

A Frame-based Approach to Polysemous Near-synonymy: the Case with Mandarin Verbs of Expression

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Abstract

In this paper, we propose a frame-based approach to polysemy by analyzing three near-synonymous verbs *biaoshi* (表示), *biaoda* (表達) and *biaolu* (表露). Based on Liu and Wu (2004), this paper further discusses the cross-frame phenomena of near-synonyms with a detailed comparison of their syntactic and collocational patterns. It is shown that polysemy among related verbs may be well defined and manifested within the framework of Frame Semantics. In addition, following Liu and Wu's finding, we also want to further explain the relationship between frames and the mechanism of forming polysemy.

Keyword:

Frame Semantics, metaphor, metonymy, near-synonymy, polysemy, verbs of Expression.

1. Introduction

The focus of this paper aims to look for a unified analysis of polysemy, as the problem of polysemy often poses theoretical and computational problems in lexical semantic studies (cf. Ravin and Leacock 2002). In this paper, the corpus data of the four expression verbs - *biaoshi* (表示), *biaoda* (表達) and *biaolu* (表露) - are thoroughly examined to show that a

frame-based approach to polysemy can provide a well-motivated and systematic distinction of the multiple senses of related verbs. In Liu and Wu (2004), a preliminary model was proposed where the verb *biaoshi* (表示) was used to illustrate the frame-based definition of sense distinction. The verb *biaoshi* has three major uses. The key examples are shown below (Liu and Wu 2004):

(1) *biaoshi* (表示)

- a) 李先生表示₁: 「這不過是做好分內的事」。
- b) 李先生表示₂同情。
- c) 鮮花表示₃愛情。

By associating different senses with different frames, Liu and Wu (2004) demonstrate a frame-based approach to polysemy with grammatical evidence. A polysemous verb such as *biaoshi* can be defined as highlighting different core frame elements that link them to different semantic frames with conceptual and structural motivations. Moreover, the ‘one frame, one sense’ principle, as suggested in Liu and Chang (2004), helps facilitate sense distinctions on a well motivated and structured basis. A ‘sense’ is thus anchored in a conceptual structure and grammatical realizations that in turn defines a ‘frame’ with a set of core participant roles. Thus, the three senses of *biaoshi* are viewed as belonging to three different frames -- Statement, Encoding, and Evidence frames, each with its own frame-based features. However, a more interesting issue arises: what about the near-synonyms of *biaoshi*? Do they display the same kind of polysemy? With a thorough investigation of the corpus data, we found that *biaoshi* is not the only verb of expression that involves polysemy. Other expression verbs such as *biaoda* (表達) exhibit similar polysemous behavior. In the examples below, the uses of *biaoda* are used to illustrate:

(2) *biaoda* (表達)

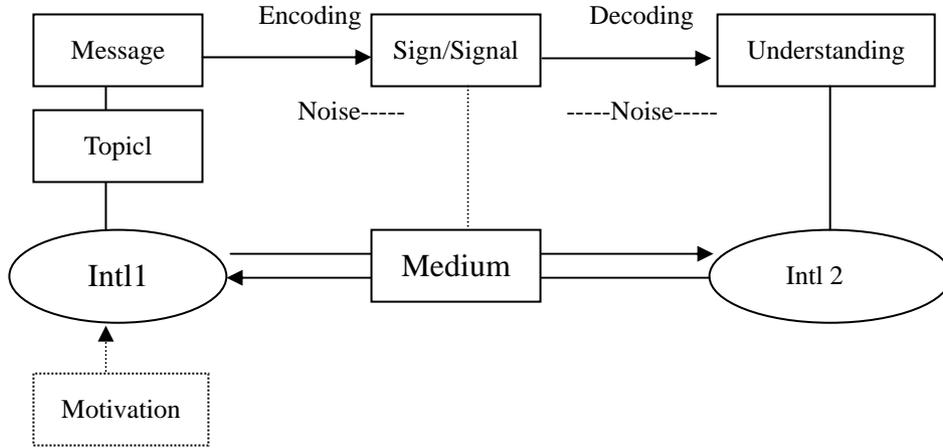
- a) 他曾一度表達₁ 希望鄉親能籌集資金補貼換牌費用，但在場的華人沒有人點頭
- b) 我今天寫這一封信就是要表達₂ 我衷心的感謝
- c) 在牛頓紀念碑設計中，部雷表達₃ 了一個規整、有限的世界

Similar to *biaoshi* (表示), *biaoda* is also polysemous and may be analyzed as belonging to different frames. But, do the two verbs share the same range of frame membership? If so, what are the fine-grained distinctions? If not, should cross-frame polysemy be taken as a defining indicator of near-synonym in addition to within-frame distinctions?

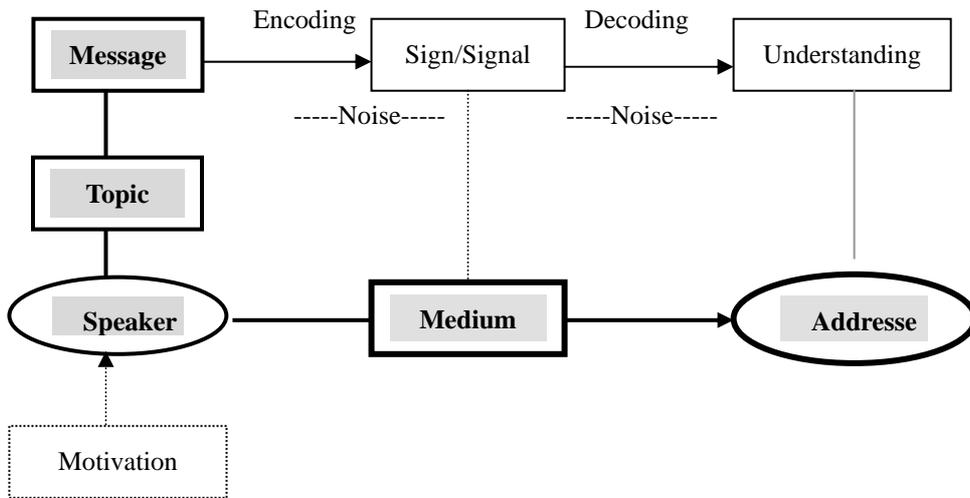
From the perspectives of frame semantics (Fillmore and Atkins 1992), the meaning of a lexical unit (or lemma) is defined within a frame. Therefore multiple senses (or ‘polysemy’) are considered as having multiple frame membership. As exemplified above, the three senses of *biaoshi* are recognized as belonging to three different frames: *biaoshi*₁ exists in the Statement frame, *biaoshi*₂ in the Encoding frame, and *biaoshi*₃ in the Evidence frame. It is then inevitable to ask the following questions: 1) if a verb belongs to multiple frames, what is the relationship between those frames? 2) are there any systematic linking principles characterizing the relationship between those frames? 3) Among near-synonyms, why and how does a certain lemma get extended to another frame? These questions are the central issues the paper attempts to answer. It is structured as follows: Section 2 is literature review of the frame-based approach to polysemy; Section 3 provides general observations and analysis of the corpus data in relation to polysemous near-synonymy. Section 4 provides the mechanism that may explain the extension to multiple frames.

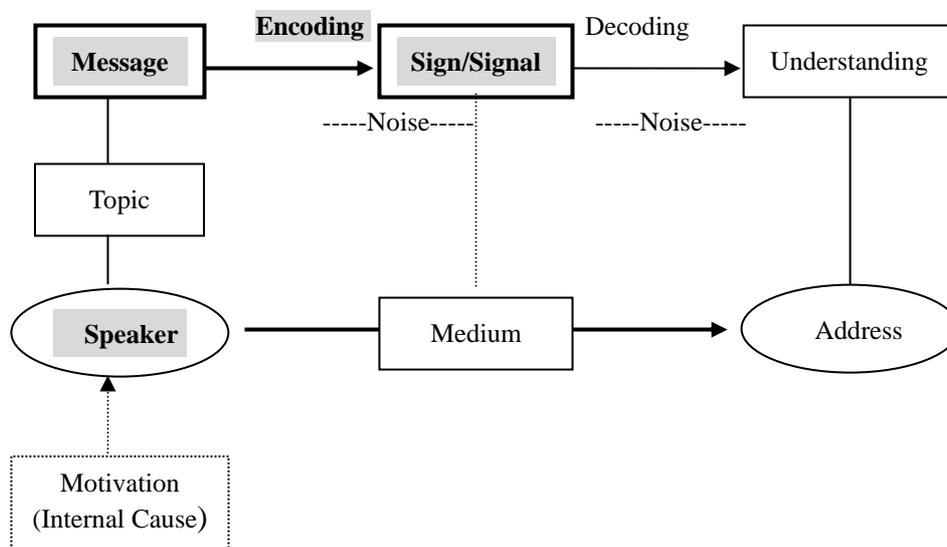
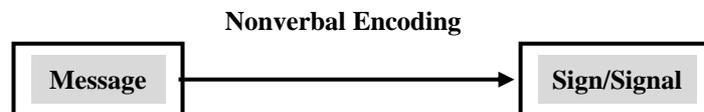
2. Frame-based approach to polysemy

From a traditional sense enumerating approach, such as WordNet’s sense definitions, the meaning of *biaoshi* (表示) in example (1a) is *say*; the meaning in example (1b) is *express*, and that of (1c) is *mean*. As an alternative to underpinning or ‘labeling’ the meanings, Fillmore and Atkins (1992) proposed that polysemy can be recognized as a result of transferring from a semantic frame to a new domain (through metonym or metaphor). They hold that Frame Semantics makes it possible to separate the notion of the conceptual underpinnings of a concept from the precise way in which the words anchored in them get used (cf. Fillmore and Atkins 1992). Following such as view, Liu and Wu (2004) provided a frame-based analysis of polysemy: the polysemous verb of communication *biaoshi* is defined as highlighting different situational types with different core participants that link them to different semantic frames with structured motivations behind them. They also proposed a cognitive system based on the Conduit Metaphor to capture the conceptual motivations and lineage between different frames in the domain of communication, as represented below:



(3) Conceptual Schema of the Communication domain



(4) Defining Schema of the Statement Frame (表示₁)(5) Defining Schema of the Encoding Frame (表示₂)(6) Defining Schema of the Evidence Frame (表示₃)

Each frame profiles different highlighted participant roles, called core frame elements. In Statement frame, verbs emphasize the utterance of a Message by a certain Speaker roughly functioning as performing speech act. Verbs of Encoding focus on the Speaker's ways of 'packaging' the Message with the use of specific Signs or Signals to express speaker's emotional state. As for the Evidence frame, the Message is encoded by the verbal or nonverbal sign (cf. Liu and Wu 2004, Liu and Chiang 2004). The core frame elements of the three frame elements are summarized below:

Statement: Speaker, Message (direct quotation or indirect description, S)

Encoding: Speaker, Message (encoded emotional state and linguistic content, NP)

Evidence: Sign (verbal or nonverbal) Message (verbal or nonverbal encoded message, S/NP)

The core frame elements of Statement are Speaker and Message coded as VP or S. The core frame elements of Encoding are Speaker and NP message expressing the emotional state of the speaker. As for Evidence, the core frame elements are Sign and Message. Verbs of Statement in Communication domain report what the speaker has already said function roughly as speech act. Verbs of Encoding in Communication Domain describe what the emotion state is. As for verbs of Evidence frame, they currently report or describe what the sign encodes (Liu and Wu 2004).

3. Grammatical patterns and frame membership

All the observations and analyses of this paper are based on Academia Sinica Balanced Corpus of Modern Mandarin Chinese (Sinica Corpus), which is a tagged Mandarin corpus containing a total of five million words from 1990 to 1997. *Biaoshi* is the highest frequent word with 5431 tokens found in the corpus. The first 667¹ tokens of *biaoshi* are taken. As for *biaoda*, all the counts of corpus tokens (667²) are taken. There are 55 counts of *chenshu*. *Biaolu* has lowest frequency; only 18³ tokens are taken from the corpus data.

Since *biaoshi*, *biaoda* and *biaolu*, are near-synonyms, we would like to ask whether the other three verbs behave like *biaoshi* (表示) and belong to multiple frames? Guided by the assumption postulated by Levin (1985) that a verb's syntactic behavior is determined by its meaning, the syntactic patterns of the three verbs are examined. In the following, the differences in the argument selection are presented. The distributional contrasts for argument selection involve determining whether the Speaker-subject and Message-object are realized as NP, VP, or S. As proposed by Liu and Wu (2004), judging the grammatical realization of arguments can help distinguish Statement from Encoding and Evidence frame. From the

¹ 20 reduplicated tokens are excluded from the counts.

² 14 reduplicated

³ 1 reduplicated

following chart, we know that *biaoshi* has much higher frequency of being used as a Statement verb than *biaoda* and *biaolu*, as shown below:

	<i>biaoshi</i> 647	<i>Biaoda</i> 651	<i>Biaolu</i> 17
Message as VP/S	72.2% (467)	6.6% (43)	0%
Message as NP	27.8% (180)	93.4% (610)	100%

(7) Distribution of the grammatical category of the Message-Object

Below are examples from the Sinica Corpus that help illustrates the differences:

(8) Speaker with VP or sentential Message

- a) 不擅談論自己的何先生[Speaker], 靦腆的**表示**: 這不過是盡心盡力做好份內工作
[Message]
- b) 他[Speaker]曾一度**表達**希望鄉親能籌集資金補貼換牌費用[Message], 但在場的華人沒有人點頭

Further distinction needs to be made between Encoding and Evidence frames. The subject position plays an important role for differentiating the two frames. Since the core frame elements of the Encoding frame are Speaker and Message while the Evidence frame requires Sign and Message, the subject of verbs of Encoding tends to be realized as human NP and that of Evidence as non-human S or NP. The semantic restriction of the former may be specified as [+animate] and that of the latter must be [-animate]. The distributional differences are show as follows:

	<i>biaoshi</i> 647	<i>biaoda</i> 651	<i>Biaolu</i> 17
Speaker [NP] < * < Message [VP, CL]	72.2% (467)	6.7% (43)	0%
Speaker [NP] < * < Message [NP]	11.6% (75)	55.1% (359)	100%
Sign [NP] < * < Message [NP, S]	16.2% (105)	38.2% (249)	0%

(9) Distribution of the grammatical category of the Subject

(10) Speaker [+animate] with NP Message

- a) 國家經委主任李富春[Speaker]**表示**歡迎[Message].
- b) 我[Speaker]今天寫這一封信[Sign]就是要**表達**我衷心的感謝[Message]
- c) 費茲瓦特並說, 海珊[Speaker]迄未**表露**願與布希特使會談的意願[Message]

(11) Sign [-animate] and NP/S Message

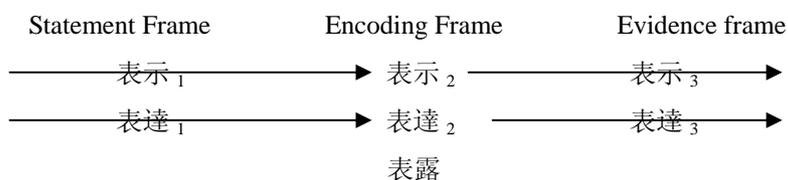
- a) 事實上，距離越遠，越表示理想的高尚
 b) 牛頓紀念碑的設計，表達了一個規整、有限的世界

From the variation of their grammatical patterns, we observe that *biaoshi* and *biaoda* are polysemous. How can a frame-based approach provide a unified analysis of the multiple sense distinction? The determining factors are: frame membership and distributional frequency. As a polysemous verb, *biaoshi* belongs to three frames-- Statement, Encoding, and Evidence. It is a prototypical verb of Statement (72.2% comparing with *biaoda* 6.7% and *biaolu* 0%) used mainly to perform speech act. Similarly, *biaoda* also has three senses as a cross-frame member. However, *biaoda* is different from *biaoshi/ biaoda* for it is used predominantly as a verb of Encoding. It is a less typical verb of Statement. As for *biaolu*, its syntactic pattern testifies that it is not as polysemous as the others. It is a verb of Encoding used mainly to convey the covert relationship between a Sign and a Message.

4. Cross-frame Comparison

We know that the three near-synonymous verbs are different in their polysemous development. The graph (12) shows their polysemous development.

(12) Polysemous development of the three verbs



According to the graph, it is interesting to ask 1) what the relationship among the three frames is and 2) why *biaolu* is not as polysemous as the others. In this section, we will try to answer the two questions.

As for the first question, the statement and Encoding frame are discussed first because they belong to the communication domain. The Statement frame is recognized as a primary frame according to its discourse-based characteristic which is experientially basic. That is, the Statement frame describes an event that we experience directly in our everyday life. Based on the Statement frame, the Encoding frame is derived through the metonymical

process. The Encoding frame focuses on the interaction between sign and message which are specified metonymically from the Statement frame. The Evidence frame, on the other hand, is viewed as a metaphorically-induced frame. The Evidence frame describes a process in which the two concepts (realized as sign and message) are combined. The metaphorical process from the Encoding frame to the Evidence frame is verbal to non-verbal. It means that the Evidence frame is structured further by means of correspondences with selected elements of the Encoding frame.

The question of the relationship among the three frames has been solved and now we want to answer why *biaolu* is not as polysemous as the others. After examining sentences of the verb in the Sinica Corpus, we find that *biaolu* cannot exist in the Statement and the message that *biaolu* can collocate with is emotional state. The graph (13) shows the Comparison between *biaoda* /*biaosi* and *biaolu*

	Statement frame (primitive frame)	Encoding frame (primitive frame)	Evidence frame (extended frame)
<i>biaoda</i> / <i>biaosi</i>	李先生 表達/表示 :「這不過是做好份內的事。」	部屬點頭 表達/表示 支持。	鮮花 表達/表示 愛情。 白色 表達/表示 純潔
<i>biaolu</i>	*李先生 表露 :「這不過是做好份內的事。」	陳志宏 表露 了對社會、大時代的反省及關懷。	*鮮花 表露 愛情。 *白色 表露 純潔。

(13) The Comparison between *biaoda* /*biaosi* and *biaolu*

Because *biaolu* can only collocate with emotional state messages, it is naturally not recognized as a possible lemma for the Statement frame. We know that Statement frame report what the speaker has already said function roughly as speech act so that *biaolu* with emotional state messages is a non-speech act and prohibit itself from being existed in the Statement frame.

Another question is why *biaolu* cannot exist in the Evidence frame. We know that the Evidence frame is structured further by means of correspondences with selected elements of the Encoding frame. It means that the core frame elements of the Evidence frame are realized through some important frame elements of the Encoding frame. Therefore, we must discuss core frame elements of *biaoda* /*biaosi* and *biaolu* first.

	Speaker	Message(post-verbal NP)		Sign
		Linguistic-content	Emotional-state	
<i>biaoda</i> / <i>biaosi</i>	Yes	Yes	Yes	Yes
<i>biaolu</i>	Yes	No	Yes	Yes

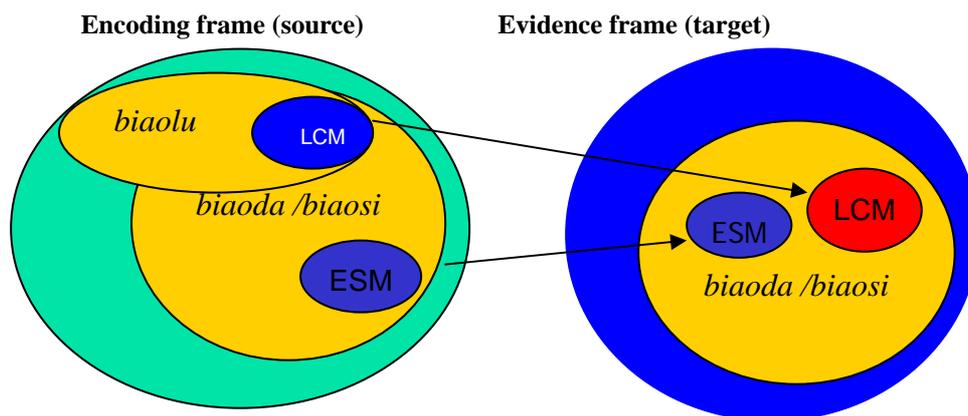
(14) Comparison between core frame elements of *biaoda* /*biaosi* and *biaolu*

The graph (14) shows that *biaoshi* /*biaoda* allows its post-verbal NP to have broader semantic range, while *biaolu* is more restricted. It is interesting to ask whether the semantic range of message types as encoded in the post-verbal NP is the key for determining which verb can be accessed into the Evidence frame.

To answer this question, we must turn to examine the Evidence frame. Example sentences of the Evidence frame are given below:

- (15) a. 藍色(sign)代表/被視為/被當成/可以看成是/象徵... 憂鬱 (emotional state).
 b. 總之, 在 F e y n m a n 圖中的線(sign)並不是代表/被視為/被當成/可以看成是... 古典粒子的路徑 (linguistic content)。

The two sentences show that in the Evidence frame, a post-verbal NP may encode messages of emotional state as well as those of linguistic content. If the Encoding frame is the cognitive basis for the Evidence frame, the possible semantic categories of Encoding such as Linguistic-content Message (LCM) and Emotional-state Message (ESM) and sign are also expected to be mapped onto the Evidence frame. For the three verbs of Encoding, only *biaoda* /*biaosi* (but not *biaolu*) can collocate with either a linguistic-content message or emotional-state message. They are thus more likely to be chosen as candidates for accessing the Evidence frame without violating the economical principle. Here, the potential for lexical polysemy, defined as frame extension, pertains to the semantic compatibility of core elements between the source and target frames. A schematic model of the transfer mechanism can be represented as follows:



(16) The model of *biaoda* and *biaoshi* accessed into the Evidence frame

5. Conclusion

A lexical semantic analysis of four near-synonymous verbs of communication - *biaoshi*, *biaoda* and *biaolu* is developed in this study from the perspective of frame semantics. A frame-based model of polysemous near-synonymy is proposed for sense and verbal distinction. The three verbs are categorized into different frames according to their grammatical realizations of core frame elements. The frames involved are Statement, Encoding and Evidence frames. Cross-frame membership or 'polysemous range' is taken to be one crucial factor for distinguishing the verbs. Moreover, distribution of grammatical forms is also important in defining the verbs. Corpus data show that 1) messages of *biaoshi* are often realized as VP or sentential object, while messages of *biaoda* and *biaolu* are often realized as NP object; 2) subjects of *biaoshi* and *biaoda* may be inanimate, while subjects of *biaolu* are mostly animate. The grammatical patterns help to define frame membership and delimit their semantic saliency. Finally, the relationship among three frames is discussed through metonymical and metaphorical process. The verb of Encoding *biaoshi* are compared to exemplify the mechanism of lexical selection with frame extension, i.e., potential for lexical polysemy. In this case, the semantic range of Message (a core element) is considered to be the key since cognitive transfer, as the basis for lexical polysemy, requires semantic compatibility and type matching between the source and target domains.

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Website Resources

- FrameNet. <http://www.icsi.berkeley.edu/~framenet/>
- Sinica Corpus (平衡語料庫): <http://www.sinica.edu.tw/SinicaCorpus/>
- WordNet: <http://www.cogsci.princeton.edu/~wn/>
- WordNet (BOW): <http://bow.sinica.edu.tw>