行政院國家科學委員會專題研究計畫成果報告

知識表徵：由詞彙出發之基礎研究—隱喻映照與知識表徵- 3/3
Metaphor Mapping and Knowledge Representation: Principles and Processing- 3/3

主持人：安可思　　　國立台灣大學語言學研究所
共同主持人：畢永峨　　　國立師範大學英語系

一、中文摘要

本研究的主要目的是藉著詞彙的豐富資料，以隱喻在漢語的表現為研究對象，探索單一概念如何表達、延伸；以及如何由典型的單純概念，預測其可能的使用範圍及使用時意義上的伸展與改變，進而探究知識表徵系統的內部構造。

關鍵詞：隱喻、映照領域、詞彙歧義分析、跨模組、互動、線上即時、模組、句子處理、語言表徵、映照原則

Abstract

The main goal of this research is to investigate how conceptual metaphors are represented in Mandarin Chinese in order to have a better understanding as to what information is required in the cognitive representation, and how the information is processed within the cognitive architecture of the language processing system.

Keywords: metaphor, domain mapping, lexical ambiguity resolution, modularity, interaction, on-line, cross-modal, sentence processing, linguistic representation, mapping principles, time, time perspective

二、緣由與目的

Our proposal is that by determining the image-schemas that map for certain metaphors, we could then determine the appropriate level of schematicity for a conceptual metaphor. The analysis of the specific image-schemas that are relevant to a particular conceptual metaphor is important because it allows us to hypothesize if a word from the source domain may or may not be mapped to the target domain. Moreover, analyzing specific image schemas over a range of conceptual metaphors will allows us to better understand the types of image-schemas that are universal to the human conceptual system.

三、結果與討論

In the first year, research work has been done included three parts. First, we identified mapping principles of forty-two metaphors, which were under the target domains MARRIAGE, BELIEF, TIME, HEART, HAPPINESS, FEELING, STOCK, MONEY, OPPORTUNITY, SEX and LOVE.

In Metaphor Mapping and Knowledge Representation: Principles and Processing-I, we already identify 31 conceptual metaphors. Please refer to Project Report # NSC 89-2420-H-002-005 for details.

For each metaphor we ask the following questions (the answers given with underlines are the answers for the IDEA IS A

1

BUILDING metaphor).

1. What entities does the SD have that are mapped to the TD?
   -- *foundation, base, model*
2. What qualities does the SD (or the entity in the SD) have that are mapped to the TD?
   -- *loose, shaky*
3. a. What does the SD do that is mapped to the TD?
   -- *none*
   b. What can S/O do to the SD that are mapped to the TD?
   --*to build, to construct, reconstruct*

Metaphor analyzed are listed below.

MARRIAGE
1. MARRIAGE IS FOOD
2. MARRIAGE IS PLANT
3. MARRIAGE IS PRISON
4. MARRIAGE IS GATE
5. MARRIAGE IS SONG
6. MARRIAGE IS PLAY
7. MARRIAGE IS BUSINESS
8. MARRIAGE IS COMPETITIOM
9. MARRIAGE IS GAMBLING
10. MARRIAGE IS JOURNEY

BELIEF
11. BELIEFS IS A PLANT
12. BELIEF IS FASHIOSN
13. BELIEF IS GUIDE
14. BELIEF IS BUILDING
15. BELIEF IS POSESSION
16. BELIEF IS POWERFUL FORCE

TIME
17. TIME IS RUNNING WATER
18. TIME IS MONEY
19. TIME IS COMMODITY
20. TIME IS HUMAN
21. TIME IS MOVING OBJECT
22. TIME IS SPACE

HEART
23. HEART IS CONTAINER
24. HEART IS GLASS
25. HEART IS WATER

26. HEART IS MUSICAL INSTRUMENT

HAPPINESS
27. HAPPINESS IS RUNNING WATER
28. HAPPINESS IS PLANT
29. HAPPINESS IS MEDICINE
30. HAPPINESS IS POSESSION

BUSINESS
31. BUSINESS IS COMPETITION
32. BUSINESS IS WAR
33. BUSINESS IS GAMBLING

FEELING
34. FEELING IS WARMTH
35. FEELING IS COLD

STOCK
36. STOCK IS GAMBLING
37. STOCK IS WAR

MONEY
38. MONEY IS RUNNING WATER

OPPORTUNITY
39. OPPORTUNITY IS MOVING OBJECT

SEX
40. SEX AS FOOD

LOVE
41. LOVE AS PLAY
42. LOVE AS FOOD

Secondly, we analyzed and compared metaphors that used the same source domain, i.e. what aspects of the source domain are used and why some particular aspects can be mapped in only a certain target domain. The source domain under examination includes the source domain of PLANT and FOOD. (Ahrens 2001ab, Ahrens 2002ab, Ahrens and Huang, in press, Ahrens & Huang 2000, Ahrens & Lu 2002, Lai and Ahrens 2001 2002, Lai, Ahrens, & Huang 2001, Lu & Ahrens 2001, Lu, Ahrens, Sung Ya-hui, & Biq Yong-O 2001)

Third, we designed off-line psycholinguistic experiments to test our

Conceptual Mapping Model. Previous analysis showed that in the course of mapping from one source to one target domain, some words are mapped while some are not. If we forcefully use those that are not mapped to create a metaphor, we obtain a novel metaphor. We examine how and to what limit people understand novel metaphors. It helped us understand how conceptual domains interact with each other.

In the experiments, each metaphor contains 6 types of sentences, including (a) conventional metaphor, (b) literal pair of conventional metaphor, (c) novel metaphor following the mapping principle, (d) literal pair of novel metaphor following the mapping principle, (e) novel metaphor not following the mapping principle, and (f) literal pair of novel metaphor not following the mapping principle. And example is given in (17) below for the metaphor LOVE IS A PLANT (Lai and Ahrens 2000). The mapping principle in this case is as follows: LOVE IS A PLANT because plants involve physical growth and love involves emotional growth. Example (a) is a conventional usage of this metaphor, while (c) is an example of a novel usage that follows the mapping principle of 'growth'. Example (e), however, is an example of a novel usage that does not follow the mapping principle because it has to do with 'death' and not 'growth'.

(a) 她　的　愛情　　開始　　萌芽
　　ta　de　aiqing　　kaishi　　mengya
　　she Mod　love　　start　　sprout
　　Her love starts to sprout

(b) 她　的　植物　　開始　　萌芽
　　ta　de　zhiwu　　kaishi　　mengya
　　she Mod　plant　　start　　sprout
　　Her plant starts to sprout

(c) 她　的　愛情　　開始　　扎根
　　ta　de　aiqing　　kaishi　　zhagen
　　she Mod　love　　start　　rooting
　　Her love starts to root

(d) 她　的　植物　　開始　　扎根
　　ta　de　zhiwu　　kaishi　　zhagen
　　she Mod　plant　　start　　rooting
　　Her plant starts to root

(e) 她　的　愛情　　開始　　落葉
　　ta　de　aiqing　　kaishi　　luoye
　　she Mod　love　　start　　fall leaves
　　Her love starts to fall leaves

(f) 她　的　植物　　開始　　落葉
　　ta　de　zhiwu　　kaish　　luoye
　　she Mod　plant　　start　　fall leaves
　　Her plant starts to fall leaves.

Subjects participated in the acceptability and interpretability rating test were to choose from 1 to 7 depending on the level of acceptability and interpretability. As for the interpretability yes/no judgment test, they were to judge yes or no in the test. Results of acceptability rating test is shown in the table below.

S-type	mean	SD
A (literal pair to B)	6.1	1.0
B (conventional metaphor)	6.0	1.0
C (literal pair to D)	5.0	1.4
D (novel met follows MP)	6.0	1.2
E (literal pair to F)	4.0	1.5
F (novel met not follow MP)	5.4	1.2

Results of interpretability rating test is shown in the table below.

S-type	mean	SD
A (literal pair to B)	6.5	0.7
B (conventional metaphor)	6.5	0.7
C (literal pair to D)	5.6	1.3
D (novel met follows MP)	6.6	0.7
E (literal pair to F)	4.6	1.7
F (novel met not follow MP)	6.2	1.0

Results from the interpretability yes/no judgment test is shown in the table below.

S-type	mean	SD
A (literal pair to B)	0.9	0.2
B (conventional metaphor)	0.9	0.2

C (literal pair to D)	0.9	0.2
D (novel met follows MP)	0.7	0.3
E (literal pair to F)	0.9	0.2
F (novel met not follow MP)	0.5	0.4

The statistics showed that the three groups ... significantly in both acceptability and interpretability ratings; thus demonstrating the usefulness of the distinctions found in the Conceptual Mapping Model.

In addition, two experiments were included to see how people process these three types of metaphor. First was the whole sentence reading time experiment. We presented the experiment stimuli auditorily, and measured how long people took to understand these sentences. We assumed that there would be a decline RT over the three different metaphor types, which suggested that people process differently when encountering different metaphors. The other on-line experiment was a literal truthfulness judgment of metaphors, which provided us more information for the metaphor processing issue. Although metaphors were literal false statements, conventional metaphors were too well embedded in our conceptual system to be easily judged as literally false. People would need longer time to judge the conventional metaphor as literal false, unlike other novel metaphors, which would be quickly classified as literal false.

The experiments' results confirmed the Conceptual Mapping Model. In the whole sentence reading time experiment, conventional metaphors were processed as fast as literal statements and they were very different from other types of metaphors. The literal truthfulness experiment showed that conventional metaphors were indeed more difficult to be rejected as literal false statements, and the error rated for conventional metaphors was higher than all other groups, which implied that conventional metaphors were embedded in our lexicon or conceptual system so that people made more mistakes when they were

forced to classify metaphors from 'metaphorical true' to 'literal false' statements. From these experiments, we found evidence for different processing of these types of metaphor and verified a model which could best explained most of the linguistic data and solved the discrepancies found in previous studies.

We have also experiment work research concerning TIME PASSING IS MOTION metaphor. We examined the two distinct movements under this metaphor in Mandarin Chinese. In the Moving Ego (ME) perspective, the time-line is stationary relative to a moving observer. In the Moving Time (MT) perspective, the observer is stationary relative to time, which moves from future to past. In particular, we are interested in the psychological validity of these two perspectives. Our research questions were 1) whether movement in space influences temporal perspective, and 2) whether temporal perspective in preceding context influences the following perspective of time.

Empirical evidence in English showed that experiencing bodily movement and previous sentential context influence the temporal perspective chosen. Previous findings suggest that the two perspectives are processed as domain-mappings on-line. This finding is consistent with the strong version of the Structure Mapping Model (Gentner & Wolff 1997). The strong version predicts that switching a different perspective will result in a slower reaction time for both conventional and novel metaphors because shifting conceptual structure requires a cognitive cost. The weak version of the Structure Mapping Model predicts the same reaction time for switching conventional metaphors.

Two experiments were conducted. The first investigated whether bodily motion influenced the perception of time. We conducted studies on the NTU campus. 153 students who were either walking or sitting on campus were approached individually and asked the target question: "Next Wednesday's meeting has been moved

4

forward two days, when is the meeting now?" We found that, unlike English, Chinese speakers always use the MT perspective in both moving and static conditions. In addition, a cross modal experiment examined the influence of context on comprehension of time. Audio context with either MT or ME perspective was followed by a related short visual target sentence (either MT or ME). Results from 96 subjects showed that in the MT condition, switching to ME (1252 msecs or to MT (1228 msec) did not reveal a statistical difference. But in the ME condition, the MT visual target was comprehended faster (1169 msec) than the ME target (1267 msec) (p < .05)

The results do not support previous processing models on TIME metaphor in English that postulate a universal primacy for ME (Gentner & Wolff 1997). We postulate, instead, that languages differ in their primary conceptualization of TIME and that in Chinese the primary conceptualization is MT and not ME.

四、計畫成果自評

In the past two years, we have proposed the Conceptual Mapping Model in order to constrain the Contemporary Theory of Metaphor. We have also added to cross-linguistic data by examining data from native speakers, which will in turn has aided in our understanding of which metaphors are language-specific and which ones are possibly universal. The examination and experiments of novel metaphors prove the psychological validity of the notion of mapping principle.

Within the Conceptual Mapping Model, we have also looked at the how the processing speed differs in three types of metaphors -- something that has not been discussed previously. The findings from two experiments indicated that conventional metaphors are processed differently from the novel metaphors. The next step is to find

more on-line evidence to show that novel metaphors do differ in the degree of novelty within the novel metaphors. We can test the acceptability and the interpretability within the novel metaphor group in on-line experiments in the future to see if the two types in the novel metaphors really differ. The reaction time data should be able to tell us something about how people process novel metaphors. If we can obtain the on-line data for the acceptability and interpretability of metaphors, we will be able to further compare to the previous off-line studies done by Ahrens (2002a) and have more information about metaphor processing. In addition, in the experiments of TIME metaphors, we have ascertained that previous processing model needed to be revised and TIME metaphors differed along language lines.

五、參考文獻

Ahrens, Kathleen. 2002a. When Love is not Digested: Underlying Reasons for Source to Target Domain Pairing in the Contemporary Theory of Metaphor. In YuChau E. Hsiao (ed.) *Proceeding of the First Cognitive Linguistics Conference,* pp 273-302. Taipei: Cheng-Chi University.

Ahrens, Kathleen. 2002b. Using the Conceptual Mapping Model to Explain Metaphors in Foreign Language Classes. Presented at Sixth Foreign Language Teaching Conference at Tamkang University. October, 4-5.

Ahrens, Kathleen. 2001a. *Mapping Principles in Conceptual Metaphors.* Presented at the International Conference on Cognitive Linguistics, University of California, Santa Barbara, July 22-27.

Ahrens, Kathleen. 2001b. Metaphor Mapping and Knowledge Representation: Principles and Processing. *Proceeding of the Symposium on Selected NSC Projects in General Linguistics from*

1998-2000, pp, 281-310. Taipei: National Taiwan University.

Ahrens, Kathleen & Chu-Ren Huang. (In press) Time Passing is Motion. *Language and Linguistics.*

Ahrens, Kathleen & Chu-Ren Huang. 2000. Time is Motion in Mandarin Chinese. Parameterizing Conceptual Metaphors. In H. Y Tai and Chang Y. L. (eds.) *Proceedings of ISCLL-7*, pp, 27-47. Chai-yi: National Chung-Cheng University.

Ahrens, Kathleen & Dora Lu. 2002. *Literal Truthfulness and Conceptual Metaphors.* 2002. To be presented at 10th ICCPCORAL (International Conference on Cognitive Processing of Chinese and Other Related Asian Languages) December 9-11, 2002. Taipei, Taiwan.

Gentner, Dedre, & Wolff, Philip. 1997. Alignment in the processing of metaphor. *Journal of Memory and Language*, 37(3), 331-335.

Lai, Tzuyin, V. & Kathleen Ahrens. 2001. Mappings from the Source Domain of Plant in Mandarin Chinese. *Proceedings of the 15th Pacific Asia Conference on Language Information and Computation.* City University of Hong Kong. February 1-3.

Lai, Tzuyin. V, & Kathleen Ahrens. 2002. *The Processing of Temporal Perspectives in Mandarin Chinese.* To be presented at 10th ICCPCORAL (International Conference on Cognitive Processing of Chinese and Other Related Asian Languages) December 9-11, 2002. Taipei, Taiwan.

Lai, Tzuyin V, Kathleen Ahrens, & Chu-Ren Huang. 2001. *Source Domains for Marriage in Mandarin Chinese.* Presented at IACL-10 & NACCL-13, University of California, Irvine, June 22-24.

Lu, Dora & Kathleen Ahrens. 2001. *A Cross-linguistic Study on Love Metaphors.* Presented at the International Conference on Cognitive Linguistics, University of California, Santa Barbara, July 22-27.

Lu, Dora, Kathleen Ahrens, & Sung Ya-hui, and Biq Yong-O. 2001. *Food Metaphor in Mandarin Chinese.* Presented at IACL-10 & NACCL-13, University of California, Irvine, June 22-24.

6