paper is organized as follows: Section 2 briefly reviews the literature and introduces the characteristics of verbs of cutting in Mandarin. The methodology adopted in this paper is introduced in Section 3, whereas Section 4 presents the major results and discussions from the categorization experiment. Section 5 provides a summary and a

conclusion.

2. LITERATURE REVIEW

In this section, three different aspects of cutting verbs are introduced. The first part looks at previous studies on the denotation of a cutting event. The second part is on *cut* and *break* (C&B)[3] verbs with respect to endangered languages as well as cross-linguistic studies, and the third part is on verbs of cutting in Mandarin.

2.1 Introduction to Verbs of Cutting

Before comparing results from different languages, let us first focus on what essential notion a cutting or breaking event denotes. Guerssel et al. (1985) argued that the syntactic differences between *cut* and *break* verb classes are semantically determined (i.e., they are derived from lexical conceptual structure, as shown in (1)-(2) and members of each class differ in causative-inchoative alternation).

(1) *break* LCS: y comes to be BROKEN   (Guerssel et al. 1985:51)

(2) *cut* LCS: x produces CUT in y, by sharp edge coming into contact with y

(3)   a. Floyd broke/cracked/shattered the vase.
       b. The vase broke/cracked/shattered.

(4)   a. Floyd cut/cubed/sliced the bread.
       b. *The bread cut/cubed/sliced.   (cf. Bohnemeyer 2007:156)

For example, members of the *break* class are allowed in (3), as

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[3] The term C&B, cutting and breaking, refers to "the considerable variability in the use of C&B verbs across languages when describing the same visual scenes in everyday events. In particular, the cross-linguistic study (the Max Planck Institute for Psycholinguistics at Nijmegen) involving 28 languages sought to look at the variation typologically (cf. Bohnemeyer et al. 2001; Majid et al. 2008).

opposed to (4), where members of the *cut* class are limited to a causative counterpart. Levin's (1993) classification of *cut* and *break* classes was based on shared valence alternations.

Rappaport Hovav and Levin (2010) further claim that verbs may encode "RESULT" meanings (e.g., *break, cut, shatter)* or "MANNER" meanings (e.g., *run, swim, jump*), but cannot be both. They argue that there is a distinction between what a verb LEXICALIZES[4] (i.e. what it lexically encodes as part of its meaning); that is, MANNER and RESULT are complementarity, as in (5):

(5) MANNER/RESULT COMPLEMENTARITY: Manner and Result meaning components are in complementary distribution: a verb lexicalizes only one.

<div align="right">(Levin and Rappaport Hovav 2013)</div>

Rappaport Hovav and Levin (2010, 2013) proposed that the English verb *cut* basically lexicalizes RESULT, which contradicts what most people assume: that the verb *cut* lexicalizes a *manner* component (cf. Guerssel et al. 1985). Rappaport Hovav and Levin (ibid.) propose that English verbs, like *climb, cut, brush, or chop*, appear to lexicalize both MANNER and RESULT but actually only lexicalize one in any given use.

On the other hand, in their study of the micro-geography of cutting verb meanings, Koenig et al. (2008) addressed the question of idiosyncratic and structural components of verb meaning (cf. Levin's two facets of verb meaning). Based on 4000 English verbs, Koenig et al. (2008) proposed the following metalanguage[5] to represent the common meaning of *cut* verbs, as shown in (6). This decomposition highlights the causal relation between three sub-events.

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[4] Rappaport Hovav and Levin (2010) claim that there is a constraint on how 'roots' can be associated with 'event schemas', which limits the meaning that a root (verb) can lexicalize, either MANNER or RESULT.

[5] It denotes situations where an agent A causes contact between an entity I and an entity P, possible motion of I while in contact with P, and as a result, incision or severance of a portion of P.

(6) **Cut:** (metalanguage formula, cf. Koenig et al. 2008:176)
  a. Cause(s_1, s_2) ∧ Pred(s_1, A, I) ∧ Pred(s_2, I, P) ∧ Cause(s_2, s_3) ∧ Pred(s_3, P)
  b. One causal relation: Cause (s_1, s_3) ∧ Pred (s_1, A,…) ∧ Pred (s_3, P,…)

Taken together, what can be drawn from the above findings is that cutting verbs (unlike *break* verbs) are not allowed in causative-inchoative alternation in terms of syntactic valence. In terms of syntactic decomposition, lexical semantics and sub-event distinctions, the metalanguage of cutting verbs encodes RESULT as well as CONTACT and CAUSE.

2.2 Cross-linguistic Studies

Studies on verb meanings have dealt with the intensional aspects of the verbs and shown how an extensional approach can help illuminate the distinctions made by languages (typologically) (Taylor 2007). For example, the intensional approach focuses on whether a verb invokes a specific or general event, such as the argument structure approach (Guerssel et al. 1985; Levin and Rappaport Hovav 1995; Bohnemeyer 2007), and lexicalization pattern (Talmy 2000). The intensional approach focuses on the availability of a causative-inchoative alternation and the conative alternation (e.g., *cut at the carrot*). Also, Bohnemeyer (2007) concluded that not all languages have a binary distinction between *cut* and *break* verbs; some languages, such as Mandarin (cf. Chen 2007), rely on employing complex predicates (e.g., bipolar verbs). Likely, Talmy (ibid) proposed the distinction between verb-framed and satellite-framed languages, in which the main verb encodes a supporting event (e.g., *cause* or *manner*) and the satellite encodes state change (*core schema*), as in English and Mandarin. However, such a dichotomy has been broadened into including a proposed third type: equipollently-framed language by Slobin (2004), as well as Chen and Guo's (2009) findings. Bohnemeyer's (2007) findings actually echo Slobin's proposal, though each is situated in different issues.

The extensional approach investigates the relation between words and events in the world that the words can be used to designate, such as

cross-linguistic conceptualization in semantic categorization (Majid et al. 2008). With respect to event categorization (*cutting* and *breaking* events), cross-linguistic similarities and language-specific differences have been illustrated in several studies (cf. Majid et al. 2004; Majid et al. 2007a and 2007b; Narasimhan 2007) based on *cut* and *break* (C&B) video-clips (Bohnemeyer et al. 2001). Many researchers have probed the semantic categories/features of cutting verbs, such as Majid et al. (2007b), van Staden (2007) and Lüpke (2007). Cross-linguistic study of event categorization involving material destruction/separation, such as *cutting* and *breaking* events, has shown considerable agreement and variations along several dimensions.

A cross-linguistic project (cf. Majid et al. 2007a) carried out by the Max Planck Institute for Psycholinguistics mainly focuses on the event categorization and language-specific variations regarding C&B events. Ameka and Essegbey (2007) argued that "agentivity" plays an important role in dividing C&B classes into four classes in Ewe and argued for a construction approach. In contrast, Lüpke (2007) adopted a lexicalist analysis for Jalonke C&B verbs. In Jalonke, the semantic features, including control of the effect over the locus of separation, theme being a whole vs. being detached from an entity, and the verb specifies *manner* or *instrument*, and so on. Similar findings that focus on what verbs can specify were found in Narasimhan's (2007) and Levinson's (2007) studies. The former indicates that C&B verbs in Tamil and Hindi largely overlap, and selection of the verbs depends on the features of the theme objects and the type of instrument. The latter focuses on an indigenous language, Yélî Dnye, which consists of two verbs, with one specifying manners and instruments of actions, and the other specifying the result state. In addition, Brown (2007) reported that in the Mayan language Tzeltal, C&B actions can be finely differentiated by semantic components, like the spatial and textural properties of the theme objects, with no superordinate term meaning "cut/break in general". That is, it was found that some C&B verbs are distinguished along "manner" and "type of instrument", or "different shapes of objects" (e.g. long vs. round; two-dimensional vs. three-dimensional). Interestingly, cutting verbs in Tzeltal are culturally-oriented, and the choice of expressing a given C&B event depends on the speakers' perspective (e.g., whether focusing on

manner or *result*).

Overall, cutting and breaking events differ, but are proven to be similar in various dimensions (e.g., Majid et al. 2008; Majid et al. 2007a). Firstly, C&B verbs can be analyzed in terms of either syntactic or semantic ways. Of course, there are language-specific principles of categorization; for example, Tidore (cf. van Staden 2007), see also Chen (2007) on Mandarin use of bipolar verbs to describe cutting actions (cf. Äiwoo, in Næss's 2012 study). This poses challenges to the clear-cut dichotomy of a lexicalization pattern. Secondly, cross-linguistic studies highlight the fact that all verbs of cutting imply different degrees of salient features lexicalized in verbs across languages. In other words, languages somehow share certain similarities or imply different degrees of salient features; for example, "the degree of control an agent has over the locus of separation", "instrument", or "theme object" has been proposed to be a salient semantic feature of cutting verbs in many languages (cf. Brown 2007; Levinson 2007; Narasimhan 2007). To summarize, the cross-linguistic variation provides a new way to a deeper investigation in semantic categorization and variation regarding C&B domains.

2.3 Previous Studies on Mandarin Verbs of Cutting

Studies on verbs of cutting in Mandarin can be found in Pye (1994), Gao (2001), Gao and Cheng (2003), and Chen (2007). Pye (1994) examines cross-linguistic differences in English, Garifuna and Mandarin; Pye (1994) proposes that C&B classes vary based on different materials of the themes, such as cloth, bubble, plate and stick (e.g., objects with the feature of SOFTNESS vs. HARDNESS). Gao (2001) and Gao and Cheng (2003) further showed that Mandarin cutting verbs are not only dominantly represented by VC structures, aside from the mono-morphemic verbs, but also imply certain conflated features within the verb root, such as *force, instrument, body part, frequency*, and so on. Many English monomorphemes do not have equivalent verbs in Mandarin, but are forced to be translated into compounds or multi-words rather than single words, i.e. *hack* has to be rendered as *yòng dāo kǎn* 'use knife slash; slash.' Another particular characteristic is that VC

structure represents a major template (schema) in describing cutting events. Specifically, verbs have to co-occur with a complement, such as *qiē-pò* 'cut-broken; cut' or *qiē-duàn* 'cut-apart; cut', to differentiate the resulting properties of the objects. In addition, unlike English or Yélî Dnye, Chen (2007) indicated that Mandarin needs a third category RVCs, depicting two verbs (V_1V_2, as opposed to V_1 or V_2 separately) and denoting action and result (state change) respectively, to describe events. Gao and Cheng (2003) did not particularly emphasize V_1V_2 structure, since their focus was mainly on the conflated features versus the corresponding linguistic forms and collocations in bilingual correspondences.

Table 1 presents the preliminary cutting action verbs that are mentioned in Gao and Cheng's study (2003: 449). Each cutting action verb listed in Table 1 is rendered in diverse corresponding English meanings.

Table 1. Verbs that describe cutting action specified in Gao and Cheng (2003)

Cutting action in Mandarin	English Meaning	Cutting action in Mandarin	English Meaning
duò	chop, cut; knife	*pǒ*	cut open
gē	cut, slice; knife	*qiē*	cut; knife
jiǎn	cut with scissors	*xiāo*	pare, peel
kǎn	chop, hack, cut; knife	*zǎi*	butcher
kē	engrave	*zhá*	cut up with a hay cutter
pī	hack, split		

Chen (2007:278) further identified three semantic features important for distinguishing Mandarin C&B verbs: *instrument, manner*, and *features of the affected object.* It is important to note that cutting with a single-blade or two-bladed instrument in Mandarin involves different verbs; there are lexicalized verbs that specify particular instruments,

such as *jiǎn* 'cut with scissor (like) instrument; cut', and *jù* 'cut with a saw; saw'. The common single-bladed instruments include knife, machete, axe, etc. Meanwhile, *manner* is shown in the distinction between two verbs, *kǎn* 'chop' and *qiē* 'cut', where the former involves cutting forcefully (salient *force*) as compared to the latter (cf. Chen 2007). However, Chen (ibid) did not exactly define the category of *manner*, leaving the category of *manner* unclear. Crucially, a single verb may involve or specify more than one of the semantic features listed above, such as instrument, manner or features of the affected object.

Based on the above literature review, semantic components, namely, INSTRUMENT, MANNER, and features of the affected OBJECT (flexible or rigid object), have been proposed to reveal variances in major dimensions (Levinson 2007). Meaning of separation event expressions (*cut* or *snap*) may be shaped by the perceptual cues that define or specify points of salience in common event types (cf. Enfield 2007 on *Lao*). However, none of these studies specifically examine the fine-grained differences among these cutting verbs in Mandarin. What are the semantic differences between *kǎn* 'chop' and *duò* 'chop' in terms of MANNER (the delivery of *force*)? Are there any dominant features (MANNER or INSTRUMENT) conflated in cutting verbs in native speakers' usage? Does the semantic feature FORCE play a role in categorizing some cutting verbs?

3. METHODOLOGY

To answer the above questions, I used (i) an online questionnaire[6] and (ii) a corpus-based analysis. The goal of the online questionnaire is to examine what criteria are used in native speakers' minds when a categorization task is given on cutting verbs in Mandarin.

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[6] https://docs.google.com/spreadsheet/viewform?formkey=dHA2OTRSR1NJN3U2UUxa TXpKZUZmdHc6MQ#gid=0

3.1 The Online Questionnaire Experiment

Participants: Thirty-six Mandarin native speakers in total were recruited and paid to take part in the first experiment (a questionnaire). All participants were Mandarin native speakers between the ages of 19 and 24. Some had college level education, while most were graduate students; none had any linguistics background knowledge. They were non-linguistics majors studying science and engineering, mathematics, or other fields.

Materials and Procedure: The questionnaire contains two major sections designed to understand the factors influencing native speakers' categorization. The first section is a categorization task, whereas the second section is a ranking task. These tasks are performed in sectional order (on different web pages).

The first task consists of ten cutting-related verbs and five breaking verbs as fillers [7]. These fifteen verbs are mixed randomly. The categorization is a simple task in which participants were required to categorize all fifteen verbs (including the five fillers, *bāi* 'break open', *dǎ* 'hit', *lā* 'pull', *sī* 'tear', and *záo* 'chisel') based on their native speakers' intuition. After which, participants were asked to provide reasons (criteria) for their proposed classified categories.

In the second task: the ranking task (on a separate page), participants were asked to select which verbs are related to strength [8] (FORCE). They then had to determine the descending order of these verbs, from highly-related to lowly-related to FORCE. There are only ten cutting verbs in the second section. After that, participants were instructed to put the chosen verbs in descending order based on the strength (FORCE) that one uses to exert this action. Finally, for each verb chosen, participants were asked to list a common INSTRUMENT that they considered as being mainly used to implement such FORCE-oriented action (that the cutting

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[7] The ten verbs of cutting are "*qiē, duò, gē, kǎn, kē, jiǎn, pī, pǒ, diāo, xiāo*," whereas the five fillers (verbs of breaking) are "*dǎ, bāi, lā, sī,* and *záo*."

[8] In the questionnaire, the jargon-free term was applied, such as *lìqì dàxiǎo* 'strength big-small; the relative strength,' to the question, and participants were asked to choose the verbs that are strongly associated with 'strength' when exerting such action events.

verb denotes). Examples in (7) and (8) illustrate sample data of participants' ranking of FORCE-related cutting verbs and the corresponding representational instruments that they indicated.

(7) a. *duò* 'chop' > *kǎn* 'chop' > *pī* 'hack' > *pǒ* 'cut open'   (female)
　　b. *pī* 'hack'> *kǎn* 'chop' > *duò* 'chop'> *qiē* 'cut'>
　　　 gē 'cut'> *diāo* 'engrave'

(8)　*duò*　'chop': *zhūròu dāo* 'the knife used for pork'; *càidāo* 'knife'
　　kǎn　'chop': *fǔtóu* 'axe'; *xīguā dāo* 'watermelon knife'
　　pī　　'hack' : *dà fǔtóu* 'big axe' ; *guāndāo* 'the blade of Guan Yu'
　　　　　　kāishān dāo 'machete'
　　pǒ　'cut open': *shǒushù dāo* 'surgical knife; scalpel'
　　gē　'cut': *měigōng dāo* 'cutter knife' ; *xiǎodāo* 'small knife'

3.2 The Corpus-based Analysis: CCL Corpus

In the second part of this study, a corpus-based approach was adopted by analyzing the data extracted from the CCL corpus[9] (Center for Chinese Linguistics, PKU) and investigated how the "separation" notion illustrated by the complements is being lexicalized in some complements (VC) in Mandarin. Based on the CCL Corpus Analysis (usage-based view, cf. Barlow and Kemmer 2000) and the results from the questionnaire, a focus was placed on three verbs that showed evidence of being embodied with the notion OF FORCE, i.e. *pī* 'hack', *kǎn* 'chop', and *duò* 'chop', and the occurrence of each cutting verb with complements *duàn* 'broken', *kāi* 'open' and *suì* 'broken'. Fifteen hundred sentences (500 sentences extracted respectively for each of the three complement types) were sampled and analyzed from the CCL Corpus. Due to the large amount of data in the CLL, only 500 sample counts for each verb (*pī* , *kǎn, duò*) were collected randomly. Among the 500 samples, not all

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[9] The rationale is that both the Sinica Corpus and the CLL should be examined for variations. However, in the Academia Sinica Balanced Corpus of Mandarin Chinese (http://db1x.sinica.edu.tw/kiwi/mkiwi/), not many data could be retrieved from this news-based corpus. Thus, another well-established corpus was used: CCL (Center for Chinese Linguistics, PKU). http://ccl.pku.edu.cn:8080/ccl_corpus/index.jsp?dir=xiandai

target verbs co-occur with complements. It was found that only 145 counts of *kǎn* 'chop' co-occur with complements. Similarly, only 87 counts of *duò* 'chop', and 79 counts of *pī* 'hack' occur with complements. Based on these data, there was further analysis of the distribution of these three complements (*duàn, kāi, suì*) depicting "BROKE/SEPARATION" with three FORCE-dominant cutting verbs (*pī* 'hack', *kǎn* 'chop', and *duò* 'chop').

3.3 Coding

In the first section, the criteria participants proposed were coded in terms of the number of "interpretation units" for each explanation provided. "An interpretation unit" was defined as the component included within the participants' reasons, with an independently important semantic feature for the interpretation. For example, if one participant gave a criterion such as, *yòng-dāo* 'use-knife; with a knife (instrument)' or *lìqì xiǎo* 'strength-small; with minor strength', one interpretation unit was counted, and each was classified in the categories of INSTRUMENT and FORCE respectively.

However, most of the time more than one interpretation unit was specified. For example, two interpretation units were produced in (9) and (10) since both examples involved two criteria, such as the degree of FORCE and the locus of SEPARATION(or SPLIT), and (10) clearly described the RESULT – a clear split separation.

(9) Yòng-lì   cóng zhōngjiān pī-kāi   de   gǎnjué
    use-force   from   middle   cut-open   DE   feeling
    'It is the feeling of cutting it open through the middle with force.'

(10) Jiāng   wùpǐn   yī-fēn- wéi-èr,   dàn   lìdào   jiào   qīng
     shall   object one-divide-into-two,   but   strength more   light
     '(Someone) split the object, but the force is relatively light.'

4.   RESULTS AND DISCUSSION

The following results are presented in terms of the order of the three posited research questions.

4.1 Experiment 1a: Categorization Task

As participants were not limited as to how many groups of verbs could be sorted, diverse classification and criterion were proposed. Thus, presented here are how many categories most participants proposed, aiming to discover implicit categorization of cutting events imposed by the verbs speakers used. Figure 1 displays the range of categories that participants used. Only ten percent of participants thought all fifteen verbs belonged to one category, whereas the maximum classification can be five categories (12.5%). In Figure 1, the results suggest that in general most participants (60%) prefer to sort the verbs into three or four categories, excluding fillers entailing hand-related actions or radical-related words. To be specific, irrelevant criteria were excluded from participants, such as specifying verb radicals or parts of speech (刀 *dāobù* 'knife radical') or hand-related action (knife-free events) (手 *shǒu* 'hand' action events), as these are Chinese characters (radicals) interferences[10].
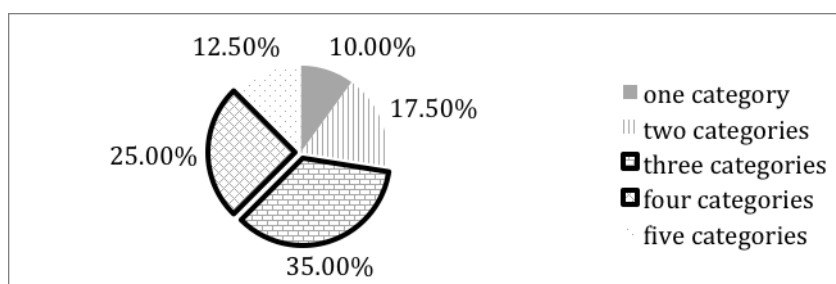

Figure 1. The categorization task

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[10]   Examples of *knife*-related radicals are "*jiǎn* (剪), *duò* (刴), *gē*(割), *pī*(劈), *xuè*(削), or *pǒ* (剖)." Similarly, examples of *hand*-related action are "*lā* (拉), *bāi* (掰), *da* (打), *pī* (劈), and *sī* (撕)."

Thus, several semantic features related to actions that were shared by participants were set up. These categories include *force, separation* (*result*-denoting: *one into two parts*), *delicateness* (*art*), *instrument*, *hand actions* and others[11]. Excluding the hand actions that fillers entail, four major categories were predominately used by participants completing the categorization task: FORCE, SEPARATION, DELICATENESS, and INSTRUMENT[12]. The percentages are shown in Figure 2, where the INSTRUMENT feature is the highest criterion that participants applied. The second and third features are DELICATENESS, FORCE, and RESULT (SEPARATION).
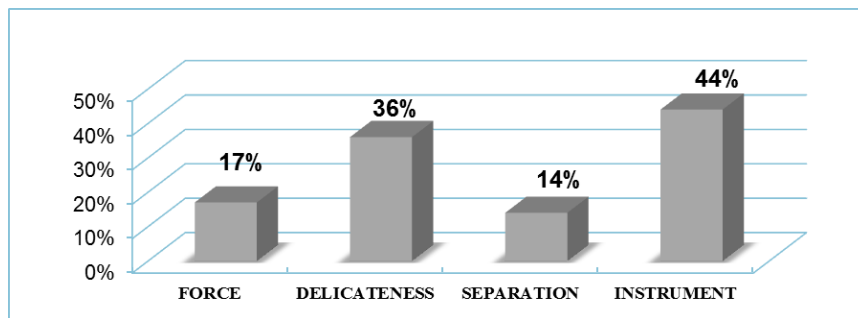

Figure 2. Categorized features regarding cutting verbs

In Figure 2, the feature INSTRUMENT plays an important role when native participants categorized verbs of cutting, with most participants further specifying the possible instrument being scissors or knife. However, this feature will not be discussed here due to space constraints. Based on the verb grouping, another set of cutting verbs also caught our attention from the questionnaire (e.g., *diāo* and *kē* 'engrave; carve').

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[11] The last category 'others' include any other criteria that are not related to the primary five categories listed above, such as 'feelings' or 'the daily-life related action', etc.

[12] As the categorization task allowed participants to classify verbs into groups, more than one criterion was provided. Since many people tend to categorize these verbs on the basis of Chinese radicals, such as hand-related or knife-radical in the character, only the major criteria that most participants agreed upon are presented. Since inconsequential reasons are not relevant, they won't be shown here.

Although neither word stands out in terms of FORCE in the survey, 79% of the participants' selections of categories were related to specific descriptions such as "DELICATENESS (art)." Part of the reason is that these two verbs (*diāo* and *kē* 'engrave; carve') are related to "controlled FORCE (a certain amount of *force* exertion)", and an incremental theme such as "delicate art." Aside from the semantic component INSTRUMENT, FORCE and RESULT (split separation) are the other two major criteria. As Mandarin is a RESULT-centered language (Tai 2003), this tendency led to further examination of the distribution of a subset of VC phrases. The aim was to explore whether there is any complementary distribution among the combination of verbs and complements in cutting-related verbs via a corpus-based search (see section 4.3).

4.2 Experiment 1b: Ranking Task

The second part of experiment one was to uncover the distinction among cutting events according to the FORCE involved. Participants were required to choose verbs they considered having meaning (action) involving the feature FORCE. The rationale for this hypothesis was that specification of the degree of FORCE may highlight the subtle distinction among lexical meanings of verbs. Not surprisingly, each cutting-related verb implies FORCE but differs in the extent of strength exerted [+FORCE].
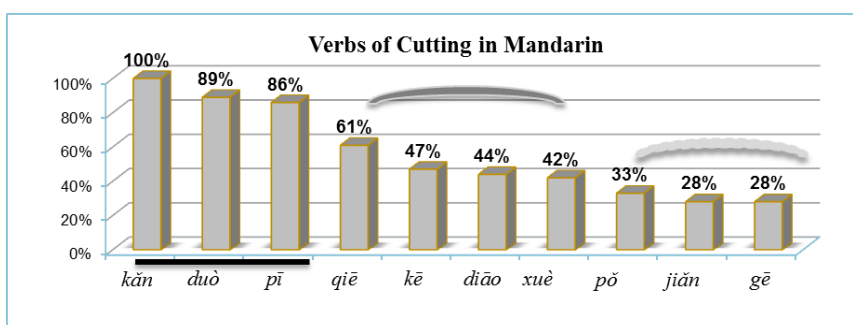

Figure 3. Percentage of categorizing cutting verbs in terms of the semantic feature FORCE

Figure 3 shows the results of the questionnaire regarding FORCE of these cutting verbs. The results show that all selected ten verbs are related to FORCE, but differ in terms of degree. Note that 61% of participants considered the verb *qiē* 'cut' to be a FORCE-related verb. The top three verbs in descending order were *kǎn* 'chop', *duò* 'chop' and *pī* 'hack', with percentages all above 86%. In particular, the verb *kǎn* 'chop' was unanimously selected by all 36 Mandarin participants; this may be due to its FORCE-dominant saliency. The group (*kē* 'engrave', *diāo* 'engrave', *xuē* 'pare; peel') was the second group where 42%~47% of the participants agreed on the saliency of FORCE. In the third group (*pǒ* 'cut open', *jiǎn* 'cut', *gē* 'cut'), only 28%~33% of the participants thought they were related to FORCE.

To take a closer look, the frequency with which native speakers chose these three groups of verbs that are related to THE FORCE dimension was calculated. That is, these ten verbs were sorted into three major categories based on FORCE implications: **high** (*pī* 'hack' > *kǎn* 'chop' > *duò* 'chop'), **intermediate** (*qiē* 'cut'> *kē* 'engrave; carve'> *diāo* 'engrave' > *xuē/xiāo* 'pare; peel'), and **neutral/low** (*pǒ* 'cut open' > *jiǎn* 'cut' > *gē* 'cut'). The results are shown in Figure 3 in different colors (black for high, grey for intermediate, and light grey for neutral/low). It is proposed there is a continuum among [+FORCE], [+/-FORCE], and [-FORCE], descending from left to right. Here, the role of [+FORCE] is characterized by emphasizing when two or more semantic components are involved in a verb, it usually overrides other semantic components, like [INSTRUMENT], in the selection of a cutting action verb. As for the [-FORCE], it means that FORCE is a default value without strong specification.

Further examination was made into how many participants simultaneously chose these three FORCE-associated verbs *(pī, kǎn, duò)* as the top three based on perception of the events in which they are involved. Figure 4 further displays that nearly 78% of the participants listed *pī* 'hack'*, kǎn* 'chop' and *duò* 'chop' as a class of verbs related to FORCE; the current result is also consistent with the top three words in Figure 3.
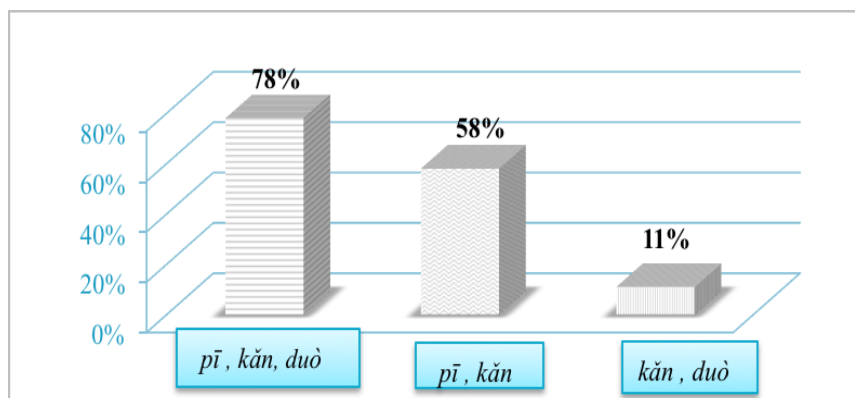
Figure 4. Percentage of different cutting verbs category

In particular, 58% of the participants chose *pī* 'hack' and *kǎn* 'chop' as a group, while only 11% of the participants categorized *kǎn* 'chop' and *duò* 'chop' together. In the follow-up question, participants had to list verbs featuring FORCE in descending order. The concurrence result regarding the highest distribution *kǎn* 'chop', *duò* 'chop' and *pī* 'hack' was examined. The results show that 46% of the participants listed *pī* 'hack' as the first verb featuring FORCE among the three verbs; their descending order was *pī* 'hack' > *kǎn* 'chop' > *duò* 'chop'. The preliminary results are in accordance with our basic hypothesis.

Also examined was whether a FORCE-salient verb is correlated with a specific type of *instrument* in native speakers' usages. As stated in the second section, participants were asked to select any verbs that they considered related to FORCE, to rank these verbs, and to specify the most representational instrument that each FORCE-related verb invoked. Following the proposed scale of continuum among [+FORCE], [+/-FORCE], and [-FORCE], there was an investigation into whether the dimension of [FORCE] is also correlated with a specific type of *instrument*.

Aside from the FORCE-highly associated group (*pī* 'hack', *kǎn* 'chop', *duò* 'chop'), *qiē* 'cut', *pǒ* 'cut open', *gē* 'cut', and *xuè/xiāo* 'pare' belong to the intermediate group [+/-FORCE]. The third group is *jiǎn* 'cut', *diāo* 'engrave; carve', *and kē* 'engrave; carve'. The types and token frequency

of each INSTRUMENT associated with each representative FORCE-related verb were calculated. The results are shown in Table 2.

Table 2. The type and token frequency that correlated with cutting verbs and FORCE category

FORCE-Dominance	[FORCE]		[+/-FORCE]	[+FORCE]
Verbs of Cutting	*jiǎn*	*pǒ, gē*	*kē, diāo, qiē, xuè(xiāo)*	*kǎn, pī, duò*
INSTRUMENT **type** frequency	1	3	4~5	7~9
INSTRUMENT **token** frequency	6.49 %	12.36%	31.15 %	50.01%
Instrument examples	scissors	various types of knives		
shape		(small)------------regular ---------------(large) Non-typical------ **typical** ---------non-typical (**exemplar**)		

As can be seen in Table 2, only the verb *jiǎn* 'cut' is an instrument-specific verb in Mandarin, which involves cutting with a double-bladed tool, such as scissors or nail clippers (cf. Chen 2007). Many other cutting verbs (cutting with a single blade, such as a knife) cross-linguistically are different in terms of other semantic components, such as "the relative predictability of the locus of separation" in the acted-on object (cf. Majid et al. 2008), or "*instrument*" used to cut the theme (cf. Gaby 2007). The types of instruments increase with MANNER/FORCE- related cutting verbs, but decrease with *instrument*-specific verbs (*pǒ* 'cut open' and *gē* 'cut open'). As for incremental theme, instrument types are less varied, which typically include paper cutter, carving knife, and penknife; these instruments are small and atypical. As for FORCE-based verbs, the typical knives listed are large knives, like machetes, axes, watermelon knives, hoes, broadswords, and so on. Both type and token frequencies increased with the highly [+FORCE]-related verbs.

4.3 VC Corpus-based Analysis

According to Chen (2007), Mandarin needs a verb and a complement to denote events of material separation. As the types of complements are diverse and combination between verbs is not arbitrary, it would be helpful to L2 Chinese learners if the current study could specify differences. For instance, although complements *duàn* 'broken' and *suì* 'shattered pieces' both imply the result state of complements in Mandarin, why are some VC structures used more often than others? For instance, why is the VC combination of *pī-duàn* 'hack-broken; cut open' more frequently used than *pī-suì* 'hack-smashed pieces; break into pieces', though both are acceptable phrases?

The remaining issue from Figure 1 is that many native speakers categorize verbs of cutting based on the concept of RESULT ("split" separation) and instrument. In particular, it drew our attention that the criterion that a few participants employed was related to RESULT—split (clear-cut) separation (e.g., into several parts, or into different shapes). Thus, I hypothesized that there may be a conceptual constraint that consistently dominates the correlated concurrence between verbs and complements in Mandarin speakers' usage. Judging from the meaning of near-synonymous complements, we chose three complements *duàn, kāi and suì,* which are roughly equivalent to the concept of "BROKEN" in Mandarin and investigated respectively whether there is any correlated occurrence/constraint between FORCE-salient verbs (*kǎn* 'chop', *duò* 'chop', *pī* 'hack') and certain corresponding complements (RESULT-implied).

Based on the Center for Chinese Linguistics (CCL corpus), 500 sentences for each verb (*pī* 'hack', *kǎn* 'chop', *duò* 'chop) were randomly selected. From these data, each verb occurs with complements as, *kǎn* 'chop' (145 times), *duò* 'chop' (87), and *pī* 'hack' (79). Only complements that occur with these three verbs were examined. Hence, the VN category or other kinds are tentatively excluded. Based on these data, the percentage of these verbs that occur with the three complements (*duàn, kāi, suì*) were calculated. The results are shown in Table 3.

Table 3. The distribution of cutting verbs and complements[13]

Cutting Verbs Complements	*kǎn* 'chop/hack'	*duò* 'chop'	*pī* 'hack'
duàn 'broken; cut into two'	3.4%(5)	5.7%(5)	3.8%(3)
kāi 'open; apart'	0%(0)	3.4%(3)	51.9%(41)
suì 'fragmentary; broken'	0%(0)	27.6%(24)	2.5%(2)
Total Number	145	87	79
V -*chéng/wéi/de* V(become/become/DE) + State	2.75%(4)	72.41%(63)	13.92%(11)

As shown in Table 3, there is a complementary distribution among the three verbs, i.e. *pī* 'hack'**,** *kǎn* 'chop/hack'**,** and *duò* 'chop'. For example, *pī* mostly occurs with the complement *kāi* 'open', whereas *duò* 'chop' mostly occurs with the complement *suì* 'into pieces', describing the imprecise control of the object separation, and *kǎn* 'chop' mostly occurs with the complement *duàn* 'broken', denoting the split separation of the object. Hence the corpus-based search result supports the hypothesis that some Mandarin cutting verbs tend to occur with particular complements (e.g., *kǎn*-*duàn* 'chop-broken'). Note that *duò* 'chop' is typically a repeated action without the precise control of the locus (e.g., object). Maybe due to this implicated meaning, *duò* 'chop' tends to occur with a complement (-*chéng/wéi/de* 'become/become/DE; become') plus a resulting state.

4.4 Discussion and Implications

Taken together, this study aimed at discovering the implicit distinctions that native speakers evoked in categorizing cutting verbs

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[13] Many irrelevant nouns were first excluded, and other types of complements are not shown. Only the target complements are included in Table 3.

(event separation), and probing to what extent the feature FORCE is involved. In adopting Goldberg's (2010) proposal of each word sense's "background frame" aside from its "profile frame", it was hoped to unravel what Mandarin native speakers take for granted (presuppose) in construing or using cutting verbs.

Regarding the first research question, the current evidence highlights the importance of FORCE, RESULT, and INSTRUMENT[14] (cf. Figure 1) categories to the meaning of cutting verbs, suggesting that these abstract (complex) characteristics may together define this semantic domain that is carved up by cutting verbs. The results reveal that some participants focused on the MANNER (i.e. FORCE) aspect of the verb, whereas others specified the INSTRUMENT or RESULT (e.g., split or an incremental theme--fine art). For example, as shown in Figure 1, *diāo* 'engrave' and *kē* 'engrave' (36%) are the primary (unique) co-occurring semantic units among verbs of cutting, and their semantic properties are associated with "delicate skill or art". Additionally, the senses of *kǎn* 'chop', *duò* 'chop' and *pī* 'hack' imply the events of separation with physical strength, whereas the meaning of *diāo* 'engrave' and *kē* 'engrave; carve' require a semantic domain defined by man-made control of FORCE and an incremental theme. Thus, a category "delicateness (art)" to cover this particular nuance has been established.

As noted, various criteria for categorization (sorting task) were employed because the participants construed the scene in different ways or perspectives. This result reflects how the participants typically dealt with extensional aspects of these cutting verbs (or events). Given that Mandarin's culture unit of event description is complex (specifying MANNER vs. RESULT, cf. Chen and Guo (2009)), it was expected that some participants might be influenced by this dominant usage (RESULT, 14%). As the notion of MANNER, RESULT or FORCE is seldom construed separately in event description/conceptualization, participants may naturally focus more on RESULT (CHANGE OF STATE), due to the language characteristics. Specifically, these three categories are closely intertwined. Assuming that a cutting verb's semantic feature FORCE is strongly and relatively identified (or inferred), one would inquire to what

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[14] This study does not further address the issue of INSTRUMENT, due to space limits.

extent do different cutting verbs share in defining or representing the concept of MANNER or RESULT? Importantly, the feature FORCE is somewhat both related t*o result* and *manner.* Some action verbs, such as *kǎn* 'chop' or *duò* 'chop', entail (exhibit) different *Manners* (the way of performing the action), which are indeed correlated with a certain degree of the delivery of FORCE, and the implied ***result*** might be compromised by mutual constraint and balance, such as *kǎn* 'chop' versus *duàn* 'broken', based on one's concept of the daily events.

Whether this postulated claim is valid or not can be supported by comparing it to lexicalization distinction. According to Talmy's (2000) lexicalization pattern on the framing event, the result state is the core schema that underlies human beings' conceptualization cross-linguistically. Tai (2003) also made a similar claim on Mandarin resultative verb compounds, which are *result*-centered. However, in response to Talmy's distinction, Slobin (2004) proposed a third type: equipollently-framed language, indicating both *manner* and *result* are equally specified in motion event description. A similar claim was made by Bohnemeyer (2007) on the argument structure of C&B verbs and by Chen's (2007) findings on C&B event descriptions in Mandarin. Participants who took part in this study might even have different understandings of the words in the on-going process, either focused on *result, manner,* or both as a cultural unit, thus explaining why various possibilities (categorization) were found.

As for the second question, most participants agreed that the majority of cutting verbs are FORCE-related in various flexible ranges. When further scrutinizing the findings (from the ranking task), it was found that *pī* 'hack'*, kǎn* 'chop'*,* and *duò* 'chop' were ranked relatively high, proving to be crucially salient in representing the most FORCE-associated cutting verbs. In a more precise definition, it is suggested that FORCE-RESULT correlation and MANNER are crucial in partitioning cutting verbs' meanings; each semantic feature is evoked in different scenes or sentences.

However, the range of FORCE varies but notably is evoked when a particular *result* is implied or the event is non-canonical, such as a carrot being cut with a hammer. On the other hand, whether the semantic feature, like FORCE or INSTRUMENT, is saliently evoked in classifying

some cutting verbs depends on one's perspective. For instance, in situations where both *force* and *manner* are involved, *manner* (FORCE) usually overrides *instrument* in the selection of cutting action verbs when the corresponding result is evoked[15]. Thus, this result can be interpreted as indirect evidence that FORCE is implicitly shaped, construed or represented in the speakers' mind about the separation verbs. In refining the semantic category MANNER, I argue and claim that the feature FORCE should be included for defining these three verbs *(pī, kǎn, duò)*, which all belong to the implied-fulfillment verbs[16], in Talmy's (2000) terms. I argue that MANNER (including the delivery of *force*) or INSTRUMENT should be included in the background frame, as part of a verb's semantic frame (cf. Goldberg 2010).

Finally, concerning the third research question, the corpus-based findings indicate that there is a co-occurrence distribution among certain V-C types. That is to say, the denotation of a verb's such as FORCE constrains the corresponding result (complement) that it can co-occur with. Likely (in reverse) the result (*core schema*) also limits certain manner-of-motion verbs in combination usage. The question remains open as to which element plays a dominant role in constraint issues, and this is beyond the scope of this paper. It would be tempting to suggest that the component FORCE (typically specified under the MANNER component) is thought to be universally available as categorizing cutting verbs depicting material separation in some languages (cf. O'Connor 2007; Majid et al. 2008).

All in all, the categorization task reflects (the fact) that the participants' attention was drawn to the result (of state change). When the participants were required to rank these cutting verbs, it seems that they resorted to the background profile of the verb action/meaning which they had encountered before (via perception, memory, or an experiential link). There must be a baseline (a proto-/basic scene or event) to which the participants implicitly and intuitively compared. Namely, the range of *force* each verb denotes can be identified by comparing it with the

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[15] If more than two semantic features are involved, only one may override the other in any given use (cf. *kǎn* 'chop' vs. *qiē* 'cut').

[16] According to Talmy (2000), the satellite can be the confirmation or fulfillment of the implicature.

corresponding ranges of result. Interestingly, as the result state is prominent in Mandarin and forms the '*core schema*' in cognition (Talmy 2000; Tai 2003), this might reflect how the participants ranked cutting verbs based on experience and evoked culture units in their descriptions (complex predicates). This suggests that there is an implicit corresponding link between the RESULT and the delivery of FORCE, though diverse complements (confirmation or fulfillment satellites) are allowed to occur with varied action verbs.

5.   CONCLUSION

Overall, this study concentrates on which semantic components are saliently packaged in cutting verbs according to the native speakers' usages/intuition. To explore these issues, two methods were adopted: an on-line questionnaire and a corpus-based analysis of cutting verbs. The ten cutting-related verbs are found to be noticeably different in the FORCE notion. The results demonstrate that there is a subtle distinction of FORCE among verbs of cutting. Namely, the senses of *kăn, duò* and *pī* imply the events of separation with strength (FORCE), whereas the meaning of *diāo* and *kē* 'engrave; carve' require a semantic domain defined by man-made control FORCE and an incremental theme (art). All (100%) participants listed *kăn* as featuring FORCE in the categorization task. With regard to FORCE, the top three selected verbs of cutting are *pī* 'hack', *kăn* 'chop', and *duò* 'chop'. And, their descending order is *pī* 'hack' > *kăn* 'chop' > *duò* 'chop'.

The remaining five words, *qiē* 'cut, *xuè/xiāo* 'pare', *jiăn* 'cut', and *pŏ* 'cut open' are related to other respective semantic components (e.g., DIRECTION), which require further investigation for justification. Finally, the corpus-based analysis supports our hypothesis of V-C complementary distribution in native speakers' usage. Verbs of cutting that feature FORCE mostly co-occur with result verbs (V_1V_2), i.e., *kāi, duàn* and *suì,* which entail a different type of RESULT (SPLIT SEPARATION). It is found that there is a complementary distribution (tendency) among the three verbs (*pī-kāi* 'hack-open; cut', *kăn-duàn* 'chop-broken; slash', and *duò-suì* 'chop-pieces; smash'). That is, *kăn* 'chop' mostly co-occurs

with *duàn* 'broken' (3.4%); *duò* 'chop' occurs with the complement *suì* 'broken into pieces' (27.6%), whereas *pī* 'hack' is mainly linked with *kāi* 'open' (51.9%).

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漢語切類相關動詞之實證探究

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本文探究切類相關動詞的語義內涵。主要的研究目標是探究語義特徵「力道」是否該納入在某些漢語切類動詞的語義本質上。研究內容包含十個常用「切」概念的動詞，如「切、削、剁、割、砍、剖、雕、劈、刻、剪」等，透過線上問卷實驗與語料庫分析，本研究結果顯示(1)母語者最常使用的四個分類依據，分別是「工具」、「(藝術)精細化」、「力道」、和「結果（一分為二）」；(2)「劈、砍、剁」三個動詞為母語者認為最常與語義元素「力道」相關的切類動詞；(3)語料庫的分析結果支持本研究關於「動補結構互補分佈」之假設。結果呈現動詞「砍」常與補語「斷」共現；另外，「剁」與「碎」常共現，而力道大的動詞「劈」則較常與補語「開」（一分為二）出現。本研究結果不但支持以使用基礎頻率為本的語言理論觀（Barlow and Kemmer 2000），且亦能對漢語動補的常用結合關係，提供不同的分析結果與建議。

關鍵字：切類動詞、範疇、力道、動補結構分布