Thematic and Argument Structures of Mandarin Si-V and V-Si Compound Verbs

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Mandarin compound verbs containing si ‘die’ are numerous and intriguing with varying meanings of si. This study investigates the meanings, functions, and thematic structures of all si-compounds. It was found that there are five basic categories of verbal si-compounds. The most common type is the resultative si-compound with the prototypical meaning of ‘to die.’ The three types have the grammaticalized si meaning of ‘to the extreme degree,’ ‘persistence,’ and ‘motionless and fixed state.’ The last type is one derived through a process of causative construction either from unaccusative si-compounds or from lexical re-mapping of theta roles in a composite causal-caused event. The five types of si-compounds all show a systematic relation among themselves either via the grammaticalization of si, or via the syntactic process of resultativity and causativity. The former causes the meaning of si to change, and the latter, the thematic structure alternation in compound verbs.

Key words: Mandarin si-compound, causative, thematic structure, grammaticalization

1. Introduction

Chinese compound verbs are abundant and have been a fascinating topic in linguistic discussion. According to Tang (1988), the morphological structure of a lot of compound verbs is actually a miniature of syntactic structure. For instance, the verb compound toutong ‘headache’ is derived from the syntactic construction of the subject NP tou ‘head’ and the predicate VP tong ‘ache’. Given this, the internal structures of Mandarin verb compounds must be various since there is a great variety of sentence structures. As different morphological structures lead to different meanings of words, we wanted to investigate how Mandarin verb compounds containing si ‘die’ in different positions, such as ai-si ‘love-die’ and si-ding-zhe ‘die-stare-DUR.’, differ in meanings and why si in different si-compounds such as sha-si ‘kill-die’ and shui-si ‘sleep-die’ display different meanings. How can morphological/syntactic structures account for these phenomena?

Previous Mandarin compound verb studies have mostly concentrated on resultative compounds such as ku-shi ‘cry-wet’ and qi-lei ‘ride-tire’ (e.g., Li 1990, Dai 2003, Huang 2006, Her 2007, Huang, Li & Li 2008). The first verb of a compound verb usually indicates the event that causes the result manifested in the second verb. In compositing the verbs, the two verbs’ theta roles are merged or suppressed and then the new argument structures of the compound verb surfaces (Li 2011, Her 2007). This analysis can explain si-compounds of sha-si ‘kill-die’ or bing-si ‘sick-die’, but other si-compounds such as re-si ‘hot-die’ and hen-si ‘hate-die’
cannot be interpreted so satisfactorily with this analysis. First, both re-si and hen-si only indicate that the degree of heat or hatred is extreme but do not mean actual death, unlike physical death in the resultative compounds of sha-si or bing-si. Second, re-si can have its experiencer theta role in an external argument position or in an internal argument position, as shown in (1a-b). There are numerous similar si-compounds such as mang-si ‘busy to death’, lei-si ‘tired to death’, and qi-si ‘angry to death’. Third, instead of the metaphorical meaning of extremely hot, re-si can also denote the literal meaning of someone’s death due to the heat and have an external causer in the subject position, as shown in (2a). Or si in the zou-si ‘walk to death’ compound can also indicate the extremity of ‘to death’ metaphorically in a similar causative construction, as shown in (2b). How the thematic structures vary and how the meaning of si changes in the si-compounds need a good explanation.

(1) a. 我熱死了。
wo re-si le
‘I feel so hot that I could die.’

b. 熱死我了。
re-si wo le
‘I feel so hot that I could die.’

(2) a. 粗心的媽媽熱死了她的小孩。
cuxin-de mama re-si le ta-de xiaohai.
‘The careless mother caused her child to die from extreme heat.’

b. 這條山路會走死你。
zhe-tiao shanlu hui zou-si ni.
‘This mountain road can cause you to walk and be extremely tired out.’

This study aims to investigate and categorize si-compound verbs in Mandarin by classifying the different semantics of si in various si-compounds via analysis of the functional relation of si with the other verb inside such compounds and analysis of

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1 CRS, an abbreviation of ‘currently relevant state’, indicates the sentential-final particle, le.
2 Le is an aspect maker attached to the end of a verb to indicate the completion of the verb in Mandarin. It will be henceforth denoted and abbreviated as ‘COM.’
3 CL is to mark classifiers, each of which categorizes a bunch of nouns into a specific class sharing some semantic features.
thematic and argument structures of the composited verbs. The remainder of the paper is organized into 4 sections. Section 2 presents the thematic structures of the most commonly seen si-compounds and the derivation processes of the resultative compounds. Section 3 demonstrates other types of si-compounds and also covers various interpretations of si as corresponding to different types of compounds. Section 4 compares thematic and argument structures in si-compounds and proposes an analysis to link transitive and intransitive si-compounds. Section 5 denotes the nature of si and explains why si always co-occurs with certain types of verbs in compounds. Section 6 summarizes and concludes the study.

2. Resultative si-compounds and derivation

Many si-compounds in Mandarin, such as sha-si ‘kill-die’, bing-si ‘sick-die’, lei-si ‘tired-die’, dong-si ‘freeze-die’, ni-si ‘drown-die’, are resultative in nature. From a relativism perspective, Tai (2003) asserts that while English resultative structures focus on the action aspect, Chinese resultative structures attend on the result aspect more. According to Her (2007), the resultative compounding is a very productive word formation process in Chinese morphology where two verbs merge, the first verb indicating the causal action or event while the second verb denotes the result state or event (Li 1990, Lin 1990). The two composited verbs can thus be referred to as $V_{cau}$ and $V_{res}$, respectively. The resultative compound verb inherits the argument roles from both composited verbs (Huang & Lin 1992, Li 1995). According to Lin (1990), Li (1990), Li, (1995), and Her (2007), the merging process of an either transitive or intransitive $V_{cau}$ and a $V_{res}$ (which is typically intransitive) results in the thematic structures in (3a) and (3b), respectively.

\[
\begin{align*}
(3) \text{a. } V_{cau} <\theta_x> + V_{res} <\theta_y> & \rightarrow V_{cau} - V_{res} <\theta_{x,y}> \\
\text{b. } V_{cau} <\theta_x \theta_y> + V_{res} <\theta_z> & \rightarrow V_{cau} - V_{res} <\theta_{x-z} \theta_y> \\
& \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \rightarrow V_{cau} - V_{res} <\theta_x \theta_{y-z}>
\end{align*}
\]

Si-compounds with si meaning ‘die’ in the $V_{res}$ position, such as bing-si ‘sick-die’, e-si ‘hungry-die’, ni-si ‘drown-die’, die-si ‘fall-die’, shuai-si ‘stumble-die’, sha-si ‘kill-die’, du-si ‘poison-die’, hai-si ‘harm-die’, ya-si ‘suppress-die’, and zhuang-si ‘hit-die’ can all be interpreted this way with si showing the result of the $V_{cau}$ action or event. One intransitive $V_{cau}$ of bing ‘sick’ and one transitive $V_{cau}$ of du ‘poison’ are given in (4a) and (4b) to show the derivation of such si-compounds in Mandarin.

\[
\begin{align*}
(4) \text{a. } V_{cau} <\theta_x> + V_{res} <\theta_y> & \rightarrow V_{cau} - V_{res} <\theta_{x,y}> \\
\text{b. } V_{cau} <\theta_x \theta_y> + V_{res} <\theta_z> & \rightarrow V_{cau} - V_{res} <\theta_{x-z} \theta_y> \\
& \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \rightarrow V_{cau} - V_{res} <\theta_x \theta_{y-z}>
\end{align*}
\]
(4) a. 張三病死了。
    Zhangsan bing-si le
    ‘Zhangsan was sick and then died.’
    bing <θ> + sires <θ> → bing -sires <θ>

b. 張三毒死了三隻老鼠。
    Zhangsan du-si le san-zhi laosu.
    ‘Zhangsan poisoned and thus killed three mice’
    ducau <θ> + sires <θ> → du -sires <θ>

According to the DOR (direct object restriction) principle of Simpson (1983), the result of the resultative compounds is always predicated on the object, if there is one, not on the subject. Huang (2006), however, proves that this principle is not always true in Mandarin, such as in the case of chi-ni ‘eat-tired’, and that the choice of theta roles depends on the semantics of the Vres. Even so, DOR is a general principle and the Vres of si in the above-mentioned compounds is always predicated on the object instead of the subject. Hence, the thematic structure of the compounds is always Vcau -Vres <θx 0y-z>, not Vcau -Vres <θx-z 0y>.

Though the resultative analysis can account for the above-mentioned si-compounds, this analysis is not very satisfactory in the following si-compounds, in which si does not mean ‘to die’. Such si-compounds come in several different categories and will be discussed in the following sections.

3. Grammaticalized Si-compounds and si-interpretations

In addition to resultative si-compounds with si meaning ‘to die’, there are several other types of si-compounds in Mandarin. First, compounds such as shuí-si ‘sleep-die’ and shuo-si ‘talk-die’ have the verb si denoting a frozen and motionless state. Second, in compounds such as ai-si ‘love-die’, hen-si ‘hate-die’, xianmu-si ‘desire-die’, and ganga-si ‘embarrass-die’ the verb si means ‘to an extreme degree.’ Third, when si is the first component of a compound, such as si-ding-zhe4 ‘die-stare-DUR.’, si-chan-zhe ‘die-tangle-DUR.’, it denotes the meaning of a very firm manner in doing an action. All these si-compounds are very different from the resultative si-compounds in their

4 Zhe is a durative aspect marker attached to the end of a verb in Mandarin. It is henceforth denoted and abbreviated as ‘DUR.’
thematic and argument structures.

### 3.1 Si denoting a motionless state

Liu (2006) analyzes all the possible lexical and grammaticalized meanings of *si* in Chinese words and phrases. According to her, *si*, after a verb in a compound, can become grammaticalized as a complement of the verb meaning either ‘die’ (under the feature ‘-life’) in resultative compounds as we have already seen, or ‘motionless’ (under the feature ‘-motion’) in compounds such as *du-si* ‘block-die’, *ding-si* ‘nail-die’ with non-animate subjects as shown in (5). I propose that grammaticalized *si*, under the ‘-motion’ feature, does not need to have this non-animate limitation and can take both animate and non-animate subjects, as demonstrated in (6). The evolved feature of ‘-motion’ and hence of ‘being firm or fixed’ in *si* is because of the similarity in appearance to ‘loss of life.’ When an animal loses its life, it will become motionless and gradually turns stiff in appearance. Consequently, the concepts of death ‘loss of life’, motionless ‘fixed and no movement’, and without flexibility ‘stiff and rigid’ are all metaphorically associated in *si*, especially in *si*-compounds.

(5) a. 洞口堵死了。
    dong-kou  du-si  le.
    hole-mouth  block-die  CRS
    ‘The hole was blocked firmly.’

b. 木板钉死了。
    mu-ban  ding-si  le.
    wood-plank  nail-die  CRS
    ‘The wood plank was nailed firmly.’

c. 門鎖死了。
    men  suo-si  le.
    door  lock-die  CRS
    ‘The door was firmly locked.’

(6) a. 張三睡死了。
    Zhangsan  shui-si  le.
    Zhangsan  sleep-die  CRS
    ‘Zhangsan was so sound asleep that he became motionless.’

b. 只見張三醉死在沙發上。
    zhi  jian  Zhangsan  zui-si  zai  shafa-shang.
    just  see  Zhangsan  drunk-die  on  sofa-top
    ‘Zhangsan was seen drunk and motionless on the sofa.’
c. 你別把話說死了。

你 not BA⁵ word 说-die  CR5
‘Don’t say words so definitely and leave no room for flexibility.’

In this type of *si*-compound, *si* has gone through a grammaticalization, a process in which a lexical or content word loses some or all of its lexical meaning and starts to fulfill a more grammatical function. The prototypical meaning of *si* is ‘to die’ or ‘to be dead,’ which means to lose life as displayed in the feature ‘-life’ in the resultative compounds. Over time, *si* gradually evolved and became grammaticalized into meaning of ‘no motion’ or ‘no flexibility’ as the complement of another verb in a compound. This semantic evolution is natural since living creatures usually are unconscious and turn rigid and motionless after death, and therefore *si* contains the semantic feature ‘-motion’. Later this type of *si* can also appear with other action verbs that have nothing to do with life just to denote the meaning of a jammed condition or condition with no flexibility, such as in *suo-si ‘lock-die’* and *ka-si ‘jam-die’. The *si* in the compounds in (6) can be paraphrased in other synonymous complement phrases with the meanings indicated above, as shown in (7). These complement phrases illustrate that *si* in this type of compound functions like a complement to modify the preceding verb, denoting the motionless, rigid state of a dead creature.

(7) a. 張三睡得像死人一樣。

張三 zhangsan  睡-DE⁶  like  死-person dead
‘Zhangsan slept so soundly that he was like a dead person.’

b. 張三醉得一動也不動。

張三 zhangsan  醉-DE  一-动-just-not-move
‘Zhangsan was so drunk that he did not move at all.’

c. 你別把話說得沒有轉圜餘地。

你 not BA word 说-DE⁶  no  转-焕-空间
‘Don’t say it in such a way that it leaves you no room for other options.’

⁵ BA here indicates the BA -construction in Mandarin, which leads the object in a preverbal position.
⁶ The DE phrase after the verb in Mandarin is a complement phrase used to modify the action of the preceding verb.
3.2 Si denoting an extreme degree

Another type of si-compound is actually very common, with si occurring after psychologically perceptive verbs or adjectives (Chiu 2001), such as ai-si ‘love-die’, hen-si ‘hate-die’, xiang-si ‘miss-die’, qi-si ‘angry-die’, xianmu-si ‘admire-die’, and jidu-si ‘envy-die’. Many Chinese linguists have noticed such compounds and proposed different syntactic analyses for si. Chao (1968) interprets si as an intensive complement while Zhu (1982) regards it as a predicate complement to show the excessive degrees of the previous verb in the compound. Some examples of such si-compounds are shown in (8).

(8) a. 張三累死了。
    Zhangsan lei-si le.
    Zhangsan tired-die CRS
    ‘Zhangsan was so tired that he felt he could die.’

b. 考試題目難死了。
    kaoshi timu nan-si le.
    test question difficult-die CRS
    ‘The test questions are so difficult that we could die.’

In addition to the ‘-motion’ complement, si can also function in a compound as a complement to manifest an extreme degree of the descriptive state of the preceding verb. Liu (2006:10) proposes that the ‘excessive degree’ meaning of si is also a result of grammaticalization, one derived from the concept of ‘towards the end of the time string.’ Adopting this view, I propose that the evolution of the meaning of si from ‘to die’ to ‘to the extreme degree’ could have come from the concept of ‘from birth to death’ with death showing the extreme end, and thus towards the extreme degree, as illustrated in the diagram in (9). The concept could have evolved from a temporal extension of ‘till the time of death’ to an intensity extension of ‘to the extreme degree.’

(9) ‘to die’ means ‘towards the extreme’
    birth ⟷ to die, to the extreme

Due to the semantics of the intensity extension, si always co-occurs with verbs of perception. This includes emotions such as gaoxing ‘happy’, nanguo ‘sad’, xia ‘scared’, zhaoji ‘worried’, and mental and psychological states such as ben ‘stupid’, jingming ‘tactful’, and jiaohua ‘cunning’. With such a combination, si is
to indicate the intensified degree of mentality. However, since *si* displays the extreme degree of the previous stative verb, any kind of verb or adjective that is measurable or gradable in degree can appear with *si*, as exemplified in (10). Sometimes the combination might sound odd in isolated phrases, but given the proper context, *si*-compounds are all very natural and productive in Mandarin, as illustrated in (11).

(10) Verbs that can co-occur with *si* in a compound

a. taste predicates
   

b. measurement predicates
   
   yuan ‘far’, chang ‘long’, gao ‘high’, zhai ‘narrow’

c. temperature predicates
   

d. speed predicates
   
   man ‘slow’, kuai ‘quick’

e. appearance predicates
   

f. predicates relating to physical or psychological state
   
   jinzhang ‘nervous’, ganga ‘embarrass’

(11) 這首詩長死了，背不起來。

   zhe-shou  shi  chang-si  le.  Bei  bu-qi-lai.
   this-CL  poem  long-die  CRS  memorize  not-rise-come
   ‘This poem is so long. (I) cannot memorize it all.’

Liu (2006:9) also indicates that the *si* in a compound could come from a complement phrase like *dao-si* ‘to death’ as in *ben-dao-si* ‘stupid-to-death’. Adopting this, I found that the *si*-compounds above are all derived from and hence can all be paraphrased with the synonymous phrasal complements of *de-yao-ming* ‘DE-want-life’ or *de-yao-si* ‘DE-want-die’, as shown in (12), meaning the *si* is a degree complement indicating the extreme degree of the preceding gradable stative verb in the compound. Due to this, though *si* does not mean physiological death, here it represents metaphorical death. *Si*, therefore, can be ambiguous, meaning either physiological or metaphorical death in *si*-compounds where the pre-*si* verb can actually cause death, such as in *lei-si* ‘tired-die’, *re-si* ‘hot-die’ or *leng-si* ‘cold-die’, or only metaphorical when the pre-*si* verb cannot cause death, such as in *mei-si* ‘pretty-die’, *tian-si* ‘sweet-die’ or *man-si* ‘slow-die’.
The mutuality of ‘death’ with ‘to the extreme’ is quite understandable. According to Liu (2006, 2008), the meaning of ‘to die’ or ‘death’ was originally taboo in human languages. Yet, this negative word, when added and combined with a predicate, can magically break the taboo in its semantic property and be converted to an intensifier, meaning ‘to an excessive extent.’ This phenomenon not only exists in Mandarin but is also observed in many other languages. Some examples in English are given in (13).

(13) a. The air is **deadly** cold.
    b. She is **dying** to know whether you love her or not.
    c. It’s **bloody** wonderful.

### 3.3 Si denoting a firm and persistent manner

The next type of si-compound has si in the initial position with examples like si-bu-chengren ‘die-not-admit’, si-bu-ken ‘die-not-willing’, si-ding-zhe ‘die-stare-DUR.’, and si-yao-zhe ‘die-bite-DUR.’. The semantic nature of si here shows a firm and persistent manner in carrying out the action of the following verb. The position of si in the compound gives a hint as to its function. As the manner adverb always modifies the verb from the left in Mandarin predicate phrases, si in this type of compound is to the left of the verb and functions like a modifier, in contrast to being a predicate or a complement as it is in other si-compounds. Tang (1988) interprets the morphological structure of this type of compound as a ‘modifier-modifyee’ relation.

Liu (2006:9) considers that si evolved from zhi-si or dao-si ‘till die’ phrases before the verb and eventually combined with the verb after some syntactic and morphological changes of deletion and reanalysis, as shown in (14). Hence, the grammaticalized si denotes a meaning of persistence and firmness in the manner of doing the action of the following verb. Naturally, the meaning of ‘persistence’ is a semantic extension from the attitude of someone doing something till s/he dies.
Evolution of *si*-V compounds (from Liu, 2006:9)

dao-si ye bu chengren si-ye bu chengren si bu chengren si-bu-chengren
till-die also not admit die-also not admit die not admit die-not-admit
dao gets deleted ye gets deleted structure reanalyzed
after weakening

*Si*-compounds of this type can be categorized into two kinds according to the verb following *si* in the compound. The first kind is an action verb with the durative marker *zhe*; the second is an achievement verb in its negative form. Since *si* denotes the persistence of the following action, the following verb has to be compatible with a durative marker. Stative verbs, which neither denote an action nor are agreeable with the durative marker, will never occur in this type of *si*-compound. Achievement verbs are ‘− durative’ in feature (Smith 1994); however, when they are negated, they become ‘+ durative’ and can co-occur with *si* to denote persistence. Examples of these two categories are given in (15).

(15) a. Action verbs with *zhe* marker

<table>
<thead>
<tr>
<th>Action</th>
<th>Action</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>死盯著</td>
<td>死咬著</td>
<td>死抓著</td>
</tr>
<tr>
<td>si-ding-zhe</td>
<td>si-yao-zhe</td>
<td>si-zhua-zhe</td>
</tr>
<tr>
<td>die-stare-DUR</td>
<td>die-bite-DUR</td>
<td>die-grab-DUR</td>
</tr>
<tr>
<td>stare persistently</td>
<td>bite persistently</td>
<td>grab persistently</td>
</tr>
<tr>
<td>死佔著</td>
<td>死煩著</td>
<td>死哭著</td>
</tr>
<tr>
<td>si-zhan-zhe</td>
<td>si-fan-zhe</td>
<td>si-ku-zhe</td>
</tr>
<tr>
<td>die-occupy-DUR</td>
<td>die-annoy-DUR</td>
<td>die-cry-DUR</td>
</tr>
<tr>
<td>occupy persistently</td>
<td>annoy persistently</td>
<td>cry persistently</td>
</tr>
<tr>
<td>死拉著</td>
<td>死撐著</td>
<td>死賴著</td>
</tr>
<tr>
<td>si-la-zhe</td>
<td>si-cheng-zhe</td>
<td>si-lai-zhe</td>
</tr>
<tr>
<td>die-drag-DUR</td>
<td>die-hold-DUR</td>
<td>die-refuse-DUR</td>
</tr>
<tr>
<td>drag persistently</td>
<td>hold persistently</td>
<td>refuse persistently</td>
</tr>
</tbody>
</table>

b. Achievement verbs in negative form

<table>
<thead>
<tr>
<th>Achievement</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>死不承認</td>
<td>死不肯</td>
</tr>
<tr>
<td>si-bu-chengren</td>
<td>si-bu-ken</td>
</tr>
<tr>
<td>die-not-admit</td>
<td>die-not-willing</td>
</tr>
<tr>
<td>not admitting persistently</td>
<td>not-willing persistently</td>
</tr>
</tbody>
</table>
死不悔改
si-bu-huigai
die-not-repent
not repenting persistently

死不覺悟
si-bu-juewu
die-not-aware
not aware persistently

As grammaticalization is always characterized by desemanticalization, i.e., semantic bleaching, the semantic contents of \( si \) in all three types of si-compounds above are hence slightly different from the original core meaning of \( si \), ‘to die.’ The semantic bleaching causes partial loss of the lexical content of \( si \), but retains the meaning of its grammatical content. Since the grammaticalizations are towards three different functions, \( si \) in the three grammaticalized \( si \)-compounds denotes different interpretations.

4. Causativity in \( si \)-compounds

In addition to the grammaticalized \( si \)-compounds above, the syntactic variations and alternation of argument structures in \( si \)-compounds contribute to a new category of \( si \)-compound, too, though there is not much meaning alternation involved here. Syntactic variations reveal that the transitivity of the \( si \)-compounds is intriguing. For instance, the compound \( re-si \) is sometimes intransitive as in (16a) but sometimes transitive as in (16b).

(16) a.那只小狗熱死了。
         ná-zhī   xǐāo-gǒu  rē-sī   lē
         that-CL little-dog hot-die  CRS
  i. ‘The little dog feels so hot that it could die.’
  ii. ‘The little dog died from over heat.’

b.車內四十度的高溫熱死了那只小狗。
     chē-nèi   sì-shí-du   děi  gāo-wēn
     car-inside four-ten-degree DE high-temperature
     rē-sī   lē    ná-zhī  xǐāo-gǒu
     hot-die COM that-CL little-dog
     ‘The 40-degree temperature inside the car caused the little dog to die from overheating.’

Sentence (16a) is ambiguous and has two possible readings as shown above. The first reading indicates that the little dog feels hot and this is metaphorically similar to the extreme degree of death. Given such semantics, the compound should consist of the structure ‘verb + degree phrasal complement’, with the \( si \)
showing the feeling of extremity. The second reading, however, is quite different. It is a resultative reading of physiological death, meaning the little dog experiences extreme heat, which causes it to die. These readings derive from two different *si*-compounds with different internal structures, as discussed in Section 3.2 and Section 2, respectively.

The transitivity actually depends on the transitivity of the verb before *si*. If the verb is transitive with an agent or experiencer subject and a patient or theme object, then the *si*-compound can be transitive, as shown in (17). On the other hand, if the verb is intransitive with an experiencer or theme subject, then the *si*-compound is intransitive, as shown in (18).

(17) a. 張三殺死李四了。
   Zhangsan sha-si Lisi le. (Zhangsan: agent; Lisi: patient)
   ‘Zhangsan killed Lisi.’

b. 張三愛死小妹了。
   Zhangsan ai-si Xiaomei le. (Zhangsan: experiencer; Xiaomei: theme)
   ‘Zhangsan loves Xiaomei so much that he could die.’

(18) a. 張三累死了。
   Zhangsan lei-si le. (Zhangsan: experiencer)
   ‘Zhangsan is extremely tired.’

b. 地板滑死了。
   diban hua-si le. (diban: theme)
   ‘The floor is extremely slippery.’

But in (16b), the transitivity is not due to the transitive verb, since the verb *re* is not transitive. Here, the transitivity of the *si*-compound is derived from the causative structure, 使得 *shide* ‘cause’. Therefore a causative theta role can be added in the matrix subject position since the causer is always the most prominent theta role and stands highest, according to the Lexical Mapping Principle (Her 2007, Huang 2012), as shown in (19a). After the conflation, the causative NP, *gao-wen* ‘high-temperature’, overrides the original thematic structure and becomes the external argument of the *si*-compound, and the experiencer and theme theta roles are compressed into one argument (via suppressing one argument, see Her 2007, Li 2011) and become the internal argument of the *si*-compound, as shown in (19b).
(19) a. 車內四十度的高溫使得那只小狗熱死了。
    che-nei  si-shi-du  de  gao-wen  shide
    car-inside  four-ten-degree  DE  high-temperature  cause
    na-zhi  xiao-gou  re-si  le.
    that-CL  little-dog  hot-die  CRS
    ‘The 40-degree temperature inside the car caused
    the little dog to die from overheating.’

b. 車內四十度的高溫熱死了那只小狗。
    che-nei  si-shi-du  de  gao-wen  re-si  le  na-zhi  xiao-gou.
    re-si  <  causer  <  experience;  theme; >>
    gaowen  xiaogou  xiaogou

This kind of causative structure is not unusual in si-compounds. In all of the
examples in (20), a causative NP is first added as an external causer and then
conflated into the si-compound and becomes the subject NP. This is the same
syntactic process described in (19b). Huang (2006) asserts that a causativity
construction like this is done by adding an external argument onto the original event
clausal complement containing si-compound verbs such as qi-si ‘angry-die’, lei-si
‘tire-die’, xiao-si ‘laugh-die’, and men-si ‘suffocate-die’. An example sentence with
its derivation process is illustrated in (21a-b). After the derivation, the semantics of
the causative light v is ‘shi-qisi’ ‘cause to feel extremely angry’, the phonetic
realization of which is still qi-si in Chinese.

(20) a. 那些話氣死了張三。
    na-xie  hua  qi-si  le  Zhangsan.
    that-several  words  angry-die  COM  Zhangsan
    ‘Those words made Zhangsan extremely angry.’

b. 這種氣氛悶死了我們。
    zhe-zhong  qifen  men-si  le  women.
    this-kind  atmosphere  suffocate-die  COM  we
    ‘This kind of atmosphere made us feel extremely suffocated.’

c. 張三的笑話會笑死你。
    Zhangsan  de  xiaohua  hui  xiao-si  ni.
    Zhangsan  DE  joke  will  laugh-die  you
    ‘Zhangsan’s jokes will make you laugh to death.’

However, there is another type of causative construction used with si-compounds,
where the causer is from an original argument inside the causal event. In this case,
instead of adding an argument from outside, the causer argument is derived through a syntactic process by suppressing another argument NP, usually an agent NP. Due to this, the *si*-compounds here are normally not lexicalized as morphological words and are therefore not found in the dictionary. Examples such as the *chi-si* ‘eat-die’, *zuo-si* ‘work-die’, and *du-si* ‘study-die’ are given in (22).

(21) a. 那些話氣死張三了。
    \[ \text{[vP [CAUSER na-xie hua qi-si [EVENT Zhangsan t ]]] le} \]
    \[ \text{[vP [CAUSER that-several words angry-die [EVENT Zhangsan t ]]] CRS} \]
    ‘Those words made Zhangsan extremely angry.’

b.  ASPP
    \[ / \]
    \[ vP \]
    \[ / \]
    \[ NP \]
    \[ / \]
    \[ na-xie hua \]
    \[ / \]
    \[ v \]
    \[ VP \]
    \[ cause-qisi \]
    \[ / \]
    \[ NP \]
    \[ / \]
    \[ V' \]
    \[ Zhangsan \]
    \[ V \]
    \[ t \]
    \[ le \]

(22) a. 那種藥會吃死你。
    \[ na-zhong yao hui chi-si ni. \]
    ‘Taking that kind of medicine will make you die.’

b. 這種工作會做死你。
    \[ zhe-zhong gongzuo hui zuo-si ni. \]
    ‘Doing this kind of job will make you work to death.’

c. 這種論文會讀死你。
    \[ zhe-zhong lunwen hui du-si ren. \]
    ‘Studying this kind of papers will tire a person to death.’
The derivation procedure of these causative si-compounds is a little complicated. Based on the Unified Mapping Principle in Her (2007), first, the original agent argument in the causative event becomes the internal argument; then the theme or patient argument becomes the external argument in the outmost emerged compound after linking the same argument in both the causal and the caused events via co-indexing. Let’s take (22a) as an example and see the derivation process in (23). Originally, the causal event ‘you take that kind of medicine’ causes the caused event ‘you die.’ The agent NP \textit{ni} ‘you’ in the causal event is co-indexed with the theme NP \textit{ni} ‘you’ in the caused event and then emerges as the internal argument of the causee. The patient NP \textit{yao} ‘medicine’ in the causal event emerges as the external argument of the causer after the suppression of the agent NP \textit{ni} ‘you.’

(23) 那種藥會吃死你。
\textit{na-zhong yao} \textit{hui} \textit{chi-si} \textit{ni}.
that-kind medicine will eat-die you
‘Taking that kind of medicine will make you die.’

The analysis above shows that causative si-compounds can be derived from two different structures. One is from creating a causative structure by adding an external argument onto an event containing a si-compound verb. When the si-compound has only one experiencer argument, it usually has the nature of an unaccusative verb, which has the variation of externalizing the internal argument, as shown in (24a-b). With this syntactic alternation, it is therefore always possible and easy to have a causer as an external argument and have the original argument of the si-compound in the internal argument position, as shown in (24a′-b′). Other one-place predicate resultative compounds without si, as shown in (25a-b), do not have such freedom in internal-external variation, nor can they have causative constructions, as in (25a′-b′).

(24) a. 我熱死了。 / 熱死我了。
\textit{wo} \textit{re-si} \textit{le}。 / \textit{re-si} \textit{wo} \textit{le}。
I hot-die ASP hot-die I CRS
‘I feel so hot that I could die.’
a’ 這天氣熱死我了。
  zhe tianqi  re-si  wo  le.
  this weather  hot-die  I  CRS
  ‘This weather makes me feel so hot that I could die.’

b. 張三嚇死了。
  Zhangsan  xia-si  le.  /  xia-si  Zhangsan  le.
  Zhangsan  scare-die  CRS  /  scare-die  Zhangsan  CRS
  ‘Zhangsan was scared to death.’

b’ 這突然的槍聲嚇死張三了。
  zhe turan  de  qiangsheng  xia-si  Zhangsan  le.
  this sudden  DE gun.sound  scare-die  Zhangsan  CRS
  ‘The sudden gunshot made Zhangsan scared to death.’

(25) a. 我看懂了。
  wo  kan-dong  le.  /  *kan-dong  wo  le.
  I  look-understand  CRS  /  hot-die  I  CRS
  ‘I looked and understood it.’

a’ *這本字典看懂我了。
  *zhe-ben  zidian  kan-dong  wo  le.
  this-CL  dictionary  look-understand  I  CRS
  (intended meaning: ‘This dictionary makes me look and understand it.’)

b. 張三長高了。
  Zhangsan  zhang-gao  le.  /  *zhang-gao  Zhangsan  le.
  Zhangsan  grow-tall  CRS  /  * grow-tall  Zhangsan  CRS
  ‘Zhangsan has grown tall.’

b’ *牛排長高張三了。
  *niupai  zhang-gao  Zhangsan  le.
  steak  grow-tall  Zhangsan  CRS
  (intended meaning: ‘Steak makes Zhangsan grow tall.’)

The other structure is the result of a syntactic process concerning re-doing lexical mapping with the theta roles on the arguments available in the causal and caused events. The agent NP in the causal event must be identical to the theme NP in the caused event and later after conflation suppressed to be the internal argument of the new si-compound, as shown in (23). These syntactically derived si-compounds are unique and productive in Modern Chinese. Since they are formed only through a syntactic procedure, they are not recognized as words or compounds morphologically and are rarely found in the dictionary. It could be that they are still new and need time to be included in the dictionary. The other more likely reason is that there are already various si-compounds with various meanings of si, causing confusion and ambiguity as
will be depicted in the following. Hence, this type of *si*-compound is syntactic and can be distinguished from morphological *si*-compounds in both meaning and structure.

The two causative constructions of *si*-compounds above make us ponder further on how the meaning of *si* has changed. Originally *si* meant ‘die’ or ‘death,’ which is negatively received. However, with time *si* evolved to mean ‘excessiveness’ in one of its grammaticalized meanings, and the excessiveness can even override and bleach the negative ‘death’ semantics to become an intensifier depicting extremity in emotion or activity that is gradable (Liu 2008). It is interesting that this evolution has occurred in numerous languages around the world. In Chinese the extremity of *si* further enables *si*-compounds to easily take on an external causer theta role which is blended into a new thematic structure via either of the syntactic derivations mentioned above.

Another area to ponder upon is the impact the extremity of *si* has on semantic and syntactic structures, especially in the case of modern Mandarin Chinese. We notice that in addition to the alternation from physiological death to metaphorical excessiveness, *si*, once it is associated with another verb and turned into a compound, can influence syntactic argument structures. Liu & Hu (2013) observed that via the human cognitive mechanism, the extremity of *si* can be conceived as equivalent to a complete overturn from life to death and thus affects the thematic structure whereby the experiencer of an emotional state is turned to be an affected undergoer and thus causes the swapping of argument positions. A typical example taken from Liu and Hu (2013) is shown in (26).

(26) a. 我羨慕死他的好運了。
    wo xianmu-si ta de haoyun le.
    ‘I envy his good luck to death.’

b. 他的好運羨慕死我了。
    ta de haoyun xianmu-si wo le.
    ‘I envy his good luck to death. / His good luck made me envious to death of him.’

With such rich variations, *si*-compounds can easily generate ambiguity between a physiological and metaphorical death, as in (27a), or between an experience or causer argument in the subject position, as in (27b). Hence, the contextual information is very important in Chinese. Moreover, syntactic formation is also a clue in interpreting *si*. For instance, in (28), the compound *shui-si* ‘sleep-die’ can only take a causative reading, not the motionless reading of *si*. The verb of *shui* ‘sleep’ is intransitive and
consequently the compound shui-si can only have an external argument, such as in (6) 
Zhangsan shui-si le ‘Zhangsan was sound asleep and motionless’. However, in (28), 
there is an internal argument ni ‘you’ and an external argument of event ‘(ni) 
zhe-yang shui-xia-qu,’ which hence acts as a causer. And the agent argument of the 
causal event, i.e., ni ‘you’, is identical with the theme argument of the caused event, 
making it possible to have the causative syntactic derivation of a new si-compound as 
illustrated in (23). Hence, there is no ‘motionless’ reading but only a ‘causative’ 
reading for shui-si in (28).

(27) a. yì gè rén rè-si le.
    You yi-ge ren re-si le.
    ‘There was one person who died of over heat.’
    (28) zhè-yáng shuí-xià-qué huì shuí-sì ni.
        this-way sleep-xia-qu will sleep-si you
        ‘Sleeping this way will make you sleep forever and never wake up.’

5. Co-occurrence in si-compounds

From the observations and discussion above, we can understand that si-compounds 
in Mandarin are abundant and varied with different internal structures. The semantics 
of si vary with its structures, grammatical functions, and the verbs with which it 
co-occurs, although si-compounds display an organized system. A brief summary of 
all the si-compounds discussed in this paper is outlined in Table 1.

The most common si-compounds are resultative compounds, with the si in the 
final position of the compound showing the result of death due to the action of the 
preceding verb. Because of this, the co-occurring verb naturally is an action verb that 
causes the death. Some examples are sha-si ‘kill-die’, du-si ‘poison-die’ and ya-si 
‘suppress-die’.

There are two complement types of si. The first, deriving its meaning from death 
to show a motionless or fixed state, positioned in the final position of the compound,
indicates the figurative state of ‘being dead’ due to a previous action. Hence, the co-occurring verb is usually an action verb that can produce a motionless state like sleeping or a fixed state without flexibility like being jammed. Some examples are zui-si ‘drunk-die’, shui-si ‘sleep-die’, and ding-si ‘nail-die’. The other kind, deriving its meaning from ‘to death’ to show extremity or the end of life, also positioned in the final position of the compound, displays the degree of extremity on the preceding perceptual or gradable verb. In its figurative meaning, si shows the excessive degree of emotion or an extreme psychological condition and naturally co-occurs with state verbs, which usually describe a state and are gradable in degree. Some examples are chou-si ‘ugly-die’, qi-si ‘angry-die’, re-si ‘hot-die’, and hen-si ‘hate-die’.

The next type of si-compound has si in the initial position of the compound. As manner adverbs always modify their verbs from the left in Mandarin, si here shows that it is an adverbial modifier in function instead of a predicate or a complement. The position of si, hence, also accords with its morphological function inside the compound. Deriving from its original meaning of death, si here indicates a persistent manner in doing something till one dies. Since it shows persistence in carrying out an action, the co-occurring verb is naturally an action verb with a durative marker zhe to emphasize continuity. Alternatively, the following verb can also be a negated achievement verb, which also has a ‘+durative’ feature after being negated. Some examples are si-ding-zhe ‘die-stare-DUR’, si-bu-chengren ‘die-not-admit.’, and si-chan-zhe ‘die-entangle-DUR’.

### Table 1. Brief summary of si-compounds in Mandarin

<table>
<thead>
<tr>
<th>Compound examples</th>
<th>Internal structure</th>
<th>Meaning of si</th>
<th>Constituting Verb</th>
</tr>
</thead>
<tbody>
<tr>
<td>shasi ‘kill-die’</td>
<td>Resultative</td>
<td>‘To die’ physiologically as a result state</td>
<td>Action V - si</td>
</tr>
<tr>
<td>dusi ‘poison-die’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>zuisi ‘drunk-die’</td>
<td>V-complement</td>
<td>In a motionless or fixed state like being dead</td>
<td>Action V - si</td>
</tr>
<tr>
<td>dingsi ‘nail-die’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chousi ‘ugly-die’</td>
<td>V-complement</td>
<td>Figurative death to depict extremity and intensity</td>
<td>State V - si</td>
</tr>
<tr>
<td>hensi ‘hate-die’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>si-ding-zhe</td>
<td>Adv-V</td>
<td>Persistently in a durative action</td>
<td>Si- Action V-DUR.; Si-not- achievement V</td>
</tr>
<tr>
<td>si-bu-chengren</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘die-not-admit.’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>resi ‘hot-die’</td>
<td>Causative</td>
<td>‘to die’ as in a resultative compound; ‘to death’ to display to an extreme degree</td>
<td>Unaccusative si-compound. Transitive V + si</td>
</tr>
<tr>
<td>chisi ‘eat-die’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The last type is the most intriguing type of *si*-compound because the original thematic structure has been altered due to the added causative argument. There are two ways to add causativity. The first is to add in an extra causer argument and make it an external argument; the original theme/experiencer argument becomes the internal argument, as illustrated in (29-30a-b). This causative construction can only be conducted on unaccusative *si*-compounds (Huang 2006). Transitive resultative *si*-compounds with an agent theta role are not unaccusative verbs since the external argument has been occupied by an agent, and therefore cannot undergo this alternation, as shown in (30c).

(29) a. 張三熱死了。
   Zhangsan re-si le.
   1. ‘Zhangsan feels so hot that he could die.’
   2. ‘Zhangsan died from overt heat.’

b. 車內45度的高溫熱死張三了。
   che-nei si-shi-wu-du de gao-wen re-si Zhangsan le
   1. ‘The hot temperature of forty-five degrees inside the car caused Zhangsan to feel extremely hot.’
   2. ‘The hot temperature of forty-five degrees inside the car caused Zhangsan to die from overt heat.’

(30) a. 張三熱死了。
   Zhangsan re-si le.
   resi: experiencer/theme < Ø > (unaccusative V)

b. 車內45度的高溫熱死張三了。
   che-nei si-shi-wu-du de gao-wen re-si Zhangsan le.
   resi: causer < experiencer/theme > (causative V)

c. 李四殺死了張三。
   Lisi sha-si le Zhangsan.
   sha-si: agent < patient/theme > (transitive resultative V with agent)

The other way of achieving causativity is via a syntactic process in which the
thematic structure is re-organized from the lexical re-mapping of the theta roles as discussed in the second half of Section 4. This causativity requires both a causal event and a caused event and the agent in the causal event needs to be identical with the theme theta role in the caused event. After the causative construction, the patient argument in the causal event becomes the external causer argument and the agent gets compressed with the theme theta role to become the internal theme argument of the new causative *si*-compound, as shown in (23). Owing to this, this kind of *si*-compound always constitutes a transitive action verb and *si*. As the caused event indicates an extreme outcome of someone’s death, literally or metaphorically, the causal event usually means drastic or constant activities that cause a person to die or be in a miserable condition similar to dying. Such a syntactic formation of the *si*-compound is quite productive in modern Chinese and some examples are shown in (31).

(31) a. 這種烈酒會喝死張三。
   Zhe-zhong liejiu hui he-si Zhangsan.
   ‘Drinking this kind of strong liquor will make Zhangsan die.’

b. 這檔股票玩死了張三。
   Zhe-dang gupiao wan-si-le Zhangsan.
   ‘Playing this stock made Zhangsan suffer greatly.’

c. 那個漂亮女生會追死你
   na-ge piaoliang nüsheng hui zhui-si ni.
   ‘Chasing that beautiful girl will tire you to death.’

6. Conclusion

This study examines the internal structures of all verbal *si*-compounds in Mandarin. There are five basic categories of *si*-compounds based on the analysis of the position, function, and meaning of *si*, the thematic structure of the composing verbs, and the derivational process of the *si*-compound. The first is the resultative *si*-compound which is formed by combining an action verb with *si*, showing the result. This type of compound involves both the morphological merging of two verbs and the syntactic re-mapping of the theta roles of the composing verbs. Next, three other types of *si*-compound can be identified from the different grammaticalizations of *si*. It is concluded that the position of *si* in the compound denotes different
functions of *si*. At the beginning of the compound, *si* functions as a manner adverb, indicating the persistence and durability in doing the action of the following composite verb. *Si* at the end of the compound usually acts as a verb and functions as a complement of the preceding verb. The complement can indicate either the extreme degree of a perception or the state of the preceding verb or a fixed or motionless state due to the action of the preceding verb. Lastly, another type of *si*-compound can also be derived from a syntactic operation of causativity by either adding an external argument, i.e., causer, to an unaccusative *si*-compound, or by doing lexical re-mapping of theta roles in a composite causal-caused event, thus creating a new thematic structure in the causative *si*-compounds.

The five categories of *si*-compounds seem intertwined, but the meaning of *si* is either its core meaning of ‘to die’ or the evolved meaning from death, such as ‘till death’ to show persistence, ‘like death’ to show a motionless or fixed state, or ‘towards death’ to indicate an extreme degree. There are also corresponding phrasal expressions synonymous with the *si*-compounds in modern Mandarin, shown in (32), meaning the morphological and syntactic structures of *si* are consistent. The whole range of *si*-compounds in Mandarin forms an organized system.

(32) a. 他至死都不道歉。
   ta  zhisi  dou  bu  daoqian.  →  ta  si  dou  bu  daoqian.
   ‘He persistently refused to apologize.’

b. 把七號球員看得死死的
   ba qi-hao  qiuyuan  kan-de si-si  -de.  →  kan-si  qi-hao  qiuyuan
   ‘Block Player No. 7 tightly (so he cannot have any function).’

c. 他累得{半死/要死/要命} 他累死了
   ta  lei-de {ban-si/yao-si/yao-ming}.  →  ta  lei-si  le.
   ‘He is so tired that he could die.’

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Linguistics Club.

[Received August 14, 2014; revised June 16, 2015; accepted October 22, 2015]
中文裡含有死字複合動詞的論旨與論元結構

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中文複合詞裡含有死字的複合動詞十分繁多而且語意變換奧妙有趣，本研究即探討這些複合動詞裡死字的意義、功能、及論旨結構。研究結果為中文裡有基本五類的動詞性死複合詞，首先最普遍的為表結果的死複合動詞，死的含意為最原始的「死掉」意義；之後的三種死複合詞都具有語法化的死，意義各為「致極端的程度」、「執著持續」、「無動靜僵住狀態」；最後一種死複合動詞是由經由句法使動結構過程形成，它可以是從非受格性的死複合動詞變化而來，或是由原因-結果兩事件合併過程經由詞彙論旨角色的重新分配而成。這五類死複合動詞看似不同但彼此有系統性關聯，或由語法化的關係相連接，或經由結果結構或使動結構的句法過程相連接；前者造成死字語意的些微變換，後者造成複合動詞內部論旨結構的換位。

關鍵詞：中文死複合動詞、使動、論旨結構、語法化