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Alternation Across Semantic Fields: A Study on Mandarin Verbs of Emotion

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Abstract

This paper explores possible co-relations between lexical semantics and morpho-syntactic structures. We first examine a consistent dichotomy among verbs of emotion, which was first observed for verbs of happiness by Tsai *et al.* [1998]. It is shown that the dichotomy can be determined based on the criterion of whether a verb is a VV compound or not.² The linguistic contrasts observed include: the grammatical functions of a verb as well as their distribution, the selectional restrictions the verbs impose as an adjunct, a verb's occurrences in imperative and evaluative constructions, its *aktionsart*, and its transitivity. We will show that the overt morpho-syntactic contrasts are due to lexical event structure properties. The description of a state (of emotion) can focus on how the state comes to be (i.e., the inchoative state) or on the being of the state (i.e., the homogeneous state). Since VV compounding has the semantic function of referring to the generic properties of the set of event tokens, it is natural for VV compounding to be chosen as the morpho-syntactic representation of homogeneity.

1. Introduction

Recent lexical semantic studies, such as those of Levin [1993] and Pustejovsky [1995], have tried to explain how lexical meaning predicts syntactic regularities. One approach is to study the differences between near synonyms to identify the minimal semantic

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² What we refer to as "VV compounds" are also referred to as parallel verb compounds in the literature. They are verbs composed of two near synonym verbs or verb stems. For example, *bei1shang1* 悲傷 "to be sad" is a VV compound since both of its components are stative verb stems meaning "to be sad." In this paper, the term "VV compounds" is used in contrast to SV, VO, AV and VR compounds in Chinese.

attributes that create the differences [Tsai *et al.* 1998, Liu 1997, and Liu *et al.* 1998]. In this current study, we extend the range of study to semantic fields which contain more than one synonym pair. Thus, we can attest to the primary status of the semantic attributes proposed in previous studies by showing that similar generalizations can be extended to the other synonym pairs in the same semantic field.

This study attempts to elaborate on Tsai *et al.*'s [1998] work on the differences between the synonyms *kuai4le4* 快樂 "to be happy" and *gao1xing4* 高興 "to be glad." We re-examine the differences over a broader range, i.e., the verbs of emotion. Our study will lead to the following four important generalizations: 1) These differences are not specific to *kuai4le4* and *gao1xing4*, but to the whole semantic field of verbs of emotion. 2) These differences can be more succinctly defined. 3) These differences are motivated by different lexical event types. 4) The source of these differences can account for the choice of compound structure.

Verbs involving seven sub-fields of emotion will be examined in this paper, i.e., Happiness, Depression, Sadness, Regret, Anger, Fear and Worry³. This allows us to obtain generalizations about the complete semantic field of emotion as well as to observe if there are any variations among the sub-fields. All the observations and statistics in this paper are based on the "Academia Sinica Balanced Corpus of Modern Mandarin Chinese" (abbreviated as the "Sinica Corpus" in the following text), which is a tagged Mandarin corpus containing a total of five million words [CKIP, 1995]. We take into account only verbs with occurrence frequency rates of over 40 in the Sinica Corpus, so that there will be sufficient empirical evidence for any observed contrasts. The verbs studied here are listed in Table 1 with their frequency of occurrence in the Sinica Corpus listed in parentheses. There are thirty-three (33) verbs in total. Four of them are monosyllabic, and twenty-nine (29) of them are disyllabic. In this study, we will focus on the disyllabic verbs in order to explore the co-relation between morpho-lexical composition and lexical semantics. In addition, the exclusion of mono-syllabic verbs allows us avoid dealing with potential complications involving polysemy and boundedness.

³ Note that they have the uniform categorical assignment of stative verbs in Chinese while the translation equivalents may predominantly be adjectives in languages such as English. Our classification of the verbs of emotion largely follows that of the *Tongyici Cilin*.

Subtype	Verbs of Emotion and their Frequency of Occurrence in the Sinica Corpus
Happiness	kuai4le4 快樂(942), gao1xing4高興(669), yu2kuai4 愉快(271), le4 樂(264), xi3yue4
	喜悅(156), kai1xin1 開心(152), huan1le4歡樂(141), huan1xi3歡喜(107), kuai4huo2
	快活(48), tong4kuai4 痛快(40)
Depression	tong4ku3痛苦(443), nang2guo4難過(232), chen2zhong4沈重(83), ju3sang4沮喪
	(62), tong4xin1 痛心(48)
Sadness	shang1xin1傷心(134), bei1shang1悲傷(52)
Regret	yi2han4 遺憾(198), hou4hui3後悔(102)
Anger	sheng1qi4 生氣(295), qi4 氣(126), fen4nu4 憤怒(112), qi4fen4 氣憤(49)
Fear	pa4 怕(548), hai4pa4 害怕(261), kong3ju4 恐懼(149), wei4ju4 畏懼(40)
Worry	dan1xin1 擔心(609), fan2nao3 煩惱(199), dan1you1 擔憂(64), fan2 煩(54), you1xin1
	憂心(46), ku3nao3苦惱(45)

Table 1. Verbs of emotion with a frequency of over 40 in the Sinica Corpus

2. Initial observations and theoretical assumptions

2.1 Initial observation

According to Tsai *et al.* [1998], the verbs *gao1xing4* "to be glad" and *kuai4le4* "to be happy" differ in the following four aspects: 1) *gao1xing4* takes sentential objects while *kuai4le4* cannot. 2) *gao1xing4* takes the sentential-final particle *le5* while *kuai4le4* cannot. 3) *gao1xing4* never occurs in wish sentences but admits evaluative sentences while *kuai4le4* occurs in wish sentences but never appears in evaluative sentences.⁴ Lastly, 4) *gao1xing4* occurs in imperative sentences while *kuai4le4* cannot.

We noticed that the differences between *gao1xing4* and *kuai4le4* create a clear dichotomy among verbs of Happiness. They are the two most frequently used verbs of the sub-field; moreover, all other verbs of Happiness also fall onto either side of the dichotomy. Hence, it is natural to ask if such generalizations can be carried over to other sub-fields of emotion. In other words, are these contrasts idiosyncratic to verbs of Happiness or do they represent some common conceptual motivation of the verbs of emotion? Our thorough examination of the verbs of emotion has revealed that these differences are repeated in each of the seven sub-fields of emotion. In addition, we have also found additional representational clues as to this dichotomy. Based on our study, five distributional criteria can be used to create a bipartite classification of the verbs of emotion. The first two criteria are newly proposed here, while the following three were proposed by Tsai *et al.* [1998] :

⁴ Wish sentences refer to the greeting constructions, such as *zhu4 ni3 kuai4le4* 祝你快樂 'May you be happy!'.

- a. the distribution of its grammatical functions;
- b. its selectional restrictions when it functions as an adjunct;
- c. its occurrence in imperative and evaluative constructions;
- d. its verbal aspect or aktionsart;
- e. its transitivity.

According to the above five criteria, we classify each of the 29 disyllabic verbs as one of two types for each of the seven subclasses of verbs of emotion. Type A includes the verbs similar to *gao1xing4*, and type B includes verbs similar to *kuai4le4*. For each of the seven subclasses, the two most frequent verbs form a contrast pair, i.e., one is type A and one is type B, as shown in Table 2.

Subtype	Type A	Type B
Happiness	gaolxing4高興(669)	kuai4le4 快樂(942)
	kai1xin1 開心(152)	<i>yu2kuai4</i> 愉快(271)
	tong4kuai4痛快(40)	<i>xi3yue4</i> 喜悅(156)
		huan1le4歡樂(141)
		huan1xi3 歡喜(107)
		<i>kuai4huo2</i> 快活(48)
Depression	nan2guo4難過(232)	Tong4ku3 痛苦(443)
	tong4xin1 痛心(48)	chen2zhong4沈重(83)
		<i>ju3sang4</i> 沮喪(62)
Sadness	<i>shang1xin1</i> 傷心(134)	bei1shang1悲傷(52)
Regret	hou4hui3後悔(102)	<i>yi2han4</i> 遺憾(198)
Anger	<i>sheng1qi4</i> 生氣(307)	<i>fen4nu4</i> 憤怒(112)
		<i>qi4fen4</i> 氣憤(49)
Fear	<i>hai4pa4</i> 害怕(261)	kong3ju4恐懼(149)
		wei4ju4 畏懼(40)
Worry	dan1xin1 擔心(609)	<i>fan2nao3</i> 煩惱(199)
	<i>dan1you1</i> 擔憂(64)	<i>ku3nao3</i> 苦惱(45)
	you1xin1 憂心(46)	

Table 2. Dichotomy of the Verbs of Emotion

2.2 Theoretical Premise: Contrast-based semantic fields

The fact that, in each of the fields of emotions we have examined, the two most frequent and, therefore, most dominant terms form a contrast pair leads us to adopt a revision of Grandy's [1992] definition of a semantic field.⁵ Even though Grandy formulated that membership in a semantic field as defined by contrast pair relations, he makes the covering term a crucial exception. This means that a single and unique covering term heads each semantic field and does not enter into contrast relations with other terms. However, since the (possibly transitive) contrast relations comprise the defining relation of membership in a semantic field, the fact that the covering term is not definable by such a relation seems to be an anomaly. On the other hand, if a covering term does enter into contrast pair relations with other terms, how can the primary status of the covering term be distinguished (from all other contrast pair relations)? Since our data clearly show that there are two dominant terms in each semantic field, they suggest an alternative view that there are possibly two covering terms for each field.

Our proposal is that for each semantic field, there are two covering terms that form a Covering Contrast Pair that defines the field. Note that each linguistic term has a set of semantic properties. If a covering term of a semantic field stands alone and, thus, has no contrast relation with any other term in the same field, then the semantic properties defining that field must be independently motivated. However, if there is a Covering Contrast Pair, then the defining semantic properties of the field can be defined by extracting common semantic attributes of the pair and need not be motivated independently. After the Covering Contrast Pair is established, it follows that other terms in the field will contrast with either of the covering terms, similar to Grandy's original formulation. In our definition, we will refer to this privileged contrast set as a **contrast pair**. Hence, there will be a unique contrast pair for each semantic field. Adopting this revised view of the structure of semantic fields, we will thoroughly examine the seven

- 2. except for the covering term, any expression that occurs in a contrast set with an element of the semantic field is also in the field.
- In addition, we re-interpret Grandy's [1992] formal definition of a Contrast Set below:
- (ii) A **contrast set** will consist minimally of a covering term T, a set of fundamental contrast relations, and a set of linguistic terms such that:
- 1. there are common linguistic beliefs that each linguistic term in the set is a kind of T (that is, the relation between any term and T can be defined by the is-a relation.);
- 2. for any two different terms in the set, it is a common linguistic belief that they contrast in terms of a single relation which is defined by the set or is derivable from the relations defined in the set.

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⁵ The definition of a Semantic Field according to Grandy [1992] is as follows:

⁽i) [A semantic field] is a set including one or more contrast sets and possibly also including permutation relations such that:

^{1.} at most one covering term does not occur as an element of a contrast set in the semantic field;

contrast pairs in the following sections. Our prediction is that the other verbs, as members of the field, will behave like either covering term in the pair.

3. The representational distinctions

In this section, we will examine the contrasts between the two groups based on the five proposed criteria: their grammatical functions, their co-occurrence restrictions, their appropriateness in the imperative and evaluative construction, their verbal aspect and their transitivity.

3.1 Grammatical functions

Generally speaking, type A (i.e., *gao1xing4*) verbs are predominantly used as predicates while type B (i.e., *kuai4le4*) verbs are much more often used in their nominalized forms as arguments or nominal modifiers. In this section, we will give a qualitative account of such contrasts based on three different quantitative criteria: 1) First is the distribution of all the grammatical functions for each covering term, with the focus on the contrast between the predicative and nominal uses. This study will illustrate how distributional information underlies linguistic generalizations. 2) In addition, there is the ratio between each contrast pair for both nominal and predicative uses, which highlights the preferential status of the dominant term for each function. 3) Last is the distribution threshold demarcation between type A and type B verbs for the entire field, both of which attest to the universal validity of this functional motivation.

3.1.1 Distributional pattern of grammatical functions for the contrast pairs

For each of the seven contrast pairs, the same distributional pattern is found, as shown in Table 3. On one hand, type A verbs exhibits a very high tendency of being used as a predicates, i.e., no less than 76%; type B verbs show a much lower tendency, no more than 41%. On the other hand, type A verbs are seldom used in their nominalized forms, i.e., less than 3.07%; type B verbs are ten-times as likely to be used in their nominalized forms (with a distribution of no less than 26.43%.) Finally, type B verbs are four times as likely as type A verbs to serve as nominal modifiers, i.e., 14.21% to 3.73% on average.

Type A	Total	Pred.	Nom.	N.M.	Adjunct	Comp.	Else
gao1xing4 高興	669	85.05%	0.30%	1.35%	6 <u>11.96</u> %	1.35%	0.00%
nan2guo4 難過	232	86.64%	2.16%	2.59%	6 4.74%	3.88%	0.00%
shang1xin1 傷心	134	76.12%	2.99%	11.19%	6 5.97%	3.73%	0.00%
hou4hui3 後悔	102	94.12%	0.00%	2.94%	6 2.94%	0.00%	0.00%
sheng1qi4 生氣	271	87.82%	0.00%	4.06%	6 7.75%	0.37%	0.00%
hai4pa4 害怕	261	93.10%	3.07%	2.68%	6 1.15%	0.00%	0.00%
dan1xin1 擔心	609	96.72%	1.97%	1.31%	6 0.00%	0.00%	0.00%
Average	325	88.51%	1.50%	3.73%	6 4.93%	5 1.33%	0.00%
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Type B	Total	Pred.	Nom.	N.M.	Adjunct	Comp.	Else
kuai4le4 快樂	942	37.79%	26.43%	24.84%	5.73%	5.20%	0.00%
tong4ku3 痛苦	443	25.73%	45.60%	20.54%	6.09%	2.03%	0.00%
bei1shang1悲傷	52	40.38%	28.85%	19.23%	9.62%	1.92%	0.00%
yi2han4遺憾 ⁶	198	34.85%	33.84%	3.54%	4.04%	0.00%	23.74%
fen4nu4 憤怒	112	28.57%	37.50%	17.86%	16.07%	0.00%	0.00%
<i>kong3ju4</i> 恐懼	149	23.49%	68.46%	7.38%	2.04%	0.00%	0.00%
fan2nao3煩惱	199	24.12%	69.85%	6.03%	0.00%	0.00%	0.00%
Average	299	30.70%	44.36%	14.21%	6.23%	1.31%	3.39%

Table 3. Distribution of Grammatical Functions of the Seven Contrast Pairs

3.1.2 Likelihood ratio: measuring the encoding preference

The above data show the clear distributional disparity between type A and type B verbs in terms of predicative and nominal uses. However, in order to obtain a linguistically significant account and its associated implications from the distributional disparity, finer statistical contrasts must be utilized. In particular, from a functional point of view, the two near synonyms in a contrast pair are competing with each other to represent the sam e concept. In other words, when a certain grammatical function is expressed, the choice is between the two verbs of a contrast pair.⁷ Given this functional perspective, the

(i) 這位 藝術家 的 作品, 很 遺憾地, 今年 無法 展出。
 zhewei yishujia de zuopin hen yihandi jinnian wufa zhanchu
 this artist 's works very regretfully this year couldn't exhibit
 "It's regretful that the works of this artist couldn't be exhibited this year."

⁷ In this study, the choice of the contrast pairs has important methodological considerations. As explained in our previous discussion, there are usually more than two terms in each semantic field. Hence, for either type A or type B, the covering term in the contrast pair may not be the only choice. However, we can see from the frequency statistics in Table 1 that a covering term has a frequency much higher than even the next most frequent term of the same type. Thus, our study uses a simplified model where only the two dominant terms in the contrast pair are compared, assuming that the less frequent terms cancel themselves out and do not contribute to significant differences if taken into consideration.

⁶ *Yi2han4* can also be used to express a speaker's judgement as shown in (i). In such cases, it functions as an evaluative adjunct.

quantitative measurement that directly characterizes the contrast between type A and type B verbs is the ratio of how often one type is chosen over another type for a certain grammatical function. To obtain this significant measurement, we compiled two likelihood ratios for each pair with the dominant type as the dividee in either case: for the likelihood ratio in predicative uses, type A term frequency was measured against the type B term frequency and vice versa for nominal uses. For instance, the frequency of predicative use of type A *sheng1qi4* is 238 while that of its near synonymous contrasting term *fen4mu4* is 32. Hence, the type A verb Anger is 7.44 times (238/32) more likely to be chosen to express a predicative meaning than is its type B counterpart. On the other hand, for the same pair of verbs, the type B verb is 5.64 (62/11) times more likely to be chosen to express a nominal meaning than is its type A counterpart. Both likelihood ratios were calculated for each of the seven pairs and given below.

Table 4. The Likelihood Ratio of Dominant Type over Non-dominant Type in terms of Predicative and Nominal Functions

Type A/Type B verbs	Predicate	Ratio of A	Nominal	Ratio of B
	Frequency	over B	Frequency	over A
gao1xing4 高興/ kuai4le4 快樂	569/356	1.59	11/483	43.91
nan2guo4 難過/ tong4ku3 痛苦	201/114	1.76	11/293	26.64
Shang1xin1 傷心/bei1shang1 悲傷	102/21	4.86	19/25	1.32
hou4hui3 後悔/yi2han4 遺憾	96/69	1.39	3/74	24.67
sheng1qi4 生氣/fen4nu4 憤怒	238/32	7.44	11/62	5.64
hai4pa4 害怕/kong3ju4 恐懼	243/35	6.94	15/113	7.53
dan1xin1 擔心fan2nao3 煩惱	589/48	12.27	20/151	7.55
Average ratio		5.62		16.75

Summing up the statistics shown in Table 4, for each contrast pair, type A verbs are more likely to occur in a predicate context while type B verbs are more likely to occur in a nominal one. Even though the likelihood ratio varies from one pair to another, on average, type A verbs are chosen as predicates almost **six times** as often as type B verbs. On the other hand, type B verbs are chosen for nominal uses almost **seventeen times** as often as type A verbs. The above ratios reveal the most significant functional contrast between type A and B verbs: that type A verbs have a dominant predicative function while type B verbs have a predominant nominal function. Since similar bi-directional ratios exist for all seven contrast pairs, they also constitute strong support for a uniform functional motivation and eliminate any possibility that the distributions of grammatical functions are idiosyncratic.

3.1.3 Sorting two types of verbs: verification of the quantitative criterion

One last piece of statistical evidence we want to give for the type A and type B dichotomy

is that there can be an empirical demarcation between the two types of verbs. Following the discussion in the previous section, the two types of nominal uses, i.e., that of a nominalized event and that of a nominal modifier, will be merged. We will refer to the merged frequency as the quantitative index of "being deverbal." In addition, since what is studied here amounts to quantitative criteria used to determine whether a term is a type A or type B verb, all relavent verbs of emotion are taken into consideration.

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Type A Verbs	Nom.	N.M .	deverbal	Type B Verbs	Nom.	N.M .	deverbal
tong4kuai4痛快	0.00%	0.00%	0.00%	<i>qi4fen4</i> 氣憤	20.41%	4.08%	24.49%
gao1xing4高興	0.30%	1.35%	1.65%	wei4ju4畏懼	22.50%	2.50%	25.00%
hou4hui3後悔	0.98%	2.94%	2.94%	yu2kuai4愉快	7.75%	22.14%	29.89%
<i>dan1xin1</i> 擔心	1.97%	1.31%	3.28%	huan1xi1歡喜	21.50%	9.35%	30.84%
<i>sheng1qi4</i> 生氣	0.00%	3.58%	3.58%	<i>kuai4huo2</i> 快活	6.25%	27.08%	33.33%
tong4xin1痛心	2.08%	2.08%	4.17%	<i>ju3sang4</i> 沮喪	20.97%	12.90%	33.87%
nan2guo4難過	2.16%	2.59%	4.75%	yi2han4遺憾	33.84%	3.54%	37.38%
hai4pa4害怕	3.07%	2.68%	5.75%	<i>ku3nao3</i> 苦惱	35.56%	11.11%	46.67%
<i>you1xin1</i> 憂心	6.52%	0.00%	6.52%	bei1shang1悲傷	28.85%	19.23%	48.08%
<i>kai1xin1</i> 開心	1.97%	5.92%	7.89%	<i>chen1zhong4</i> 沈重	0.00%	48.19%	48.19%
<i>dan1you1</i> 擔憂	9.38%	0.00%	9.38%	kuai4le4快樂	26.43%	24.84%	51.27%
shang1xin1傷心	2.99%	11.19%	14.18%	fen4nu4憤怒	37.50%	17.86%	55.36%
				<i>tong4ku3</i> 痛苦	45.60%	20.54%	66.14%
				<i>kong3ju4</i> 恐懼	68.46%	7.38%	75.84%

Table 5. Verbs of Emotion Sorted According to Deverbal Uses

Table 5 shows clearly that the 29 verbs of emotion can be correctly classified as type A or type B according to the simple quantitative measurement of the frequency of their deverbal uses.⁸ For example, in Table 5, we find that, without exception, all type A verbs have a nominal use frequency of 14.18% or lower, while all type B verbs have a nominal use frequency of 24.49% or higher. Between the two groups, there is an obvious gap in two crucial senses: First, the least frequent deverbal use of a type B verb is more than 10% higher than that of the most frequent type A verb. In other words, the distributions of the two groups of verbs are clearly discrete and not continuous. Second, the contrast in each contrast pair is even more prominent than the above gap. The smallest gap between a pair is 33.90% (*shang1xin1* vs. *bei1shang1*).

fan2nao3煩惱

xil yue4喜悅

huan1le4歡樂

69.85%

90.38%

31.91%

6.03%

1.92%

60.99%

75.88%

92.20%

92.91%

⁸There are two complimentary positions for nominal use: as either a referential complement or as a nominal modifier. Hence, we often find that when certain type B verbs show a low tendency to be used as referential complements, they necessarily show a higher tendency to be used as nominal modifiers, see, e.g., *chen2zhong4* 沈重, *kuai4huo2* 快活, and *yu2kuai4* 愉快.

3.1.4 Summary

In this section, we will summarize the quantitative measurements we chose to characterize the distribution of the grammatical functions of the two types of verbs and their interpretations. First, we observed the overall distributions of all the represented grammatical functions of the seven contrast pairs and established that type A verbs are used predominantly for predicative uses, and that type B verbs are used predominantly for nominal uses. Second, the likelihood ratio measurements for both predicative and nominal uses were calculated for each contrast pair. This measurement was used to test the function-driven hypothesis that the two contrast pair members are candidates which compete to represent the same concept in any given context. The quantitative measurements were predicted based on the hypothesis and, thus, supported a functional account. Last, to verify that our quantitative measurements represented a true classificatory criterion instead of a random demarcation point in continuous distribution, we showed that the type A and type B verbs actually form two discrete groups separated by a significant gap according to their frequency of deverbal uses.

3.2 Selectional restrictions the verbs impose as adjuncts

The second important observation regarding the distribution of the two types of verbs of emotion is that, as adjuncts, they impose very different selectional restrictions on their heads. Type A verbs can only modify a very restricted set of nouns or verbs while type B verbs seem to be much freer.

In the Sinica Corpus, type A verbs, such as *gaolxing4*, can only modify six types of nouns, "time when" (e.g. *shi2hou4* 時候 / *shi2* 時), "event/story," "mood," "facial expressions," "person" and "utterance." In contrast, type B verbs, such as *kuai4le4*, can be adjuncts for many additional noun classes. The contrast is shown in (1) and (2).

(1) Type A

?高興的	童年	/? 高興的	」婚姻	/? 高興的	り 上班族	/? 高興	的 環境
gaoxingde	tongnian	/gaoxingde	hunyin	/gaoxingde	shangbanzu	/gaoxingd	le huanjing
glad	childhood	/glad	marriage	e/glad	workers	/glad	environment

(2) Type B

/ 快樂的 快樂的 童年 / 快樂的 婚姻 上班族 / 快樂的 環境 kuailede tongnian /kuailede hunyin /kuailede shangbanzu /kuailede huanjing childhood /happy marriage /happy workers environment happy /happy "happy childhood/ happy marriage/ happy workers/ happy environment"

With regard to post-verbal adjuncts, both groups can modify transient activities, such as *wan2 de hen3 gao1xing4* 玩得很高興 "play happily" and *wan2 de hen3 kuai4le4* 玩得很快樂 "play happily." However, only type B verbs can be adjuncts of non-transient (state-like) activities, such *ashuo2 de kuai4le4* 活得快樂 "live happily," *guo4 de kuai4le4* 過得快樂 "live happily," and *ao2 de hen3 tong4ku3* 熬得很痛苦 "endure terribly."

3.3 The imperative and evaluative constructions

Some verbs of emotion are used in imperative sentences containing deontic modal verbs, as in (3). Many of them can also occur in evaluative sentences which contain the verb *zhi2de2* 值得 "be worthwhile (to)" or the phrase *mei2 she2me5 hao3* … *de5* 沒什麼 好… 的 "be not worthwhile to," as in (4). In either case, they lose the prototypical "command" or "evaluation" meaning. Pragmatically speaking, both constructions with verbs of emotion have the same "dissuading" function.⁹

(3)	別	傷心	/莫傷/	ù	/ 不要	傷心。			
	bie	shangxin	/mo sha	ngxin	/buyao	shangxin			
(don't	sad	/don't sad		/don't	sad			
"Please don't feel sad."									
(4)	不	值得	傷心	/ 沒	什麼	好	傷心	的。	
	bu	zhide	shangxin	/mei	sheme	e hao	shangxin	de	
	NEC	G worth	sad	/without	anythi	ng worth	sad	PARTICLE	
"It is not worthwhile to feel sad. /There's nothing to be sad about.									
	(Please don't feel sad.)"								

Based on the Sinica Corpus, we find that 1) all type A verbs appear in the imperative or the evaluative construction, and 2) with only one exception, (i.e., *fan2 nao3*)¹⁰, type B verbs do not appear in either type of construction, as shown in Table 6.

⁹In most cases, verbs of emotion which appear in evaluative constructions do not just express the speaker's judgement, but "dissuade" the listener from the stated emotion. Of course, the dissuading function of the imperative comes from the negative constructions, such as the negative imperative constructions or the negative evaluative constructions.

¹⁰We assume that the inherent properties of each emotion, such as the perceived degree of controllability, will affect the uses of each class of verb in these two constructions. Hence, it is more accurate to directly contrast the frequency of uses of verbs in the same field. Although *fan2nao3* has 7 occurrences in the two constructions, it is still a relatively small distribution when compared with the 80 occurrences of its contrast set counterpart *dan1xin1*.

Verb Types	I	ł			В			
	Verbs	Imp.	Eva.	Total	Verbs	Imp.	Eva.	Total
Нарру	gaolxing4 高興	6	6	12	kuai4le4 快樂	0	0	0
Depression	nan2guo4 難過	10	1	11	tong4ku3 痛苦	0	0	0
Sadness	shang lxinl 傷心	4	0	4	beilshangl 悲傷	0	0	0
Regret	hou4hui3 後悔	3	0	3	yi2han4 遺憾	1	0	1
Anger	sheng1qi4 生氣	12	0	12	fen4nu4 憤怒	0	0	0
Fear	hai4pa4 害怕	9	0	9	<i>kong3ju4</i> 恐懼	0	0	0
Worry	dan1xin1 擔心	78	2	80	fan2nao3 煩惱	6	1	7

Table 6. Imperative and Evaluative Uses of the Seven Pairs

3.4 Verbal aspect or aktionsart

Verbs of emotion express mental states. They can represent either a homogeneous state, as in (5), or an inchoative state, as in (6).

(5)	他	爲	此	事	傷心	不已。
	ta	wei	ci	shi	shangxin	buyi
	he	for	this	matter	sad	continuous
	"He	e has l	been sa	d about	this for a lon	g time."

(6) 他一 想起 妻子 已經 死 了,就 傷心 了 起來。
ta yi xiangqi qizi yijing si le jiu shangxin le qilai
he once think of wife already die LE then sad LE asp.
"He felt sad whenever the thought came into his mind that his wife had died."

The inchoative *le* can be used to differentiate between the two types of verbs.¹¹ We find in the Sinica Corpus that in each contrast pair, the particle *le* is associated with the type A verb much more frequently than it is associated with the type B verb, as shown in Table 7.

¹¹Li & Thompson [1981], among others, characterized the sentential-final particle *le* as marking a new state, and *le* attached to a verb as marking the perfective aspect. However, when *le* co-occurs with a state verb, it always represents a change of the state (thus inchoative), regardless of its position.

Verb Types	A		В		
	Verbs	Freq.	Verbs	Freq.	
Happiness	gao1xing4 高興	20	<i>kuai4le4</i> 快樂	10	
Depression	nan2guo4 難過	9	tong4ku3 痛苦	0	
Sadness	shang1xin1 傷心	2	bei1shang1 悲傷	1	
Regret	hou4hui3 後悔	7	yi2han4 遺憾	0	
Anger	sheng1qi4 生氣	14	fen4mu4 憤怒	0	
Fear	hai4pa4 害怕	5	<i>kong3ju4</i> 恐懼	2	
Worry	dan1xin1 擔心	6	fan2nao3 煩惱	3	

Table 7. Verbs of Emotional Association with the Sentential Final Particle le

3.5 Transitivity

A verb of emotion takes either a cause or a goal as its direct object.¹² In the previous section, we showed that a verb of emotion can indicate an inchoative state. A new state does not come into being without a cause. Hence, a logical cause can be implied for each inchoative state. Grammatically, however, only the verbs of *Happiness, Fear* and *Worry* take a cause as their object.¹³ More precisely, only type A verbs of *Happiness, Fear* and *Worry* do so while none of the type B verbs take eventive Cause objects. This is demonstrated in (7) and (8), as well as in Table 8.

(7)	他們	很	高興	張三	沒	走。	[Tsai 1998]		
	tamen	hen	gaoxing	zhangsan	mei	zou			
	they	very	glad	John	doesn't	go			
	"They were glad that John didn't go."								

¹² Adopting Teng's [1975] framework, goal in the Sinica Corpus and CKIP lexicon refers to both a transitivity goal (vs. patient) and a circumstantial goal (vs. source). In this paper, only a transitivity goal is considered. Please also note that since there is a theme but no patient in the CKIP argument role system, some of Teng's patient roles that do not qualify as themes are also classified as (transitivity) goals. See Lin [1992] for more details regarding the role classification system.

呢?

(i) 爲了 <u>這件事</u>,我曾傷心了好久。

weil	e zhe	jian	shi	wo	ceng	shan gx in	le	hao	jiu
for	this	piece	matter	Ι	ever	sad	LE	quite	long time
"I've felt sad about this matter for quite a long time."									
(ii) 母	子	音	不得	Ę	1面,	怎麼	能	不	傷心

()			20	1 1 4		10022	11	1	1227 - 🖬	·/u ·
	mu	zi	jing	bude	jianmian	zenm e	neng	bu	shangxin	ne
	mother	son	dare	couldn't	meet	how	can	not	sad	NE
	"How c	an th	ey no	t feel sad	that the m	other ar	nd son	can't	meet each	other."

¹³ For those verbs that do not take a cause event as a direct object, the cause event shows up in other positions, such as an adjunct PP (i) or a topic clause (ii).

(8)*他們 很 快樂 張三 沒 走。[Tsai 1998]
 tamen hen kuailezhangsan mei zou
 they very glad John doesn't go
 "They were happy that John didn't go."

As for goal, only the verbs of *Angry*, *Afraid* and *Worried* semantically take this kind of argument and, thus, syntactically take them as direct objects. However, in the Sinica Corpus, only Group A verbs of those types can take a goal as a direct object while Group B verbs as a rule do not take a goal as a direct object, as shown in Table 8.

Type A	-Cause Event		-Goal	Type B	-Cause Event		-Goal
	-VP/S	-Event N	-Simple N		-VP/S	-event N	-Simple N
gao1xing4 高興	69	3	0	kuai4le4 快樂	0	0	0
sheng1qi4 生氣	0	0	0/1214	fen4nu4 憤怒	0	0	0
hai4pa4 害怕	68	9	8	kong3ju4 恐懼	3	0	2
dan1xin1 擔心	285	17	35	fan2nao3 煩惱	2	0	2

Table 8. The Transitive Uses of Four Representative Pairs

4. Semantic explanation

In this section, we will first summarize the contrasts and then propose a lexical semantic explanation for all the contrasts.

4.1 The syntactic contrasts

In the previous section, we presented the syntactic basis for our bipartite classification of the verbs of emotion. There are five distributional syntactic criteria. The two groups differ in terms of tendency. In each of the five schemes of grammatical representations, one of the two types of verbs dominate, as shown below:

Type A verbs:

- 1. function mostly as predicates and are seldom used deverbally;
- 2. have strict selectional restrictions on the head when they function as adjuncts;
- 3. can appear in imperative or evaluative constructions;

¹⁴ Whether *sheng1qi4* can be a transitive verb or not depends on one's definition of transitivity in Chinese. This is because its goal can only be inserted into the so-called 'possessive object' position and never into a canonical object position, such as *shang1 ta1 de5 qi4* 生他的氣 [Huang 1990].

- 4. can represent inchoative states; and
- 5. can take causes or goals as their direct objects.

Type B verbs:

- 1. are the predominant choice in a deverbal context;
- 2. have looser selectional restrictions on the head when they function as adjuncts;
- 3. are seldom used in imperative or evaluative constructions;
- 4. rarely represent inchoative state; and
- 5. seldom take causes or goals as their direct objects.

4.2 The semantic basis for the bipartite classification

Bear in mind that the 14 verbs we are studying here form seven contrast pairs. While each pair represents a different semantic field, they all belong to the same subordinating semantic field of emotion. If the same five contrasts differentiate all seven pairs, we may assume that there is a fundamental semantic motivation underlying all these contrasts. This semantic motivation may be a design feature of the field of emotion. It is highly unlikely that these exact five contrasts are independently motivated for each contrast pair and yet are identically represented in each of the fields.

It is also important to note that the members of each contrast pair differ minimally in semantics and are mutually substitutable in many contexts. In other words, it is natural for a null hypothesis account to assume that the minimally contrasting feature contributes to the grammatical contrasts. We can understand the behavioral contrasts we have observed better by rephrasing the question as follows in (9):

(9) Why are type A verbs chosen over type B verbs (and vice versa) in construction X?

From a functional perspective on language, this question helps us to directly look for motivations to differentiate between the two types of verbs. Since the contrasts exist regularly across the seven sub-fields of emotion, we expect the motivation to be semantic in nature, and expect that it may involve the fundamental semantic dichotomy of the semantic field of emotion. In anticipation of this interpretation, we summarize and re-organize the contrasts between the two groups as follows:

Linguistic Instantiation	ТуреА	Type B
Predicative use	Strong	Weak
Inchoative states	Predominate	Rare
Transitivity	Strong	Weak
Imperative or evaluative constructions	Predominate	Rare
Adjuncts to non-transient activities	Rare	Predominate
Adjuncts to nouns	Weak	Strong
Nominalization	Rare	Predominate

Table 9. Contrasts in Linguistic Distribution

From the above contrast, we generalize that all the distinctive linguistic instantiations are related to event structure properties. Generally speaking, type A verbs are preferred for indicate **transition** while type B verbs are preferred for **homogeneity**. In particular, when we want to indicate a change of state, such as with the change-of-state *le*, type A verbs are usually used. When an object or cause is present, the event focus naturally shifts to the transition to a new state, and again, type A verbs are preferred. When dissuasion is intended and, thus, the potential for transition is involved, type A verbs are usually used.

On the other hand, type B verbs are preferred for indicate continuous and homogeneous states. This is why only type B verbs are used to modify non-transient verbs and to ascribe attributes to nouns. This is also why type B verbs are preferred as deverbal nouns since a referential entity is regarded as a wholistic unit and, thus, homogeneous composition is implied.

5. A semantic interpretation of the preferred sub-lexical structure

In this section, we will explore and explain the close relationship between the sub-lexical structure of these compound verbs and their bipartite classification.

An interesting observation involving the current set of data is that the distinctions among the internal structures of these compounds seem to correspond to the distinctions between the two groups. We find that 14 of 16 type B verbs are VV compounds while none of the 13 type A verbs are VV compounds, as shown in Table 10.

Type A: gao1xing4 高興 (non-VV), nan2guo4 難過 (non-VV), hou4hui3 後悔 (non-VV),tong4ku3 痛快 (non-VV), dan1you1 擔憂 (non-VV),sheng1qi4 生氣 (non-VV), chi1jin1 吃驚 (non-VV), dan1xin1 擔心 (non-VV), shang1xin1 傷心 (non-VV), kai1xin1 開心 (non-VV), you1xin 憂 心 (non-VV), tong4xin1 痛心 (non-VV), hai4pa4 害怕 (non-VV) Typep B: kuai4le4 快樂 (VV), xi3yue4 喜悅 (VV), huan1le4 歡樂 (VV), fan2nao3 煩惱 (VV), kong3ju4 恐懼 (VV), tong4ku3 痛苦 (VV), fen4nu4 憤怒 (VV), chen2zhong4 沈重 (VV), bei1shang1 悲傷 (VV), ku3nao3 苦惱 (VV), yi2han4 遺憾 (AN or VO)¹⁵, ju3sang4 沮喪 (VV), kuai4huo2 快活 (VV or AV)¹⁶, huan1xi3 歡喜 (VV), yu2kuai4 愉快 (VV), wei4ju4 畏懼 (VV)

We have shown that all VV compounds examined here belong to type B. Based on our lexical semantic account offered earlier, this means that VV compounds are preferred to represent homogenous states. We argue that this fact is due to the semantic properties of VV compounds.

VV compounds differ from other compounds (such as SV, VO, AV and VR) in the compounding process. In contrast to the other major verbal compounding processes, VV compounds are double-headed. In all the other constructions, the V root employs one more constituent to elaborate on the event so as to make it either more complete or more specific. For instance, in a SV compound, the subject is added to the event structure; in a VO compound, an object is incorporated into the event structure; in an AV compound, the manner of executing an action is described; and lastly, in a VR compound, the result of the action is explicitly indicated. However, a VV compound does not elaborate. In VV compounding, the concept of an event is "diffused" because two similar events are juxtaposed so as to suggest extraction of the common properties of the pair. It is a common morpho-lexical strategy in Mandarin to concatenate two antonyms or synonyms to form the concept of "kind" or "property." For example, the word hu1xi1 呼吸 "to breathe" is the juxtaposition of hu1 "exhale" and xi1 "inhale" while $da4xiao3 \pm 1$."

Since the concept of an event is diffused or lifted to "kind/property," it is natural for VV compounds to be used to indicate a homogeneous state, but it is difficult to use them to indicate an inchoative state. That is why Mandarin employs VV compounds to indicate more referential contexts, such as a nominalized event or a nominal modifier. It is also a natural consequence that the VV verbs of emotion are seldom used in imperative and evaluative constructions since in both constructions transitional characteristics are highlighted, which is contrary to the nature of a VV compound.

¹⁵ yi2han4 could be viewed not only as a VO compound verb, but also an AN compound noun because it can be interpreted as an abbreviation of the idiom: yi2zhu1zhi5han4 遺珠之憾 "the regret of missing one pearl," and thus be realized as a noun. If this is true, then yi2han4 was originally a noun. As a verb

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of emotion, it is a denominal verb formed through abbreviation.

¹⁶ The inner structure of *kuai4huo2* is hard to determine. It might be VV (happy and vivid) or AV (happily live).

6. Conclusion

In this paper, we have illustrated consistent grammatical and distributional contrasts in seven types of verbs of emotion and proposed a semantic explanation of the contrasts. The homogeneous state/transition semantic dichotomy is found to be inherent in the semantic field of emotion. It is natural to suggest, however, that this dichotomy may show up in all semantic fields of states. Our re-interpretation of the structure of semantic fields, where a **contrast pair** (instead of a single cover term) heads a semantic field, has several theoretical implications. First, we need to find out if all semantic fields are actually headed by contrast pairs that are defined by a primary contrast relation. Second, we need to exhaustively list all primary contrast relations and try to develop a theory of classification of semantic fields based on them. Third, it will be important to see if theoretical constraints are placed on the primary contrast relations. For instance, the transition/homogeneous state contrast is clearly central to the event type definition of states.

In addition, we have observed that all VV compounds belong to type B, and we have proposed a morpho-semantic explanation for their distribution. VV compounds undergo a process that involves merging two individual events to create a superset of properties covering both events; hence, it is a more appropriate morpho-lexical process for representing homogeneous states.

In research on regularities between lexical meaning and syntactic behaviors, it is very important to distinguish between the constructional meaning and the core meaning. The explanation we have offered above suggests that the regularities we have extracted from VV compounds in the semantic field of emotion exist in all Mandarin VV compounds. A preliminary study on the Sinica Corpus does confirm that all VV compounds have a higher tendency of being nominalized. In addition to our continuing research on the formal properties of semantic fields, we are also looking into the process whereby morpho-lexical structures encode constructional meanings.

References

- Chinese Knowledge Information Processing (CKIP). 1995. An Introduction to the Sinica Corpus. [In Chinese]. CKIP Technical Report 95-02. Taipei: Academia Sinica.
- Grandy, Richard E. 1992. "Semantic Fields, Prototypes, and the Lexicon." In Lehrer and Kittay Eds. *Frames, Fields, and Contrasts: New Essays in Semantic and Lexical Organization*. Pp.103-122. Hillsdale: Lawrence Erlbaum.

- Huang, Chu-Ren, 1998, "Classifying Event Structure Attributes: A Verbal Semantic Perspective from Chinese." Chinese Workshop. The 1998 International Lexical-Functional Grammar Conference. June 30-July3. Brisbane, Australia.
- Huang, Chu-Ren. 1990. "A Unification-based LFG Analysis of Lexical Discontinuity." *Linguistics*. 28.263-307.
- Huang, Chu-Ren, Mei-chun Liu, and Mei-chih Tsai, 1998, "From Lexical Meaning to Event Structure Attributes: Across Semantic Classes of Mandarin Verbs." The 6th International Conference on Chinese Linguistics/The 10th North American Conference on Chinese Linguistics. June 26-28. Stanford.
- Levin, Beth. 1993. English Verb Classes and Alternations: A Preliminary Investigation. Chicago: University of Chicago Press.
- Li, Charles, and Sandra Thompson. 1981. *Mandarin Chinese: A Functional Reference Grammar*. Berkeley, Los Angeles: University of California Press.
- Lin, Fu-Wen. 1992. Some Reflections on the Thematic System of Information-based Case Grammar (ICG). [In Chinese.] CKIP Technical Report No. 92-01. Nankang: Academia Sinica.
- Liu, Mei-chun. 1999. "Lexical Meaning and Discourse Patterning the three Mandarin cases of 'build'." In Barbara A. Fox, Dan Jurafsky and Laura A. Michaelis, eds. *Cognition and Function in Language*. 181-199. Stanford: Center for the Study of Language and Information (CSLI).
- Liu Mei-chun, Chu-Ren Huang, and Charles C.L. Lee. 2000. "When Endpoint Meets Endpoint: A Corpus-based Lexical Semantic Study of Mandarin Verbs of *Throwing*." *Computational Linguistics and Chinese Language Processing*. 5.1:81-96.
- Pustejovsky, James, S. Bergler, and P. Anick. 1993. "Lexical Semantic Techniques for Corpus Analysis." *Computational Linguistics*. 19.2:331-358.
- Pustejovsky, James. 1995. The Generative Lexicon. Cambridge: MIT Press.
- Teng, Shou-hsin. 1975. *A Semantic Study of Transitivity Relations in Chinese*. Berkeley and Los Angeles: University of California Press.
- Tsai, Mei-chi, Chu-Ren Huang, Keh-jiann Chen, and Kathleen Ahrens. 1998. "Towards a Representation of Verbal Semantics: An Approach Based on Near-Synonyms," *Computational Linguistics and Chinese Language Processing*. 3.1:62-74.

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