

Mental Simulation and Translation An Analysis of the Cognitive Motivations in the English Translations of 天淨沙·秋思

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Abstract: This research features the argument that the essence of translation is embodied simulation, which is powered by mirror neurons in the human brain. Through a renewed and detailed analysis of the two contrastive English translations of a well-known Chinese poem 天淨沙·秋思, it is argued that the embodied simulation principles can persuasively govern the mental operations in translation. On the one hand, a translator derives the mental simulation from the source language and culture, and such simulation is conditioned by numerous influencing factors, such as his linguistic competence in the source language and his overall knowledge of the source culture, both of which are individualized by one's life experiences. On the other hand, the translator represents or restores the simulations he has constructed from the source language in the target language and culture. The representation process and the final products, in turn, are constrained by the translator's conditions. Since translators' background conditions differ, the simulation that each of them makes then varies accordingly, resulting in diverse renditions of the same source language text.

Keywords: Cognition, embodiment, embodied simulation, mirror neurons, metaphor, metonymy, priming, affordance, Chinese/English translation

1. Introduction

In the last forty years, cognitive linguistics has grown from its daring nascence to a sophisticated enterprise marked by, to list just a very incomplete number of monumental works: Lakoff and Johnson's *Metaphors We Live By* (1980), Langacker's *Foundation of Cognitive Grammar* (1987), Talmy's *Toward a Cognitive Semantics* (2000), the discovery of mirror neurons at the University of Parma (Iacoboni, 2009), Pinker's language as a window into human thought (2007), Bergen's embodied simulation hypothesis (2012), the study of abstract concepts by Wilson-Mendenhall, Simmons, Martin and Barsalou (2013), and the researches on metonymy by Denroche (2016) and Littlemore (2017).

All these pioneering and important explorations have opened up the systematic and insightful theoretical perspectives that not only have transformed our understanding of the relationship between language and thought, but also have handed us the torch of enlightening light that can guide our ways to re-examine issues in Chinese/English translation. This research is an effort in this direction.

2. The Theoretical Background

Since the central theme of in our discussion is about the cognitive motivations in Chinese-English translation where simulation plays a decisive role, it is therefore essential that some basic concepts related to cognition and simulation are clearly described at the onset.

First, what is cognition? According to the online edition of *Oxford Dictionaries*, cognition refers to “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses”¹.

Evans (2007, p. 17) further explains that “cognition relates to all aspects of conscious and unconscious mental functions, including the mental events and knowledge involved in a whole host of tasks ranging from ‘low-level’ object perception to ‘high-level’ decision-making tasks.” In other words, cognition is a process that allows a human to sense his environment, retrieve raw data from it, synthesize these data into knowledge and thought, and then adapt better to the external world. In this cyclic process, the cognitive activities can be conscious or unconscious, concrete or abstract, perceptive or calculated. As Lakoff and Johnson (1999, p. 7) point out, the notion that can be addressed as cognitive would cover various types of “mental operations and structures that are involved in language, meaning, perception, conceptual systems, and reason.”

In cognitive linguistics, simulation refers to the mental construction of perception and action without actually seeing or acting (Bergen, 2012). In terms of language comprehension, this means that we are able to create in our mind the movie-like scenes based on what is described by language. Moreover, when we read or listen to sentences, we can in our mind’s eye see the scenes and imagine the actions described (cf. Iacobini, 2009; Colman, 2009).

Simulation in cognitive linguistics and cognitive science is now often discussed together with the concept of embodiment, which refers to how our minds are affected and shaped by our bodies. As Lakoff points out, our bodies, their faculties to feel and interact with the world, play a determining role in our language understanding, thought formation, conceptual organization, and intelligence development (cf. Lakoff & Johnson, 1999, p. 19; Shapiro 2011, p. 52). The acquisition of knowledge or thought organization from the functions of the bodily apparatuses is known as embodiment. A well known example of embodiment is the metaphor AFFECTION IS WARMTH, where the embodiment part is the warmth that a baby can feel from a mother’s bosom. After the repeated experiences of feeling the mother’s corporal temperature, this physical measurement is then conceptualized as an abstract notion of affection. Thus a neural bridge is built connecting the cerebral parts in charge of physical feelings and abstract thinking. Therefore, metaphors are physical. Likewise, when a baby is put at a distance from the mother, he will not be able to feel so much warmth from the latter. Metaphorically, coldness can be used to describe a distant interpersonal relationship. In a word, our mind and conceptual organization are dependent on how we interact with our environment through our bodies.

The mechanism that makes mental simulation possible is the mirror neurons in our brains, which were first discovered at the University of Parma, Italy in the 1980s and 1990s. Mirror

¹ (Cognition (n.d.). In *Oxford Dictionaries*. Retrieved from <http://oxforddictionaries.com/definition/english/cognition>).

neurons were recorded for the first time in Area F5 of the monkey brain, which corresponds anatomically to an area of the human brain called Broca's area. Mirror neurons are motor neurons. They are activated when a human being is executing and observing an action, hearing the sound related to the action, hearing, or reading the language describing the action (Iacoboni, 2009). An interesting example is peanuts cracking. The same mirror neurons will fire, although at different degrees, when a person is cracking the peanuts, or watching someone doing it, or hearing the sound, which can even be the audio recording, of peanuts being cracked, or reading the language that describes peanuts cracking. These characteristics of mirror neurons provide the physiological foundation for human empathy, sympathy, language understanding, and simulation.

Thanks to mirror neurons, we do not have to be 5,000 years old in order to understand the grandeur and magnificence of the Chinese history and literature. We can simulate in our mind's eye what happened in the glorious and sometimes misfortunate past of China. We laugh with our historical heroes. We cry for their tragic losses. We are able to appreciate the beauty in the poems of the Tang and Song Dynasties, which are often lauded for their picturesque effects. When we say that a particular poem is like a picture, we have put in a good deal of mental simulation into its reading and comprehension. For this reason, in Chinese we have such phrases as "like a poem and like a picture" (如詩如畫), where the relationship between the two is established by mental simulation through mirror neurons.

Therefore, meaning goes way beyond abstract mental symbols. It is a creative embodied simulation process in which we construct virtual experiences that can be perceived and felt in our mind. Moreover, simulation may vary from individual to individual and from culture to culture. In this dynamic process, the mental experiences thus re-created can result in, for instance, different interpretations or depictions of the same recorded historical events, as well as various criticisms of the same piece of literature.

Two mental operations related to simulation are worth mentioning here. They are priming and affordance. Prime, according to Colman (2008) refers to a given cue that facilitates a particular response, as in *bread* priming *butter*. This is also known as semantic priming. Affordance refers to a hint whereby an action (typically expressed in language by a verb) can be suggested by a particular object (typically expressed as a noun), such as a cup of water, which in many cases suggests the action of drinking.

Now, what do we simulate when we are reading language input? Our simulations may include, but are not limited to the following:

- Images, physical properties, and number of the entities indicated by the words in the context.
- The relative geographic locations of the images in a context (Liu & Bergen, under review).
- Expectancies for verbs afforded by nouns (McRae et al, 2005).
- Aspect/tense of the event, e.g., progressive vs. perfect (Bergen, 2012).
- Perspectives to the event, which can be expressed by grammatical persons.

As a brief illustration and experiment, let us read the following phrases and simulate the

physical shapes of the bird:

(1) A bird in the sky.

(2) A bird in the nest.

Most likely, (1) would induce a simulation in Figure 1:



Figure 1. A Bird in the Sky.

And (2) may lead to a simulation in Figure 2:



Figure 2. A Bird in the Nest.

The difference between the physical shapes of the birds in Figure 1 and Figure 2, which is not given linguistically, is a result of the different simulations we may have, based on our experiences and knowledge about birds in the world. We know that due to the earth's gravity,

the bird in (1) has to extend its wings in order to stay in the sky while the bird in (2) would most likely have its wings folded in order to sit in the nest.

Simulation is often used in creative writing, as in a poem by Shao Yong of the Song Dynasty, where the author uses the cardinal number 1,2,3,4,5,6,7,8,9,10 as the foundation to create a simulated poetic environment in which these numbers are sensibly accommodated, as in (3), with the Chinese original, *pinyin*, and glossary given:

- (3) yí qù èr sān lǐ
 一 去 二 三 里
 A Leisure Walk
 邵雍 (北宋)
 Shao Yong (The Northern Song Dynasty: 960-1127)
- | | |
|----------------------------------|--|
| yí qù èr sān lǐ
一 去 二 三 里 | one go two three li (classifier, measure word) |
| yān cūn sì wǔ jiā
烟 村 四 五 家 | smoke village four five home (classifier) |
| tíng tái liù qī zuò
亭 台 六 七 座 | pavilion six seven seat (classifier) |
| bā jiǔ shí zhī huā
八 九 十 枝 花 | eight nine ten twig (classifier) flower |

The English translation of (3) is given in (4):

- (4) A Leisure Walk
- Once upon a time, we walk leisurely for two or three miles
 On the way, we see four or five villages
 Six or seven temples and
 Eight , nine or ten branches of flowers*
 (cf. <http://raychinese-ray.blogspot.com/2009/02/interesting-poem-with-numbers.html>)

In sum, we have described several concepts essential for the analysis of the cognitive motivations of the translations of 天淨沙・秋思. We have covered cognition, simulation, embodiment, mirror neurons, priming, and affordance. Embodied simulation is the most important hypothesis here, which is powered by mirror neurons in our brains. Under the umbrella notion of embodied simulation, translation operations are considered as creative processes whereby virtual experiences are understood and presented.

3. A Simulation Analysis of the Chinese Poem 天淨沙・秋思 and Its English Translations

The Chinese original of 天淨沙・秋思, *pinyin*, glossary, and two of its English translations are given in (5), (6), (7):

- (5) tiān jìng shā • qiū sī
天 淨 沙 • 秋 思
mǎ zhì yuǎn
馬 志 遠

kū téng lǎo shù hūn yā 枯 藤 老 樹 昏 鴉	1)	dry vine old tree dusk crow
xiǎo qiáo liú shuǐ rén jiā 小 橋 流 水 人 家	2)	low bridge flow water people home
gǔ dào xī fēng shòu mǎ 古 道 西 風 瘦 馬	3)	ancient road west wind thin horse
xī yáng xī xià 夕 陽 西 下	4)	evening sun west descend
duàn cháng rén zài tiān yá 斷 腸 人 在 天 涯	5)	broken intestine person at world end

- (6) Tune to “Sand and Sky”
— Autumn Thoughts
by Ma Zhiyuan

Dry vine, old tree, crows at dusk
Low bridge, stream running, cottage.
Ancient road, west wind, lean nag,
The sun westering
And one with breaking heart at the sky's edge.
(Trans. Cyril Birch)

- (7) Tune: Tian Jin Sha
by Ma Zhiyuan

Withered vines hanging on the old branches,
Returning crows croaking at dusk.
A few houses hidden past a narrow bridge,
And below the bridge a quiet creek running
Down a worn path, in the west wind,
A lean horse comes plodding.
The sun dips down in the west,
And the lovesick traveler is still at the end of the world .
(Trans. Ding Zuxin & Burton Raffel)

Apparently, the Chinese original in (5) is teeming with nouns, with little predicated to specify many details, for example, the relationships between the entities represented by the

nouns. In comparison, (6) appears to be closer to (5) than (7). If we examine (6) and (7) in the light of the embodied simulation theory, I would argue that (7) is rendered with a good deal of the translators' simulation built in, while (6) shows a conspicuous lack of such mental simulation, which makes it more similar to the Chinese original in (5).

Let us take a closer look to see if the language data in (5), (6) and (7) support this claim. In line 2) of (5), which is 小橋流水人家 [xiǎo qiáo liú shuǐ rén jiā] in Chinese, the text does not tell us what the relative physical locations are of 小橋 [xiǎo qiáo] "low bridge", 流水 [liú shuǐ] "stream running", and 人家 [rén jiā] "cottage". Is the bridge over the stream, or under it? Our life experience and knowledge tell us that the bridge should be over the stream, not the stream over the bridge. Unless the bridge in question is a raised irrigation canal, then the water can run above it, which, obviously, cannot be the case described in the poem. Furthermore, with respect to the stream, a more logical simulation of the location of the cottage would be that it is on one or both of the banks, not in the stream or on the stream. Similarly, when it comes to the relative locations of 枯藤 [kū téng] "dry vine" and 老樹 [lǎo shù] "old tree", the question is whether a). The dry vine intertwines the old tree or b). The old tree intertwines the dry vines, or c). The two are separate. Again, our knowledge about plants would exclude the possibility of b) in most cases, and the likelihood of c) is low because if the vine creeps along the ground, it will not be as vertically visible, and that scenario would fail to match the image of 昏鴉 [hūn yā] "crows at dusk", which are more likely to be either flying in the sky or perching high on the old tree. In short, all these relative physical locations have to be simulated, which is exactly what we find in (7), where prepositions like "on", "past", "below" are used to identify the layout of these entities. The use of these prepositions is a strong testimony that the simulations of the physical locations do exist. For this reason, we claim that (7) is rich with added simulation while (6) is without.

More embodied simulation is testified by the uses of verbs in (7). The Chinese original in (5) has no verbs for the dry vine, crows at dusk, cottage (or house), and horse. However, from (7), we find the following pairing verbs (in italics), as in (8):

- (8) vines *hanging*
 crows *croaking*
 houses *hidden*
 horse *comes plodding*

Why is it possible that the translators of (7) can pair different nouns with appropriate verbs? In this juncture, priming and affordance are at work. As Iacoboni (2009, p. 9) reports, the same mirror neurons are activated during grasping behavior (indicated by a verb) and also at the very sight of graspable objects (indicated by nouns). This is the neurological basis for nouns to afford verbs. As a result, expectancies for verbs can be generated by nouns. Moreover, the priming operation allows us to choose the most appropriate verb for a noun according to the context (cf. McRae et al., 2005).

Returning to (8), we can see that several verbs can be chosen for the vines, such as "creep", "grow", "intertwine", and "hang", depending on how the scenes regarding the old tree and

dry vines are simulated. Since “dry vine” suggests that the vine is quite lifeless, then the verbs “creep” and “grow” can be excluded, because they carry too much vitality. Left behind are “intertwine”, and “hang”, and the latter “hang” is actually used. This is because it can add more to the descriptive nuance of lifeless vines drooping down, a state more desirable for the desolated atmosphere the whole poem is trying to convey. The simulations with depressive audio and visual effects can also be found in the use of verbs “croak” (i.e., making a rough low sound) for the crows, “plod” (i.e., walking slowly with heavy steps, especially because of exhaustion) for the horse, and “hidden” (i.e., the disapproving covertness of things) for the houses, all consistent with the melancholy descending on the readers from the poem.

Therefore, in human cognition, a particular noun can often prime a verb that typically associates with it in the context. This kind of pairing is largely activated cognitively by a person’s world knowledge and life experience about the event where the noun occurs.

The use of verbs in mental simulation in (7) compels the translator to consider tense, aspect, person, and number for the verbs, because these are grammatical categories in English. As in (8), present tense and progressive aspect are used in the translation. One of the features the present tense and progressive aspect share is that both can describe an event that is unbound on both ends. In the cognitive test, the progressive is helpful for the description of protagonist’s mental state (Sato, Sakai, Wu, & Bergen, 2012). By the same token, so should be the present tense. Metaphorically, BOUNDEDNESS IS TEMPORAL DELIMITATION; UNBOUNDEDNESS IS TEMPORAL LIMITLESSNESS (Pecher & Zwaan, 2005, p. 271). Therefore, the progressive aspect, which is unbound and temporally limitless, makes the poetic and mental picture presented in the poem more stable and lasting.

Grammatical persons provide perspectives from which the events described by verbs are viewed. Note that the 3rd person is chosen in (8) with the verbs, as in the form of “horse *comes* plodding”, “the (setting) sun *dips*”, and “the lovesick traveler *is* still at the end of the world”. Using the grammatical third person for the actions or states, the translators here adopt an observer’s role in looking at the event described in the poem, which may make it easier for the reader, who is also an observer, to perceive the empathetic projection of the “lovesick traveler”.

Number in Chinese is not a grammatical category. As a result, the singular or plural grammatical number of the nouns in Chinese have to be simulated in the English translation, which again depends on how the translator would prefer to build the number into the scenes he constructs, based on his reading of the Chinese original, as well as his reasonable deduction from the context. Because the sun is unique, its singularity is unquestionable. As to the horse and traveler, singularity is more appropriate in depicting the loneliness that the poem attempts to present. The number of the bridge and that of the stream (or creek) should match each other so as to allow the physical feasibility for the lonely traveler to move around on the horse back. Therefore, the singular form is used for these two nouns in (7). The plurality of the trees, vines, and crows in the mental simulation is once again based on the translators’ life experiences and reasonable reckoning. It will be less probable if only one of these plants or birds is found in a natural environment.

Semantically, all these grammatical vehicles present schematic and abstract meanings (Dancygier & Sweetser, 2014) and play the role of fine tuning the mental simulation, which not only makes the English translation grammatical but also lets the English readers “see”,

with less effort, the scenes the author of the Chinese original may have wanted to paint. Indeed, paintings based on (5) do exist. Figure 3 is a typical one of them:



Figure 3. 天淨沙·秋思
(cf. can.elt.nhcue.edu.tw: 詩詞圖像語意 網絡研究報告)

Figure 3 can be regarded as the mental simulation materialized on paper. Comparing Figure 3 with (7), it is interesting to notice in (7) that the simulation created with the English language is not exhaustive. For example, the colors of the attire, the animals, the plants, the stream, the bridge, the mountains, the houses, the setting sun, etc., are not specified, probably because this physical property is built in lexically in both Chinese and English. In this sense, language is more often than not only metonymic (Denroche, 2016), where part is frequently used to represent the whole, with some default values unexpressed.

On the whole, therefore, the differences between (6) and (7) are largely a matter of simulation. In (7), the relative physical locations, as well the verbs primed and afforded by the nouns in the poems, together with the relevant information on tense, aspect, person, and number are all simulated and linguistically presented. In comparison, (6), which is a close syntactic duplicate of the Chinese original in (5), lacks such simulation, leaving the burden of the possible simulation tasks to the readers, as the Chinese original does. Hence, in translation between Chinese and English, as exemplified by (5), (6), and (7), although the linguistic and cultural differences between the two languages can motivate some simulation to fill in the gaps in grammaticality and effective communication, whether to simulate or how much to simulate can be a matter of choice by the translator. That explains why (6) is without much linguistically simulation expresses, but (7) features language that carries a good deal of simulation.

4. Conclusion

As can be seen from the previous discussion, many motivational issues in C /E translation can be re-examined by the emerging theories in cognitive linguistics and cognitive sciences, one of which is the powerful embodied simulation hypothesis. The main argument of it is that language comprehension is virtually based on the mental simulation of the experience described by the language. On the other hand, language generation calls for the adequate provision of linguistic data that can warrant a satisfactory restoration of the intended meaning through simulation by the reader or listener, which is implied by Grice's cooperative maxims (Grice, 1975).

So, what is the paradigm shift of translation theories as examined in the light of the mental simulation hypothesis? The new paradigm can be stated as follows: on the one hand, a translator derives mental simulation from the source language and culture, and such simulation is conditioned by numerous influencing factors that put constraints on the translator. The influencing constraining factors include life experience, education, ideology, linguistic competence, cultural knowledge, social and economic status, and many more. On the other hand, the translator represents or restores the simulations in the target language and culture, which, in turn, is also conditioned by those constraining factors. Because simulations based on the source language input and those presented in the target language output are highly individualized (cf. Schnelle, 2010, pp. 25-26), we seldom find completely identical translations of the same source language text.

Nevertheless, it is worth noticing that many such simulations are close, turning the overlapping parts into the core of typicality of the acceptable versions of translation. Following this reasoning, variations in simulation are a function of the translators' backgrounds. With regard to machine translation practices nowadays where the statistical approach has demonstrated many advantages, the programming algorithm then should be designed and implemented in such a way that the artificial intelligence can be based on the most frequently seen simulations drawn from the parallel corpora, so that the translation generated by the machine could gain the widest readers' acceptance.

In short, like language understanding, translation is a complex human endeavor that cannot go far without embodied simulation. The observations gleaned from this research widen the emergent cognitive perspective in translation studies, which indeed can be continuously well-informed and solidly supported by progress in cognitive linguistics and neural sciences (cf. Feldman, 2008).

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