Study of Near Synonymous Mental-State Verbs: A MARVS Perspective

Yuan Tao¹,²
1. Dalian University of Technology / No. 2 Linggong Road, Ganjingzi District, Dalian
taoyuan@dlut.edu.cn
2. The Hong Kong Polytechnic University / Hung Hom, Kowloon, Hong Kong
yuann.tao@connect.polyu.hk

Abstract

Near synonym has become a central issue for lexicon and semantics for the nuances in meaning, distribution and context. This study, drawing upon the MARVS framework of Huang et al. (2000) and Chang et al. (2000), aims to carry out the descriptive lexical-semantic analysis, elaborate the similarities and differences and investigate the factors influencing the discrepancy of the near synonyms. A mixed method of quantitative and qualitative analysis was used to identify the sense, role module and event module. The findings show that the near synonyms of mental-state verbs vary in frequency, role module and role internal attribution and indicate that there is a positive relationship between event structure modules and the senses. The study should, therefore, be of value to theoretical, pragmatical and pedagogical implication to a better understanding for the mental state verbs as well as the nature of the cognition.

1 Introduction

Near-synonym, or the paired-off signifiers, is an increasingly important area in linguistics. Because perfect or full synonyms do not exist logically (van Orman Quine, 1987), synonyms present subtle nuances, which is considered a “deviation from the one form-one meaning relation” (Taylor, 2003). Mental state verbs (MSVs), also known as psych-verbs or cognitive verbs such as remember, think and recall, are defined as the “internal state lexicon” (Booth and Hall, 2000). Extensive research has distinguished the difference of near synonyms, particularly action or transitional verbs from the perspective of collocation, distribution and corpus-based studies (Lee and Liu, 2009; Hong, 2014) and shown the acquisition and production of cognitive verbs in children and the understanding of the polysemous meanings (e.g., Booth et al., 1997; Nixon, 2005). However, little is known about near synonyms of mental state verbs. Consequently, what is not clear is the fine-grained distinction between near synonyms of mental state verbs.

Hall et al. (1987) suggest that cognitive words may be “central to accessing, monitoring and transforming internal states”. Fetzer (2008) notes that cognitive verbs are applied in “a strategic manner”. The analysis of the near-synonyms of mental state verbs plays a crucial role in the study of meta-cognition and cognitive states. It is therefore important to investigate the mental state verbs, especially the near synonymous mental-state verbs for the understanding of metacognition.

As a theory analyzing the verbal semantics based on Mandarin Chinese database, the Module-Attribute Representation of Verbal Semantics (MARVS) is fast becoming a key instrument in the comparison of near synonyms. There are a number of studies that apply MARVS to the analysis of transitive verbs (e.g., Ahrens et al., 2003; Hong et al., 2008; Hong et al., 2012), from the perspective of MARVS.
Following the framework of Huang et al. (2000) and (Chang et al., 2000), the primary objective of this paper is to carry out the descriptive lexical-semantic analysis of the near-synonyms of 专心 zhuanxin ‘concentrate’ and 注意 zhuyi ‘pay attention to’ supplemented by another pair of psych-verbs, 担心 danxin ‘worry’ and 担忧 danyou ‘be concerned’ for the eventive information. Moreover, the study clarifies the similarities and differences of the near-synonyms from sense, role module and event module with quantitative analysis and qualitative analysis systematically. Thirdly, this research sets out to gain further understanding of the factors influencing the similarity and discrepancy of two near-synonyms. Specifically, the study seeks to address the three questions:

RQ1. What are the senses and PoSs of the two near-synonym pairs?
RQ2. What are the role module and the event structure module of the near synonyms?
RQ3. Why do the role module and event module of the mental state verbs vary?

Utilizing Sinica Corpus and Chinese Word Sketch (CWS), the study, to the best of the author’s knowledge, first identifies the senses and parts of speech (PoS) of the mental state near-synonyms. In particular, it will generate some important insights into the roles and event modules of two pairs of near-synonyms zhuanxin and zhuyi, danxin and danyou. Further, the investigation provides an exciting opportunity to advance our knowledge of mental state verbs based on empirical study. In addition, the study contributes to pedagogical implication for the Chinese learners of the near synonyms.

The paper is structured as follows: it starts with the brief overview of the recent research on near synonyms. Then, on the basis of online tools of Sinica Corpus 4.0 with 11, 245, 330 word tokens and CWS with 1.4 billion word tokens, it will give an account of the comparison of the agent and the eventive information of the near-synonym of zhuanxin and zhuyi from a MARVS perspective. In addition, another pair of synonyms of perception of danxin and danyou is supplemented to further examine the role and event modules of mental state verbs. The next section explains the similarity and difference of the near synonyms and it concludes with the main findings, limitations, and the implications.

2 Literature Review

Though near synonyms share similar core meaning, they have subtle differences. A great deal of previous research has focused on the analysis and comparison of near synonyms from computational approaches including distribution patterns and syntactic behavior (Lee and Liu, 2009; Hong, 2014). Based on co-extension relation and distribution on psycholinguistic experimentation, Taylor (2003) distinguishes the near synonyms of “high” and “tall”. Chief et al. (2000) analyze syntactic behavior and distribution difference of fangbian and bianli on corpus-based study. It is also observed that context plays an important role in lexical choice (Reiter and Sripada, 2004). The distribution patterns of the state verbs and the Mandarin verbs of “throwing” are also investigated on corpus-based study (Tsai et al., 1998; Liu et al., 2000). These quantitative analyses have explored the semantic and syntactic behaviors and distribution patterns of near synonym pairs, however, what is less clear is the inherent semantic discrepancy.

To further examine the nature of near synonyms, Huang et al. (2000) establish the linguistic model of MARVS to examine the eventive information including role modules and event modules, which explores the words from lexical, semantic, syntactic views and grammatical explanation. In the same vein, Chung and Ahrens (2008) suggest that sense distribution and mutual information be supplemented in the differentiation. Several attempts have been made to distinguish put and set, verbs of ingestion, sensation verbs of kanjian ‘see’ and chumo ‘touch’, and transitive verbs of chi1 ‘eat’, wan2 ‘play’, huan4 ‘change’ and shao1 ‘burn’ (e.g., Ahrens et al., 2003; Hong et al., 2008; Hong et al., 2012). These studies examine the verbal polysemy and event structure of the transitive verbs, in particular, the action verbs whereas the eventive information of state verbs has not been closely examined.
Teng (1975) divides verbs into action- and state-verbs and distinguishes state-verbs with the modifiers of both degrees and time adverb. In an investigation into cognitive words, Hall et al. (1987) classify six levels systematically ranging from perception and attention, recognition, recalling, understanding, metacognition to evaluation of presuppositions in terms of processing degrees. The typology covers all the mental state verbs. Based on the comprehensive and elaborate criteria, Levin (1993) categorizes psych-verbs into four types of amuse, admire, marvel and appeal verbs. Her nearly fifty subcategories of verbs have an extensive analysis of action and state verbs, however, the classification of psych-verbs is not comprehensive.

The near synonyms of mental state verbs provide subtle nuances in cognitive state and metacognition. Up to now, a number of studies have highlighted factors that are associated with the acquisition and production of cognitive verbs in children and the understanding of the polysemous meanings (e.g., Booth et al., 1997; Naigles, 2000; Nixon, 2005). Near synonyms of mental state verbs have seldom been analyzed from the perspective of MARVS.

To summarize, these studies highlight the similarity of meaning in near-synonyms and the analysis from distribution, context, corpus-based study and MARVS. However, little is known about the role module and event module of near synonym of cognitive verbs, which are significant in understanding the internal mental state, the self-awareness and metacognitive monitoring (Booth et al., 1997). This paper supplements another pair of the mental state verbs of danxin and danyou by Hall et al. (1987) and Levin (1993) to further analyze the psych-verbs.

3 Methodology

3.1 Theoretical Framework
Based on the assumptions of the universal properties of direct representation, conceptual motivation and representation clues, verbs have the eventive information (Huang et al., 2000). In MARVS, verbs can be divided into event models and role modules for the research on lexical semantic distinctions and two respective internal attributes:

![Theoretical framework of MARVS (Huang et al., 2000)](image)

As shown in Figure 1, verbs contain the eventive information of event modules and role modules. Event modules include five atomic event structures of boundary, punctuality, state, process and stage. Further, event inherent attributes can be classified into control, realized and disposal. Roles involve agents, cause, causer, comparison, experiencer, goal, instrument, incremental theme, location locus, manner, range, recipient, source, and target. The role internal attributes include sentience, volitive, affectedness and design.

3.2 Procedure
Prior to data collection, the senses are referred to from the dictionary and parts of speech (PoS) of the two verbs are extracted from Sinica Corpus and Chinese Word Sketch. Based on WordSketch from CWS, it then analyses the role module and the event structure module in terms of the tense, modifier and event inherent attributes. To further analyze the verbs of perception, the study carries out WordSketch on another pair of negative admire verbs of danxin and danyou from Chinese Synonymous Usage Dictionary (Teng, 1996) to get the role module and event module. The next step is to compare the two pairs of near synonyms of mental state verbs for an examination of the common attributes. Finally, it provides the explanation for the similarity and discrepancy and concludes with a summary of the findings.
4 Results

To distinguish the near synonyms of the mental state verbs, the study investigates the three factors of senses, role modules and event modules respectively.

4.1 Senses of the near-synonym verbs

Both verbs have one sense of similar meanings of being absorbed in something. According to Chinese Modern Dictionary, zhuanxin has one sense of concentrating one’s attention and one part of speech (VH). Zhuyi has one sense of focusing the willpower and two parts of speech (VK and Nv):

zhuanxin focus one’s concentration
zhuyi focus one’s willpower to a certain aspect

A general overview of the near synonym in Sinica Corpus indicates that zhuanxin (freq. = 244) is much less used than zhuyi (freq. = 2007). Similarly, WordSketch of the near synonym showcases the sharp contrast. As shown in Figure 2, the frequency of zhuanxin (freq. = 3859) and zhuyi (freq. = 136547) varies greatly in gagaword2 corpus, indicating that zhuyi is much more extensively applied in various text types.

Figure 2: WordSketch comparison of zhuanxin and zhuyi in gagaword2

Furthermore, the PoSs of the verbs also vary since zhuanxin is VH, or stative intransitive verb and zhuyi is mostly used as VK, namely Stative Verb with a Sentential Object as indicated in Table 1:

Based on the study of the senses and PoSs, it is observed that the distribution of the near synonym varies although the near synonym shares similar meaning, meaning that they are used in different context. Moreover, the mental state verbs are used to indicate a durative event, but the nuances in PoSs illustrate that structure of the near synonym differ.

4.2 Role module

As stated earlier, role includes the elements of agent and theme. This study compares the agent, or the subject and theme (object) of the near synonym. The comparison is revealing in three ways. Firstly, the subjects of zhuyi include instrument such as chuanzhi (ships) and experiencer including minzhong (mass), jiashiren (driver) and kaosheng (examinee). As presented in Table 2, subject of zhuanxin tends to be the pronouns of I or he, while that of zhuyi a community or a group of people.

Table 1: Comparison between zhuanxin and zhuyi in Sinica Corpus

| Words | PoS | Freq. |
|-------|-----|-------|
| zhuanxin | VH  | 244   |
| zhuyi   | VK  | 1879  |
|         | Nv  | 128   |

Table 2: Comparison of subject collocation between zhuanxin and zhuyi

| Subjects | Freq. | Salience |
|----------|-------|----------|
| 我 (I)   | 6     | 13.81    |
| 他 (he) | 12    | 13.75    |
| 船只 (ships) | 2349 | 97.12   |
| 民众 (masses)  | 471  | 38.49   |
| 驾驶人 (drivers) | 50  | 33.03   |
| 考生 (examinees) | 55  | 27.45   |
| 家长 (parents) | 53   | 24.98   |
| 投资 (investors) | 35   | 22.39   |

Secondly, turning to objects, Table 3 illustrates the collocation of objects with zhuanxin and zhuyi. As shown in Table 3, zhuyi is collocated with a noun such as problem, items, development related to risk. Conversely, zhuanxin is followed by a phrase of event type including a process and a state such as note-taking, study, listening to lecture, incubation and painting. The theme of zhuanxin is a durative event and that of zhuyi tends to be a noun.

Thirdly, the two verbs share similarity in role internal attributes which include sentience, vo-
专心 *Zhuanxin* ‘concentrate’  注意 *Zhuyi* ‘pay attention to’

| Objects                          | Freq. | Objects                          | Freq. |
|---------------------------------|-------|---------------------------------|-------|
| 相夫教子 (mothering)            | 16    | 事项 (items)                    | 3101  |
| 向学 (study)                    | 35    | 动态 (development)              | 641   |
| 待产 (labour)                   | 10    | 自身 (self)                     | 68    |
| 作笔记 (note taking)            | 3     | 饮食 (diet)                     | 574   |
| 妊娠 (recovery from illness)    | 14    | 动向 (development)              | 428   |
| 听讲 (listening to lecture)     | 30    | 情势 (situation)                | 396   |
| 病伤 (recovery for injury)      | 7     | 环境卫生 (environment)          | 781   |
| 孵蛋 (incubation)               | 3     | 交通安全 (safety)               | 182   |
| 念书 (study)                    | 36    | 卫生 (sanitation)               | 171   |
| 作画 (painting)                 | 21    | 变化 (change)                   | 972   |

Table 3: WordSketch comparison for objects of *zhuanxin* and *zhuyi*

| 专心 concentrate                  | 5     | 注意 pay attention to            | 22    |
|-----------------------------------|-------|----------------------------------|-------|

Table 4: Frequency of collocation with *yiding* (must) in gigaword2

a. 上课一定要专心听讲，回家要复习。
   “Be concentrated in class and review the lecture after returning home.”

b. 卫生部门因此提醒患者个人用药时一定注意药品的有效期，不要使用失效药品。
   “The health department remind the patients of paying attention to the expiry date of the medicine and do not take the expired drugs.”

Overall, WordSketch on the subjects of the near synonyms indicates that the subject is experienter which varies in scope based on the severity of objects. Further, both *zhuyi* and *zhuanxin* can be collocated with a role-internal attribute of [+volition]:

| 专心 concentrate                  | 5     |
|-----------------------------------|-------|
| 注意 pay attention to              | 22    |

Table 4: Frequency of collocation with *yiding* (must) in gigaword2

4.3 Event Structure Module

By analysing the collocations and MI of modifiers of the near synonym pairs in Sinica Corpus, this study examines the tense, boundary, modifier and event inherent attributes of event structure module.

**Tense**

It is observed that *zhuyi* can be collocated with the collocation of *le* (freq. = 544) whereas *zhuanxin* is not followed with *le*, indicating that *zhuyi* has the event module of process as exemplified in the following example:

由于上海较早地注意了再就业、养老保险、医疗保险等社会保障工作，进而比较好的解决了企业人多、债多、社会负担重的问题。

“Because Shanghai paid attention to the social insurance of reemployment, endowment insurance, medical insurance earlier, the problems of overstaff, debt and social burdens are solved more satisfactorily.”

However, it is noteworthy that *le* is both an aspect marker (freq. = 143) and sentence particles (freq. = 401) in the collocation with *zhuyi*. In most cases, when *le* is placed at the end of the sentence, it is a sentence particle in which the collocation with *le* often indicates the boundary in the future tense as shown in the following example:

喜爱天文的民众注意了！台北市立天文科学教育馆今明两天举办「天文仪器联展」。

“Astronomy enthusiasts, attention please. Taipei Astronomical Museum will hold ‘Astronomical Instruments Exhibition’ today and tomorrow.”

**Boundary**

Both of the near-synonym verbs can be collocated with *开始* *kaishi* ‘start’, indicating that they can be used in the boundary events.

| 专心 concentrate                  | 21    |
|-----------------------------------|-------|
| 注意 pay attention to              | 374   |

Table 5: Frequency of collocation with *kaishi* in gigaword2

a. 经济部已*开始*注意战后的市场问题，经济部所属的中华工程公司将率先重回科威特。
   “Economic Development has noticed the marketing problem after the war, and China’s Engineering Company attached to the department will return to Kuiwait first.”

b. 等于吃了定心丸，*开始*专心规划立委选举辅选工作。
   “They feel reassured and begin to devote themselves in the planning of supportive work of the legislative.”
Modifiers
Modifiers of zhuyi include adverb of time such as 随时 suishi ‘anytime’ with the frequency of 32 and the MI of 5.441 meaning that the event type of the verb is the process and state.

| MI     | Freq(y) | freq(x, y) | Modifier       |
|--------|---------|------------|----------------|
| 5.441  | 777     | 32         | 随时 anytime (D) |
| 5.197  | 186     | 6          | 时时 always (D)  |
| 4.636  | 326     | 6          | 定期 regularly (D) |
| 4.382  | 490     | 7          | 平常 usually (Nd) |

Table 6: Modifiers of time of zhuyi

However, it is worth noting that zhuyi has a collocation with 一下 yixia ‘for a moment’ (freq. = 1458), showing that it has the event module of punctuality.

Event Inherent Attributes
The event inherent attributes of control can be identified with the collocation of “Don’t”, realized with negative expressions and disposal with ba. WordSketch of the near-synonym indicates that both can be collocated with negative expression, meaning that they have in event inherent attributes of being “realised”. The filtering of 不 bu ‘not’ in CWS presents that zhuanxin (64) and zhuyi (854) has the collocation with bu which is the indication of negative expressions.

| 专心 concentrate | 64 |
| 注意 pay attention to | 854 |

Table 7: Frequency of collocation with bu (not) in gigaword2

The comparison between the near synonyms of zhuanxin and zhuyi can be summarised as follows

As indicated in Table 8, the near synonym varies in frequency, PoS and event modules but share similarities in role internal attribute and event internal attribute. Zhuyi, the stative intransitive verb is more frequently used than zhuanxin, a stative verb. Though both the near synonyms can be used for state and process, zhuyi can be used in punctual event. Both have role internal attribute [+volition] on experiencer and the event internal attribute of “being realized”.

4.4 Negative admire verb of danxin and danyou

Turning to another near synonym pair of negative admire verbs, a similar analysis is carried out in terms of senses, role module and event structure module.

Senses and PoSs
danxin to be concerned about a problem, situation
danyou to be in a worried/troubled state of mind

As shown in Figure 3, WordSketch on the near synonym display that danxin (freq. = 75,459) is more frequently used than danyou (17,272). Both danxin and danyou are VK, stative verb with a sentential object based on the analysis of Sinica Corpus.

Figure 3: WordSketch comparison of danxin and danyou in gigaword2

| PoS | zhuanxin | zhuyi |
|-----|----------|-------|
| VH  | <experiencer, goal> (he, research) | <experiencer/instrument, theme> (drivers/ships, situation) |
| VK and Nv | [+volition] (writing, should) | [+volition] (writing, should) |

| Role modules | zhuanxin | zhuyi |
|--------------|----------|-------|
| boundary (start), stage (this year), state (yizhi) | boundary(start), process (always), punctuality (for a moment) | [+realized] [+]realized |
4.4.1 Role module

The subject of *danxin* include the experiencer of investor, they, people, analyst, family members, we, officials and the industry, and that of *danyou* is officials, they, people, he and government.

Since *danyou* can be collocated with “feel”, it has the role-internal attribute of [+sentience].

4.4.2 Event Structure Module

Modifiers of *danyou* are related to durative event of process and state, such as *chixu* (continue) (freq. = 9) and *jizhu* (keep) (freq. = 7) and *danxin* with *yizhi* (keep) (freq. = 358). The frequency of the modifiers showcases that both verbs are used in process and state.

Both *danxin* (freq. = 402) and *danyou* (freq. = 47) can be collocated with “start”, meaning that they can be used in boundary events as well.

In addition, the collocation with le of *danxin* (freq. = 72) and *danyou* (freq. = 30) illustrates that they can be used in process and state. Strikingly, time adverb is followed after the verbs to indicate the period of time:

- *danxin* · //////: *yilu* (all along the way) 10 *jitian* (several days)
- *danyou* · //////: *yitian* (a day) *yizhen* ( a while)

To sum up, despite the similarity in meaning between *danxin* and *danyou*, the near synonyms have similarity and difference in MARVS as indicated in Table 9:

| PoS         | *VK* and *Nv* | *VK* and *Nv* |
|-------------|---------------|---------------|
| Role modules| <experience, theme/recipient> | <experience/cause, theme> <officials, pandemic> |
| Role-internal attribute | [sentence] feel | [sentence] feel |
| Event Modules | boundary (start), process (a day) | boundary (start), process (months) |
| Event Internal Attribute | [+control] (bie, don’t) | lack of control |

Table 9: Comparison of eventive information between *danxin* and *danyou* in MARVS

As presented in Table 9, the synonyms are similar in PoS, role-internal attribute and event modules, but vary in event internal attribute. Moreover, both Sinica Corpus and CWS indicate that *zhuyi, danxin* and *danyou* can be separated by other elements, which indicates that all the three words are separatable words (*liheci*).

**Figure 4:** Separatable word of *zhuyi* in gigaword2cna

**Figure 5:** Separatable word of *danxin* in gigaword2cna

**Figure 6:** Separatable word of *danyou* in gigaword2cna

Similarly, Sinica Corpus also indicates that *danxin* can be used as a separatable word.

每考一次试就要担一次心 be worried for each examination
害得大家为他担不少心 all are worried about him
你担什么心嘛 What are you worried about?
害大家担半天心 all are worried about you for a long time.
Further analysis illustrates that *zhuyi* is separated by words of severity, *danxin* by frequency, severity and time duration, and *danyou* by severity.

5 Discussion

This paper set out to examine the sense and PoSs of two near synonyms of *zhuanxin* and *zhuyi* and *danxin* and *danyou* with Sinica Corpus and CWS. First of all, both of the first synonym pair have the core meaning of paying attention to something but they vary in frequency and PoSs. *Zhuanxin* is less frequently used than *zhuyi* in the various text types. *Zhuanxin* is a stative intransitive verb and *zhuyi* is mostly used as stative verb with a sentential object. Compared with the first pair, *danxin* and *danyou* have similar core meaning of being worried about, but *danyou* is applied in a worried state and they are VK or a stative verb. *Danxin* is more frequently used than *danhou*.

Turning to the second question of the role module and the event structure module of the near synonyms, both *zhuanxin* and *zhuyi* indicate state and process, bounded activity and inchoative activity, however, *zhuyi* can also be used in punctuality. They share the event inherent attributes of realisation, while *zhuyi* has the role internal attribution of volition. Similarly, the negative admire verbs of *danxin* and *danyou* have the role internal attribute of sentience and are used in process and state, but *danyou* has the event internal attribute of control.

The third question in this research is the factors influencing the similarity and discrepancy. The study found that mental state near synonyms share similar core meaning, PoSs and durative state. Accordingly, the two pairs of near synonyms share many similarities in the boundary and the event internal attributes of being “realised”. A possible explanation of similarity lies in the durative event of the mental-state near-synonyms. This finding supports evidence from observations that distribution and context are crucial in lexical choice (Chief et al., 2000; Taylor, 2003; Reiter and Sripada, 2004).

On the other hand, the distribution, subject and object of the near synonyms vary greatly. The discrepancy in the senses of the verbs could be attributed to the difference in usage since *zhuanxin* is the concentration of attention and *zhuyi* that of willpower. Therefore, *zhuyi* can be used in the role-internal attribute of [+volition], in punctual event and the future tense. Conversely, *zhuanxin* which is a more durative event is mainly used in the past tense and collocated with the modifier of time lasting for a period. The results further support the idea of Levin that the meaning determines the behaviour of the verbs (1993:1).

One unanticipated result is that *zhuyi*, *danxin* and *danyou* are separatable words though the elements between the diasyllabic verbs vary in terms of severity, frequency and time duration. This result may be explained by the verb-object morphological structure of the near synonyms. The finding is congruent with that of Petrovčič (2016) that monosyllabic counterparts of the di-syllabic verb are tagged as two different verbs. Moreover, the study demonstrates that the V-O structure mental state verbs can be applied as separable words.

6 Conclusion

This present study was designed to determine the sense, role modules and event structure modules of mental state near synonyms on the Sinica Corpus and CWS. The findings clearly indicate they share similarities in state and process, bounded activity, role-internal attribute and event internal attribute. However, *zhuyi* can also be used in punctuality. Further, they share the event inherent attributes of realisation, while *zhuyi* has the role internal attribution of volition.

The finding may contribute in several ways to our understanding of mental state verbs and provide an empirical basis for us to understand the discrepancy of mental-state synonyms, in particular, the role modules of the experiencer and the role internal attributes and the modifiers. Pragmatically, the descriptive study of the near synonym in collocation, modifier and tense is applicable in the usage and identification of
the near synonym. It will be a matter for further research to supplement more near-synonyms of mental state verbs for the sense, role module and event modules from the MARVS perspective to explore the nature of the cognition.

Although the study has demonstrated the event information of mental-state verbs, the findings are subject to two limitations. Firstly, the study focuses on two pairs of near synonym and the negative admire verbs. It might be possible to enlarge the quantity and category from two pairs of near synonym to more mental state verbs and subcategories such as perception, marvel and appeal for a holistic analysis of cognition. Secondly, the study concentrates on the PoS of verb whereas some mental state verbs such as zhuanxin can also be used as adverbs, which can be taken into account for the role module in the future study.

Acknowledgments

The author would like to sincerely thank Professor Chu-Ren Huang for his guidance and constructive suggestions which helped to improve this paper.

References

Kathleen Ahrens, Yuan Hsun Chuang, and Chu Ren Huang. 2003. Sense and meaning facets in verbal semantics: A marvs perspective. Language and Linguistics, 4(3):469–484.

J. R. Booth and W. S. Hall. 2000. Role of the cognitive internal state lexicon in reading comprehension. Journal of Educational Psychology, 86(3).

James R. Booth, William S. Hall, and Robison Su Yeong Kim. 1997. Acquisition of the mental state verb know by 2- to 5-year-old children. Journal of Psycholinguistic Research.

Li Li Chang, Keh Jiann Chen, and Chun Ren Huang. 2000. A lexical-semantic analysis of mandarin chinese verbs: Representation and methodology. Computational Linguistics & Chinese Language Processing.

Lian-Cheng Chief, Chu-Ren Huang, Keh-Jiann Chen, Mei-Chih Tsai, and Li-Li Chang. 2000. What can near synonyms tell us. International Journal of Computational Linguistics & Chinese Language Processing, 5(1):47–60.

Siaw-Fong Chung and Kathleen Ahrens. 2008. Marvs revisited: Incorporating sense distribution and mutual information into near-synonym analyses. Language and Linguistics: Lexicon, Grammar and Natural Language Processing, 9(2):415–434.

Anita Fetzer. 2008. “and i think that is a very straightforward way of dealing with it” the communicative function of cognitive verbs in political discourse. Journal of Language and Social Psychology, 27(4):384–396.

William S Hall, Ellin Kofsky Scholnick, and Alva T Hughes. 1987. Contextual constraints on usage of cognitive words. Journal of Psycholinguistic Research, 16(4):289–310.

Jia-Fei Hong, Chu-Ren Huang, and Kathleen Ahrens. 2008. Event selection and coercion of two verbs of ingestion: A marvs perspective. International Journal of Computer Processing Of Languages, 21(01):31–42.

Jia-Fei Hong, Kathleen Ahrens, and Chu-Ren Huang. 2012. Event structure of transitive verb: a marvs perspective. International Journal of Computer Processing Of Languages, 24(01):37–50.

Jia-Fei Hong. 2014. Chinese near-synonym study based on the chinese gigaword corpus and the chinese learner corpus. Workshop on Chinese Lexical Semantics, pages 329–340.

Chu-Ren Huang, Kathleen Ahrens, Li-Li Chang, Keh-Jiann Chen, Mei-Chun Liu, and Mei-Chih Tsai. 2000. The module-attribute representation of verbal semantics: From semantic to argument structure. International Journal of Computational Linguistics & Chinese Language Processing, 5(1):19–46.

Ching-Ying Lee and Ji-Shane Liu. 2009. Effects of collocation information on learning lexical semantics for near synonym distinction. International Journal of Computational Linguistics & Chinese Language Processing, June 2009-Special Issue on Computer Assisted Language Learning, 14(2).

Beth Levin. 1993. English verb classes and alternations: A preliminary investigation. University of Chicago press.

Mei-chun Liu, Chu-Ren Huang, Charles C Lee, and Ching-Yi Lee. 2000. When endpoint meets endpoint: A corpus-based lexical semantic study of mandarin verbs of throwing. International Journal of Computational Linguistics & Chinese Language Processing, February 2000: Special Issue on Chinese Verbal Semantics, 5(1):81–96.

Letitia Naigles. 2000. Manipulating the input: Studies in mental verb acquisition. Perception, cognition, and language: Essays in honor of Henry and Lila Gleitman, pages 245–274.
Stephanie M Nixon. 2005. Mental state verb production and sentential complements in four-year-old children. *First Language*, 25(1):19–37.

Mateja Petrovčič. 2016. Word sketches of separable words liheci in chinese. *Acta Linguistica Asiatica*, 6(1):47–57.

Ehud Reiter and Somayajulu Sripada. 2004. Contextual influences on near-synonym choice. In *International Conference on Natural Language Generation*, pages 161–170. Springer.

John R Taylor. 2003. Near synonyms as co-extensive categories: ‘high’ and ‘tall’ revisited. *Language sciences*, 25(3):263–284.

Shou-hsin Teng. 1975. *A Semantic Study of Transitivity Relations in Chinese*, (University of California Publications in Linguistics 80). University of California Press, Berkeley.

Shou-hsin Teng. 1996. *Han-Ying hanyu changyong jinyici yongfa cidian (Chinese Synonyms Usage Dictionary)* 汉英汉语常用近义词语法词典. Beijing yuyan xueyuan chubanshe, Beijing.

Mei-Chih Tsai, Chu-Ren Huang, Keh-Jiann Chen, and Kathleen Ahrens. 1998. Towards a representation of verbal semantics–an approach based on near-synonyms. 3(1):61–74.

Willard van Orman Quine. 1987. *Quiddities: an intermittently philosophical dictionary*. Belknap Press of Harvard University Press.

**Website resources**

[1] Sinica Corpus  
http://db1x.sinica.edu.tw/kiwi/mkiwi/

[2] Chinese Word Sketch  
http://wordskeetch.ling.sinica.edu.tw/