The Priming Effect of Mapping Principles on the Processing of Ambiguous Metaphors in Mandarin Chinese
Shu-Ping Gong¹ and Kathleen Ahrens²
¹National Chiayi University and, ²Hong Kong Baptist University
contact: spgong@mail.ncyu.edu.tw

In recent years, there has been growing interest in exploring how conceptual mappings between source and target domains are constructed and processed during the comprehension of conceptual metaphors (Bowdle & Gentner, 2005; Gentner, 1983; Glucksberg, 2003; Glucksberg & Keysar, 1990; Gibbs, 1994; Gibbs et al., 1997; Fauconnier, 1994; Fauconnier & Turner, 1998; McGlone, 1996, 2007; Lakoff & Johnson 1980, Lakoff 1993). In past studies, three mapping accounts have been proposed: the category-based accounts (i.e., the Attribution Categorization Model, Glucksberg et al., 1997), the alignment-based account (i.e., the Structural Mapping Model, Gentner & Wolff 1997) and the principle-based account (i.e., the Conceptual Mapping Model, Ahrens 2002, 2010). Even though each account received empirical evidence from psycholinguistic experiments, the three models did not answer the question of whether all mappings between source and target domains affect the processing of metaphors. In particular, are some mappings more salient than the others to facilitate the processing of conceptual metaphors?

This study aims to determine what conceptual mappings between source and target domains are able to facilitate the processing of ambiguous metaphors (i.e., “X IS Y” metaphors). We examined whether the mapping principles (MPs), i.e., underlying reasons, occur in metaphors constructions and can determine which conceptual mappings can facilitate the processing of metaphors (Ahrens 2010). If mapping principles are involved in the processing of metaphors, we expect that concepts that follow mapping principles are able to facilitate the processing of metaphors while those that do not follow mapping principles can not elicit the facilitation effect.

A priming task was conducted in this study. Thirty-eight “X IS Y” metaphors were primed by two conditions of lexical items (Table 1). One condition of the primes was a lexical item that followed mapping principles. The other condition of primes was a lexical item that did not follow mapping principles. For example, the “X IS Y” metaphor in Chinese 大腦就是機器 dànǎo jiùshì jīqì MIND IS MACHINE would be primed by either the word 運轉 yùnzhuǎn “operate” or the lexical item 精密 jīngmì “accurate”. The former was the one that followed the mapping principle of MIND IS MACHINE: “Mind is understood as machine in that machine involves physical operation and mind involves emotional operation” (Ahrens 2010), and the latter did not follow the mapping principle. The 38 “X IS Y” metaphors with their primes were selected from our previous production study (Ahrens & Gong, 2010), in which participants saw 38 “X IS Y” metaphors and were instructed to interpret their meanings. We analyzed the interpretations of the participants and classified them into two groups. If their interpretation is relevant to mapping principles, it would be classified to be the prime following mapping principles. If the interpretation is not relevant to mapping principles, it would be classified to be the one not following mapping principles.

In addition, word frequency of two conditions of primes was controlled (196 vs. 227) and there was no significant difference between two conditions of primes (t (71) = -0.350, p > .05). Furthermore, the level of semantic relatedness between primes and the source domain in “X IS Y” metaphors in two conditions were well balanced. For example, in the MIND IS MACHINE, both 精密 jīngmì “accurate” (i.e., the condition not following MPs) and 運轉 yùnzhuǎn “operate” (i.e., the one following MP) are the primes for 大腦就是機器 dàn o jiùshì jīqì MIND IS MACHINE. In addition, the two primes related to source domain of
MACHINES. We had to balance the level of semantic relatedness between 大腦 “accurate” and 機器 “machine” and between 大腦 “operate” and 機器 “machine”. We used the Chinese Latent Semantic Analysis (http://www.lsa.url.tw/modules/lsa/), a technique in natural language processing for measuring the level of relevance between a set of concepts, for controlling the semantic relationship between primes and their source domains (Chen et al. 2009, Kintsch 2002, Landauer & Dumans 1997). The results of the pretest conducted via the tool of Chinese LSA showed no significant difference between two conditions of stimuli (0.25 vs. 0.23, t (68) = -0.382, p > .05).

<table>
<thead>
<tr>
<th>Prime as MPs</th>
<th>Prime as non- MPs</th>
<th>“X IS Y” Metaphors</th>
</tr>
</thead>
<tbody>
<tr>
<td>運轉 yùnzhu “operate”</td>
<td>精密 jīngmí “accurate”</td>
<td>大腦就是機器 MIND IS MACHINE</td>
</tr>
<tr>
<td>治療 zhìliáo “cure”</td>
<td>麻醉 mázuì anaesthetize”</td>
<td>快樂就是藥物 HAPINESS IS MEDICINE</td>
</tr>
<tr>
<td>基礎 jīch “base”</td>
<td>水電 shuǐdiàn “waterpower”</td>
<td>研究就是建築物 THEORY IS BUILDING</td>
</tr>
</tbody>
</table>

Forty-two college students from National Chiayi University in Taiwan took part in this task and were assigned to one of two lists randomly. They were instructed to read each prime-target pair and judge the relatedness level between the prime and the target of “X IS Y”. The reaction time was measured from the onset of the target to the moment when participants made their judgment by pressing the button. The experimental results show that the reaction time of metaphors primed by concepts following MPs is significantly shorter than those primed by concepts not following MPs (1168.9 ms vs. 1303.1 ms, t(41) = -3.4558, p < .05). The findings of this study suggest that when a source domain is mapped to a target domain for constructing the meanings of metaphors, not all conceptual mappings between source and target domains are salient to facilitate the processing of ambiguous metaphors. Indeed, only the concepts that follow mapping principles are selected and activated in the processing of metaphors. To conclude, the mapping principles are crucial to determining the salient and non-salient mappings for processing conceptual metaphors. This study has theoretical implication that mapping principles do occur in metaphor constructions and are accessed during the processing of metaphors. This study supports the principle-based account, i.e., Conceptual Mapping Model.

![Figure 1: Reaction times for “X IS Y” metaphors primed by either the lexical item following mapping principles or the one not following mapping principles](image-url)
References: