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The impact of cultural background knowledge in the processing of metaphorical expressions:

An empirical study of English-Chinese sight translation

Binghan Zheng & Xia Xiang

Abstract: This study aims to explore the role and possible impact of cultural background knowledge (CBK) on performance in sight translation, specifically the translation of metaphorical expressions (MEs). A between-subjects experiment was designed for 68 interpreting students who were assigned to a control group (CG) and an experiment group (EG). They were asked to sight translate a speech containing ten MEs, with only the EG members given relevant CBK beforehand. The study triangulates data from the recordings of sight translation outputs, the transcriptions of the recordings, and the subjects' guided interviews. The paper concludes with two main findings: (1) CBK markedly alleviates the cognitive load imposed by MEs and thus facilitates the process of translation by shortening the processing time and improving the translation quality; (2) although CBK does not exert a significant influence on the choice of translation strategies as a whole, it discernibly reduces the use of omission as a coping strategy to deal with inadequacies in the understanding of metaphorical meanings.

Keywords: metaphorical expressions, cultural background knowledge, sight translation, processing time, translation quality, translation strategies

1. Introduction

“The phenomenon of metaphor has regularly been of concern to translation scholars” (Schäffner 2004a, 1254), because “problems of metaphor can be most clearly seen and defined when a metaphorical expression is to be translated, that is, when its sense is to be conveyed in another language. Another language also means another cultural background and another value system of other listeners or readers” (Dobrzyńska 1995, 595-596). A number of cross-linguistic studies have investigated the role that knowledge of culture plays in the process of understanding and translating metaphors (e.g., Boers 2004; Dobrzyńska 1995; Gibbs *et al.* 1997; Kövecses 2002, 2005; Littlemore 2003; Yu 2008). Our empirical study aims to examine the effect of cultural background knowledge (CBK) on the processing of metaphorical expressions (MEs) in English-Chinese sight translation (STR). To ensure definitive identification of metaphorical expressions in the source texts, the present study does not focus on the conceptual level of metaphor, but rather on the linguistic level, defined by Lakoff (1993, 202-203) as individual linguistic expressions (words, phrases, or sentences) that are the surface realization of cross-domain conceptual mappings. We feel it is essential to research linguistic metaphors in language use, since the study of them “may provide a good clue to find the systematic conceptual correspondences between domains (i.e., to conceptual metaphors)” (Kövecses 2005, 32). The cultural background we refer to is not the cultural connotations of the conceptual metaphors, but rather the cultural context in which the discourse embedding the linguistic metaphors takes place. In this empirical study, it can be narrowed down to “social history”, an example of the internal manifestations of a culture.

This paper is a follow-up to an earlier study by Zheng and Xiang (2013). Based on a within-subjects experiment, the previous study presented two main findings: (1) in the process of STR, MEs require more cognitive effort than their literal counterparts; and (2) the extra cognitive effort mainly occurs in the understanding phase. The present study involves a between-subjects experiment with CBK as the independent variable and aims to answer the following questions: (1) Does the acquisition of CBK have a positive influence on a sight translator’s performance, both in terms of translation speed and quality? (2) Does CBK have an impact on the sight translator’s choice of translation strategies?

2. Background

As “an inherent part of culture” (Kövecses 2005, 2), metaphors are “embodied in their cultural environment” (Yu 2008, 247), and “strongly culture-conditioned” (Dobrzyńska 1995, 597). In cross-linguistic communication, “there is variability in the extent to which people from different cultural backgrounds share cultural knowledge, and people’s ability to understand metaphors is likely to reflect this variability” (Littlemore 2003, 273). Thus, the extent to which a metaphor is translatable “varies with the degree to which it is embedded in its own specific culture, also with the distance that separates the cultural background of source text and target audience in terms of time and place” (Snell-Hornby 1995, 41).

After comparing metaphors on ‘love’ and ‘time’ in English and Hungarian, Kövecses (2005, 161) contends that both conceptual and linguistic metaphors are not only cognitively but also culturally motivated. This observation was backed by some empirical studies on the topic. Mandelblit (1996) and Tirkkonen-Condit (2002) report on experiments involving professional and student translators, and conclude that metaphoric expressions take more time to translate if they exploit a different cognitive domain to the ‘equivalent’ expressions available in the target language (TL).

With the help of think-aloud protocols, Jensen (2005) examines the translation process of metaphorical and metonymic expressions by expert translators, young professionals, and non-professionals, respectively, and concludes that knowledge of source and target domains of two cultures is necessary for the translation of such expressions.

Jakobsen, Jensen, and Mees (2007) focus on the translation of idioms, and since “idioms do not exist as separate semantic units within the lexicon, but actually reflect coherent systems of metaphorical concepts” (Gibbs *et al.* 1997, 142), the findings are highly relevant to our study. By investigating the processing of 12 English expressions during the course of translation and STR by five professional translators and five interpreters, respectively, Jakobsen *et al.* (2007, 235) confirm their hypothesis that “both translators and interpreters spent more time processing idiomatic expressions than literal ones.” They also find that idiom-to-idiom translation was strongly preferred by translators, while interpreters preferred paraphrase.

Inspired by the work of these researchers, we decided to conduct a between-subjects experiment, combining a quantitative analysis and a qualitative analysis, to ascertain the impact of cultural background on the subjects’ translation speed, quality, and strategies when dealing with metaphorical

expressions in an STR task.

3. Research design

3.1 Subjects

The research was conducted with 68 4th-year undergraduates majoring in English language and literature at a Chinese university. All the subjects were of a similar age (around 22) and had a similar language background (Chinese as L1, English as L2). They had all passed the Test of English Majors (Band 4)¹, and were taking an intermediate interpreting course when enrolled for the experiment, with limited professional translation and interpreting experience. We assigned the subjects to an experimental group (EG) and a control group (CG) based on their scores in the most recent interpreting exam to ensure that both groups' interpreting abilities were as similar as possible.

3.2 The source text and the identification of MEs

We had used two adjacent excerpts from Bill Clinton's farewell speech (given in 2001) as the STR source texts in our previous research (Zheng and Xiang, 2013), and decided to use the one containing ten MEs (see Appendix I) for this study as well. Apart from the obvious fact that it contained numerous MEs, the text was selected because: 1) it was of acceptable length (241 words) and difficulty; and 2) the subjects were unlikely, as a result of their youth, to be familiar with the speech or its social and historical background.

The ten metaphors were initially identified as such by the authors. In seven out of ten cases it was possible to confirm this using reference sources; in the other three cases the nature of the phrase was felt clearly to indicate metaphorical usage in this linguistic context (see Appendix II).

3.3 Reading materials

Before the STR task, the EG was given ten minutes to read a passage (559 words) entitled 'The Clinton Presidency: A Foreign Policy for the Global Age' as cultural background. This passage is excerpted from 'Record of Progress' on a website launched by Bill Clinton². As the title suggests, the passage is mainly about Clinton's approach to dealing with other countries, with the aim of harnessing the benefits of globalization to advance America's objectives of democracy, shared prosperity, and peace.

This passage provides insights into the social background of the Clinton presidency, without touching directly on the content or language of the source text used for the experiment.

3.4 Experiment stages

A small-scale pilot study was first carried out with eight subjects who were then excluded from the experiment. The experiment took place several days later and included six stages, as indicated below.

1. The experimenter described the task and briefed the subjects on the occasion of Clinton's speech, as in a real-life translation scenario.
2. The subjects completed questionnaires concerning prior knowledge of this speech and the social background to it³.
3. The CG left the lab for ten minutes while the EG was asked to read the passage providing social background to the Clinton presidency (see section 3.3).
4. The CG re-entered the lab and was assigned a warm-up task together with the EG. This consisted of STR of a non-experimental excerpt (containing two MEs) from this speech, followed by a retrospective report.
5. Both groups completed the STR task on the chosen text: the source text appeared using moving window presentations (Macizo and Bajo 2009) controlled by the experimenter (four slides altogether, see Appendix I). The subjects were required to read the text in front of them and sight translate it within a pre-defined time span (150% of Clinton's original speaking time).
6. After the STR task was completed, the subjects were interviewed by the experimenter from the console about their processing of the ten metaphors during the STR⁴. Both the STR sessions and the guided interview were audio recorded and afterwards transcribed.

3.5 Data collection

The answers to the questionnaires revealed that 4 out of 68 subjects had had some knowledge of the Clinton presidency and 3 had heard about this speech before the experiment. Out of concern that their long-term background knowledge might be activated and thus give them an advantage over the other subjects, we decided to remove these seven samples from the corpus. Another randomly selected sample from the CG was deleted to ensure the numbers would be even. In all, there were 60 valid samples included in the ensuing data analysis: 30 for each group.

Three streams of data were collected to establish the triangulation: (1) recordings of the subjects' acoustic outputs, which were then imported and analyzed using *Audacity 2.0.3*⁵; (2) transcriptions of the audio recordings, which were used as sources when identifying translation errors (see table 2 below) and categorizing translation strategies; and (3) the subjects' guided interviews, from which a clearer picture was obtained of how each one coped with MEs.

4. Data presentation and analysis

In the following sections, results are presented for the quantitative analysis, in which the processing time of the metaphorical expressions was calculated and the translation errors and strategies were classified and counted. Since the provision of CBK is the only difference in treatment between the two groups in the experiment, the results are interpreted as revealing the impact of CBK on the subjects' translation speed, quality, and strategies. A qualitative analysis based on guided interview data is incorporated in each section to help explain the quantitative results.

4.1 ME processing time

The processing time is the time that subjects take to perceive the source message, mentally develop an interpretation, and then deliver it in the target language. In the process of translating/interpreting or language production, it is assumed that pauses signal cognitive processes (Schilperoord 1996; O'Brien 2006; Dragsted and Hansen 2007). Hence, in the present research, the processing time for each metaphorical expression includes the pause time immediately before plus the time taken to deliver the target text (see Jakobsen *et al.* 2007). It might be criticized that the length of the immediately preceding pause does not necessarily reflect the cognitive processing effort in sight translating the following metaphor. However, Schilperoord argues that in the particular combination of production behaviour such as 'speaking-pausing-speaking', "this pause serves to activate the mental structure underlying the subsequent speaking increment" (1996, 11). Since the STR task in the present study is an example of 'speaking-pausing-speaking', we assume that under the time constraints for performing the STR, the majority of the pause time was allocated to the planning and preparation of the translation of the following metaphorical expression. The second potential issue is that, in sight translating a metaphor, the planning step might go beyond the pause section preceding the targeted metaphor. However, Camayd-Freixas (2011) points out that attention must be selectively directed to the various tasks in the

reception and production sequences during simultaneous interpretation, because human information processing can operate only on a single channel at a time. Moser-Mercer (1995) also argues that STR operates on distinct reading (input) and oral (output) channels and that the two are separate enough to prevent interference. Based on the above arguments, we believe that our student subjects are more likely to concentrate on either reading or speaking during STR, rather than sharing their attention between multiple tasks.

All recorded materials were imported into *Audacity* and then represented as oscillograms; these enabled us to measure speech production speed and pause times precisely.

Figure 1 represents the processing of the sentence in Example 1. We started counting immediately after ‘正 (pinyin: zheng)’ (4:49.1) was pronounced and stopped at the sound of ‘缘 (pinyin: yuan)’ (4:51.7); therefore, the processing time for the metaphor was 2.6 seconds (4:51.7-4:49.1=2.6).

Example 1. (with metaphor in bold)

ST: ...the billions around the world who **live on the knife’s edge of survival**...

TT:…数以亿计的人，人们，正…生活，**哦，挣扎在生存的边缘**…

[Back translation: ...billions of people, people, were...living, oh, struggling at survival’s edge...]

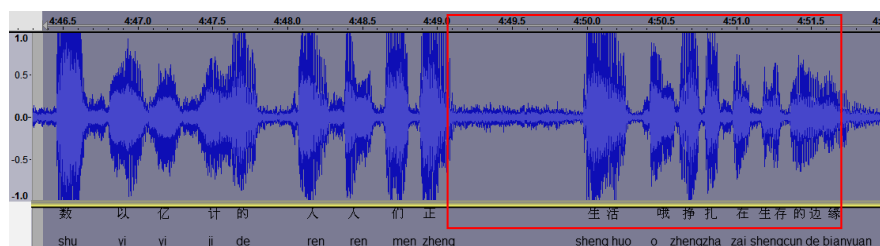


Figure 1. Oscillogram of the processing of the metaphor in Example 1

We measured the processing time for each of the 600 MEs and then compared the groups in three respects: (1) total MPT (metaphor processing time); (2) average MPT; and (3) average MPT per TT character⁶. We decided that the third comparison was essential, since there was a possibility that some subjects might produce a more detailed output, thus entailing more processing time, or some subjects might spend less time as a result of not translating the MEs. The results are given in Table 1.

Table 1. The processing time for MEs in STR (in seconds)

	Total MPT	Average MPT	Average MPT per TT character
EG (EG1-EG30)	1621.52	54.05	0.32
CG (CG1-CG30)	1847.50	61.58	0.39
two-tailed t-test*	N.A.	$p=0.026$	$p=0.004$

*The null hypothesis for the two-tailed t-test is that the mean difference between each group is zero.

The figures in Table 1 show that both the average MPT and the average MPT per TT character were significantly shorter for the EG (54.05 and 0.32, respectively) than for the CG (61.58 and 0.39, respectively, with two-tailed t-tests; $p<0.05$). These results support the claim that the acquisition of CBK significantly reduces the time invested in comprehending and reformulating the MEs in an STR task. Since a number of scholars have adopted processing time as the primary measure of the cognitive effort involved in understanding and translating MEs (Ortony *et al.* 1978; McDonald and Carpenter 1981; Jakobsen *et al.* 2007), it is reasonable to conclude that CBK works effectively to alleviate the cognitive load imposed by MEs.

The above finding can be further explained using schemata theory. As “mental representations of typical instances” (Cook 1994, 11), schemata function as “the building blocks of cognition” (Rumelhart 1980, 33) and “the foundation on which people depend to learn and understand the world” (Wang 2001, 19). According to Gile (1995, 183), STR can be modeled as a process consisting of Reading Effort and Production Effort; we will investigate how CBK impacts on these two efforts using relevant schemata. Working memory, which is so crucial in simultaneous interpreting, has a more limited function in STR since subjects commonly reread the text when retrieving the translation equivalent (McDonald and Carpenter 1981, 246).

The schema theory interprets Reading Effort as the interaction of ‘bottom-up’ and ‘top-down’ processing strategies in and among all the hierarchies of a discourse.

The ‘bottom-up’ processing is initiated by the detailed information which evokes the most concrete schemata at the bottom... and ends up in the formation or substantiation of more abstract schemata of higher levels. ‘Top-down’, on the other hand, starts from higher level schemata and background information, which are used to predict, infer, select, absorb or assimilate the input message, and ends up in the abstract schemata (Huang 1998, 20).

From the perspectives of translation and interpretation, Pöschhacker (2004, 119) argues that “comprehension is not a passive, receptive process but depends crucially on what is already known. Processing new information thus requires the active construction of some form of mental representation by integrating the input with various kinds of pre-existing knowledge.” There are also empirical studies pointing to the same conclusion that CBK can help achieve faster and more accurate comprehension of the text (Kintsch and Franzke 1995; McNamara and Kintsch 1996).

In order to support the above quantitative analysis with concrete and specific examples, we also examined subjects’ post-experimental interview data. The following analysis is based on the STR of M1 (*close the gap*), M2 (*the cutting edge*), and M3 (*the knife’s edge*) in our study. The subjects’ interview data reveal that 70% of EG members ‘immediately realized’ that the first paragraph containing these three MEs was about the gap between rich and poor countries, as they read the words ‘trade’ and ‘gap’ at the very beginning. This indicates that the background knowledge from the reading material that ‘economic integration advances both our interests and our values, but also accentuates the need to alleviate economic disparity’ (see endnote 2) was instantly activated and steered their comprehension of M1 (*closed the gap*) along the correct path; at the same time, it served as a clue to the comprehension of M2 and M3. As they read on, *knife* and *edge* in M3 probably triggered their bottom-up association and activated schemata such as ‘knifepoint’, ‘be meat on somebody’s chopping board’, ‘perilous situation’, and ‘difficult lives’ in the target culture, compatible matches with the pre-established higher schemata of *the gap between the rich and the poor*, which were successfully assimilated. According to the interview data, 80% of the EG subjects identified *on the knife’s edge* as not explicable from its lexical meaning, but rather had the figurative meaning ‘living a poor life’ and thus they achieved a more accurate and a deeper understanding. This to a large extent set off a virtuous circle reaction: since they had already worked out that the topic was the income gap, it was not difficult for them to infer that M2 (*on the cutting edge*) was the polar opposite of M3 despite their superficial resemblance; this, in turn, matched the higher schema of ‘America’s greatest expansion in world trade’ from the reading material.

Compared with consecutive or simultaneous interpreting, the continuous presence of the source text in STR significantly increases the risk of interference between the two languages, impacting on TL expression and on the coordination of silent reading and oral translating (Gile 1995, 184; Agrifoglio 2004, 61). However, as Anderson (1984) suggests, knowledge schemata can facilitate inferential

reconstruction. When dealing with the above-mentioned three metaphors, the EG subjects equipped with such understanding seemed able to think creatively and successfully activate the relevant schemata in Chinese culture, and then reformulate the underlying message in succinct and expressive Chinese phrases.⁷ Thus we conclude that the EG subjects had more chance than the CG subjects of breaking away from the syntactic structure of the source text, re-formulating the derived message smoothly and accurately in the TL, and thus succeeding in their aim of effectively transferring the information to the target audience.

By contrast, the translations of the CG members, who had not been provided with CBK, suggest that they relied on random associations when trying to understand and reformulate the MEs. Consequently, in sight translating M3, 46.7% of them activated wrong schemata: some connected *knife* with ‘western-style cuisine’ and then ‘being rich’; others jumped from *edge* to ‘edging areas’; 66.7% of them failed to identify the sharp contrast that existed between M2 and M3, and were misled by the words and structures of the phrases concerned into misinterpreting the meaning. There were many long pauses, repetitions, and self-corrections detected by our data recordings at this time. When they finally came up with a translation, they either equated the meaning of the two MEs because of their superficial resemblance or haltingly produced a rigid word-for-word translation that was nearly incomprehensible.

From the examples of M1, M2, and M3, we can see how the translation of the MEs was developed from a process of image association and knowledge activation and how the acquisition of CBK helped facilitate the process.

4.2 ME translation quality

This section examines whether the EG’s superiority with respect to translation speed comes at the expense of compromised translation quality. ‘Error observation’ recommended by Agrifoglio (2004) and Lambert, Darò, and Fabbro (1995) was adopted as the means of quality assessment. As a first step, we arranged the translation products of the 600 MEs into three quality categories, namely, successful translations, faulty translations (or translation with minor errors⁸) and failed translations (or translation with major errors). The operational definition of each category can be found in Table 2.

Table 2. Operational definition for marking categories used in quality assessment (English gloss in square brackets)

Category	Operational Definition	Example for M9. ST: weave the threads ...into the fabric of one America.
Failed translations	The translation of the ME displays 'a high degree of explicit divergence from source text' (Al-Qinai 2000, 500) or sounds 'alien to the target language recipients' (Al-Qinai 2000, 507)	M9. was translated as “把各种材料融进一个美国的纤维” [to weave all materials into an American fabric].
Faulty translations	The translation of the ME displays errors including 'missing information' and 'added mistakes' (Lambert <i>et al.</i> 1995, 42)	M9. was translated as “将...(7 seconds' pause) (10. LH) 各种人融合成一个美国(3. IM)”[to...melt all people into one America].
Successful translations	The translation of the ME has successfully achieved functional equivalence (Nida and Taber 1969, 12) to the source text.	M9. was translated as “将美国境内，所有人团结在一起” [to unite all people within the US].

Based on the above operational definitions, two external assessors were asked to assign the translations of the MEs to the relevant categories. The first assessor evaluated only the audio recordings, and the second assessor only the transcriptions. When discrepancies occurred, they discussed them until they reached an agreement. Table 3 reflects the final outcomes of their error observation.

Table 3. Number and percentage of assessment outcomes based on error observation (300 MEs in total for each group)

	Failed translations (%)	Faulty translations (%)	Successful translations (%)
EG (EG1-EG30)	119 (39.67%)	129 (43%)	52 (17.33%)
CG (CG1-CG30)	158 (52.67%)	117 (39%)	25 (8.33%)
two-tailed t-test*	$p=0.013$	$p=0.38$	$p=0.005$

*The null hypothesis for the two-tailed t-test is that the mean difference between each group is zero.

As the figures in Table 3 clearly indicate, all the subjects experienced great difficulty in accurately sight translating the MEs. However, although the EG only managed a success rate of 17.33%, the CG was significantly worse, with only 8.33% (two-tailed t-test $t=-2.93$, $p=0.005$). There were 119 and 158 failed translations by the EG and the CG respectively, and the results of the t-test ($t=2.58$, $p=0.013$) show that the difference was also statistically significant. The EG had a slightly higher percentage of faulty translation than the CG, but the difference was not statistically significant.

Tables 1 and 3 together lead to the conclusion that the provision of CBK enabled the EG subjects to spend less time on processing the 10 MEs, yet came up with higher quality translations. We may thus deduce that the CBK exerted a positive influence on the sight translating of the MEs. The subjects'

interview data support this: the majority of the EG members indicated their reliance on the assistance afforded by the CBK when trying to decipher M2, M3, M6, M7, M9, and M10. Moreover, according to the assessors, they performed better on these six expressions, with more instances of successful translation and fewer major errors.

The minor errors were recorded and counted according to their respective type (there might be more than one minor error found in each ME translation). After a closer examination of the subjects' STR transcripts and their interview data, we discovered that the distribution of minor errors suggested some interesting implications. For example, the differences between the EG and CG in total minor error count were slight, with the EG (204 in total) actually producing around 5% more errors than the CG (195 in total).

Table 4. Number and percentage of minor errors in STR of MEs (the top 5 minor errors are shown in bold)

Type of error	EG (%)	CG (%)
1.errors of translation	16 (7.84)	7 (3.59)
2.omissions	5 (2.45)	1 (0.51)
3.imperfections	15 (7.35)	17 (8.72)
4.calques	8 (3.92)	21 (10.77)
5.additions	1 (0.49)	11 (5.64)
6.repetitions	62 (30.39)	56 (28.72)
7.morphosyntactic mistakes	3 (1.47)	8 (4.10)
8.slips of the tongue	3 (1.47)	7 (3.59)
9.false starts	21 (10.29)	31 (15.9)
10.long hesitations	36 (17.65)	19 (9.74)
11.wrong corrections	2 (0.98)	1 (0.51)
12.correct corrections	32 (15.69)	16 (8.21)

Some similarities and differences are found in Table 4 concerning the distribution of minor errors between the EG and the CG. Using the top five minor errors as examples, the most frequent errors committed by the EG are: 6.repetitions; 10.long hesitations; 12.correct corrections; 9.false starts; and 1.errors of translation. Those by the CG are: 6.repetitions; 9.false starts; 4.calques; 10.long hesitations; and 3.imperfections. There is some overlap (though with slight divergences in the proportions), namely in repetitions, false starts, and long hesitations, all of which are categorized as added mistakes and can be identified as symptomatic of disfluency in the flow of the TT. Hence, these three added mistakes may be a clear reflection of the extra cognitive load added by the MEs; by repeating words and adding

filled and unfilled pauses, the subjects were probably trying to gain more time for their mental processing of the MEs.

12. correct corrections are more frequently made by the EG, while 4. calques more frequently occur with the CG. Correct corrections could mirror what McDonald and Carpenter (1981, 236-237) called the last two passes of STR: “verbal translating and error recovery.” The subjects delivered the translation, detected a discrepancy, returned to the troublesome phrase, searched for the error, and came up with a new translation. Based on the guided interview data, we can conclude that many EG subjects made correct corrections only when they detected a discrepancy between the CBK and their initial translation. Calques are assumed to be more common in STR than in other branches of interpreting, since sight translators are constantly distracted by the continuous presence of the source text. Both the EG and the CG were exposed to this risk, but as indicated above, the provision of CBK could help accomplish a meaning-driven understanding so that the EG subjects were more likely to de-verbalize the derived message in a flexible way.

We conclude that for subjects with equal translation ability, the provision of CBK brought about a tangible difference in their STR performance. With particular focus on the translation of MEs, EG subjects, being supported by CBK, produced a higher percentage of successful translations and a lower percentage of failed translations than CG subjects. Furthermore, the different distribution of minor errors, to some extent, demonstrates the positive function of CBK in sight translating MEs.

4.3 Translation strategies

Dobrzyńska suggests that a translator can choose among three possibilities in adopting a metaphor in a new context:

he or she can use an exact equivalent of the original metaphor (M→M procedure); he or she can seek another metaphorical phrase which would express a similar sense (M1→M2 procedure); finally, he or she can replace an untranslatable metaphor of the original with its approximate literal paraphrase (the M→P procedure). (Dobrzyńska 1995, 595)

According to Dobrzyńska (1995, 599), “the choice of translational tactics should depend on the type of text translated and the function it is supposed to fulfill for its new audience in its new communicative

context.” Jensen’s (2005) classification of possible solutions for translating metaphors includes the above three strategies and a complementary one: the total omission of the metaphorical expression. We adopted Jensen’s classifications in the present study, and for greater clarity renamed them direct transfer ($M \rightarrow M$), substitution ($M1 \rightarrow M2$), paraphrase ($M \rightarrow P$), and omission ($M \rightarrow \emptyset$). All 600 translations of MEs were classified according to the four categories. The results are given in Table 5.

Table 5. Number and percentage of four translation strategies in STR of MEs (300 MEs in total for each group)

	M→M (%)	M1→M2 (%)	M→P (%)	M→∅ (%)
EG (EG1-EG30)	118 (39.33)	36 (12)	136 (45.33)	10 (3.33)
CG (CG1-CG30)	109 (36.33)	26 (8.67)	139 (46.33)	26 (8.67)
two-tailed t-test*	$p=0.57$	/	$p=0.84$	/
Mann-Whitney test **	/	$p=0.23$	/	$p=0.01$

*The null hypothesis for the two-tailed t-test is that the mean difference between each group is zero.

**The null hypothesis for the nonparametric Mann-Whitney test is that the population of the two groups is the same.

From Table 5, we see that the most favored solution by both groups was paraphrase ($M \rightarrow P$). The popularity of paraphrase in STR is determined by the particular features of interpreting (STR included). It seems to be the case that translators tend to search tirelessly for “the right word” (Schäffner 2004b, 7) to a much higher degree than interpreters, who, due to time constraints, often resort to a “meaning-based interpreting approach”, instead of a “form-based approach” (Pöchhacker 2004, 135). The translations of MEs in this study were no exception. The subjects did go for metaphor-to-metaphor solutions, but in nearly half of the cases they ultimately produced more generalized literal paraphrases instead.

Jakobsen *et al.* also report that among the idiom-to-idiom solutions, “interpreters preferred a variant of the TL idiom that could be constructed entirely by means of direct transfer rather than selecting a semi-cognate variant form of the TL idiom that was less directly parallel though possibly more acceptable by TL standard” (2007, 241). Again, our study lends support to this finding: $M \rightarrow M$ and $M1 \rightarrow M2$ ranked as the second and third most frequent strategies for both groups, but with a certain difference in frequency: 39.33% and 12%, respectively, for the EG and 36.33% and 8.67%, respectively, for the CG. This result might be attributable to the time constraints of STR. In on-the-spot communication scenarios, it is definitely faster and more efficient to seek a direct match than to trigger a different metaphoric image in the target culture.

The data in Table 5 reveal a similar pattern in the groups’ choice of ME translation strategies in this

experiment. All the subjects used primarily $M \rightarrow P$, and then $M \rightarrow M$, $M1 \rightarrow M2$, $M \rightarrow \emptyset$, however, the CG omitted the metaphor more frequently than the EG did. We applied both t-tests (for normally distributed data in $M \rightarrow M$ and $M \rightarrow P$ strategies) and Mann-Whitney tests (for data in $M1 \rightarrow M2$ and $M \rightarrow \emptyset$ strategies which cannot be assumed to be normally distributed) for significance testing, and the results show that a statistically significant difference only exists in the case of the $M \rightarrow \emptyset$ strategy ($p=0.01$). A further examination of the retrospective reports reveals that omission was not the subjects' strategic choice, but a last resort when they 'absolutely had no clue what the text was about' or 'felt helpless and choiceless'. The CG went for the omission solution for the first eight MEs, which could be interpreted as them processing the MEs at a surface level. M9 and M10 were exceptions, but mainly because the subjects felt compelled to say something since M9 and M10 were lengthy in the SL. By contrast, the EG members rarely resorted to $M \rightarrow \emptyset$ strategy, but attempted to process the MEs in most cases.

Overall, CBK does not seem to play a significant role in the subjects' choice of translation strategy, but it does markedly reduce the use of omission as a solution of last resort. If we view the comprehension of MEs as a continuum with 'total lack of understanding' at one extreme, 'full and thorough understanding' at the other, and 'half understanding' or 'apparent understanding' in the middle, the data given in this section support the proposition that CBK is able to reduce greatly the 'total lack of understanding' proportion.

5. Conclusion

The study combines both quantitative and qualitative analyses, on the basis of which the questions posed at the beginning of the paper are addressed.

1. For subjects with comparable language proficiency and translation ability, the acquisition of CBK prior to STR tasks can effectively help reduce the cultural difference-based cognitive load imposed by metaphors and can assist in deducing the meaning of metaphorical expressions more accurately and speed up target language production. On average, the EG spent significantly less time processing metaphors than the CG did. Considering that the only variable differing between the two groups was the CBK material, we conclude that the key factor in determining the processing time of metaphors in the STR was the extent to which the subjects were exposed to the underlying cultural knowledge.

2. The reduction in metaphor processing time for the EG did not come at the expense of translation quality. By comparing the numbers of failed translations, faulty translations, and successful translations between the two groups, it was evident that the quality of the EG's translations, although not good in absolute terms, was considerably better than that of CG's translations. The comparison of high-frequency minor errors was equally revealing: while the common minor errors that both groups made could be attributable to the cognitive effort required in sight translating metaphors, the differences in the types of minor errors between the two groups demonstrated the positive impact of CBK in the processing of MEs.

3. The acquisition of CBK did not significantly impact the subjects' choice of translation strategy for MEs, since both groups converged in their choices and used $M \rightarrow P$, $M \rightarrow M$, $M1 \rightarrow M2$, and then $M \rightarrow \emptyset$ in descending order of frequency. A comparison of the first three strategies between the two groups did not yield statistically significant differences. We contend that this result has its cause in the stringent time constraints placed on STR. On the other hand, the CG chose $M \rightarrow \emptyset$ more frequently than the EG, indicating that the acquisition of CBK helped the EG subjects understand the source text better and therefore reduced the need to adopt the $M \rightarrow \emptyset$ strategy.

Investigating the dynamic relationship between metaphor and cultural factors in STR, the present empirical study has provided new insights into the cross-lingual and cross-cultural study of metaphor. However, there are a few caveats that we feel obliged to make. First and foremost, we share the same opinion as Jakobsen *et al.* (2007) that eye movement data collected by eye-trackers would be helpful in accurately measuring the processing time for MEs. Secondly, the quality assessment cannot be absolutely objective and nor can the categorization of translation strategies and errors. Finally, this empirical study is relatively limited in scope, only considering ten metaphors in a short passage. Hence, the next stage in our research will be to carry out a larger study supported by eye-tracking data.

Notes:

1. The Test for English Majors Band 4 (TEM-4) is mandatory for all Chinese college students majoring in English. For these students, passing the TEM-4 is a graduation requirement and it should be taken by the end of the sophomore year. The test requires a candidate to master 8,000 words, and it includes four testing components: listening, reading, writing, and translation.
2. There were five sections in the reading material, which can be summarized as “Alliances with Europe and Asia”, “Relations with former adversaries”, “Local conflicts, global consequences”, “Old threats, new dangers”, “Economic integration, economic disparity.” <http://clinton5.nara.gov/WH/Accomplishments/eightyears-10.html> accessed on 27 October 2013.
3. The questionnaire is composed of one closed-ended and two open-ended questions: 1. Have you ever heard about this speech? 2. Please make a list of whatever you know about Bill Clinton? 3. How much do you know about Clinton’s achievements in his presidency?
4. The subjects answered the questions asked by the experimenter immediately after the STR task in order to facilitate recall of how they had processed the MEs. There was little audio interference with each other, as they listened and talked through headsets and microphones in their respective cubicles.
5. *Audacity 2.0.3* is a free sound editor and recording software which can be downloaded from <http://audacity.sourceforge.net/download/>.
6. The formula used was:
Average MPT per TT character (EG) = (EG1MPT/EG1TNC+EG2MPT/EG2TNC+...+EG30MPT/EG30TNC)/30,
Average MPT per TT character (CG) = (CG1MPT/CG1TNC+CG2MPT/CG2TNC+...+CG30MPT/CG30TNC)/30, with
MPT standing for the metaphor processing time, and TNC for the total number of characters in the transcription of oral product.
7. For example, M2.*The cutting edge* was translated as ‘非常富有’ (very rich) by EG12, and M3.*The knife’s edge* was translated as ‘生活在水深火热之中’ (live in deep water and scorching fire) by EG2, and EG13.
8. We referred to Lambert *et al.* (1995) classifying minor errors into two categories: ‘missing information’ (items which were not reproduced in TL) and ‘added mistakes’ (errors which added some irregularities to the message in the TL). Missing information includes 1.errors of translation, 2.omissions, 3.imperfections (i.e., imprecise and/or inaccurate translation), and 4.calques. Added mistakes include 5.additions, 6.repetitions, 7.morphosyntactic mistakes, 8.slips of the tongue, 9.false starts, 10.long hesitations (only pauses lasting more than 5 seconds were counted), 11.wrong corrections, and 12.correct corrections (Correct corrections are marked as minor errors because they break the continuity of oral expression, thus violating the fluency criterion required of STR).

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Appendix I. Source texts: excerpt from Clinton's Farewell Speech (2001)

Slide 1

- The expansion of trade hasn't fully closed the gap between those of us who live on the cutting edge of the global economy and the billions around the world who live on the knife's edge of survival. This global gap requires more than compassion. It requires action. Global poverty is a powder keg that could be ignited by our indifference.

Slide 2

- In his first inaugural address, Thomas Jefferson warned of entangling alliances. But in our times, America cannot and must not disentangle itself from the world. If we want the world to embody our shared values, then we must assume a shared responsibility.

Slide 3

- If the wars of the 20th century, especially the recent ones in Kosovo and Bosnia, have taught us anything, it is that we achieve our aims by defending our values and leading the forces of freedom and peace. We must embrace boldly and resolutely that duty to lead, to stand with our allies in word and deed, and to put a human face on the global economy so that expanded trade benefits all people in all nations, lifting lives and hopes all across the world.

Slide 4

- Third, we must remember that America cannot lead in the world unless here at home we weave the threads of our coat of many colors into the fabric of one America. As we become ever more diverse, we must work harder to unite around our common values and our common humanity.

Appendix II. The identification of linguistic metaphors in the source text

Linguistic metaphors	Source semantic domain	Target semantic domain	Identification indicator
M1. close the gap /global gap	cover the opening or break in something or between two things	bridge the separation between two parts	OALD (E-C) [*]
M2. the cutting edge	the cutting surface of a blade	the most modern and advanced point in the development of something	MED ^{**}
M3. the knife's edge	cutting edge of the blade of a knife	at a critical point	OALD (E-C)
M4. a powder keg	a small barrel for holding gunpowder	potentially dangerous or explosive situation	OALD (E-C)
M5. be ignited by our indifference	a powder keg be ignited by fuse	global poverty be triggered by indifference	Linguistic context
M6. entangling alliances	becoming twisted, tangled, or caught (in something)	involving somebody/oneself (in difficult or complicated circumstances)	OALD (E-C)
M7. disentangle itself from the world	free something/somebody from something that impedes it/him	free something/somebody from a relationship with something/somebody	OALD (E-C)
M8. put a human face on the global economy	connect things to an actual person.	make something seem more real and easier to understand	MED
M9. weave the threads ...into the fabric of one America	weave threads into a fabric	make America into a melting pot with many nationalities and diversified cultures	Linguistic context
M10. coat of many colors	the name for the multicolored garment that Joseph owned (in the Bible)	people of all ethnic groups	Linguistic context

^{*}OALD (E-C) = *Oxford Advanced Learner's English-Chinese Dictionary* (Hornby 1997)

^{**} MED = *Macmillan Dictionary for Advanced Learners* (Rundell 2007)