

## Mandarin emotion verbs: a frame-based analysis

Meichun Liu, Shihmei Hong

Institute of Foreign Literatures and Linguistics, National Chiao Tung University, Taiwan  
1001 Ta-hsueh Rd., Hsinchu 30010, Taiwan  
mliu@mail.nctu.edu.tw, nancy219219@hotmail.com

---

### Abstract

*This paper aims to classify Mandarin verbs of emotion by adopting a frame-based (Fillmore & Atkins 1992) and corpus-based approach, and propose that there should be a more distinct schema than the structure of frames in FrameNet (<http://www.icsi.berkeley.edu/~FrameNet/>). We start with exploring equivalents of the English verbs of the emotion domain in FrameNet, the database provides frame-based lexical information. However, a purely frame-based approach may be inadequate for Mandarin verbs, hence we create a new classification of Mandarin emotional verbs differing from FrameNet and previous studies.*

### Keywords

*emotion verbs, frame-based, corpus-based, FrameNet, lexical semantics*

---

### 1 Introduction

Lexical semantics has been an important area in linguistics. Verbs, as the core of lexicon, provide the key to exploring the interaction between syntax and semantics as well as understanding the nature of lexicon. Examples below illustrate the unique syntactic patterns and semantic properties of Mandarin emotion verbs.

- (1) a. 媽媽覺得/感覺/感到高興/\*原諒。  
b. \*媽媽後悔/擔心/原諒高興。
- (2) a. 媽媽很高興/難過/生氣/煩惱/害怕(小明會來)。  
b. 媽媽原諒(\*他的過錯)。
- (3) a. 媽媽很高興/難過/生氣/煩惱/害怕/後悔/渴望/希望.....。  
b. \*媽媽很寬恕/原諒/覺得/感覺/感到.....。

In (1), only the verb *juede* 覺得(feel) can be followed by another emotional verb,

such as *gaoxing* 高興 (be glad), but other verbs like 後悔, 擔心, or 原諒 cannot. Besides, emotional verbs which can collocate with *jeude* 覺得 (feel) are restricted; verbs like *yuanliang* 原諒 (forgive) cannot be a complement of the verb *jeude* 覺得. In (2), verbs like 高興, 煩惱, or 害怕 may or may not take a complement, however, verb *yuanliang* 原諒 would be ungrammatical without a complement. In (3), some verbs may take a degree modifier 很, but others cannot. These verbs are all verbs of emotion, but as what we observe that they have different syntactic and semantic representations. The various syntactic patterns of emotional verbs tell us that emotional verbs are very specific, and therefore it must be hard to make a fine and adequate classification, which can interpret the syntactic and semantic differences of verbs of emotion.

Previous studies have mainly looked at verbs of emotional state and proposed that emotion verbs can be divided into two groups: Huang et al (2000) called them inchoative and homogeneous state verbs by their event types; Tsai et al (1996) proposed a semantic account with two distinct features: [change of state] and [control]; Chang et al (2000) concluded that the grammatical differences derive from their morphological structures: Group A are Non V-V compound, while Group B are V-V compound. What would be a unified approach to link and categorize the distinct syntactic pattern and semantic properties?

## 2 Related Studies

Previous studies have looked at verbs of emotional state or verbs of emotion and categorized them into subfields, such as Tsai *et al* (1996), Chang *et al* (2000), Liu (2002) and Levin (1993).

### 2.1 Tsai et al's study

Tsai *et al* (1996) showed that syntactic contrasts can be predicated from lexical semantics and underlines the importance of interactions between semantics (lexical semantic properties) and syntax (syntactic behaviors).

By observing the syntactic behaviors of the near-synonyms pair of emotional state verbs, *gaoxing* (高興) and *kuaijie* (快樂), they found *gaoxing* and *kuaijie* can be differentiated according to their syntactic distribution:

Function \ Verb	GAOXING 高興 (280) 'be glad'	KUAILE 快樂 (365) 'be happy'
Predicate	<b>224 (80%)</b>	<b>119 (32%)</b>
Complement	8 (3%)	17 (5%)
Adverbial	47 (17%)	30 (8%)
Adjective		116 (31.7%)
Nominalized	1 (0.3%)	83 (23%)

**Table 1:** The syntactic distribution of *Gaoxing* and *Kuaile*

*Gaoxing* is typically used as a predicate (*gaoxing* takes sentential objects while *kuaile* cannot.), but barely or never used as adjective (0%) or a noun or nominal modifier (0.3%); contrarily, *kuaile* shows a much higher frequency of nominalization (23%) and adjectival using (32%). As examples below:

(5) Transitive predicate: 他們都很高興/\*快樂創刊號終於出來了。

(6) Adjective: 如何做個\*高興/快樂的上班族。

(7) Nominalized: 人有追求\*高興/快樂, 逃避痛苦的本能。

Tsai *et al* proposed that these syntactic contrasts are systematically accounted for with lexical features <change of state> and <control>.

(8) Change-of-state: a. 客人高興/\*快樂了會賞你錢。

b. 他們談得正高興/\*快樂。

c. 從此不再快樂/\*高興。

(9) Control: a. 生活快樂/\*高興最重要。

b. 別高興/\*快樂!

c. 你應該高興/\*快樂才對。

d. 為他高興/\*快樂。

Hence, they divided emotional stative verbs semantically into two groups: homogeneous state verbs which are characterized as <-change of state, -control> (like *kuaile*) and result state verbs characterized as <+change of state, +control> (like *gaoxing*).

## 2.2 Chang *et al*'s study

Chang *et al* (2000) followed Tsai *et al*'s dichotomous study mentioned above, and then re-examined a succinct difference over a broader range—the whole semantic field of verbs of emotion. In the study, they firstly categorized emotional verbs into seven subfields,

i.e., Happiness, Depression, Sadness, Regret, Anger, Fear, and Worry; secondly they revised Grandy's (1992) definition of a semantic field to propose that there are two covering terms that form a Contrast Pair (Type A and B) that define each semantic field. And then they thoroughly examined the seven contrast pairs of subfields of emotional verbs and predicted that the other verbs being members of the field will behave like either type A or type B.

Chang *et al* examined the contrasts between the two types based on five distributional syntactic criteria. They found that type A and type B verbs can be characterized as below:

Criteria Verb types	Type A verbs (e.g. <i>gaoxing</i> 高興)	Type B verbs (e.g. <i>kuai</i> 快樂)
Grammatical function	Mostly as <b>predicates</b>	Mostly as <b>nominal uses</b>
Co-occurrence restriction	<b>Strict</b> selectional restrictions on the head when the function as adjuncts	<b>Looser</b> selectional restrictions on the head when the function as adjuncts
The appropriateness in the imperative and evaluative constructions	<b>Most</b> verbs can appear in either type of construction	<b>Few</b> verbs cannot appear in either type of construction
Verbal aspect	<b>Predominantly</b> represent inchoative state	<b>Rarely</b> represent inchoative state
Transitivity	<b>Can</b> take causes or goals as their direct objects	<b>Seldom</b> take causes or goals as their direct objects

**Table 2:** *The contrastive distribution of Type A and Type B verbs.*

From the above contrast, Chang *et al* generalized that type A verbs are preferred for indicate transition while type B verbs are preferred for homogeneity. What kind of reason drives the grammatical differences? They conclude that the grammatical contrasts derive from their morphological structures. A VV compound is double-headed and does not elaborate. Therefore, in VV compounding, the concept of an event is not so clear. It is common morpho-lexical strategy in Mandarin to link two antonyms or synonyms to form the concept of 'kind' or 'property', and therefore it is natural for VV compounds to be

chosen as the representation of homogeneity.

Hence, verbs of emotion are morphologically separated by Chang *et al* into **Non-VV compound** and **VV compound**. Type A verbs are Non-VV compound, while type B verbs are VV compound.

Type A: *gao xing* 高興(non-VV), *nan guo* 難過(non-VV), *hou hui* 後悔(non-VV), *shang xin* 傷心(non-VV), *sheng qi* 生氣(non-VV), *hai pa* 害怕(non-VV), *dan xin* 擔心(non-VV)

Type B: *kuai le* 快樂(VV), *tong ku* 痛苦(VV), *yi han* 遺憾(AN or VO), *bei shang* 悲傷(VV), *fen nu* 憤怒(VV), *kong ju* 恐懼(VV), *fan nao* 煩惱(VV)

### 2.3 Liu's study

In Liu (2002) "Case 2: Verbs of Emotional activity", she focus on the two near-synonym pairs 羨慕 *xianmu* 'envy' and 嫉妒 *jidu* 'be jealous of':

(10) a. 羨慕別人能自由自在的唱歌。

b. 對他這個本領真是羨慕。

c. 他的表現令人羨慕。

(11) 你只會嫉妒/\*羨慕。

She counted corpus tokens and "examined corpus distributions to provide an alternative semantic explanation for the paradigmatic variation characteristic of emotional-activity verbs." In (10), verb 羨慕 tend to be associated with an externally describable or mentioned 'cause'. However, for verb 嫉妒 in (11), an overt cause is not always mentioned or required.

	羨慕 (112)	嫉妒 (38)
CAUSE mentioned (NP or S)	<b>100%</b> <b>(112)</b>	45% (17)
CAUSE not Mentioned	0% (0)	<b>55%</b> <b>(21)</b>

**Table 3:** Distribution of CAUSE: 羨慕 *Xianmu* vs. 嫉妒 *Jidu*.

Therefore, Liu classified emotional activity verbs into two groups based on the distinctive role CAUSE and the default CAUSE can be **internal or external**.

Group A (e.g. <i>Xianmu</i> 羨慕 & <i>Tongqing</i> 同情)	Group B (e.g. <i>Jidu</i> 嫉妒 & <i>Lianmin</i> 憐憫)
Unmarked (more corpus tokens)	Marked (less corpus tokens)
Used more as Predicates	Used more in Nominalized forms
More overt CAUSE	Less overt CAUSE
Externally caused, inchoative state	Internally caused, homogeneous state

**Table 4:** *Two groups of emotional activity verbs and their characteristics.*

Other emotional activity verbs also support her conclusion, such as verbs of anger (生氣 vs. 憤怒), verbs of fear (害怕 vs. 恐懼), verbs of sadness (傷心 vs. 悲傷), verbs of depression (難過 vs. 痛苦), and so on.

#### 2.4 Levin's study

Levin (1993) classified verbs on the basis of both intuitive semantic grouping and their participation in valence alternations. She described emotion verbs in her *English verb classes and Alternations* as Psyche-verbs, that is, verbs of psychological state. Psyche verbs have 4 subclasses:

- Amuse verbs: transitive verbs whose object is the experiencer and whose subject is the cause of the change.
- Admire verb: transitive verbs with experiencer-subject.
- Marvel verb: intransitive, experiencer as subject, express the stimulus/object of emotion in a PP headed by one of a variety of prepositions.
- Appeal verb: the least in four subclasses; intransitive, taking the stimulus as subject and expressing the experience in a PP headed by one of a variety of prepositions.

Besides psyche verbs, Levin also has a group of “Verbs of Desire” in her book. Verbs of desire are sometimes regarded as psyche verbs that take an experiencer as subject; it includes *Want verbs* and *Long verbs* as subclasses.

#### 2.5 Criticism

Tsai *et al* only looked at verbs of emotional state whose members include verbs like *happy*, *depressed*, etc. Hence, someone may ask if the generalizations can be carried over to all

subfields of emotional verbs. It seems that their dichotomous distinction cannot account for the whole semantic field of emotional verbs. Moreover, the semantic features proposed above are general factors which pertain to eventivity. They are too broad to explain the unique behavior of the particular class of emotional verbs (Liu, 2002).

Chang *et al* divided verbs of emotion into seven subfields and examined the contrast pairs defining the seven subfields. Although they believed that their study can be extended to the whole semantic field of verbs of emotion. However, just like what Liu (2002) mentioned, the morphological account is at best an observation associated with and resulted from a deeper semantic relation. It fails to explain the driving force for the paradigmatic variation.

Levin's classification seems to lack a systematic criterion to classify; just as Baker and Ruppenhofer (2002) mentioned in their paper, "but the meaning which is to be associated with a Levin class is hard to define." Moreover, in many of Levin's class, there are certain members that corpus data didn't support their uses. Besides, the above classification might be inadequate for Mandarin verbs, since Mandarin verbs are more complex in many ways such as inherent aspects.

No matter their analysis is adequate or not, these classifications are still weak to explain and interpret the specific syntactic and semantic properties of emotional verbs. Hence it motivates us to make a new categorization of verbs of emotion.

### 3 Methodology

In this study, we classify Mandarin verbs of emotion by adopting a frame-based and corpus-based approach. Our methodology is to make a reference on FrameNet's categorization, and then we revise it based on data from Sinica Corpus (<http://www.sinica.edu.tw/SinicaCorpus/>) and our native intuition, since FrameNet is a lexical database for English and the VerbNet, which we want to construct, is for Mandarin Chinese.

#### 3.1 FrameNet's classifying methodology: frame semantics

FrameNet adopts the frame semantics theory, proposed by Fillmore and Atkins (1992), to build their structures. There are domain level, which is very general categories of human experience and knowledge, and frame level, which is the grouping of lexical units sharing same conceptual patterns. All the important information about the verbs is captured by their associations with specific frames and by constraints on their syntactic expression of the

elements of those frames. There are also frame-to-frame relations such as Inheritance, Using, Subframe, and so on (see Fillmore, Baker or FrameNet publications for further information about frame semantic theory.) So in FrameNet, there are frames with its upper level (domain), its frame elements (roles collocate with main verbs), basic patterns and other association information.

The definition of Emotions domain is that ‘*An Experiencer has a particular emotional State, which may be described in terms of a specific Stimulus that provokes it, or a Topic which categorizes the kind of Stimulus. Rather than expressing the Experiencer directly, it may (metonymically) have in its place a particular Event (with participants who are Experiencers of the emotion) or an Expressor (a body-part of gesture which would give an indication of the Experiencer’s state to an external observer).*’ This domain includes 12 frames which have “Using<sup>1</sup>” relationship with Emotions: Predicament, Judgement, Feeling, Forgiveness, Contrition, Desiring, Subject\_stimulus, Experience\_subject, Experience\_object, Emotion\_heat, Emotion\_directed, and Emotion\_active. The conceptual schema and 12 frames of emotions domain is as in Figure 1 and Table 5:

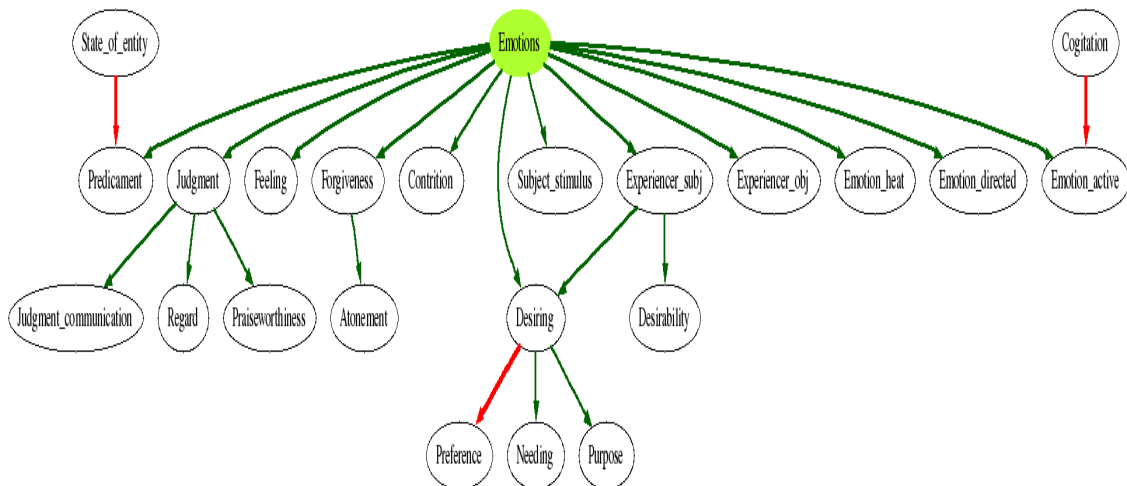


Figure 1. The twelve frames and their relations under FrameNet’s Emotions domain.

<sup>1</sup> Using relationship: The definition of a Using relationship in FrameNet is: When a frame uses part of background information of its upper-level frames (frame→domain or subframe→frame), for example some core semantic frame elements, then the two levels of frames are having a using relationship.



N o.	Frame Name	Lemma
1	Predicament	Misfortune, problem, trouble, fix, mess, jam...
2	Judgment	Admire, disapprove, blame, mock, scorn...
3	Feeling	Feel, feelings, emotion, experience ...
4	Forgiveness	Forgive, forgiveness, pardon, excuse...
5	Contrition	Contrition, guilt, guilty, repent, remorse, sorry...
6	Desiring	Desire, ambition, eager, hope, long, lust, want...
7	Subject_stimulus	Amazing, amusing, annoying, boring, delight, disgusting, dull, enjoyable, sad, scary, tiring, worrying...
8	Experiencer_subj	Adore, afraid, dislike, empathy, envy, fear, hate, like, pity, regret, nervous, love...
9	Experiencer_obj	Amaze, anger, annoy, bore, cheer, please, sicken, upset, trouble, surprise, shock, shame...
10	Emotion_heat	Boil, burn, simmer... (e.g. <i>I'm boiling with anger</i> )
11	Emotion_directed	Agony, anxious, blue, concern, discouraged, distress, furious, grief, mad, sad, upset...
12	Emotion_active	Worry, obsess, agonize, fret...

**Table 5:** Frames and lemma in the Emotions domain in FrameNet

### 3.2 Use FrameNet to analyze Mandarin emotion verbs

The methodology FrameNet uses to subcategorize verbs is firstly based on native speaker's intuition, according to the FAQ on their website, "work on a new frame begins with the native speaker analyst's intuitive judgment that some particular conceptual pattern underlies one or more lexical units in the language in a systematic way." We can say that they separate verbs mainly *syntactically*.

Some demerits lie in FrameNet if we want to subcategorize Mandarin emotion verbs directly: First of all, the structure of English is different from Chinese; as a result we must make adjustments based on Mandarin data. Second, FrameNet only categorizes syntactically, instead of both syntactically and semantically. As a result, after observing real Mandarin corpus data, we decided to adjust the structure of Mandarin emotion verbs

## 4. Our Analysis

### 4.1 Nine frames

In Mandarin emotion verbs, after adopting the framework proposed in Liu & Chiang (In press) and observing Mandarin data in Sinica Corpus, we renamed some frames to make them more precise for mandarin lexical meanings, i.e., took off four frames: **predicament**, **emotion\_heat**, **desiring** and **subject\_stimulus** since we don't have similar counterparts in Mandarin Chinese, and added one **Cause\_to\_experience** frame since in Chinese, those verbs are also relative to emotions. Thus we have 9 frames as table below:

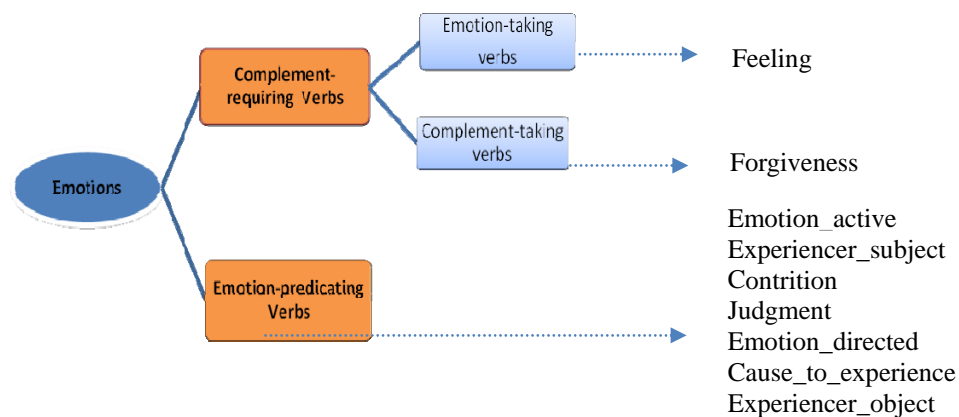
No.	Frame Name	Lemma
1	Feeling	感覺、覺得、感到、感受.....
2	Emotion_directed	窘困、尷尬、羞慚、激動、煩躁、悲哀、痛苦、悲傷、哀痛、高興、快樂、苦惱、不安、羞愧、窘迫、困窘、惱火、悲痛、受屈、恐懼、吃驚、驚訝、困惑、煩、鎮定、平靜、振奮、目眩、眼花、消沈、失望、為難、洩氣、沮喪、生氣、陶醉、憂愁、著急.....
3	Emotion_active	擔心、顧慮、擔憂、掛心.....
4	Contrition	懊悔、後悔、悔恨、自責、惋惜.....
5	Experiencer_subj	愛、喜愛、喜歡、愛好、熱愛、酷愛、恨、討厭、厭惡、痛恨、怕、害怕、畏懼、懼怕、恐懼、羨慕、妒忌.....
6	Experiencer_obj	安慰、吸引.....
7	Cause_to_experience	折磨、打擾、誘惑、激怒、惹惱.....
8	Judgement	欽佩、尊敬、欣賞、感謝、感激.....
9	Forgiveness	寬恕、赦免、原諒.....

**Table 6:** Nine frames of Mandarin emotional verbs

### 4.2 Three classes

Adopting the framework proposed in Liu & Chiang (In press), we start with revising the 12 frames in FrameNet into 9 frames for Mandarin, based on corpus observations: **Feeling**, **Emotion\_directed**, **Experiencer\_subj**, **Emotion\_active**, **Contrition**, **Cause\_to\_experience**, **Experiencer\_obj**, **Judgment**, and **Forgiveness**. However,

FrameNet fails to capture the interrelationship among some of the frames. To explain and interpret the specific syntactic and semantic properties of emotional verbs shown in examples (1) to (3), these 9 frames can be plotted into two classes as illustrated and analyzed below:



**Figure 2.** The structure of the classification of emotional verbs frames

In figure 2, the nine frames of Mandarin emotional verbs are generalized into two classes: **Complement-requiring verbs** (in which a complement is required) and **Emotion-predicating verbs** (in which a complement is not necessary or required). Besides, Complement-requiring verbs can be further divided into another two classes, Emotion-taking verbs and complement-taking verbs. Our classification is based on their syntactic patterns and semantic properties.

#### 4.2.1 Emotion-taking verb

This group of verbs takes an emotional state or “emotion-predicating verb” as its complement. For example, verbs such as *ganjue* 感覺, *gandao* 感到 and *juede* 覺得; they are all in the **Feeling** frame. These verbs share the characteristics of [-很], [+comp-emotion] and the distinctive basic pattern “Experiencer < Feeling < Emotion-predicating [ADJ].”

(12) [媽媽/Experiencer] [感到/Feeling] [難過/Emotion]。

#### 4.2.2 Complement-taking verbs

Verbs in this group grammatically share the characteristics of [-很] and [+comp] (the complement is NP or CL, not other emotion verbs.) Semantically, they indicate a judge refrains imposing, or demanding a punishment for an evaluatee who has committed an

offense, and therefore verbs in this class are combinations of emotion and speech act, such as *kuanshu* 寬恕, and *yuanliang* 原諒 representing our **Forgiveness** frame. The basic pattern should be “Judge < Forgive < Evaluatee or Offense [NP].”

- (13) a. [他/Judge]還是[原諒/Forgive]了[我/Evaluatee]。  
 b. [神/Judge][寬恕/Forgive]了[我的過錯/Offense]。

#### 4.2.3 Emotion-predicating verbs

These emotional verbs that can be either adjective-like main predicates or the complement of the emotion-taking verbs in a sentence, such as *nanguo* 難過, *yanwu* 厭惡, *fanna* 煩惱, *houhui* 後悔, *gaoxing* 高興, *qinpei* 欽佩, etc. They includes verbs in the **Emotion\_directed**, **Experiencer\_subj**, **Emotion\_active**, **Contrition**, **Judgment**, **Cause\_to\_experience**, and **Experiencer\_obj** frames. This group of verbs share the characteristics of [+很], and the complement is not requiring. The basic pattern is “Experiencer < ( 很 ) < Emotion-predicating (< Comp [NP/CL]).”

- (14) a. [我/Experiencer]很[後悔/Contrition][做了那件事 /Fault]。(CL)  
 b. [小玲/Experiencer]很[煩惱/Emotion\_directed]。(no Comp)  
 c. [我/Experiencer]很[欽佩/Respect][他/Evaluatee] (NP)

In sum, while providing a frame-based account, our analysis differs from FrameNet in two aspects. First, we came up with 9 emotion frames to account for the syntax-to-semantic variations among emotion verbs, so that the sketch is more suitable for Mandarin verbs of emotion. Second, for further generalizations, the 9 frames are further categorized into 2 major types according to their grammatical properties and semantic correlations.

## 5. Conclusion

There is no absolute rule of the classification of verbs. Previous studies seem to fail to explain the whole field of Mandarin verbs of emotion and to interpret the specific syntactic and semantic properties of emotional verbs, hence we try to make a more general classification. We start with exploring equivalents of the English verbs of the emotion domain in FrameNet, but do not limit to its current design, i.e., we revise the construction of emotion domain in FrameNet to provide a more adequate categorization for Mandarin emotional verbs. We divide verbs of emotion into nine frames: **Feeling**, **Emotion\_directed**, **Experiencer\_subj**, **Emotion\_active**, **Contrition**, **Cause\_to\_experience**,

**Experiencer\_obj, Judgment, and Forgiveness.**, and further generalize them into two major groups: **Complement-requiring verbs** and **Emotion-predicating verbs**.

### References

- Baker, Collin F., Josef Ruppenhofer. 2002. FrameNet's Frames vs. Levin's Verb Classes. In *Proceedings of the 28th Annual Meeting of the Berkeley Linguistics Society*, J. Larson and M. Paster (eds.), pp. 27-38, Berkeley, CA.
- Chang, Li-Li, Keh-jiann Chen, Chu-Ren Huang. 2000. "Alternation Across Semantic Fields: A Study on Mandarin Verbs of Emotion." *Computational Linguistics and Chinese Language Processing*. Vol.5, No.1, February 2000, pp. 61-80.
- Fillmore, Charles J., and Atkins, Beryl T. 1992. Toward a Frame-Based Lexicon: The semantic of Risk and Its Neighbors. *Frames, Fields, and Contrasts*, ed. By Adrienne Lehrer and Eva Feder Kittay. 75-102. Hillsdale. New Jersey:Lawrence.
- Grandy, E. Richard. 1992. Semantic Fields, Prototypes, and the Lexicon. *Frames, Fields, and Contrasts: New Essays in Semantic and Lexical Organization*, ed. by Adrienne Lehrer and Eva Feder Kittay. 103-122. Hillsdale, N. J.: Lawrence Erlbaum Associates.
- Huang, Chu-Ren, Kathleen Athens, Li-Li Chang, Ken-Jiann Chen, Mei-Chun Liu, and Mei-Chih Tsai. 2000. The Module-Attribute Representation of Verbal Semantics: From Semantics to Argument Structure. *International Journal of Computational Linguistics and Chinese Language Processing*. 5(1). 19-46.
- Lakoff, George, and Mark Johnson. 1999. *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York: Basic Books.
- Liu, Mei-chun. 2002. *Mandarin Verbal Semantics: a Corpus-based Approach*, 2<sup>nd</sup> Edition. Taipei: Crane Publishing Co.
- Levin, Beth. 1993. *English Verb Classes and Alternations: A Preliminary Investigation*. Chicago: University of Chicago Press.
- Tsai, Mei-Chih, Chu-Ren Huang, and Keh-Jiann Chen. 1996. From Near-synonyms to the Interaction between Syntax and Semantics. (由近義詞辨義標準看語意、句法之互動). *Proceedings of the Fifth International Symposium on Chinese Languages and Linguistics*. 167-180. Taipei: National Chengchi University.

### Website Resources

FrameNet. <http://www.icsi.berkeley.edu/~Framenet/>

Sinica Corpus (中央研究院現代漢語平衡語料庫).

<http://www.sinica.edu.tw/SinicaCorpus/>